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FIRST OUTLINES

OF A

DICTIONARY OF SOLUBILITIES

OF

CHEMICAL SUBSTANCES.

BY FRANK H. STORER.

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PREFACE.

The utility of a complete dictionary of the solubilities of chemical substances, or in fact of any of the physical constants of chemistry, needs no explanation. In publishing, however, these *First Outlines* of the Dictionary of Solubilities, which some years ago I began to compile, I wish to state the circumstances which have occasioned this course, and to request that the purport and aim of the book may be kept constantly in view.

Some six years since, while attending lectures on applied science in Paris, I was first impressed with the great practical importance of a wider dissemination of our knowledge of the solubilities of salts, while at the same time I was convinced that Chemical Science itself might gain many advantages if all known facts respecting solubilities were gathered from the widely scattered original sources into one special comprehensive work, and thus presented in an easily accessible form. I at that time conceived the idea of collecting all the materials and embodying them in a dictionary, where each of the determinations already made might be within the reach of all persons interested, and which might, moreover, serve as a body of facts into which new and scattered observations should be incorporated, and from which erroneous statements, now current, could be eliminated, as they are from time to time disproved. The importance of such a work was the more clearly impressed upon me, since I had learned, by previous experience, how many difficulties and delays attend the correct determination of solubilities, and had observed how little attention is usually paid to the labors of earlier experimenters, either as regards avoiding or refuting their errors, or bearing witness to the accuracy of their results. Besides furnishing, as an aid to chemical research, either in the scientific or the practical laboratory, a catalogue of known (or supposed) facts, such a compilation might answer the further purpose of indicating to those willing to labor for the advancement of science the numerous gaps in our knowledge of the subject which remain to be filled up.

In proceeding to carry out this scheme, it was thought best to prepare, in the first place, a rough outline list of the names of substances, together with such general statements of their solubilities as are contained in standard systematic works on Chemistry, like Gmelin's Handbook, the treatises of Gerhardt, Dumas, etc. From these materials an alphabetical catalogue — the first of the kind, it is believed, ever attempted in our language — was framed, into which more detailed statements from original memoirs were to be inserted; the matter previously taken from text-books serving merely as a guide in collating materials drawn directly from first sources, and as a means of controlling the accuracy of the final abstracts. This part of the plan having been in a measure accomplished, it was my intention, before publishing the work, to pursue the method, just indicated, of compiling from original sources until the leading chemical publications of this century, at least, had all been carefully searched, and the collected items duly

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digested. But owing to the great bulk and rapidly increasing complexity of the manuscript, with its innumerable interpolations, the mere mechanical labor of comparing newly found data with the intricate notes already made soon became so great that the work could no longer be carried on except at a great disadvantage. It was therefore deemed advisable to print the matter already accumulated, in order to facilitate the completion of the projected work; it being also hoped and believed that these Outlines, even as they now stand, may be useful to others. The student, investigating in detail all that is known of the solubility of any one special substance, may no doubt sometimes find the account of it here given meagre and unsatisfactory. But he should remember that the work makes no pretension to be more than a general outline, each special feature of which must be filled up in detail before anything like a complete dictionary can be hoped for.

Of the statements not credited to any authority, and which have been condensed from text-books, as already mentioned, it should be remarked, that these are much less complete than I could wish, since they were not originally intended to be published as they now stand, but were to be superseded by fuller and more careful abstracts from the original memoirs.

Many practical men will be inclined to object to the manner in which all the statements found relating to any subject have been copied, without special indication that any attempt has been made to single out the more trustworthy among them. To this objection I reply by denying that the compiler has, as a general rule, any right to pass judgment upon experimental results with which he has no special familiarity. The correction of errors of experiment, excepting occasional instances of palpable inaccuracy, should be left to subsequent experimenters, i. e. to persons practically conversant with the subject; and the criticisms of such have been given already in most of the instances in which they have fallen under my notice.

When the writer of a memoir makes no mention of the labors of his predecessors, it is but fair to attribute this silence to ignorance of the earlier experiments, and, other things being equal, to hold each set of observations equally liable to error. To my mind, a recent date is of itself no indication whatsoever of the superior accuracy of any series of results. In cases of conflicting authority, the reader has but to refer to the original memoirs, and decide for himself. It is true that special prominence might justly be given to experiments made with unusual care and with superior facilities, as, for example, those recently published by Kremers, Gerlach, Schiff, and others; and that, on the other hand, suspicious matter, and that which has been actually disproved, should properly be printed in smaller type than the ordinary text, and I would gladly have had this done if a more mature condition of the work had warranted the expenditure of this kind of labor. I may here say, that any information which will contribute to the growth or accuracy of the work, or in any way add to its usefulness, will be most gratefully received.

The term "solubility" in the title of the present publication is to be taken in its most comprehensive sense. I have no intention, at this time, of attempting a strict definition of the word, or of discussing the forces upon which solution may depend. In the present state of science, the collection of experimental data, and the study and comparison of well-authenticated special observations, seem to be of far greater importance than the disputes of the earlier chemists whether the phenomena in question should be referred to the domain of chemical affinity, or be studied as a purely physical problem.*

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* "Dans les sciences naturelles, et surtout dans la chimie, les généralités doivent résulter de la connaissance minutieuse de chaque fait, et non la précéder." — Gay-Lussac, *Premier Mémoire sur la Dissolubilité des Sels dans l'Eau.*

It need only be remarked, that I am accustomed to class among phenomena of solubility all those reactions of liquids upon solids or gases, and those combinations of liquids with liquids, — excluding for the present molten metals and other substances in a state of igneous fusion, — in which the chemical force, as understood by Berzelius, for instance, is not the principal and as it were overwhelming force in action; we may have, perhaps, "solution" depending upon merely physical forces, like adhesion or cohesion, and also upon these forces plus a certain amount of chemical force. It can indeed hardly admit of a doubt that the chemical force is exerted in many cases of solution, while at the same time other forces unquestionably come into play; in which connection the old adage, that "like dissolves like," should be borne in mind. Hence, while the manifestations of chemical affinity proper, as evinced by the combination of bodies in simple and definite proportions, constitute the main subject of chemical text-books, many of the less clearly defined phenomena of chemical science may fairly come within the scope of a treatise on solubilities. Thus, though in the term "solubility of a substance," we ordinarily include only the comportment of the substance towards water, alcohol, wood-spirit, ether, oil of turpentine, benzin, and analogous hydrocarbons, and the other "neutral solvents," it is obviously sometimes proper to add observations on the action of acids and alkalies; for example, any account of the solubility of nitrate of baryta would be manifestly incomplete without a statement of the fact that this salt is taken up but sparingly by nitric acid. Again, in the solution of chloride of silver in ammonia-water, and that of various salts, as sulphate of lime, for example, in acids, there are probably at work other forces than the usual solvent power; but until the whole theory of solution is better understood, we must be content to treat of these allied phenomena under the same general head of "solubilities." Pains have also been taken to bring forward facts known respecting those cases in which two or more salts acting upon each other in presence of water, or the like, are, to a certain extent, mutually decomposed and dissolved, as in the familiar instance of nitrate of potash and chloride of sodium, which promote each other's solubility; or that of the reciprocal decomposition which ensues when sulphate of baryta is treated with a solution of an alkaline carbonate.

Any extended discussion of the methods ordinarily employed in determining solubilities, and the precautions necessary to insure accuracy, would perhaps hardly be in place in a mere compilation of results like the present work. Directions for making such experiments may be found in several chemical hand-books; — for example, in Fresenius's System of Instruction in Quantitative Chemical Analysis, or, better, in the original memoirs of those chemists who have occupied themselves with the experimental determination of solubilities, references to which may be found in the body of this work. It may, nevertheless, be well to remark here, that the text-books do not usually lay sufficient stress upon *the preparation of the solution* of the substance under examination; and yet this is the single fundamental point of a correct determination, the other steps of the process being altogether subsidiary, and in general easy of execution as well as comparatively free from sources of error. It is commonly stated that an exactly saturated solution of a salt may be prepared either by exposing a large excess of the salt to the action of the solvent during several hours at the desired temperature [*method by digestion*], or by heating a mixture of the salt and solvent until a strong solution has been obtained at a temperature higher than that at which the determination is to be made, and then cooling this solution to the desired degree, and maintaining it at this point for some time in contact with crystals of the salt, the whole being frequently agitated [*method of cooling*]. Now the latter method, though theoretically correct, is in practice peculiarly liable to error, and great care should consequently be exercised in employing it. It is no doubt true, that, as regards most substances, the saturated solutions prepared by either method would finally coincide in composition, provided the cooled solution be allowed to stand, under proper conditions, for a sufficient length of time. Yet it is often exceedingly difficult thus to obtain normally saturated solutions, even of our most common and easily crystallized salts, within the limits of time which can be conveniently allotted to a single experiment. This depends upon the tendency of the solutions of many, if not of most, substances to an indeterminate supersaturation when cooled from a higher to a lower temperature. This supersaturation is not always to be easily detected unless comparative solutions are prepared by the method of digestion, and the length of time required by any given solution to assume the normal condition is a point not readily ascertained. Gay-Lussac, in his classical memoir upon the solubility of salts in water,[*] enjoins the necessity of maintaining the final temperature constant during at least two hours.[†] His own experiments were made in the cellar of the Observatory at Paris, in which the thermometer varies but a fraction of a degree centigrade in the course of the year; they are unquestionably correct in themselves, and there can be little doubt that his statement regarding the preparation of normally saturated solutions by the method of cooling is true, not only for the limited number of salts upon which he operated, but in general for crystalline substances. Yet the rule seems hardly safe to be followed in all cases by experimenters less favorably circumstanced, and is obviously inapplicable to numerous uncrystallizable substances, or those liable to pass into an amorphous, gum-like condition, or to undergo other molecular changes. The difficulty of avoiding supersaturation is moreover illustrated by the experience of Legrand, who found that solutions might become supersaturated to a certain extent even while they were actually boiling.[‡] Indeed, it is my opinion, that, next to impurity of the material operated upon, by which many published determinations have unquestionably been vitiated, there is no source of error so grave, none which has so seldom been fully guarded against, or so often altogether overlooked, as this tendency to supersaturation.

On the other hand, in the preparation of solutions by the method of digestion, a difficulty is encountered in the tendency of many substances, like arsenious acid, for example, to dissolve with extreme slowness; this can, however, be overcome by the exercise of patience, and, in any event, admits of being detected and controlled. It would, therefore, appear that, where practicable, the method by digestion should generally be preferred, at least for temperatures low enough to insure the experiment against the influence of evaporation. The completion of the solution can then always be ascertained by determining from time to time the amount of substance dissolved; the operation being considered finished when the results of two of these tests accord with each other. As frequent agitation is indispensable, some process of stirring by machinery moved by clock-work, analogous to that described in Mohr's *Lehrbuch der pharmaceutischen Technik*, might probably here be used with advantage.[§] Kemp's regulator [||] for maintaining constant temperatures might also be found serviceable in some cases.

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[*] *Annales de Chimie et de Physique*, 1819, (2.) **11.** 298.

[†] "Dans chaque cas il faut maintenir constante la temperature finale pendant deux heures au moins, et remuer fréquemment la dissolution saline, pour être bien assuré de sa parfaite saturation."

[‡] "Il semble d'abord que pour avoir cette température, il n'y a qu'à observer celle à laquelle le sel *commence* à se déposer; mais on n'aurait ainsi rien de constant, il faut prendre celle qui a lieu *pendant* que le sel se dépose. En effet, j'ai remarqué que la dissolution pouvait se saturer malgré le mouvement d'ébullition, et atteindre une température de plus en plus élevée; mais aussitôt que le sel se dépose, le thermomètre redescend en un point où il se tient parfaitement fixe." — *Ann. Ch. et Phys.*, (2.) **59.** 428.

[§] Compare Berzelius, in his *Lehrbuch*, **3.** 82, *et seq.*

[||] *Liebig & Kopp's Jahresbericht*, **3.** 620; **10.** 612; **12.** 709; also *Journ. of the Franklin Instit.*, (3.) **25.** 319.

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It was my original intention to designate the method employed in determining each of the solubilities given, whenever this could be ascertained; but in the present stage of the work this idea cannot be conveniently carried out. It may be said, in this connection, that the commendable example of several recent investigators, who have carefully stated the details of the methods employed by them in obtaining saturated solutions, ought to be generally followed.

The alphabetical arrangement adopted I believe to be altogether the best for a work of this kind. Several slight departures from the purely alphabetical order were, however, deemed advisable. Thus, the names of acids are made to precede the names of their salts: — Sulphuric Acid, for example, standing immediately before Sulphate of Acediamin, the first in the list of Sulphates. In the arrangement of the names of the radicals constituting the compound ammonias, custom seems to have already determined a different arrangement, as in "Hydrate of MethylEthylAmylammonium,"* instead of Hydrate of AmylEthylMethylammonium, which a strictly alphabetical system would require.

Prefixes, as *bi*, *di*, etc., being mere appendages to the names of substances, have not been allowed to separate names which really belong together. Thus, *Bi*-Chromate of Potash will be found next to Chromate of Potash, and not among substances the names of which begin with B. In all cases these prefixes have been printed in italics, in order to indicate more clearly their extrinsic character.

Many synonymes have been unavoidably omitted; but as an aid to the identification of compounds, all established formulæ have been given. In choosing from the multiplicity of names which in many instances have been applied to a single substance, I have usually endeavored to select the one which would probably be most familiar to the general reader, without holding strictly to any particular system of nomenclature; and the same remark applies to the formulæ employed. In making this statement, I must, however, confess that I should have preferred a more uniform system. Had the excellent work of Weltzien on Organic Compounds † been published earlier, it is probable that many of the names therein suggested would have been incorporated into the present work; as it is, several praiseworthy innovations have been adopted from it, for which I would here express my acknowledgments.

In the matter of prefixes, the English custom has been followed of employing those of Latin origin, as *bi*, *ter*, *quadri*,‡ *quinqui*, &c., in case the acid or electro-negative ingredient of the compound is doubled, trebled, &c., and the abbreviated Greek numeral adverbs *di*, *tri*, *tetra*, *penta*, &c., when the basic or electro-positive constituent is multiplied; thus, *bi*-Chromate of Potash refers to the compound $KO + 2\,CrO_3$, and *ter*-Chloride of Antimony to the compound $Sb\,Cl_3$; while *di*- or *din*-Oxide of Mercury refers to the compound $Hg_2\,O$, and *tri*- or *tris*-Acetate of Lead to the compound $3\,Pb\,O + C_4\,H_3\,O_3$. In many of the names of organic compounds terminating in *yl*(*e*), *in*(*e*), and *id*(*e*), the final French *e* has been dropped, in accordance with the usage of several standard authors. A sufficient reason for this omission is found in our liability to confound such words as Camphene (of Berthelot), and Camphin (of Claus), if the latter be written with a final *e* and pronounced accordingly. Moreover, there can be no propriety in attaching to this last term, which, with Benzin, Ethyl, and many others, has been transferred to our language from the German, a letter not used in the original, and answering no purpose in our own tongue. If it be argued by some, that the ety-

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* In most of these exceptional instances the names of the radicals are in the order of the homologous series.

† *Systematische Zusammenstellung der organischen Verbindungen.* Von C. Weltzien. Braunschweig, 1860.

‡ Introduced by Wollaston.

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mology of our language demands that the final *e* should be likewise omitted from the names chloride, sulphide, nitride, etc.,[*] it may be replied, that the case is hardly parallel, for all these names have become thoroughly incorporated by common consent in the language of science, and cannot now well be changed; and, moreover, no confusion can arise in this case from retaining the *e*, whereas the terms designating the above-mentioned organic compounds are still unsettled, and have acquired no such circulation in general literature.

The Centigrade thermometric scale is employed throughout the work; but, for the convenience of those who use other thermometers, a comparative table of the different scales is given in the Appendix.

In stating the degree of solubility of substances, each of the several methods employed by chemists has been sometimes followed, no attempt having been made to reduce the various expressions of different authors to any uniform mode of statement. The following proportions may consequently be found convenient in making such reduction. When the expression "100 parts of water dissolve x parts of the substance" is used, x is a quantity determined in the following manner. If the weight of the saturated solution taken be called W, and the weight of substance found to be therein dissolved be w, then $(W-w)$ will equal the weight of the water; and $(W-w) : w = 100 : x$, or $x = \frac{100 \cdot w}{W-w}$. And if y represent the weight of water required to dissolve one part of the substance, then $x : 100 = 1 : y$, or $w : (W-w) = 1 : y$, or $y = \frac{(W-w)}{w}$. If the statement is one of percents, the relation is, of course, $W : w = 100 : n\%$.

In preparing any compilation, there must always be great difficulty in bringing the subject up to the date of publication, and this is especially true of a work like the present, which, as has been already explained, only presents the outlines of the subject. It is unnecessary to particularize the various delays which have tended to aggravate the difficulty in question to so great an extent, that the date of this Preface is some months later than the real date of the work.

I am not insensible to the fact that many errors and imperfections will be discovered in the following pages. In the words of Lempriere, "A Dictionary, the candid reader is well aware, cannot be made perfect all at once; it must still have its faults and omissions, however cautious and vigilant the author may have been, and in every page there may be found, in the opinion of some, room for improvement and for addition."

In conclusion, I again beg the reader, who may detect errors, to bring them to my attention.[†]

F. H. S.

BOSTON, *April*, 1862.

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[*] Compare the article Nomenclature in *Rees's Cyclopædia*, 1st Phila. edit., Vol. **26**, column 5 of the article; and Prof. J. D. Dana, in *Am. J. Sci.*, 1848, (2.) **5**. 437.

[†] Communications addressed to the author in care of the Smithsonian Institution will be forwarded, if placed in the hands of any agent of this Institution, or delivered to any of the numerous learned societies in correspondence with it.

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ABBREVIATIONS.

Amer. Journ. Pharm., — American Journal of Pharmacy, published by authority of the Philadelphia College of Pharmacy. Now edited by W. Procter, Jr., 30 vols., Philadelphia, 1830 - 58, *continued.*

Am. J. Sci. (1.) and (2.), — The American Journal of Science and Arts. First Series, by B. Silliman, 50 vols., New Haven, 1818 - 45. Second Series, by B. Silliman, B. Silliman, Jr., and J. D. Dana, 28 vols., 1846 - 59, *continued.*

Ann. Ch. et Phys. (2.) and (3.), — Annales de Chimie et de Physique. Second Series, by Gay-Lussac, Arago, &c., 75 vols., Paris, 1816-40. Third Series, by Gay-Lussac, Arago, Chevreul, Savary, Dumas, Pelouze, Boussingault, Regnault, and De Senarmont, 53 vols., 1841 - 58, *continued.*

Ann. Ch. u. Pharm., — Annalen der Chemie und Pharmacie (a continuation of *Ann. Pharm. q. v.*), by F. Wœhler and J. Liebig, afterwards by Wœhler, Liebig, and H. Kopp. 100 vols. (including the 32 vols. of *Ann. Pharm.*), Heidelberg, 1840 - 56, *continued.*

Ann. de Chim., — Annales de Chimie, ou recueil de Mémoires concernant la Chimie et les Arts qui en dependent, et spécialement la Pharmacie, by De Morveau and others. 96 vols., Paris, 1781-1815.

Ann. Min. (or *Ann. des Mines*), (1.), (2.), (3.), (4.), and (5.), — Annales des Mines, ou recueil de Mémoires sur l'Exploitation des Mines et sur les Sciences et les Arts qui s'y rapportent; rédigées par les Ingénieurs des Mines. First Series, 13 vols., Paris, 1817 - 26. Second Series, 8 vols., 1827 - 30. Third Series, 20 vols., 1832 - 41. Fourth Series, 20 vols., 1842 - 51. Fifth Series, 14 vols., 1852 - 58, *continued.*

Ann. Pharm., — Annalen der Pharmacie, edited at first by R. Brandes, Geiger, and Liebig; and finally by Wœhler and Liebig. 32 vols., Heidelberg, 1832 - 39, continued as *Ann. Ch. u. Pharm.*, *q. v.*

Ann. Phil. (1.), and (2. or N. S.), — Annals of Philosophy; or, Magazine of Chemistry, Mineralogy, Mechanics, Natural History, Agriculture, and the Arts. By Thomas Thomson. 16 vols., London, 1813 - 20. Second Series, under the title, *The Annals of Philosophy*, New Series. [Edited by R. Phillips.] 12 vols., 1821 - 26. [Afterwards united with the *Phil. Mag.*, *q. v.*]

Beiträge. See Claus.

Bergman's Essays, — Physical and Chemical Essays, by T. Bergman. Translated by E. Cullen. 2 vols., London, 1788.

Berlin Abhandl., — Abhandlungen der königlichen Akademie der Wissenschaften zu Berlin.

Berzelius's Jahrb., — Jahres-Bericht über die Fortschritte der physischen Wissenschaften, by J. Berzelius. (After the 21st vol., under the title, *Jahresbericht über die Fortschritte der Chemie und Mineralogie.*) 30 vols., Tübingen, 1822 - 51.

Berzelius's Lehrb., — Lehrbuch der Chemie, by J. J. Berzelius. Fifth edition, in 5 vols., Dresden and Leipzig, 1843 - 48.

Brandes's Archiv. (1.), (2.), — Archiv des Apothekervereins im nördlichen Teutschland, für die Pharmazie und deren Hülfswissenschaften, by R. Brandes. First Series, 39 vols., Schmalkalden and Lemgo, 1822 - 31. Second Series, under the title, *Archiv der Pharmacie des Apotheker-Vereins im nördlichen Teutschland*, by R. Brandes and H. Wackenroder, subsequently by L. Bley, 84 vols., Lemgo and Hannover, 1835 - 55, *continued.*

Brewster's Journal, (1.), (2.), — The Edinburgh Journal of Science, by D. Brewster. First Series, 10 vols., 1824 - 29. New Series, 6 vols., 1829 - 32.

Bunsen's Gasometry, — Gasometry, comprising the leading Physical and Chemical Properties of Gases, by R. Bunsen. Translated by H. E. Roscoe. London, 1857, 8vo, pp. 298.

Canstatt's Jahresbericht, — Jahresbericht über die Fortschritte der gesammten Pharmacie und Pharmacologie im In- und Aus-lande, by Profs. Dierbach and Martins, and others. [Separat-Abdruck für Pharmaceuten aus Canstatt's Jahresbericht über die Fortschritte der gesammten Medicin in allen Ländern.] Erlangen, 1842 - 58, *continued.*

Chem. Centr.-B. Vid. *Pharm. Centr.-B.*

Claus, Beiträge, — Beiträge zur Chemie der Platinmetalle, by Dr. Carl Claus. Dorpat, 1854.

C. R., — Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences, publiés par MM. les Secrétaires perpetuels. 49 vols., Paris, 1835 - 59, *continued.*

Crell's Ann., — Chemische Annalen für die Freunde der Naturlehre, Arzneygelahrtheit, Haushaltungskunst und Manufacturen, by L. Crell. 40 vols. Helmstädt and Leipzig, 1784 - 1804.

Dalton's New System, — A New System of Chemical Philosophy, by John Dalton. 8vo. Manchester, Vol. II. pt. 2, 1810, and pt. 1, 1827.

Denkschriften der Wiener Akad., — Denkschriften der kaiserlichen Akademie der Wissenschaften. Mathematisch-naturwissenschaftliche Classe. 15 vols., Vienna, 1850 - 58, *continued.*

Dingler's polytech. Journ., — Polytechnisches Journal, edited at first by J. G. Dingler, afterwards by E. M. Dingler. 150 vols., Stuttgart and Augsburg, 1820 - 58, *continued.*

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Dumas, Tr., — Traité de Chimie appliquée aux Arts, by Dumas. 8 vols., Liége, 1847, 8vo.

Edin. Phil. Journ., — The Edinburgh Philosophical Journal, by Brewster and Jameson. 14 vols., Edinburgh, 1819 - 26. Continued as *Edin. New Phil. Journ.*, *q. v.*

Edin. New Phil. Journ., — The Edinburgh New Philosophical Journal, by Jameson. 57 vols., Edinburgh, 1826 - 54, *continued in a new series.*

Essays. See *Bergman.*

Ferrusac's Bulletin, — Bulletin des Sciences Mathématiques, Astronomiques, Physiques, et Chimiques. — Première Section du Bulletin Universel des Sciences et de l'Industrie, publié sous la direction de M. le Baron de Férussac. 16 vols., Paris, 1824 - 31.

Fresenius's Quant., — Anleitung zur quantitativen chemischen Analyse, by C. R. Fresenius. 4te Aufl., Braunschweig, 1858.

. . . . . *Qual.*, — Anleitung zur qualitativen chemischen Analyse. 10te Aufl., Braunschweig, 1860.

Gehlen's Journ. für Ch. Phys. u. Min., — Journal für die Chemie und Physik, by A. F. Gehlen; afterwards under the title, *Journal für die Chemie, Physik, und Mineralogie.* 9 vols., Berlin, 1806 - 10. An earlier journal by Gehlen was entitled *Neues allgemeines Journal der Chemie*, 6 vols., Berlin, 1803 - 1806.

Gerhardt's Tr., — Traité de Chimie Organique, by Ch. Gerhardt. 4 vols., Paris, 1853 - 56, 8vo.

Gerlach's Sp. Gew. der Salzlösungen, — Specifische Gewichte der gebräuchlichsten Salzlösungen bei verschiedenen Concentrationsgraden, by Dr. G. Th. Gerlach. Freiberg, 1859, 8vo, pp. 124.

Gilbert's Ann. der Phys., — Annalen der Physik, by L. W. Gilbert. 76 vols., Halle and Leipzig, 1799 - 1824.

Gm., *Gmelin*, or *Gmelin's Handbook*, — Handbook of Chemistry, by Leopold Gmelin. Translated by H. Watts. 14 vols., London (Cavendish Society), 1848 - 60, *continued.*

Handw. = *Handwœrterbuch.* See *Wittstein.*

Jahresbericht. See *Berzelius*, *Canstatt*, and *Liebig & Kopp.*

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J. Ch. Soc., — The Quarterly Journal of the Chemical Society of London. 10 vols., London, 1849 - 58, *continued.*

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Karsten u. v. Dechen's Archiv, } logie, Geognosie, Bergbau und Hüttenkunde, by C. J. B. Karsten, afterwards by Karsten and H. v. Dechen. 26 vols., Berlin, 1829 - 54.

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Quant.
Qual. Vid. *Fresenius.*

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All temperatures are given in degrees of the Centigrade thermometer, — excepting when otherwise expressly stated.

In the references to authorities, the larger figures indicate the volume, and the smaller figures the page, of the journal or work alluded to; single figures in parentheses ( ) denote the number of the series of the journal.

The names of authors who have labored in concert are connected by the character *&*, — not by *and*.

Ppt. = Precipitate.
Pt. = Part.
% = Per cent.
@ = to; as, 9 @ 10%, from 9 to 10 per cent.

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FIRST OUTLINES
OF
A DICTIONARY
OF THE
SOLUBILITIES OF CHEMICAL SUBSTANCES.

Abietic Acid.
Abietin. } See under **Resins** (of Turpentine).

Abolbic Acid. *Vid.* Œnanthylic Acid.

Absinthin. (*Absynthin. Bitter of Wormwood.*) $C_{32}H_{22}O_{10}$ Scarcely soluble in 1000 parts of water; more easily soluble in ether, and still more readily in alcohol. (Mein.) Soluble in concentrated acetic acid, from which it is partially reprecipitated on the addition of water, and in the strong mineral acids with more or less decomposition. Sparingly soluble in ammonia-water.

AceChlorPlatin. (*Proto Chloride of Platinum with Oxide of Mesityl; or with Metacetone. ChlorAcePlatin.*) $C_{12}H_{10}Cl_2Pt_2O_2$ (?) Very sparingly soluble in water; the aqueous solution undergoing partial decomposition when left to itself, and more quickly on being heated. Ether dissolves but little of it; alcohol somewhat more, especially if it be hot, the compound crystallizing out unchanged as the solution cools. Much more abundantly soluble in acetone, though 1 pt. of acetone dissolves scarcely more than $\frac{1}{80}$ pt. of it at the ordinary temperature, and but little more at higher temperatures. Chlorhydric acid, even when concentrated, dissolves it only at elevated temperatures, but the acid solution is not perceptibly decomposed by boiling. Completely soluble, with alteration in a solution of caustic potash. Very much more abundantly soluble at the ordinary temperature in aqueous solutions of the chlorides of potassium or sodium than in pure water; at more elevated temperatures these solutions dissolve still more of it, and no decomposition occurs even on continuous boiling. (Zeise, *Ann. Ch. u. Pharm.*, 1840, **33.** 41.)

AceChlorPlatinAmmonia. Remarkably easily and very abundantly soluble in water. Easily soluble in alcohol. An excess of ether precipitates it from the alcoholic solution. Pure acetone has but little solvent action upon it. (Zeise, *Ann. Ch. u. Pharm.*, 1840, **33.** 59.)

Acediamin. $C_4H_6N_2 = N_2\left\{\begin{matrix}C_4H_3''' \\ H_3\end{matrix}\right.$ Not isolated.

Acephogenic Acid. (*Acephosgenic Acid.*) Very soluble in water. Most of its salts are insoluble, or but sparingly soluble in water. (Zeise, *Ann. Ch. et Phys.*, (3.) **6.** pp. 504, 505.)

Acephogenate of Lead. Insoluble in water. (Zeise, *loc. cit.*, pp. 503, 504.)

Acephogenate of Lime. Insoluble in water. (Zeise, *loc. cit.*, pp. 503, 504.)

Acephogenate of Silver. Ppt.

Acephogenate of Soda. More soluble in water than phosphate of soda. (Zeise, *loc. cit.*, p. 503.)

Acephosic Acid. (*Acephoric Acid.*) Very soluble in water. Most of its salts are easily soluble in water, and alcohol. (Zeise, *Ann. Ch. et Phys.*, (3.) **6.** pp. 504, 505.)

Acephosate of Ammonia. Soluble in water, and alcohol. (Gm.)

Acephosate of Baryta. Soluble in water, and alcohol. (Zeise, *loc. cit.*)

Acephosate of Lead. Soluble in water, and alcohol, but on evaporating the aqueous solution a portion of the lead salt passes into the insoluble state. (Zeise, *loc. cit.*)

Acephosate of Lime. Soluble in water, and alcohol. Ether precipitates it from the alcoholic solution. (Zeise, *loc. cit.*, p. 503.)

Acephosate of Silver. Ppt.

Acephosate of Soda. Soluble in water, and alcohol. (Gm.)

Acetal. (*Ethylate of Ethylene.*) $C_{12}H_{14}O_4 = \left.\begin{matrix}C_4H_4'' \\ (C_4H_5)_2\end{matrix}\right\}O_4$ Soluble in about 18 vols. water at 25°, less soluble as the temperature is more elevated. (Stas, *loc. infra cit.*) Soluble in 6 @ 7 pts. water. (Liebig.) Miscible in all proportions with alcohol and ether. Soluble in monohydrated sulphuric acid, with subsequent decomposition. Chloride of calcium, and in general all very soluble salts, when added to its solution in water, cause it to separate out. From the alcoholic solution chloride of calcium does not precipitate it unless water is added at the same time. (Stas, *Ann. Ch. et Phys.*, (3.) **19.** 150.)

Acetamic Acid. Identical with Glycocoll, *q. v.*

Acetamid. (*Acetic Amid. Acetylamid.*) $C_4H_5NO_2 = N\left\{\begin{matrix}C_4H_3O_2 \\ H_2\end{matrix}\right.$ Deliquescent. Soluble in water, the solution undergoing decomposition when boiled. Soluble in alcohol, and ether. Decomposed by acids and by alkaline solutions. (Strecker.)

Acetamid with *di*Acetamid. $C_4H_5NO_2, C_8H_7NO_4$ Readily soluble in water, alcohol, and ether. (Strecker.)

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Acetamid with **Mercury**. *Vid.* Mercur(*ic*) Acetamid.

Acetamid with **Silver**. *Vid.* ArgentAcetamid.

*Di***Acetamid**. $C_8H_7NO_4 = N\left\{\begin{matrix}(C_4H_3O_2)_2\\H\end{matrix}\right.$ Very easily soluble in water, alcohol, and ether. Decomposed when boiled with acids. (Strecker.)

Acetanilid. *Vid.* PhenylAcetamid.

Acetic Acid (**Anhydrous**). (*Acetate of Acetyl. Acetic Acetate.*) $\left.\begin{matrix}C_4H_3O_2\\C_4H_3O_2\end{matrix}\right\}O_2$ Decomposes in moist air. Not immediately miscible with water; dissolving, with decomposition, only after continued agitation, or on the application of heat. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 314.)

Acetic Acid with **Aldehyde** (**Hydride of Acetyl**). $C_{12}H_{10}O_8$ Insoluble in water. (Geuther.)

Acetic Acid. $C_4H_4O_4 = C_4H_3O_3,HO$ Hygroscopic. Miscible in all proportions with water, alcohol, and many of the essential oils; and with chlorhydric, sulphuric, nitric, and phosphoric acids. Glacial acetic acid is miscible with ether, but on the addition of water it separates from this solution.

Glacial acetic acid is soluble in oil of copaiba (Gerber). When 80 vols. of acetic acid of 1.075 sp. gr. are shaken up with 80 vols. of oil of lavender, 45 vols. of the acid are dissolved, a weaker acid containing oil being left, which, if agitated with 80 vols. of fresh oil, produces 110 vols. of oil containing acetic acid, while 5 vols. of still weaker acid remain, containing a large quantity of oil separable by water. The oil charged with acetic acid gives up the greater part of this acid when agitated with an equal volume of water, and the whole when agitated with four times the quantity of water, a certain quantity of the oil dissolving in the water at the same time. (Vauquelin.)

On exposing a mixture containing 90% of $C_4H_4O_4$ and 10% of water to a pressure of 1100 atmospheres for several minutes, it was found that $\frac{7}{8}$ of the space occupied by it was filled with crystals of very strong acid, while the remaining liquid was only a very weak vinegar. (Perkins, *Ann. Ch. et Phys.*, 1823, (2.) **23.** 410.)

Concentrated acetic acid dissolves many resins, camphors, coloring matters, essential oils, sugars, gums, proteine compounds, organic acids, &c., &c.

Percentage of Glacial Acetic Acid in the Aqueous Acid.

Sp.Gr.	Per cent of $C_4H_4O_4$.	Sp.Gr.	Per cent of $C_4H_4O_4$.	Sp.Gr.	Per cent of $C_4H_4O_4$.
1.000	0	1.024	17	1.045	34
1.001	1	1.025	18	1.046	35
1.002	2	1.026	19	1.047	36
1.004	3	1.027	20	1.048	37
1.0055	4	1.029	21	1.049	38
1.0067	5	1.031	22	1.050	39
1.008	6	1.032	23	1.0513	40
1.010	7	1.033	24	1.0515	41
1.012	8	1.034	25	1.052	42
1.013	9	1.035	26	1.053	43
1.015	10	1.036	27	1.054	44
1.016	11	1.038	28	1.055	45
1.017	12	1.039	29	1.055	46
1.018	13	1.040	30	1.056	47
1.020	14	1.041	31	1.058	48
1.022	15	1.0424	32	1.059	49
1.023	16	1.044	33	1.060	50
1.061	51	1.0700	68	1.0730	85
1.062	52	1.0700	69	1.0730	86
1.063	53	1.0700	70	1.0730	87
1.063	54	1.0710	71	1.0730	88
1.064	55	1.0710	72	1.0730	89
1.064	56	1.0720	73	1.0730	90
1.065	57	1.0720	74	1.0721	91
1.066	58	1.0720	75	1.0716	92
1.066	59	1.0730	76	1.0708	93
1.067	60	1.0732	77	1.0706	94
1.067	61	1.0732	78	1.0700	95
1.067	62	1.0735	79	1.0690	96
1.068	63	1.0735	80	1.0680	97
1.068	64	1.0732	81	1.0670	98
1.068	65	1.0730	82	1.0655	99
1.069	66	1.0730	83	1.0635	100
1.069	67	1.0730	84		

(Mohr., *Ann. Pharm.*, 1839, **31.** 284.)

Sp.Gr.	Per cent of $C_4H_4O_4$.	Sp.Gr.	Per cent of $C_4H_4O_4$.	Sp.Gr.	Per cent of $C_4H_4O_4$.
1.0075	5	1.0647	56	1.0750	80
1.0147	10	1.0665	58	1.0740	82
1.0213	15	1.0675	60	1.0738	84
1.0282	20	1.0687	62	1.0735	86
1.0342	25	1.0701	64	1.0730	88
1.0405	30	1.0712	66	1.0728	90
1.0459	35	1.0716	68	1.0715	92
1.0512	40	1.0725	70	1.0700	94
1 0558	45	1.0733	72	1.0680	96
1.0603	50	1.0740	74	1.0650	98
1.0617	52	1.0743	76	1.0620	100
1.0634	54	1.0748	78		

(Ure (1818), in his *Dict. of Arts, &c.*, Boston, 1853, **1.** 5.)

Percentage of Anhydrous Acid in the Aqueous Acid, at 15°.

Per cent of $C_4H_3O_3$.	Sp.Gr.	Per cent of $C_4H_3O_3$.	Sp.Gr.	Per cent of $C_4H_3O_3$.	Sp.Gr.
1	1.0019	30	1.0485	59	1.0745
2	1.0037	31	1.0498	60	1.0749
3	1.0055	32	1.0510	61	1.0753
4	1.0072	33	1.0522	62	1.0756
5	1.0089	34	1.0539	63	1.0759
6	1.0107	35	1.0546	64	1.0762
7	1.0124	36	1.0558	65	1.0764
8	1.0141	37	1.0569	66	1.0765
9	1.0159	38	1.0580	67	1.0766
10	1.0177	39	1.0591	68	1.0766
11	1.0194	40	1.0601	69	1.0766
12	1.0211	41	1.0611	70	1.0765
13	1.0228	42	1.0621	71	1.0763
14	1.0245	43	1.0631	72	1.0759
15	1.0261	44	1.0640	73	1.0754
16	1.0277	45	1.0649	74	1.0748
17	1.0293	46	1.0658	75	1.0741
18	1.0310	47	1.0667	76	1.0732
19	1.0326	48	1.0675	77	1.0722
20	1.0342	49	1.0683	78	1.0710
21	1.0358	50	1.0691	79	1.0696
22	1.0373	51	1.0698	80	1.0681
23	1.0389	52	1.0705	81	1.0664
24	1.0404	53	1.0711	82	1.0646
25	1.0419	54	1.0717	83	1.0626
26	1.0433	55	1.0723	84	1.0603
27	1.0447	56	1.0729	85	1.0574
28	1.0460	57	1.0735	85.11	1.057*
29	1.0472	58	1.0740		

(Van der Toorn, *Rep. Br. Assoc.*, 1834, p. 571.)

With the exception of the salts of silver and suboxide of mercury, which are difficultly soluble,

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* Glacial acetic acid.

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almost all of the normal acetates are easily soluble in water and in alcohol.

Acetate of Allyl. (*Acetate of Acryl. Acetate of Propylenyl.*) $C_{10} H_8 O_4 = C_4 H_3 (C_6 H_5) O_4$ Nearly insoluble in water. Miscible in all proportions with alcohol, and ether. (Zinin.)

Acetate of Alumina.

I.) *ter.* Deliquescent. Soluble in water. $C_{12} H_9 Al_2''' O_{12}$ The aqueous solution saturated at 12.5° contains 10.6% of it. (Hassenfratz, *Ann. de Chim.*, **28.** 291.) A solution prepared by decomposing *pure* sulphate of alumina with acetate of lead may be heated without becoming cloudy, and this no matter how concentrated the solution may be; but a solution which contains sulphate of potash, such as is formed when acetate of lead is decomposed by alum, the sulphates of magnesia, soda, or ammonia, chloride of sodium, or alum, deposits an abundant precipitate on being similarly heated: this precipitate gradually redissolves as the liquid becomes cold, especially if it be frequently agitated, and a transparent solution is again obtained; on heating the solution a second time, it becomes troubled anew, and again clears up on cooling. The experiment, being repeated 20 times, constantly afforded the same result; the reaction occurring not only in concentrated, but also in dilute solutions, even at temperatures as low as 50°. The reaction occurs as well in hermetically closed vessels as in those which are open, and the same phenomena are observed in solutions which are strongly acidulated with acetic acid. When nitrate of potash is substituted for the salts above named, the precipitate which forms on heating will be less abundant, while the chlorides of calcium and of barium, nitrate of baryta and acetate of lead, produce nothing of the kind. The longer the heat is continued, so much the less readily does the precipitate redissolve on cooling, since it becomes more coherent. (Gay-Lussac, *Ann. Ch. et Phys.*, 1817, (2.) **6.** 201, and *Ann. de Chim.*, 1810, **74.** 193; Osann, *Gilbert's Ann. der Phys.*, 1821, **69.** 294.)

The aqueous solution is readily decomposed by evaporation, with loss of acetic acid and formation of binacetate. Solutions, prepared by decomposing [partially] purified sulphate of alumina with acetate of lead, containing 4 @ 5% of alumina being allowed to stand at a temperature of 15° @ 21° begin to deposit a crust of the insoluble binacetate, which afterwards gradually increases. At lower temperatures the solution remains unaltered during a much longer time. If the above-mentioned solution be heated, it quickly becomes cloudy, and a heavy white precipitate separates out. At 38° a considerable quantity of this powder separated out in the course of several days, but at 71° the whole of the dissolved salt separated out in 2 or 3 hours, and at the temperature of boiling this was effected in a much shorter time, and besides acetic acid only a trace of alumina could be detected in the filtrate. With a weaker solution of the acetate, containing, for example, only 3% of alumina, the insoluble binacetate is formed in like manner; but in this case a considerable quantity of alumina remains in solution. Solutions containing 2% of alumina may be precipitated on boiling after they have been kept for several weeks, but not when recently prepared. The formation of the insoluble salt seems to be promoted by the presence of free acetic acid; thus a solution of the teracetate, which contained 0.75% of alumina, and could not be precipitated by boiling, was readily precipitated thereby after having been mixed with so much acetic acid that it contained as much as would be present in a solution of the teracetate containing 4% of alumina. On mixing a solution of the teracetate with chloride of sodium, sulphate of potash, or nitrate of potash, and heating the mixture, precipitation occurs. (W. Crum, *Ann. Ch. u. Pharm.*, 1854, **89.** pp. 158, 161, 162, 177, 178.)

An aqueous solution of Sp.Gr. (at 12°.5).	Contains per cent of it.	An aqueous solution of Sp.Gr. (at 12°.5).	Contains per cent of it.
1.0090	1	1.0570	6
1.0190	2	1.0670	7
1.0280	3	1.0780	8
1.0380	4	1.0880	9
1.0470	5	1.0990	10

(Hassenfratz, *Ann. de Chim.*, **28.** 302.)

II.) *bin.*

α = *Soluble Modification.* $Al_2 O_3, 2 C_4 H_3 O_3 + 4 Aq$ Easily and completely soluble in water. The solution is gradually decomposed by evaporation. (W. Crum, *Ann. Ch. u. Pharm.*, 1854, **89.** 164.)

β = *Insoluble Modification.* $Al_2 O_3, 2 C_4 H_3 O_3 + 2 Aq, \& 3 - 5 Aq$ Exceedingly insoluble in water, either hot or cold, or in acetic acid. When 1 pt. of it is boiled with 200 pts. of water during an hour and a half it dissolves, with decomposition. Soluble in 2 equivalents of sulphuric, chlorhydric, or nitric acid. Soluble in a hot concentrated solution of tersulphate of alumina with evolution of acetic acid; also soluble in a hot solution of potash alum. (W. Crum, *Ann. Ch. u. Pharm.*, 1854, **89.** pp. 163, 158, 178.)

Tissier describes a 6 hydrated salt insoluble in water, sparingly soluble in dilute acids, and readily soluble in solutions of the caustic alkalies.

III.) *Polybasic.* Compounds containing as many as six equivalents of the base to one of acid may be obtained in solution. These slightly opalescent liquids may be diluted or boiled without undergoing decomposition. They are precipitated on the addition of soluble sulphates, but may be mixed with nitrates, or chlorides. Compounds more basic than the hexa salt are insoluble. (Ordway, *Am. J. Sci.*, (2.) **26.** 203.)

Acetate of Amarin. Very readily soluble in water. (Fownes.)

Acetate of *bi*AmidoBenzoic Acid. Soluble in water, but the aqueous solution is decomposed by evaporation. (Voit.)

Acetate of Ammolin (of Unverdorben). Very readily soluble in water, and alcohol. Insoluble in ether.

Acetate of Ammonia.

I.) *normal.* $C_4 H_3 (NH_4) O_4$ Deliquescent. Very soluble in cold water, and in alcohol. Readily soluble in creosote. (Reichenbach.) The aqueous solution gradually undergoes decomposition when kept for some time.

II.) *acid.* $C_4 H_3 (NH_4) O_4, C_4 H_4 O_4$ Very deliquescent, and soluble in water. Easily soluble in alcohol. (Lassone.)

Acetate of Ammonia & of Copper. Efflorescent. (Coulon, *Ann. de Chim.*, **96.** 327, [T.].)

Acetate of Ammonia & *of protoxide* of Mercury. $NH_4 O, Hg O, C_4 H_3 O_3$ Easily soluble in water. Almost entirely insoluble in alcohol. (Hirzel.)

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Acetate of Ammonia & of Uranium. $C_4 H_3 (NH_4) O_4 ; 2 (Ur_2 O_3, C_4 H_3 O_3) + 6 Aq$. Very soluble in water. The solution not being decomposed on ebullition. (Wertheim, *Ann. Ch. et Phys.*, (3.) **11.** 64.) Very easily soluble in water, and alcohol. (Berzelius's *Lehrb.*)

Acetate of Amyl. $C_4 H_3 (C_{10} H_{11}) O_4$ Insoluble in water. Soluble in alcohol, or spirit, ether, and fusel oil (hydrate of amyl). (Cahours.)

Acetate of Amyl*chloré*. *Vid.* ChlorAcetate of Amyl; and Acetate of *bi*ChlorAmyl.

"**Acetate of Amylene.**" *Vid.* Acetate of Amyl.

Acetate of Amylene. (*Acetate of Amyl Glycol.*) $C_{18} H_{16} O_8 = C_8 H_6 (C_{10} H_{10}'') O_8$ Insoluble in water. (A. Wurtz.)

Acetate of Amylene*chloré*. *Vid.* ChlorAcetate of Amyl.

Acetate of Anilin. Soluble in water.

Acetate of Antimony. $C_{12} H_9 Sb''' O_{12}$ Easily soluble in water. (Berzelius's *Lehrb.*)

Acetate of Atropin. Permanent. Readily soluble in water.

Acetate of Baryta. $C_4 H_3 Ba O_4 + Aq \& 3 Aq$ Efflorescent. The monohydrated salt is soluble in
1.25 pts. of water at 12.5° @ 15°
1.1 " " boiling. (Bucholz, *Beiträge*, **3.** 105, cited by Gehlen, *Schweigger's Journ. für Ch. u. Phys.*, 1812, **4.** pp. 41, 35.)
100 pts. of water at 15.5° dissolve about 88 pts. of it.
" " boiling " 96 " "
Soluble in 100 pts. of pure cold alcohol, and scarcely any more soluble in hot alcohol. (Bucholz, *Beiträge*, **3.** 102. [T.].) More soluble in *cold* than in hot water. (Liebig, in Kolbe's *Lehrb.*, **1.** 624.)
Soluble in 1.75 pts. of cold water.
" " 1.03 " boiling water; the saturated cold solution containing 36.36% of it, and the saturated boiling solution 50%. (Berzelius's *Lehrb.*) The monohydrated salt is soluble in 100 pts. of cold, and in 67 pts. of boiling alcohol. (Bucholz.) Insoluble in cold absolute alcohol. (Schlieper.) Insoluble in absolute alcohol, or very strong spirit. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **11.** 254.) Insoluble in ether. (Wurtz.) Insoluble in creosote. (Reichenbach.)

When one equivalent of $C_4 H_3 BaO_4$, in aqueous solution, is mixed with a solution of an equivalent of nitrate of lead (PbO, NO_5) 0.77 of it are decomposed to nitrate of baryta, which may be precipitated by adding alcohol, while 0.23 of it remain unchanged; when mixed with the solution of an equivalent of nitrate of potash (KO, NO_5) 0.72 of it are decomposed as before, while 0.28 of it remain unchanged. (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.)

Acetate of Baryta & of Uranium. $C_4 H_3 Ba O_4 ; 2 (C_4 H_3 O_3, Ur_2 O_3) + 6 Aq$ Very soluble in water. (Wertheim, *Ann. Ch. et Phys.*, (3.) **11.** 71.)

Acetate of Baryta with Nitrate of Baryta. $C_4 H_3 Ba O_4 ; Ba O, NO_5 + 8 Aq$ Efflorescent. Easily soluble in water. Insoluble in absolute alcohol. (Lucius, *Ann. Ch. u. Pharm.*, **103.** 113.)

Acetate of Benzidin. Readily soluble in water, and alcohol.

Acetate of Benzol. (*Acetate of Benzol Ether.*) $C_{22} H_{12} O_8 = C_8 H_6 (C_{14} H_6'') O_8$ Very easily soluble in spirit, and ether. Water precipitates it from the alcoholic solution. (Wicke, *Ann. Ch. u. Pharm.*, **102.** 367.)

Acetate of Benzyl. *Vid.* Acetate of Toluenyl.

Acetate of Bismuth. $Bi_2 O_3, 3 C_4 H_3 O_3$ Easily ("sparingly") soluble in water.

Acetate of Brucin. Extremely soluble in water.

Acetate of Butyl. (*Acetate of Tetryl.*) $C_{12} H_{12} O_4 = C_4 H_3 (C_8 H_9) O_4$

***Bin*Acetate of Butylene.** $C_8 H_8 (C_4 H_3 O_2)_2 O_4$ Insoluble in water. Soluble in alcohol, and ether. (A. Wurtz.)

Acetate of Cadmium. $C_4 H_3 Cd O_4 + 3 Aq$ Permanent. Very soluble in water. (Stromeyer.)

Acetate of Cadmium & of Uranium. $C_4 H_3 Cd O_4 ; C_4 H_3 (Ur_2 O_2) O_4 + 5 Aq$ Soluble without decomposition in water acidulated with acetic acid. (Weselsky.)

Acetate of Capryl. (*Acetate of Octyl.*) $C_{20} H_{20} O_4 = C_4 H_3 (C_{16} H_{17}) O_4$ Insoluble in water. Soluble in alcohol. Soluble in concentrated sulphuric acid, from which it is precipitated on the addition of water. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 136.)

Acetate of Cerium. $C_4 H_3 Ce O_4$ Permanent. Very soluble in water. Very sparingly soluble in alcohol. (Berzelius.)

Acetate of Cetyl. $C_4 H_3 (C_{32} H_{33}) O_4$ Insoluble, or very sparingly soluble, in water. Soluble in ether. (Becker.)

Acetate of Chelerythrin. Readily soluble in water, and alcohol.

Acetate of Chelidonin. Very soluble in water, and alcohol.

Acetate of *bi*ChlorAmyl. (*BiChlor Acetate of Amyl.*) $C_4 H_3 (C_{10} H_9 Cl_2) O_4$ Insoluble in water. Soluble in alcohol, and ether. (Cahours.)

Acetate of *bi*ChlorEthyl. (*Vinic bi Chlor Acetate. Bi Chloro Vinic Acetate. Acetate d'ethyle bichloré.*) $C_8 H_6 Cl_2 O_4 = C_4 H_3 Cl_2 O, C_4 H_3 O_3$ Slowly decomposed by water, in which it is itself insoluble. Slowly decomposed by alkaline lyes.

Acetate of *ter*ClhorEthyl. (*Acetate d'ethyle trichloré.*) $C_8 H_5 Cl_3 O_4 = C_4 H_2 Cl_3 O, C_4 H_3 O_3$ Decomposed by an aqueous solution of potash. (Leblanc.)

Acetate of *quadri*ChlorEthyl. (*Acetate d'éthyle quadrichloré. Quadrichlorovinic acetate.*) $C_8 H_4 Cl_4 O_4 = C_4 HCl_4 O, C_4 H_3 O_3$ Decomposed by an aqueous solution of potash. (Leblanc.)

Acetate of *per*ChlorEthyl. (*Acetate d'éthyle quintichloré. Quinquichlorovinic Acetate.*) $C_8 H_3 Cl_5 O_4 = C_4 Cl_5 O, C_4 H_3 O_3$ Decomposed by a strong aqueous solution of potash. (Leblanc.)

Acetate of *bi*ChloroMethyl. (*Acetate de Methyle bichloré. Acetate de "methylene" chlore. Bichloromethylic Acetate.*) $C_6 H_4 Cl_2 O_4 = C_2 HCl_2 O, C_4 H_3 O_3$ Slowly decomposed by water. Quickly by a solution of caustic potash. (Malaguti.)

Acetate of *ter*ChloroMethyl. (*Chloracetate of Chloromethylase. Chloracetate méthylique. Ter Chloro Methylic Acetate. Acetate de Methyle trichloré.*) $C_6 H_3 Cl_3 O_4 = C_2 Cl_3 O, C_4 H_3 O_3$ Insoluble in water. Soluble in alcohol, and ether. (Laurent.)

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ACETATE OF CHLORONICINE. Soluble in water. (St. Evre.)
$C_{20}H_{12}Cl_2N_2, 2C_4H_4O_4$

ACETATE OF CHOLESTERIN.
$C_{56}H_{46}O_4 = C_4H_3(C_{52}H_{43})O_4$

ACETATE *of protoxide* OF CHROMIUM. Oxidizes when exposed to the air. Very sparingly soluble in cold water free from air, more soluble in hot water. Very sparingly soluble in alcohol. (Peligot, *Ann. Ch. et Phys.*, (3.) **12.** 542. Lœwel, *Ibid.*, (3.) **39.** 53.)
$C_4H_3CrO_4 + Aq$

ACETATE *of sesquioxide* OF CHROMIUM.

I.) *normal.* Very soluble in water. (Brandenburg.)
$C_{12}H_9Cr_2'''O_{12}$

II.) *basic.* Compounds containing three equivalents and less of the base to one of the acid may be obtained soluble in water. Those which contain more base that this are insoluble in water. (Ordway, *Am. J. Sci.*, (2.) **26.** 203.)

ACETATE OF CINCHONIDIN. Very sparingly soluble in cold water.

ACETATE OF CINCHONIN. Decomposed by cold water to an insoluble basic and a soluble acid salt. Completely soluble in acetic acid. (Pelletier & Caventou.)

ACETATE *of protoxide* OF COBALT. Deliquescent. Very soluble in water.
$C_4H_3CoO_4 + 4Aq$

ACETATE *of sesquioxide* OF COBALT. Deliquescent. Soluble in water.

The aqueous solution is decomposed on boiling, with separation of Co_2O_3. (H. Rose, *Pogg. Ann.*, **83.** 148.)

ACETATE *of protoxide* OF COBALT & OF URANIUM. Soluble, without decomposition in water acidulated with acetic acid. (Weselsky.)
$C_4H_3CoO_4; 2(Ur_2O_3, C_4H_3O_3) + 7Aq$

ACETATE OF CONIIN.

ACETATE *of dinoxide* OF COPPER. Permanent. (Berzelius.) Hygroscopic. (Gehlen.) Insoluble in water, by which, however, it is slowly decomposed. Partially soluble in alcohol. (Lassone.)
$C_4H_3Cu_2O_4$

ACETATE *of protoxide* OF COPPER.

I.) *normal.* Somewhat efflorescent. Soluble in 13.4 pts. of water at 20°. (Gehlen, *Schweigger's Journ. für Ch. u. Phys.*, 1812, **4.** pp. 29, 31.) Soluble in 5 pts. of boiling water. (Wenzel, in his *Verwandtschaft*, p. 444, cited by Gehlen.) Soluble in 14.06 pts. of water at 18.75°. (Abl, from *Oesterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) 1 pt. of the dry salt is soluble in 5.061 pts. of water at 101.1°; or, 100 pts. of water at 101.1° dissolve 19.796 pts. of it: the aqueous solution saturated at its boiling-point (101.1°) containing 16.5% of the dry salt. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) The dilute aqueous solution is decomposed by boiling. Much less quickly soluble in water which contains sugar than in pure water. (Holger.)
$a = C_4H_3CuO_4 + Aq$
(Crystallized, distilled, purified Verdigris. Verdet.)

Soluble in 13.333 pts. of boiling alcohol. (Wenzel, in his *Verwandtschaft*, p. 437, cited by Gehlen.) Insoluble in ether (Unverdorben), sparingly soluble in cold, more readily soluble in hot creosote. (Reichenbach.)

$b = C_4H_3CuO_4 + 5Aq.$

II.) *sesquibasic.* Easily soluble in water; the aqueous solution undergoing decomposition when diluted with much water or boiled. Sparingly soluble, or insoluble, in alcohol.
$3CuO, 2C_4H_3O_3 + 5Aq$

III.) *di.* When treated with a little water it swells up, and if more water be added a portion of it (No. 2) dissolves, while a quantity (No. 4) remains undissolved.
(Common blue verdigris.)
$2CuO, C_4H_3O_3 + 7Aq$

IV.) *tri.* Insoluble, even in boiling water. (Proust.) Decomposed by large quantities of water, especially when this is boiling. (Berzelius.) Insoluble in alcohol.
$3CuO, C_4H_3O_3 + 2Aq$

V.) *hyperbasic.* Very sparingly soluble in cold water. (Berzelius.) The basic acetates of copper are soluble in an aqueous solution of cane-sugar. (Ure.)
$48CuO, C_4H_3O_3 + 12Aq$

ACETATE OF COPPER & OF LIME. Slightly efflorescent. Readily soluble in water. (Ettling.) Readily soluble in water. (T. Thompson, in his *First Principles*, **2.** 449, and in his *System of Chem.*, London, 1831, **2.** 791.)

I.) $C_4H_3CuO_4; C_4H_3CaO_4 + 8Aq$

II.) $C_4H_3CuO_4, CuO, HO; C_4H_3CaO_4 + 8Aq$

ACETATE OF COPPER & OF PICOLIN. Slowly efflorescent. Readily soluble in water; but the solution is decomposed on boiling. Readily soluble in alcohol. Insoluble in ether. (Unverdorben.)

ACETATE OF COPPER & OF POTASH.
$C_4H_3CuO_4; 2C_4H_3KO_4 + 12Aq$

ACETATE OF COPPER with ARSENITE OF COPPER. Insoluble in water, but is partially decomposed by continued boiling with water. (Ehrmann.) Soluble in ammonia-water.
(Schweinfurt green. Vienna green.)
$C_4H_3CuO_4; 3(CuO, AsO_3)$

ACETATE OF COPPER with *proto*CHLORIDE OF MERCURY. Scarcely at all soluble in cold, decomposed by boiling water. (Wœhler & Hütteroth.)
$2CuO, C_4H_3O_3; 2HgCl$

ACETATE OF CORYDALIN. Readily soluble in water.

ACETATE OF CRESYL.

ACETATE OF CUMIDIN.

ACETATE OF CUMOL Soluble in ether.
$C_{28}H_{18}O_8 = C_8H_6(C_{20}H_{12}'')O_8$, or $C_{20}H_{12}O_2, 2C_4H_3O_3$

ACETATE OF CURARIN. Soluble in water.

ACETATE OF CYANETHIN.

I.) *basic.* Insoluble in water.

II.) *acid.* Soluble in water, and alcohol. (Kolbe & Frankland, *J. Ch. Soc.*, **1.** 72.)

ACETATE OF DELPHIN. Soluble in water.

ACETATE OF ETHYL. Soluble in 7 pts. of water at 16.6°. (Thénard.) Soluble in 9 pts. (or a trifle more) of water at 17.5°. (Gehlen, *Schweigger's Journ. für Ch. u. Phys.*, 1812, **4.** pp. 23, 22.) When uncontaminated with water or ether it is soluble in 11 @ 12 pts. of water at ordinary temperatures. (Mohr.) Soluble in 12 pts. of water at ordinary temperatures. (Becker.) Soluble in 8 pts. of water at 18.75°. (Abl, from *Oesterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76. The aqueous solution slowly undergoes decomposition. Miscible with the strong mineral acids and with concentrated acetic acid. (Westendorff.) Miscible in all proportions with alcohol, and ether; on adding water it separates from the ethereal solution.
(Acetic Ether. Ethylic Acetate.)
$C_8H_8O_4 = C_4H_5O, C_4H_3O_3$

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Acetate of Ethylamin. Very deliquescent. (A. Wurtz, *Ann. Ch. et. Phys.*, (3.) **30.** 490.)

Acetate of Ethylene.

I.) *normal.* Soluble in 7 pts. of water at 22°. Soluble in all proportions in alcohol, and ether. On the addition of chloride of calcium it separates out from the aqueous solution. (A. Wurtz.)

$C_{12}H_{10}O_8 = C_8H_6(C_4H_4'')O_8$ (*Binacetate of Glycol. Isomeric with the compound of Aldehyde with anhydrous Acetic Acid.*)

II.) *mono.* Miscible with water, and alcohol. (Atkinson.)

$C_8H_8O_6 = C_4H_4'', C_4H_4O_6$ (*Monacetate of Glycol.*)

III.) *basic.*

$C_{16}H_{14}O_{10}$

Acetate of Ethyl *chloré — quintichloré.* *Vid.* Acetate of ChlorEthyl.

Acetate of Ethyl *sexchloré.* *Vid.* ChlorAcetate of *per*ChlorEthyl.

Acetate of Ethyl *septichloré.* *Vid. bi*ChlorAcetate of *per*ChlorEthyl.

Acetate of Ethyl *perchloré.* *Vid. ter*ChlorAcetate of *per*ChlorEthyl.

Acetate of EthylMethylConiin. Deliquescent. Readily soluble in water. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **89.** 139.

Acetate of EthylNicotin. Very easily soluble in water. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **87.** 6.)

Acetate of EthylStrychnine. Soluble in water.

Acetate of Fumarin. Soluble in water, and alcohol. (Hannon.)

Acetate of Furfurin. Very soluble in water. (Fownes.)

Acetate of Glaucin. Soluble in water.

Acetate of Glucina.

I.) *normal.* Very soluble in water. (Vauquelin.)

$C_{12}H_9Gl_2''', O_{12}$

II.) *terbasic.* Very deliquescent and soluble in water.

The basic acetates of glucina which contain more than six equivalents of base to one of acid are insoluble in water, but those containing less than six equivalents of base may be obtained in solution. (Ordway, *Am. J. Sci.* (2.) **26.** 207.)

Acetate of Glyceryl.

I.) *normal.* Insoluble in water and not miscible therewith. Readily soluble in spirit. Soluble in ether. Easily soluble in baryta-water. (Berthelot, *Ann. Ch. et Phys.*, (3.) **41.** 277.)

$C_{18}H_{14}O_{12} = C_6H_5O_3, 3\,C_4H_3O_3,$ or $C_{12}H_9(C_6H_5''')O_{12}$ (*TrisAcetin.*)

II.) *monobasic.* With 1 vol. water it forms a limpid mixture; 2 more vols. of water cause an opalescence; 5 vols. water render the liquor very opaline. With 200 vols. water it forms a transparent emulsion or solution. It is miscible with ether and dissolves in benzine; but is nearly or quite insoluble in bisulphide of carbon. (Berthelot, *loc. cit.*)

$C_{14}H_{12}O_{10} = C_6H_5O_3, HO, 2\,C_4H_3O_3$ (*DiAcetin. Acétidin.*)

III.) *bibasic.* Mixes with half its bulk of water, forming a clear liquor which becomes turbid when two additional volumes of water are added; it remains turbid also when a large excess of water is added to it. Miscible with ether. (Berthelot, *loc. cit.*)

$C_{10}H_{10}O_8 = C_6H_5O_3, 2\,HO, C_4H_3O_3$ (*MonoAcetin.*)

Acetate of Glycocoll. Soluble in water; less easily soluble in alcohol. (Horsford, *Am. J. Sci.*, (2.) **4.** 63.)

$C_4H_5NO_4, C_4H_4O_4 + Aq$

Acetate of Glycol. *Vid.* Acetate of Ethylene.

Acetate of Gold (AuO_2). Known only in solution. This solution slowly decomposes when left to itself, or immediately on being boiled. (H. Rose, *Pogg. Ann.*, **83.** 149.)

Acetate of Harmalin.

Acetate of Harmin.

Acetate of HydrargEthyl. *Vid.* Acetate of MercurEthyl.

Acetate *of protoxide* **of Iron.** Easily oxidizes in the air. Very soluble in water.

$C_4H_3FeO_4 + 3\,Aq$

Acetate *of sesquioxide* **of Iron.**

I.) *mono.* Very soluble in water. (Bette.) Soluble in 3 pts. of water. Soluble in 6 pts. of highly rectified alcohol. Soluble in 4 pts. of ordinary alcohol. (Walz, in Wittstein's *Handw.*) The aqueous solution is decomposed by boiling. (Duflos.)

$Fe_2O_3, C_4H_3O_3 + 4\,Aq$

II.) *bi.* Soluble in water and in alcohol. (Oudemans.) The aqueous solution undergoes partial decomposition in the cold and is totally decomposed on boiling. (W. Crum, *Ann. Ch. u. Pharm.*, **89.** 173.)

$Fe_2O_3, 2\,C_4H_3O_3 + Aq$

III.) *sesqui.* Slowly but completely soluble in 3 pts. of cold water. This solution has a great tendency to become gelatinous. Incompletely soluble in absolute alcohol or in highly rectified spirit; but is soluble for the most part in 8 pts. of ordinary alcohol. Behaves like the teracetate as regards ether, chloroform, and acetate of ethyl. (Walz, in Wittstein's *Handw.*)

$2\,Fe_2O_3, 3\,C_4H_3O_3 + 10\,Aq$

IV.) *ter, or normal.* When exposed to the air it effloresces, losing 2 equivs. of HO. The 2 hydrated salt thus formed is soluble in almost all proportions in water, in 4 pts. of absolute alcohol, and in 3 pts. of highly rectified spirit. Insoluble in ether or chloroform. Very sparingly soluble in acetate of ethyl. (Walz, in Wittstein's *Handw.*) Soluble in a moderate amount of water, but is precipitated from this solution when the latter is diluted or boiled. (Barker.) The aqueous solution is liable to be decomposed to a slight extent both when dilute or concentrated. This decomposition is somewhat greater at the temperature of boiling than in the cold. (Crum, *Ann. Ch. u. Pharm.*, **89.** 173.) Miscible with alcohol. Soluble in acetic ether. When a solution of acetate of peroxide of iron is maintained at a temperature near 100° during several hours, the properties of the salt are essentially changed. The addition of a trace of sulphuric acid or of an alkaline salt occasioning the precipitation of an oxide of iron which is insoluble in cold acids. [See under sesquioxide of iron hydrated ($Fe_2O_3, 3HO$).] (Pean St. Gilles.) Hence, if a solution of sesquioxide of iron, containing but little free acid, be treated with an excess of acetate of soda, and then boiled, all the iron will be precipitated. (Fresenius, *Quant.*, p. 141.)

$C_{12}H_9Fe_2'''O_{12} + 4\,Aq$

V.) *bibasic*, or *di.* Soluble in water; if this solution be diluted and boiled, a still more basic salt will be precipitated. (Janssen.)

$2\,Fe_2O_3, C_4H_3O_3$

VI.) *polybasic.* Basic acetates of iron which contain six equivalents or less of base to one equivalent of acid may be obtained dissolved in water, but those which contain a larger proportion of base than this, are insoluble. (Ordway, *Am. J. Sci.*, (2.) **26.** 202.)

Insoluble in acetic acid. (Duflos.)

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Acetate of Jervin. Soluble in water.

Acetate of Lanthanum. Easily soluble in water. (Mosander.)

Acetate of Lead.

I.) *normal, or mono.* Soluble in water. Sparingly soluble in hot absolute alcohol.
a = anhydrous. $C_4H_3PbO_4$

$b = C_4H_3PbO_4 + 3Aq$ (*Sugar of Lead. Salt of Saturn.*) Slightly efflorescent in dry air. Soluble in 0.5 pt. of boiling water. (Wenzel.) Soluble in 1 pt. of water at 38°. (Wenzel in his *Verwandtschaft*, p. 308 [T.].) Thompson (in his *System*, **2.** 641) affirms that this statement of Wenzel is a mistake. Soluble in 1.63 pts. of cold water; the saturated solution containing 37 % of it; still more readily soluble in hot water. (M. R. & P.) Soluble in 1.714 pts. of water at 18.75°. (Abl, from *Oesterr. Zeitschrift, für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht, für* 1854, p. 76.)
100 pts. of boiling water dissolve about 29 pts. of it.
" " cold water retains in solution about 27 pts. of it. (Bostock, *Nicholson's Journ.*, **11.** 79, [T.].)

The aqueous solution saturated
at 10° contains 11.4% of it. (Eller.)
" ?° " 7.7% " (Mussembrock.)
" 12.5° " 24.4% " (Hassenfratz, *Ann. de Chim.*, **28.** 291.)

The aqueous solution saturated at 15° is of 1.236673 sp. gr., and contains dissolved in every 100 pts. of water at least 45.653 pts. of the salt. (Michel & Krafft, *Ann. Ch. et Phys*, (3.) **41.** pp. 478, 482.) The aqueous solution saturated at its boiling-point (101.70°) contains 41.5% of the dry salt; or 100 pts. of water at 101.7° dissolve 70.94 pts. of it; or 1 pt. of the dry salt is soluble in 1.41 pts. of water at 101.7°. (T. Griffith's, *Quar. J. Sci.*, 1825, **18.** 90.)

Melts in its water of crystallization at about 57°.

An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of the salt.	An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of the salt.
1.0070	1	1.0731	10
1.0140	2	1.0891	12
1.0211	3	1.1055	14
1.0283	4	1.1221	16
1.0366	5	1.1330	18
1.0430	6	1.1560	20
1.0505	7	1.1740	22
1.0580	8	1.1928	24
1.0655	9		

(Hassenfratz, *Ann. de Chim.*, **28.** 302.)

Tolerably soluble in spirit, less so in absolute alcohol. Soluble in 8 pts. of alcohol. (M. R. & P.) Soluble in 1 pt. of strong alcohol at 68°. (Cited in Thompson's *System of Chem.*, **2.** 285.) 100 pts. of alcohol, of 0.835 sp. gr., dissolve 7.85 pts. of it at 15.5°. (*Ibid.*, p. 641.) Ether precipitates it from its alcoholic solution. Very readily soluble in boiling creosote, the solution becoming solid on cooling. (Reichenbach.)

When one equivalent of $C_4H_3PbO_4$, in aqueous solution, is mixed with a solution of an equivalent of nitrate of potash (KO, NO_5) 0.09 of it are decomposed to nitrate of lead, which may be precipitated by adding alcohol, while 0.91 of it remain unchanged; when mixed with a solution of an equivalent of nitrate of baryta (BaO, NO_5), 0.22 of it are decomposed as before, while 0.78 of it remain unchanged; when mixed with a solution of an equivalent of nitrate of strontia (SrO, NO_5), 0.33 of it are decomposed while 0.67 of it remain unchanged. (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.)

II.) *sesquibasic.* $3PbO, 2C_4H_3O_3$ & $+Aq$ The crystals dissolve in 0.9 pts. of water at 12.75°; therefore more abundantly than the normal salt. The saturated aqueous solution can still dissolve both monobasic and terbasic acetate of lead. Less soluble in alcohol than in water, but more soluble in alcohol than the normal acetate.

The anhydrous salt dissolves in strong alcohol; on adding water to this solution trisacetate of lead is precipitated, while the normal salt remains in solution. (Payen, in Berzelius's *Lehrb.*)

III.) *din.* $2PbO, C_4H_3O_3$ & $+ Aq$, & $2Aq$ Soluble in less than 1.5 pts. of water. Tolerably soluble in weak spirit. Soluble in about 30 pts. of alcohol of 90%. Insoluble in absolute alcohol. (Schindler.)

IV.) *tris.* $3PbO, C_4H_3O_3 + Aq$ Very soluble in water, though less so than the normal salt. Soluble in 5.56 pts. of boiling water.

Soluble in 18 pts. of cold water. Insoluble in strong alcohol. (Berzelius, *Lehrb.*) Soluble in spirit and in dilute wood-spirit, though less so than in water. Slightly soluble also in wood-spirit of 97%, but not in alcohol of 97%. (Payen.) Soluble in a saturated aqueous solution of the sesquibasic salt.

V.) *hexa.* $6PbO, C_4H_3O_3 + 3HO$ Sparingly soluble in boiling water, from which it crystallizes on cooling.

Acetate *of peroxide* **of Lead.**
$PbO_2, 3C_4H_3O_3$

Acetate of Lead & of Potash. $3PbO, 2KO, 3C_4H_3O_3$ Tolerably soluble in hot water. (Taddei.)

Acetate of Lead & of Soda.
$2C_4H_3PbO_4; C_4H_3NaO_4 + 3Aq$

Acetate of Lead & of Uranium. $C_4H_3PbO_4; Ur_2O_3, C_4H_3O_3 + 6Aq$ Readily soluble in water. (Wertheim, *loc. cit.*)

Acetate of Lead with Anacardate of Lead. $C_4H_3PbO_4; C_{44}H_{31}PbO_7$ Insoluble in water. Insoluble in cold alcohol, but is partially decomposed by long-continued washing therewith, or immediately by boiling alcohol. Decomposed by ether.

Acetate of Lead with Chloride of Lead. $5C_4H_3PbO_4; PbCl + 15Aq$ Efflorescent. Easily soluble in water. Decomposed by alcohol. (Poggiale.)

Acetate of Lead with HydroKinone. $2C_4H_3PbO_4; C_{12}H_6O_4 + 3Aq$ Difficultly soluble in cold, easily soluble in boiling water. Almost insoluble in cold alcohol; decomposed by boiling alcohol, and ether. (Kolbe's *Lehrb.*, **1.** 467.)

Acetate of Lead, with Picrate of Lead.
I.) $C_4H_3PbNO_4; C_{12}H_2Pb(NO_4)_3O_2 + 4Aq$ Readily soluble in water. The solution is decomposed by evaporation.

II.) $C_4H_3PbO_4; 2C_{12}H_2Pb(NO_4)_3O_2, PbO + 8Aq$ Decomposed by long-continued boiling with water.

Acetate of Lead with ThioNaphtamate of Lead. $C_4H_3PbO_4; C_{20}H_8PbNS_2O_6$ Sparingly soluble in cold, more readily soluble in hot water. (Piria, *Ann. Ch. et Phys.*, (3.) **31.** 247.)

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Acetate of Lime. Effloresces in dry air. $C_4H_3CaO_4+xAq$ Very soluble in water.

The aqueous solution saturated at 12.5° contains 17.8% of it. (Hassenfratz, *Ann. de Chim.*, **28.** 291.) Less soluble in alcohol than in water.

100 pts. of alcohol of 0.900 sp. gr. dissolve 2.4 pts. of it.
" " " 0.848 " " 4.12 "
" " " 0.834 " " 4.75 "
" " " 0.817 " " 4.88 "

(Kirwan, *On Mineral Waters*, p. 274. [T.].) Insoluble in creosote. (Reichenbach.)

An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of it.	An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of it.
1.0049	1	1.0400	8
1.0098	2	1.0453	9
1.0147	3	1.0507	10
1.0197	4	1.0615	12
1.0247	5	1.0735	14
1.0297	6	1.0860	16
1.0348	7		

(Hassenfratz, *Ann. de Chim.*, **28.** 302.)

Acetate of Lime & of Uranium. $C_4H_3CaO_4; 2(C_4H_3O_3, Ur_2O_3)+8Aq$ Permanent. Soluble in water,—without decomposition if acetic acid be present. (Weselsky.)

Acetate of Lime with Chloride of Calcium. $C_4H_3CaO_4; CaCl+10Aq$ Permanent. Easily soluble in water. (Fritzsche.)

Acetate of Lithia. Permanent. (Winter.) $C_4H_3LiO_4+4Aq$ [Deliquescent. (Troost.); Berzelius's *Lehrb.*] Soluble in 0.2833 pt. of water at 15°; this solution solidifies at 4°. Soluble in 4.64 pts. of alcohol, of 0.81 sp. gr., at 14°. Sparingly soluble in ether. (Pleischl.) It begins to melt in its water of crystallization at 19°. (Berzelius's *Lehrb.*)

Acetate of Lobelin. Soluble in alcohol.

Acetate of Magnesia. Deliquescent. $C_4H_3MgO_4+4Aq$ Very soluble in water, and alcohol. (Bergman, *Essays*, **1.** 450; Wenzel.) The aqueous solution saturated at 12.5° contains 50% of it. (Hassenfratz, *Ann. de Chim.*, **28.** 291.)

An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of it.	An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of it.
1.0041	1	1.0983	22
1.0082	2	1.1086	24
1.0124	3	1.1180	26
1.0166	4	1.1294	28
1.0208	5	1.1400	30
1.0250	6	1.1507	32
1.0293	7	1.1614	34
1.0337	8	1.1723	36
1.0380	9	1.1834	38
1.0424	10	1.1946	40
1.0512	12	1.2058	42
1.0603	14	1.2172	44
1.0696	16	1.2287	46
1.0790	18	1.2403	48
1.0885	20	1.2520	50

(Hassenfratz, *Ann. de Chim.*, **28.** 303.)

Acetate of Magnesia & of Uranium. $a=2C_4H_3(Ur_2O_2)O_3; C_4H_3MgO_4+8Aq$ Less soluble in cold than in warm water. (Wertheim, *Ann. Ch. et Phys.*, (3.) **11.** 65.)

$b=$ ditto $+12Aq$ Efflorescent. Soluble in water, without decomposition if this be acidulated with acetic acid. (Weselsky.)

Acetate of Manganese. Permanent. $C_4H_3MnO_4+4Aq$ Soluble in 3.5 pts. of cold water (John.) Soluble in 3.0 pts. of cold water. (Klauer.) 100 pts. of water at 15.5° dissolve 3 pts. of it. (Ure's *Dict.*) Soluble in alcohol.

Acetate of Manganese & of Uranium. $2C_4H_3(Ur_2O_2)O_3; C_4H_3MnO_4+12Aq$ Efflorescent. Soluble in water, without decomposition if this be acidulated with acetic acid. (Weselsky.)

Acetate of Melamin. Very soluble in water.

Acetate of Mercur(*ic*)ammonium. $C_4H_3(N\left\{\begin{matrix}H_3\\Hg\end{matrix}\right.)O_4+2Aq$ Readily soluble in water. Insoluble in alcohol. (Hirzel, [Ger.].)

Acetate of *tetra*Mercur(*ic*)ammonium. $C_4H_3(N\{Hg_4)O_4+4Aq$; or "$C_4H_3(N\left\{\begin{matrix}H_3\\Hg\end{matrix}\right.)O_4; 8HgO$" Slightly soluble in water, since 1000 pts. of boiling water dissolve 5.7 pts. of it, but the solution undergoes decomposition when boiled for some time. Insoluble in alcohol or ether. Decomposed by caustic potash. (Berzelius's *Lehrb.*)

Acetate of *tetra*Mercur(*ous*)ammonium. $C_4H_3(N\{(Hg_2)_4)O_4+2Aq$; or "$C_4H_3(N\left\{\begin{matrix}H_2\\2Hg_2\end{matrix}\right.)O_4; 2HgO$" Insoluble in water. (Berzelius's *Lehrb.*)

Acetate of MercurEthyl.

Acetate *of dinoxide* of Mercury. $C_4H_3Hg_2O_4$ Permanent. Soluble in 600 pts. of cold, much more soluble in hot water.

Soluble in 133 pts. of water at 12° @ 15°. (Garot.) Soluble in 320 pts. of water at 18.75°. (Abl, from *Oesterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) 1000 pts. of water at 15° dissolve only 1.3 pts. of it [or, 1 pt. of the salt is soluble in 769 pts. of water at 15°]. Partially decomposed by boiling water. Much more soluble in water acidulated with acetic acid than in pure water, a considerable quantity being dissolved on boiling. (Berzelius's *Lehrb.*) Insoluble, or almost insoluble, in alcohol. Decomposed on boiling with water or alcohol.

It is one of the least soluble of the metallic acetates. When treated with aqueous solutions of the alkaline chlorides, and especially when these are hot, a certain amount of protochloride of mercury ($HgCl$) is formed and dissolves. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 179.)

Acetate *of protoxide* of Mercury. $C_4H_3HgO_4$ Suffers partial decomposition in the air. Soluble in 4 pts. of water at 10°. (Garot.) Soluble in 2.75 pts. of water at 19°. Soluble in about 1 pt. of boiling water. (Stromeyer.) The solution saturated at 19° contains 26.66% of it. Soluble in 17.7 pts. of alcohol (of 0.811 sp. gr.) at 19°, but with partial decomposition. (Stromeyer.) Alcohol, and ether, dissolve out its acid, leaving oxide of mercury. (Garot.) When the aqueous or alcoholic solution is boiled, a portion of the acid escapes, and a part of the HgO is reduced to Hg_2O. (Berzelius's *Lehrb.*) Instantly decomposed by ether. (Harff.)

Acetate *of protoxide* of Mercury with Cyanide of Mercury.

Acetate *of protoxide* of Mercury with Sulphide of Mercury. Ppt. Completely soluble in boiling water. (Taddei.)

Acetate of Methyl. $C_4H_3(C_2H_3)O_4$ Soluble in water, the aqueous solution suffering decomposition to a slight extent on

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being boiled. Miscible in all proportions with alcohol, wood-spirit, and ether.

ACETATE OF METHYL*chloré*. *Vid.* Acetate of ChloroMethyl.

ACETATE OF METHYL *perchloré*. *Vid. Ter*Acetate of *ter*ChloroMethyl.

ACETATE OF METHYLENE. (*biAcetate of MethylGlycol.*) $C_{10}H_8O_8 = C_8H_6(C_2H_2'')O_8$ Slowly and sparingly soluble in water. Easily soluble with decomposition in alkaline solutions. Soluble in ether. (Boutlerow, *Ann. Ch. et Phys.*, (3.) **53.** 320.)

ACETATE OF METHYLNICOTIN. Soluble in water.

ACETATE *of protoxide* OF MOLYBDENUM. $C_4H_3MoO_4$ Insoluble in water. Slightly soluble in acetic acid. (Berzelius.)

ACETATE *of binoxide* OF MOLYBDENUM. $C_8H_6Mo''O_8$ Ppt. While yet moist it is soluble in boiling acetic acid, but the solution becomes gelatinous on cooling. (Berzelius, [*Gm.*].)

ACETATE OF MOLYBDIC ACID. Very sparingly soluble in water. (Berzelius.)

ACETATE OF MORPHINE. $C_4H_3(N\left\{\begin{matrix}C_{34}H_{18}O_6''.H\\H\end{matrix}\right.)O_4+4Aq$ Permanent. Soluble in 17 pts. of cold water. Soluble in 1 pt. of boiling water. Soluble in 44 pts. of cold alcohol of 80%. Soluble in 1 pt. of boiling alcohol of 80%. (Wittstein, in his *Handw.*) Soluble in 24 pts. of water at 18.75°. (Abl, from *Oesterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) 100 pts. of chloroform dissolve 1.66 pts. of it at the ordinary temperature. (Schlimpert, *Kopp & Will's Jahresbericht, für* 1859, p. 405.)

ACETATE OF NARCOTIN.

ACETATE OF NICKEL. $C_4H_3NiO_4+5Aq$ Slightly efflorescent. Soluble in 6 pts. of cold water. Insoluble in alcohol. (Tupputi.)

ACETATE OF NICKEL & *of sesquioxide* OF URANIUM. $2Ur_2O_3, NiO, 3C_4H_3O_3+7Aq$ Soluble in water, — without decomposition if this be acidulated with acetic acid. (Weselsky.)

ACETATE OF NICOTIN. Readily soluble in water, alcohol, and ether. (Schlœssing.)

ACETATE OF NITROHARMALIN. Soluble in water.

ACETATE OF NITROHARMIN. Partially decomposed by water, especially when this is hot.

ACETATE OF OCTYL. *Vid.* Acetate of Capryl.

ACETATE OF OXYCANTHIN.

ACETATE OF PHENYL. $C_{16}H_8O_4 = C_4H_3(C_{12}H_5)O_4$ Slightly soluble in cold water. Soluble with decomposition in hot water. (Scrugham, *J. Ch. Soc.*, **7.** 241.)

ACETATE OF PICOLIN. Soluble in water. (Unverdorben.)

ACETATE OF PLATINUM (Pt O). $C_4H_3PtO_4$ Soluble in water. (Berzelius.)

ACETATE *of sesquioxide* OF RHODIUM. A red solution. (Berzelius.)

ACETATE OF RHODIUM & OF SODIUM. Easily soluble in water. Insoluble in alcohol.

ACETATE OF POTASH.

I.) *normal.* $C_4H_3KO_4$ Very deliquescent. Very easily soluble in water. Soluble in 0.531 pt. water at 2°. Soluble in 0.437 pt. water at 13.9°. Soluble in 0.321 pt. water at 28.5°. Soluble in 0.203 pt. water at 62.0°. (Osann.) Soluble in 1.02 pt. of water at 15.5°. (Speilmann.[T.].) Soluble in 1 pt. of water at 18.75°. (Abl, from *Oesterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) Soluble in 0.125 pt. of water at 169° (boiling-point of the saturated solution), or 100 pts. of water at 169° dissolve 798.2 pts. of it. (Legrand, *loc. inf. cit.*) A very dilute aqueous solution decomposes when left to itself. (Berzelius, *Lehrb.*) Partial decomposition with loss of acetic acid also occurs when the aqueous solution is boiled down.

In a solution containing for 100 pts. of water, pts. of dry acetate of potash	The boiling-point is elevated.	Difference.
0.0	0°	
10.5	1	10.5
20.5	2	9.5
28.6	3	8.6
36.4	4	7.8
43.4	5	7.0
49.8	6	6.4
55.8	7	6.0
61.6	8	5.8
67.4	9	5.8
73.3	10	5.9
79.3	11	6.0
85.3	12	6.0
91.4	13	6.1
97.6	14	6.2
103.9	15	6.3
110.3	16	6.4
116.8	17	6.5
123.4	18	6.6
130.1	19	6.7
136.9	20	6.8
143.8	21	6.9
150.8	22	7.0
157.9	23	7.1
165.1	24	7.2
172.5	25	7.4
180.1	26	7.6
188.0	27	7.9
196.1	28	8.1
204.4	29	8.8
213.0	30	8.6
230.6	32	17.6
248.7	34	18.1
267.5	36	18.8
287.3	38	19.8
308.3	40	21.0
330.8	42	22.5
354.9	44	24.1
380.6	46	25.7
407.9	48	27.3
436.9	50	29.0
467.6	52	30.7
500.0	54	32.4
534.1	56	34.1
569.9	58	35.8
607.4	60	37.5
646.6	62	39.2
687.6	64	41.0
730.4	66	42.8
775.0	68	44.6
798.2 (Saturated.)	69	23.2

The point of ebullition of pure water, observed in a glass tube, containing bits of metallic zinc, having been 100.2°. (Legrand, *Ann. Ch. et Phys.*, 1835, (2.) **59.** 440.) Easily soluble in alcohol, though less so than in water. Soluble in 3 pts. of absolute alcohol at the ordinary temperature. Soluble in 2 pts. of absolute alcohol at the temperature of ebullition.

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(Destouches.) Soluble in alcohol of 60%. (Trommsdorff.) Ether precipitates it from the alcoholic solution. Readily soluble in boiling, less so in cold creosote. (Reichenbach.) Soluble in both anhydrous and hydrated acetic acid. Soluble in warm, less soluble in cold hydrate of anisyl. When one equivalent of $C_4H_3KO_4$, in aqueous solution, is mixed with a solution of an equivalent of nitrate of lead (PbO, NO_5), 0.92 of it are decomposed to nitrate of potash, which may be precipitated by adding alcohol, while 0.08 of it remain unchanged; when mixed with a solution of an equivalent of nitrate of strontia (SrO, NO_5) 0.67 of it are decomposed as before, while 0.33 of it remain unchanged; when mixed with a solution of an equivalent of nitrate of baryta (BaO, NO_5), 0.27 of it are decomposed, while 0.73 of it remain unchanged; when mixed with a solution of an equivalent of sulphate of soda (NaO, SO_3), 0.62 of it are decomposed, while 0.38 of it remain unchanged. (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.)

II.) "*Anhydrous bin*ACETATE OF POTASH." Less deliquescent than the normal salt. Exceedingly soluble in water. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 317.)

$2\,C_4H_3KO_4, C_8H_6O_6$

III.) *Bin*ACETATE OF POTASH. Deliquescent, though less so than the normal salt. Easily soluble in water, and alcohol. More soluble in hot than in cold absolute alcohol.

(*Ordinary.*)
$C_4H_3KO_4, C_4H_4O_4$ & $+ 6\,Aq$

ACETATE OF POTASH & OF THORIA. Soluble in water.

ACETATE OF POTASH & OF URANIUM. Easily soluble in cold water; partially decomposed by boiling water. (Wertheim, *Ann. Ch. et Phys.*, (3.) **11.** 62.)

$2\,C_4H_3(Ur_2O_3)O_3;\ C_4H_3KO_4 + 2\,Aq$

ACETATE OF PROPYL.
(*Acetate of Trityl. Propyl Acetic Ether.*)
$C_{10}H_{10}O_4 = C_4H_3(C_6H_7)O_4$

*Bin*ACETATE OF PROPYLENE. Insoluble in a small quantity, but dissolves in about 10 times its volume of water. Soluble in all proportions in alcohol, and ether. (A. Wurtz.)

(*BinAcetate of Tritylene* (*of Gerhardt*). *Propyl Glycol diAcetique.*)
$C_{14}H_{12}O_8 = C_8H_6(C_6H_6'')O_8$

ACETATE OF PROPYLENYL.
Vid. Acetate of Allyl.

ACETATE OF QUINIDIN. Readily soluble in water; more soluble than the acetate of quinine.

ACETATE OF QUININE. Sparingly soluble in cold, readily soluble in boiling water. Soluble in alcohol.

ACETATE *of sesquioxide* OF RHODIUM. Soluble in boiling water. (Berzelius, *Lehrb.*)

ACETATE *of sesquioxide* OF RHODIUM & OF SODA. Very readily soluble in water. Insoluble in alcohol. (Berzelius.)

ACETATE OF SALICYLOUS ACID.
Vid. AcetoSalicyl.

ACETATE OF SILVER. Difficultly soluble in water; being one of the least soluble of the metallic acetates. (Otto-Graham.) Soluble in 100 pts. of cold water. (Chenevix.) Readily soluble in cyanide of potassium.

$C_4H_3AgO_4$

ACETATE OF SILVER & OF URANIUM. Easily soluble without decomposition in cold, but is decomposed by boiling water. (Wertheim, *Ann. Ch. et Phys.*, (3.) **11.** 61.)

$2\,C_4H_3(Ur_2O_3)O_3;\ C_4H_3AgO_4 + 2\,Aq$

ACETATE OF SILVER with PROPIONATE OF SILVER. Difficultly soluble in water.

$C_4H_3AgO_4;\ C_6H_5AgO_4$

ACETATE OF SODA.

I.) *normal.* Slowly efflorescent. Soluble in 2.86 pts. of cold water, the saturated solution containing 25.91% of it. (Bergman, **5.** 78, [T.].)

$a = C_4H_3NaO_4 + 6\,Aq$
(*Ordinary Commercial.*)

Soluble in 3.9 pts. of water at 6°.
" 2.4 " " 37°.
" 1.7 " " 48°.
(Osann.)

Soluble in 3 pts. of water at 18.75°. (Abl, from *Oesterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) The aqueous solution saturated at 12.5° contains 51.7% of it. (Hassenfratz, *Ann. de Chim.*, **28.** 291.) 100 pts. of water at 15.5° dissolve 35 pts. of it. (Ure's *Dict.*) The aqueous solution saturated at its boiling-point (124.4°) contains 60% of the dry salt; or, 100 pts. of water at 124.4° dissolve 150 pts. of it; or 1 pt. of the dry salt is soluble in 0.66 pt. of water at 124.4°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.)

When heated, it melts in its water of crystallization, and if the fluid is covered with a layer of oil it will not solidify as it becomes cold, unless it be agitated as by adding a crystal of the salt. (Berzelius, *Lehrb.*)

An aqueous solution of sp. gr. at 12.5°	Contains per cent of the salt.	An aqueous solution of sp. gr. at 12.5°	Contains per cent of the salt.
1.0028	1	1.0685	22
1.0058	2	1.0751	24
1.0087	3	1.0817	26
1.0117	4	1.0883	28
1.0146	5	1.0955	30
1.0176	6	1.1018	32
1.0206	7	1.1090	34
1.0237	8	1.1165	36
1.0267	9	1.1242	38
1.0299	10	1.1320	40
1.0361	12	1.1399	42
1.0424	14	1.1482	44
1.0488	16	1.1567	46
1.0553	18	1.1656	48
1.0619	20	1.1755	50

(Hassenfratz, *Ann. de Chim.*, **28.** 303.)

An aqueous solution of sp. gr. at 12.5°	Contains 1 pt. of crystallized Acetate of Soda in pts. of water.	Boils at °C.
1.008	50	100.18°
1.010	40	100.2°
1.014	30	100.3°
1.017	20	100.4°
1.030	10	100.8°
1.060	5	101.7°
1.100	2	103.6°

(R. Brandes, *Brandes's Archiv.*, 1827, **22.** 147.)

In a solution containing for 100 pts. of water, pts. of dry Acetate of Soda.	The temperature of ebullition is elevated.	Difference.
0.0	0°	
9.9	1	9.9
17.6	2	7.7
24.1	3	6.5
30.5	4	6.4
36.7	5	6.2
42.9	6	6.2
49.3	7	6.4
55.8	8	6.5
64.2	9	6.6
69.2	10	6.8
76.2	11	7.0

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In a solution containing for 100 pts. of water, pts. of dry Acetate of Soda.	The temperature of ebullition is elevated.	Difference.
83.4	12°	7.2
90.9	13	7.5
98.8	14	7.9
107.1	15	8.3
115.8	16	8.7
125.1	17	9.3
134.9	18	9.8
145.2	19	10.3
156.1	20	10.9
167.4	21	11.3
179.3	22	11.9
191.6	23	12.3
204.5	24	12.9
209.0 (Saturated.)	24.37	4.5

The point of ebullition of pure water, observed in a glass tube containing bits of zinc, having been 100.1°. (Legrand, *Ann. Ch. et Phys.*, 1835, (2.) **59.** 439.)

Less soluble in alcohol than in water. Soluble in 2.143 pts. of strong boiling alcohol. (Wenzel, in his *Verwandtschaft*, p. 300, [T.].) Ether precipitates it from its cold alcoholic solution. (Dœbereiner.) Readily soluble in boiling, less so in cold creosote. (Reichenbach.)

When one equivalent of $C_4H_3NaO_4$, in aqueous solution, is mixed with a solution of an equivalent of sulphate of potash (KO, SO_3) 0.365 of it are decomposed to sulphate of soda, which may be precipitated by adding alcohol, while 0.635 of it remain unchanged. (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.)

b = $C_4H_3NaO_4 + 9Aq$ Effloresces more rapidly than *a*.

*Bin***Acetate of Soda.**

Acetate of Soda & of Uranium. Soluble in water. (Wertheim, *Ann. Ch. et Phys.*, (3.) **11.** 50.) Its aqueous solution is decomposed on boiling, with separation of sesquioxide of uranium. (H. Rose, *Pogg. Ann.*, **83.** 148.)

$2(Ur_2O_3, C_4H_3O_3) ; C_4H_3NaO_4$

Acetate of Soda with Cyanide of Mercury. Soluble in water. (Custer.)

$HgCy ; C_4H_3NaO_4 + 7Aq$

Acetate of Soda with Propionate of Soda. Easily soluble in water. (Gottlieb.)

$C_4H_3NaO_4 ; C_6H_5NaO_4 + 9Aq$

Acetate of Soda with Sulphate of Soda. (Mill, *Ann. Phil.*, (2.) **10.** 113. [T.].)

(*SulphoAcetate of Soda.*)
$7C_4H_3NaO_4 ; NaO, SO_3 + x\,Aq$

Acetate of Solanin. Readily soluble in water.

Acetate of StanMethyl.

Acetate of StannEthyl. Soluble in water. (Cahours & Riche.)

Acetate of Stib*tri*Amyl.

Acetate of Stib*tri*Ethyl. Soluble in water. (Merck.)

Acetate of StibEthylium. Soluble in water, and alcohol. More soluble in water than the formiate.

Acetate of StibMethylEthylium. Slowly deliquescent. Readily soluble in water. (Friedlænder.)

$C_4H_3\left(Sb\left\{\begin{matrix}C_2H_3\\(C_4H_5)_3\end{matrix}\right.\right)O_4$

Acetate of StibMethylium. Soluble in water, the solution decomposing when evaporated.

Acetate of Strontia. Efflorescent. Soluble in 2.5 pts. of cold water. (Berzelius's *Lehrb.*, **3.** 389.) 100 pts. of water at 100° dissolve 40 pts. of it. (Ure's *Dict.*) Very easily soluble in water; less soluble in alcohol. (Vauquelin.) Insoluble in creosote. (Reichenbach.)

$C_4H_3SrO_4 + 4Aq$, & $+ \frac{1}{2}Aq$

When one equivalent of $C_4H_3SrO_4$, in aqueous solution, is mixed with a solution of an equivalent of nitrate of lead (Pb O, NO_5) 0.655 of it are decomposed to nitrate of strontia, which may be precipitated by adding alcohol, while 0.345 of it remain unchanged; when mixed with a solution of an equivalent of nitrate of potash (KO, NO_5) 0.36 of it are decomposed as before, while 0.64 of it remain unchanged. (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.)

Acetate of Strontia & of Uranium. Soluble in water; without decomposition if this be acidulated with acetic acid. (Weselsky.)

$2C_4H_3(Ur_2O_2)O_3 ; C_4H_3SrO_4 + 6Aq$

Acetate of Strontia with Nitrate of Strontia. Permanent. Soluble in water. (v. Hauer.)

$C_4H_3SrO_4 ; SrO, NO_5 + 3Aq$

Acetate of Strychnine. Soluble in 96 pts. of water at 18.75°. (Abl, from *Oesterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) Very soluble in water, and alcohol. (Parrish's *Pract. Pharm.*, p. 409.)

Acetate of TellurMethyl. Easily soluble in water. (Wœhler & Dean.)

Acetate of Tetryl.
Vid. Acetate of Butyl.

Acetate of ThiAcetonin. Very soluble in water, and alcohol. (Stædeler.)

Acetate of Thoria. Scarcely at all soluble in water.

$C_4H_3ThO_4$

Acetate *of protoxide* **of Tin.** Soluble in water. Insoluble in alcohol.

$C_4H_3SnO_4$

Acetate *of binoxide* **of Tin.** Easily soluble in water. (Wenzel.)

$C_8H_6Sn''O_8$

Acetate of Titanium (Ti O_2). Soluble in water.

Acetate of Toluenyl. Insoluble in water. Soluble in alcohol.

(*Acetate of Benzene.*)
$C_{18}H_{10}O_4 = C_4H_3(C_{14}H_7)O_4$

Acetate of Trehalose. Tolerably easily soluble in water.

$C_8H_6(C_{12}H_8O_8'')O_8$

Acetate *of protoxide* **of Uranium.** Soluble in water, at least when this is acidulated with acetic acid, but the solution is decomposed by evaporation.

$C_4H_3UrO_4$

Acetate *of sesquioxide* **of Uranium.**

I.) *normal.* Much less soluble in water than nitrate of uranium. Decomposed by boiling water. (Wertheim, *Ann. Ch. et Phys.*, (3.) **11.** pp. 50, 57.) Easily soluble in water, and alcohol. (Berzelius, *Lehrb.*)

$Ur_2O_3, C_4H_3O_3 + 2Aq$ & $+ 8Aq$

II.) *terbasic.* Soluble in water. (Ordway, *Am. J. Sci.*, (2.) **26.** 209.)

Acetate of Uranium & of Zinc. Soluble in water, without decomposition if this is acidulated with acetic acid. (Weselsky.)

$2(Ur_2O_3, C_4H_3O_3) ; C_4H_3ZnO_4 + 7Aq$

Acetate of Vanadium. Very slowly soluble in water. (Berzelius.)

$C_8H_6Va''O_8$

Acetate of Yttria. Permanent. Soluble in 9 pts. of cold water, and in much less hot water. Soluble in alcohol. (Berlin.)

$C_4H_3YO_4 + 2Aq$

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Acetate of Zinc.

I.) *normal.*

a = anhydrous. Soluble in water.

b = hydrated. Permanent. Very soluble in water.

$C_4H_3ZnO_4 + 3\,Aq$

Soluble in 3 pts. of cold water.
" 0.5 " boiling "
" 80 " cold alcohol of 80%.
" 30 " boiling " "
(Wittstein's *Handw.*)

Soluble in 3 pts. of water at 18.75°. (Abl, from *Oesterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) Readily soluble in boiling, less so in cold creosote. (Reichenbach.)

II.) *basic.* There appear to be two basic compounds, one of which is difficultly soluble in water.

Acetate of Zirconia. Deliquescent. (Berzelius.) Permanent. (Vauquelin.) Easily soluble in water and in alcohol. (Klaproth.)

$C_{12}H_9Zr'''O_{12}$

Acetene.
Vid. Ethylene.

Acetic Chloride.
Vid. Chloride of Acetyl.

Acetic Ether.
Vid. Acetate of Ethyl.

Acetic Salicylate.
Vid. AcetoSalicylic Acid(Anhydrous).

Acetidin.
Vid. Acetate of Glyceryl(II.).

Acetin, *mono, bi, tri.*
Vid. Acetate of Glyceryl.

AcetoBenzoic Acid(Anhydrous). Slowly acidified by boiling water. Decomposed by alcohol. Soluble in ether. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 308.)

(Benzoacetic Acid. Acetate of Benzoyl. Benzoate of Acetyl. Benzoic Acetate. Acetic Benzoate.)

$C_{18}H_8O_6 = \left.\begin{matrix}C_4H_3O_2\\C_{14}H_5O_2\end{matrix}\right\}O_2$

AcetoButyrate of *X.*
Vid. ButyroAcetate of *X.*

AcetoClhorhydrin. Nearly insoluble in water. (Berthelot, *Ann. Ch. et Phys.*, (3.) **41.** 302.)

$C_{10}H_9ClO_6$

Aceto*di***Chlorhydin.** Sparingly soluble in water. (Berthelot, *Ann. Ch. et Phys.*, (3.) **52.** 460.)

$C_{10}H_8Cl_2O_4$

*Din***AcetoChlorhydrin.**

$C_{14}H_{11}ClO_8$

AcetoChlorhydroBromhydrin.

$C_{10}H_8ClBrO_4$

AcetoCinnamic Acid(Anhydrous). Soluble in ether. (Gerhardt.)

(Cinnamic Acetate. Acetic Cinnamate. Acetate of Cinnamyl. Cinnamate of Acetyl.

$C_{22}H_{10}O_6 = \left.\begin{matrix}C_{18}H_7O_2\\C_4H_3O_2\end{matrix}\right\}O_2$

AcetoCuminic Acid (Anhydrous). Readily acidified by water. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 310.)

(Acetate of Cumyl. Cuminate of Benzoyl. Cuminic Acetate. Acetic Cuminate.)

$C_{24}H_{14}O_6 = \left.\begin{matrix}C_4H_3O_2\\C_{20}H_{11}O_2\end{matrix}\right\}O_2$

Acetonic Acid. Easily soluble in water, alcohol, and ether. (Stædeler.)

$C_{16}H_{16}O_{12} = C_{16}H_{14}O_{10}, 2\,HO$

Acetonate of Baryta. Easily soluble in water, and alcohol. Insoluble in ether. (Stædeler.)

$C_{16}H_{14}Ba_2O_{12}$

Acetonate of Zinc. Only very sparingly soluble even in boiling water. Insoluble in alcohol or ether. (Stædeler.)

$C_{16}H_{14}Zn_2O_{12} + 4\,Aq$

Acetone. Miscible in all proportions with water, alcohol, ether, and the volatile oils; also with many of the compound ethers, and with hot olive oil, but is somewhat less soluble in cold olive oil. On the addition of chloride of calcium, or hydrate, or carbonate of potash to the aqueous solution a portion of the acetone separates out.

(Pyroacetic Spirit. Pyroacetic Ether. Mesitic Alcohol. Methyl Acetyl.)

$C_6H_6O_2 = \left.\begin{matrix}C_4H_3\\C_2H_3\end{matrix}\right\}O_2$

It dissolves many of the fats, resins, camphors, waxes, &c. — But most of the metallic salts which are soluble in alcohol are insoluble in acetone. (Liebig.)

Acetone *Chloré.*
Vid. ChlorAcetone.

Acetonin. Readily soluble in water. The solution becomes turbid when heated. Readily soluble in alcohol, and ether. (Stædeler.)

$C_{18}H_{18}N_2 = N_2\left\{(C_6H_5'')_3\right.$

AcetoNitrate of *X.*
Vid. Acetate of *X* with Nitrate of *X.*

AcetoNitril.
Vid. Cyanide of Methyl.

AcetoNitrile, *trinitré.*
Vid. *ter*NitrAcetoNitril.

AcetoPropionate of Silver. Sparingly soluble in water, the solution undergoing decomposition when boiled. (Frankland & Kolbe.)

$C_{10}H_8Ag_2O_8 = \left.\begin{matrix}C_4H_3AgO_4\\C_6H_5AgO_4\end{matrix}\right\}$

AcetoPropionate of Soda. Very readily soluble in water. (Gottlieb.)

$C_{10}H_8Na_2O_8 + 9\,Aq = \left.\begin{matrix}C_4H_3NaO_4\\C_6H_5NaO_4\end{matrix}\right\} + 9\,Aq$

AcetoSalicyl. Insoluble in water, or in aqueous solutions of potash, or ammonia. Sparingly soluble in cold, more abundantly soluble in boiling alcohol. Sparingly soluble in ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **52.** 192.)

(Salicylide of Acetyl. Acetyl-Salicylous Acid.)

$C_{18}H_8O_6 = \left.\begin{matrix}C_{14}H_5O_4\\C_4H_3O_2\end{matrix}\right\}$

AcetoSalicylic Acid (Anhydrous). Decomposed at once by an aqueous solution of carbonate of soda. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 326.)

(Acetate of Salicyl. Salicylate of Acetyl. Acetic-Salicylate.

$C_{18}H_8O_8 = \left.\begin{matrix}C_{14}H_5O_4\\C_4H_3O_2\end{matrix}\right\}O_2$

Acetosamin. Hygroscopic. Easily soluble in water, with subsequent partial decomposition. Soluble in all proportions in alcohol. Insoluble in ether. Its salts are generally deliquescent; very soluble in water; insoluble, or but sparingly soluble, in alcohol, and insoluble in ether. (Natanson.)

(Acetoylamin. Acetosylamin. Acetylamin (of Natanson).)

$C_4H_5N = N\left\{\begin{matrix}C_4H_3\\H_2\end{matrix}\right.$

AcetoStannEthyl.
Vid. $\frac{4}{3}$-StannEthyl.

Acetosylamin.
Vid. Acetosamin.

*Tetra***Acetosylium.**
Vid. *tetra*Vinylium.

Acetoyl. Not isolated.

(Acetyl (of Berzelius). Vinyl.)

$\left.\begin{matrix}C_4H_3\\C_4H_3\end{matrix}\right\}$ or C_4H_3

Acetoylamin.
Vid. Acetosamin.

AcetoylPhenylamin.
Vid. PhenylAcetosamin.

"**Acetyl**" (of Berzelius). = Acetoyl.

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Acetyl (of Gerhardt, &c). Not isolated.
(*Acetoxyl.*)
$C_4H_3O_2$

AcetylAldehyde. *Vid.* Hydride of Acetyl.

Acetylamin. *Vid.* Acetosamin.

“ **Acetylammonium** ” (of Natanson). *Vid.* Acetosamin.

Acetylammonium. *Vid.* Acetylide of Ammonium.
$C_4H_7NO_2$

AcetylAnilin. *Vid.* PhenylAcetosamin.

AcetylBenzoin. Insoluble in water. Readily soluble in alcohol, and ether. Warm alcohol dissolves nearly twice its weight of this compound. (Zinin.)
$C_{32}H_{14}O_6 = \left.\begin{matrix}C_{28}H_{11}O_2\\C_4H_3O_2\end{matrix}\right\}O_2$

Acetylide of Ammonium. Miscible in all proportions with water; less soluble in alcohol. Very sparingly soluble in ether. (Gerhardt.) Not at all soluble in ether. (Liebig.) Decomposed by dilute acids, like acetic acid.
(*AldehydeAmmonia.*)
$C_4H_7NO_2 = \left.\begin{matrix}C_4H_3O_2\\NH_4\end{matrix}\right\}$

Acetylide of Ammonium with **Nitrate of Silver.** Very soluble in water. Sparingly soluble in alcohol.
$2C_4H_3(NH_4)O_2; AgO, NO_5$

Acetylide of Potassium. Soluble in water.
(*Aldehydate of Potash.*)
$C_4H_3KO_2$

Acetylide of Silver. Easily soluble in water. Sparingly soluble in alcohol.
(*Aldehydate of Silver.*)
$C_4H_3AgO_2$

Acetylium. *Vid.* Acetosamin.

*Tetra***Acetylium.** *Vid.* *tetra*Vinylium.

AcetylMercaptan. *Vid.* Hydride of SulphAcetyl.

AcetylMethyl. *Vid.* Acetone.

AcetylNitroPhloretic Acid. Sparingly soluble in water. Soluble in alcohol. (v. Gilm.)
$C_{22}H_{11}NO_{12} = C_{18}H_7(NO_4)(C_4H_3O_2)O_5, HO$

AcetylPhloretic Acid. Sparingly soluble in cold, easily soluble in boiling water. Easily soluble in ether. (v. Gilm.)
$C_{22}H_{12}O_8 = C_{18}H_8(C_4H_3O_2)O_5, HO$

AcetylSalicylic Acid. Insoluble in cold, somewhat soluble in boiling water. Easily soluble in alcohol, and ether. (v. Gilm.)
$C_{18}H_8O_8$

AcetylSulphide of X. *Vid.* ThiAcetate of X.

AcetylUrea. [See also MethylUrea.] More readily soluble in hot than in cold water, and alcohol. (Moldenhauer.) Very sparingly soluble in cold water. Soluble in 100 pts. of cold alcohol. Soluble in 10 pts. of boiling alcohol. Much more soluble in boiling water than in boiling alcohol. Insoluble in ether. (Zinin.)
$C_8H_6N_2O_4 = N_2\left\{\begin{matrix}C_2O_2''\\C_4H_3O_2\\H_3\end{matrix}\right.$

Achilleic Acid. Soluble in 2 pts. of water at 12.5°. (Zanon.)
(*Perhaps identical with Malic Acid.* (*Gmelin.*)

Achilleate of Ammonia. Very soluble in water. Insoluble in alcohol.

Achilleate of Lead. Ppt.

Achilleate of Lime. Insoluble in alcohol.

Achilleate of Magnesia. Soluble in water.

Achilleate of Potash. Permanent. Very soluble in water. Sparingly soluble in alcohol.

Achilleate of Quinine. Easily soluble in water, and alcohol.

Achilleate of Soda. Very soluble in water. Sparingly soluble in alcohol.

Achillein. (From *Achillea millefolium.*) Hygroscopic. Easily soluble in water, and in boiling alcohol. Insoluble in ether, but soluble in acidulated ether. Also soluble in ammonia-water. (Zanon.)

Acichloride. } Names proposed by Berzelius
Acisulphide. } for compounds of an acid and chloride, or sulphide. (See Berzelius's *Jahresbericht*, **20.** (2. *Abth.*) p. 478.)

AconitAnilic Acid.
Vid. PhenylAconitamic Acid.

AconitAnilid. Soluble in cold alcohol. Partially soluble in ammonia-water. (Pebal.)
$C_{48}H_{21}N_3O_6$ (?)

Aconitic Acid. Permanent. Soluble in 3 pts. of water at 15°, and in a smaller quantity of hot water. (Baup.) Very readily soluble in water, either hot or cold, being much more soluble than its isomer fumaric acid. (Buchner.) Soluble in 2 pts. of alcohol. of 88% at 12°. (Baup.) Readily soluble in alcohol, and ether. (Crasso.) Most of the normal aconitates are easily soluble in water.
(*Citridic Acid. Equisetic Acid. Achilleic Acid.*)
$C_{12}H_6O_{12} = C_{12}H_3O_9, 3HO$

Aconitate of Ammonia.

a = tri, or normal. Readily soluble in water; but the solution loses ammonia when exposed to the air.

b = mono. Soluble in 6.5 pts. water at 15°; more soluble in hot water. (Baup, *Ann. Ch. et Phys.*, (3.) **30.** 322.)
$C_{12}H_5(NH_4)O_{12}$

c = acid. More soluble than the monobasic salt, but is decomposed, with separation of the latter, as soon as it dissolves. (Baup, *loc. cit.*, p. 321.)
$C_{12}H_3(NH_4)_3O_{12}; C_{12}H_6O_{12}$

Aconitate of Baryta. Scarcely at all soluble in water. Soluble in an aqueous solution of aconitic acid. (Buchner.) By precipitating equisetic acid Regnault obtained a gelatinous baryta salt soluble in 9 pts. of water at 20°.
$C_{12}H_3Ba_3O_{12} + 6Aq$

Aconitate of Copper. Somewhat soluble in water.

Aconitate of Ethyl. Soluble in an alcoholic solution of chlorhydric acid, from which it separates on the addition of water. (Crasso.)
$C_{24}H_{18}O_{12} = C_{12}H_3(C_4H_5)_3O_{12}$

Aconitate *of peroxide* **of Iron.** Ppt.

Aconitate of Lead. Very sparingly soluble in boiling water. (Buchner.)
$C_{12}H_3Pb_3O_{12} + 3Aq$

Aconitate of Lime. At first it is soluble in water, but after having crystallized it is but slowly soluble. Soluble in 98 @ 99 pts. water at 15°. Soluble in dilute nitric acid. (Baup, *Ann. Ch. et Phys.*, (3.) **30.** 323.)
$C_{12}H_3Ca_3O_{12} + 6Aq$

Aconitate of Magnesia. Very soluble in water.

Aconitate of Manganese. Permanent. Sparingly soluble in cold, more readily soluble in hot water. Partially decomposed by boiling water. (Baup, *Ann. Ch. et Phys.*, (3.) **30.** 323.)
$C_{12}H_3Mn_3O_{12} + 12Aq$

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Aconitate *of dinoxide* **of Mercury.** Ppt.

Aconitate *of protoxide* **of Mercury.** Sparingly soluble in water; decomposed when boiled therewith. (Buchner.)

Aconitate of Potash.

a = *normal*. Very deliquescent.
$C_{12}H_3K_3O_{12}$

b = *di*. Permanent. When dissolved in 3 or 4 pts. of water it is at once partially decomposed, with deposition of a salt containing a larger proportion of acid. Much more soluble in water than the monobasic salt. (Baup, *Ann. Ch. et Phys.*, (3.) **30.** 316.)
(*biAconitate*) *of Baup.*
$C_{12}H_4K_2O_{12}$

c = *mono*. Soluble in 11 pts. water at 15° if it be dissolved directly in water, but if a solution saturated at a higher temperature be cooled, a larger amount than this will remain in solution even after standing during several days. Much less soluble in water than the bibasic salt. Baup, *loc. cit.*, p. 317.)
(*triAconitate*) *of Baup.*
$C_{12}H_5KO_{12}$

Aconitate of Silver. Very slightly soluble in water. Readily soluble in alcohol, and ether. (Buchner.)
$C_{12}H_3Ag_3O_{12}$

Aconitate of Soda.

a = *normal* or *tri*. Hygroscopic. Very readily soluble in water. Insoluble in alcohol. (Buchner.)

b = *acid*. Efflorescent. Soluble in 2 pts. water at 15°; less soluble in alcohol. (Baup, *Ann. Ch. et Phys.*, (3.) **30.** 319.)
(*bin*) *of Baup.*
$C_{12}H_3Na_3O_{12}$; $C_{12}H_6O_{12} + 12\,Aq$

Aconitate of Zinc. Very soluble in water.

Aconitin. Permanent. Soluble in 150 pts. of cold water. Soluble in 50 pts. of boiling water; the saturated cold solution containing 0.66% of it and the boiling saturated solution 2%, but the hot solution deposits nothing on cooling. (Hesse.) Sparingly soluble in cold, more soluble in boiling water. Readily soluble in alcohol and in ether, though less soluble in the latter than in the former. (v. Planta.) 100 pts. of chloroform dissolve 22 pts. of it. (Schlimpert, *Kopp & Will's J. B.*, *für* 1859, p. 405.) Soluble in nitric acid. The salts of aconitin are generally permanent and easily soluble in water, and alcohol.
$C_{60}H_{47}NO_{14} = N\left\{C_{60}H_{47}O_{14}'''\right.$

Aconitobianil. *Vid.* Phenyl Aconitimid.

Aconito*bi***Anilic Acid.**(?) Sparingly soluble in water. Readily soluble in alcohol, and in ammonia-water. (Pebal.)
$C_{36}H_{16}N_2O_8$ (?)

Acrol. *Vid.* Hydride of Acryl.

Acrolein. *Vid.* Hydride of Acryl.

Acryl. *Vid.* Allyl.

Acryl Resins. *Vid.* Resins of Acryl.

Acrylic Acid. Miscible in all proportions with water. The acrylates, with the exception of the silver salt, are easily soluble in water.
(*Acronic Acid.*)
$C_6H_4O_4 = C_6H_3O_3, HO$

Acrylate of Baryta. Very soluble in water, somewhat less so in alcohol.
$C_6H_3BaO_4$

Acrylate *of sesquioxide* **of Iron.** Ppt. (Schlippe.)

Acrylate of Silver. Very sparingly soluble in cold, decomposed by boiling water.
$C_6H_3AgO_4$

Acrylate of Soda. Efflorescent. Very soluble in water. More soluble in water than acetate of soda. (Redtenbacher.)
$C_6H_3NaO_4 + 5\,Aq$

Adipic Acid. 100 pts. of water at 18° *dissolve* 7.73 pts. of it. A solution prepared at a higher temperature which deposited crystals on cooling contained in 100 pts., at 18°, 8.61 pts. of the acid. (Wirz, *Ann. Ch. u. Pharm.*, **104.** 276.) Readily soluble in boiling, much less soluble in cold water. Soluble in alcohol, and ether. (Malaguti, *Ann. Ch. et Phys.*, (3.) **16.** 84.) Readily soluble in boiling, tolerably soluble in cold water. (Laurent.) Very readily soluble in boiling alcohol, and ether.
$C_{12}H_{10}O_8 + Aq = C_{12}H_8O_6, 2\,HO + Aq$

Soluble in somewhat more that 1 pt. of water, or of nitric acid. (Bromeis.) Soluble in water. Only sparingly soluble in concentrated nitric acid. (Lawrence Smith, *Ann. Ch. et Phys.*, (3.) **6.** 60.)

Adipate of Ammonia. Soluble in water.

Adipate of Baryta. Soluble in water.
$C_{12}H_8Ba_2O_8$

Adipate of Copper. Soluble in water. (L. Smith, *Ann. Ch. et Phys.*, (3.) **6.** 61.)

Adipate of Ethyl. Soluble in alcohol, from which it separates on the addition of water. (Malaguti.)
$C_{20}H_{18}O_8 = C_{12}H_8(C_4H_5)_2O_8$

Adipate *of sesquioxide* **of Iron.** Ppt.

Adipate of Lead.

I.) *normal*. Soluble in water. (L. Smith, *Ann. Ch. et Phys.*, (3.) **6.** 61; Bromeis.)
$C_{12}H_8Pb_2O_8$

II.) *basic*. Ppt. Soluble in an aqueous solution of basic acetate of lead. (Smith, *Ibid.*)

Adipate of Lime. Soluble in water, from which alcohol precipitates it. (Laurent.)
$C_{12}H_8Ca_2O_8 + 4\,Aq$

Adipate of Silver. Ppt. Slightly soluble in water. (L. Smith, *Ann. Ch. et Phys.*, (3.) **6.** 61.)
$C_{12}H_8Ag_2O_8$

Adipate of Strontia. Soluble in water, from which it is precipitated by alcohol. (Laurent.)
$C_{12}H_8Sr_2O_8 + 4\,Aq$

Adipate of Zinc. Soluble in water. (L. Smith, *Ann. Ch. et Phys.*, (3.) **6.** 61.)

Aesculin. *Vid.* Esculin.

Aethal. *Vid.* Hydrate of Cetyl.

Aethalic Acid. *Vid.* Palmitic Acid.

Aetherin. *Vid.* Ethylene.

Aethokirrin. *Vid.* Anthokirrin.

Agaricin.

Agrostemmin (from *Agrostemma Githago*). Sparingly soluble in water. Easily soluble in alcohol. (H. Schulze.)

Air (Atmospheric).

1 vol. of water under a pressure of 0.76m of mercury at °C	Dissolves of atmospheric air: — vols., reduced to 0°C, & 0.76m pressure of mercury.	1 vol. of water under a pressure of 0.76m of mercury at °C	Dissolves of atmospheric air: — vols., reduced to 0°C, & 0.76m pressure of mercury.
0°	0.02471	11°	0.01916
1°	0 02406	12°	0.01882
2°	0.02345	13°	0.01851
3°	0.02287	14°	0.01822
4°	0.02237	15°	0.01795
5°	0.02179	16°	0.01771
6°	0.02128	17°	0.01750
7°	0.02080	18°	0.01732
8°	0.02034	19°	0.01717
9°	0.01992	20°	0.01704
10°	0.01953		

(Bunsen's *Gasometry*, pp. 289, 128, 156, 174.)

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100 vols. of water at 18°, and the ordinary pressure, absorb about 5 vols. of atmospheric air. (Th. de Saussure, *Gilbert's Ann. Phys.*, 1814, **47.** 167.)

When absolute alcohol is exposed to the air it takes up 0.11 of its volume of gas, ⅓ of which is oxygen and ⅔ nitrogen. On mixing the alcohol with an equal volume of water ⅔ of the dissolved gas is expelled. (Dœbereiner.)

Akcethin (of Zeise). Rather difficultly soluble in water. Easily soluble in alcohol, ether, and weak acids.

(Probably identical with Thiacetonin.)

Alanin. Soluble in 4.6 pts. of water at 17°; more readily soluble in warm water, and still more soluble in dilute acids. Soluble in about 500 pts. of cold alcohol of 80%. Insoluble in ether. Soluble, without decomposition, in monohydrated sulphuric acid. Unacted on by boiling alkaline solutions. (Schlieper.)

(Amido Propianic Acid. Isomeric with Sarcosin, Urethan, and Lactamid.)

$$C_6H_7NO_4 = N\left\{\begin{matrix}C_2HO_2\\ C_4H_5\\ H\end{matrix}\right\}O_2$$

Alanin with Baryta. Very soluble in water.

Alanin with Copper. Tolerably soluble in water. Almost completely insoluble in alcohol.

$C_6H_6CuNO_4 + Aq$

Alanin with Lead. Soluble in water. Insoluble in spirit.

$2C_6H_6PbNO_4, PbO, HO + 5Aq$

Alanin with Silver. Very soluble in water.

$C_6H_6AgNO_4$

Alantin. *Vid.* Inulin.

Alban. *Vid.* β. Resin of Gutta-Percha.

Albumen. Two modifications are distinquished; the one *soluble*, and the other *insoluble*.

I.) *Soluble Albumen.* Soluble in water. When a concentrated solution is heated to 59.5° it commences to become cloudy, at 61° @ 63° flocks form in the liquor, and at a slightly higher temperature the whole coagulates, the albumen being converted into the insoluble modification.

Neither alcohol nor ether dissolve albumen. When a large excess of strong alcohol is added to an aqueous solution of albumen the latter is precipitated in its insoluble modification, but if only a small quantity of dilute alcohol be employed the precipitate produced may be redissolved in water. When alcohol is added to a somewhat strongly diluted solution of albumen so that it becomes opaline, the liquor will gelatinize after a time, but on heating this jelly it redissolves. Dried white of eggs or serum of blood may be dissolved in alcohol which contains a litte alkali in solution. (Scherer.) When ether is agitated with a solution of albumen (of white of eggs or serum of blood), it coagulates only a very small quantity of the latter, the greater portion preserving the soluble state; if the albumen solution is concentrated, it becomes so thick that it appears to be coagulated. (Lieberkuehn.)

Insoluble in the fatty, or essential, oils. It is coagulated by creosote, and by anilin.

Most mineral acids — as sulphuric, chlorhydric, nitric, and pyrophosphoric — precipitate it in the insoluble state. Common (*c*) phosphoric, acetic, tartaric, and most organic, acids do not precipitate albumen from moderately concentrated solutions.

Soluble in an aqueous solution of potash, and in concentrated chlorhydric acid.

Soluble albumen behaves like fibrine, *q. v.*, with very dilute chlorhydric acid, dissolving therein. But coagulated albumen is insoluble in pure dilute chlorhydric acid. (Bouchardat & Sandras, *Ann. Ch. et Phys.*, (3.) **5.** 483.)

Alcohol, concentrated mineral acids, solutions of bichromate of potash, of alum, corrosive sublimate, subacetate of lead, &c., &c., all precipitate pure albumen from its aqueous solution, just as they do the white of egg. When several volumes of ether are added to a concentrated solution of albumen a gelatinous magma is formed; this mass redissolves in water if this be added immediately, but if it be left for a short time water can no longer dissolve it.

A very large excess of acetic acid does not precipitate albumen immediately, but after standing for several hours the solution gelatinizes, forming a mass insoluble in water, from which all the acid may be removed by prolonged washing; albumen thus prepared is remarkable for the facility with which it dissolves in solutions of potash, a trace of this alkali being sufficient to render a large quantity of the albumen soluble in water, — it undergoes change however. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **12.** 220.)

Soluble albumen, when submitted to the influence of agitation, may be transformed into an insoluble body. (Melsens, *Ann. Ch. et Phys.*, (3.) **33.** 177.)

Several weak acids do not precipitate albumen from its solutions: thus trihydrated phosphoric acid, or acetic acid, will not re-precipitate it excepting when certain salts are present. (Melsens, *loc. cit.*)

Albumen combines with various salts, forming compounds which are soluble in an excess of an aqueous solution of albumen; from these solutions *c* phosphoric acid precipitates the compound, excepting certain salts in solutions of which phosphoric acid produces no precipitate, for example, phosphate of soda, acetate of soda, and acetate of potash; but even in these a slight precipitate is produced after agitation. The precipitates which phosphoric acid produces are soluble in an excess of this acid. In general the acid phosphates behave like phosphoric acid.

Acetic acid also precipitates the compounds of albumen and salts, and the precipitates are not sensibly soluble in acetic acid. Sometimes the precipitates are granular, sometimes flocculent. In the former case they are soluble in phosphoric acid, in the latter case only very sparingly soluble. When a precipitate formed by acetic or by phosphoric acid has been dissolved in the latter, the addition of an excess of acetic acid will often reproduce the precipitate. The precipitates produced by an excess of acetic acid in solutions of albumen and salts are, in general, insoluble in alcohol, ether, oils, cold or hot water, cold or hot ammonia-water, or cold caustic potash, but are decomposed by hot caustic potash. They are attached by energetic acids, as concentrated chlorhydric acid. Albumen is precipitated by corrosive sublimate, the precipitate being soluble both in an excess of albumen or of the solution of corrosive sublimate; it is also soluble in a solution of chloride of sodium or of the alkaline chlorides, bromides, or iodides. Albumen is, however, precipitated, partially at least, when in presence of the chlorides, bromides, or iodides of the alkaline earths; the precipitate is usually soluble, however, in an excess of albumen. If to a mixture of albumen and corrosive sublimate, with excess of chloride of sodium, phosphoric acid be added, a precipitate forms which is soluble in an excess of the acid; with acetic acid a precipitate is also formed, but this is not soluble in an excess of the

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acid. (Melsens, *Ann. Ch. et Phys.*, (3.) **33.** pp. 179, 180.) Chloride of mercury (corrosive sublimate) precipitates albumen from its solution in many salts, as phosphate, sulphate, nitrate, or borate of soda, nitrate or sulphate of potash, and the like. These precipitates are often soluble in an excess of the compound of albumen and the salt; they are also soluble in phosphoric acid, in ammonia, and in potash ; an excess of acetic acid, however, always produces a permanent precipitate when added to these solutions. (Melsens, *loc. cit.*, p. 180.) Alcohol, ether, oil of turpentine, and creosote act sensibly in the same manner upon solutions of the compounds of albumen with salts as upon those of normal albumen. In general, acids produce precipitates more readily in dilute solutions of the compounds of albumen with salts than in equally dilute solutions of pure albumen. (Melsens, *loc. cit.*, p. 181.)

Soluble in cold concentrated chlorhydric acid, from which solution it is precipitated by alkalies. When this solution is mixed with a concentrated solution of potash or soda, it forms a firm jelly, which when decomposed by an acid furnishes albumen which is more difficultly soluble in chlorhydric acid than it was originally. (Caventou, *Ann. Ch. et Phys.*, (3.) **8.** pp. 326, 327.)

II.) *Insoluble Modification.* Insoluble in cold water, but is partially dissolved with alteration when boiled for a long time with water.

If it is maintained at 150° with a small quantity of water in a sealed tube, it gradually dissolves, and is no longer capable of coagulating. (L. Gmelin.) Insoluble in alcohol or ether. Soluble in warm acetic, tartaric, and (*c*) phosphoric acids.

Soluble in concentrated, but insoluble, even in exceedingly dilute chlorhydric acid alone, but dissolves therein when in presence of a peculiar substance ["pepsin"] which occurs in the stomachs of living animals. (Bouchardat & Sandras, *Ann. Ch. et Phys.*, (3.) **5.** 484.)

III.) *Vegetable Albumen.* Soluble in water, and is coagulated by heating. Soluble in acetic acid. Insoluble in boiling alcohol, or ether. (Dumas & Cahours, *Ann. Ch. et Phys.*, (3.) **6.** pp. 409, 389.)

ALBUMEN with X. *Vid.* Albuminate of X. Also under Albumen (Soluble Modification).

ALBUMINATE OF BARYTA. Insoluble in water, alcohol, or ether.
$C_{144}H_{113}BaN_{18}S_2O_{44} + 2\,Aq$ (?)

ALBUMINATE OF BARYTA & OF COPPER.

ALBUMINATE OF COPPER. Insoluble in water or alcohol.
$C_{144}H_{110}Cu_2N_{18}S_2O_{44} + 2\,Aq$?

ALBUMINATE OF COPPER & OF LIME.

ALBUMINATE OF COPPER & OF MAGNESIA. Insoluble in water.

ALBUMINATE OF COPPER & OF POTASH. Is swollen up, and eventually dissolved by water.

ALBUMINATE OF LEAD. Insoluble in water. Soluble in a solution of acetate of lead. Decomposed by all acids, even by carbonic acid. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **12.** 218.)

ALBUMINATE OF LIME. Insoluble in water.

ALBUMINATE OF MERCURY, or rather of **CHLORIDE OF MERCURY.** [See also *Art.* Albumen (No. I.).] Insoluble in water.

Before having been dried, water dissolves traces of it. It is dissolved in considerable quantity by aqueous solutions of the alkaline chlorides, bromides, and iodides ; also by cold phosphoric, sulphurous, arsenic, acetic, oxalic, tartaric, malic, and racemic acids, but to no appreciable extent by sulphuric, nitric, chlorhydric, or tannic acids. It is also easily soluble in aqueous solutions of caustic potash, soda, lime, and ammonia, but with subsequent decomposition. (Wittstein's *Handw.*) 1 pt. of the freshly-precipitated compound is soluble in 4.1 pts. of chloride of sodium, in saturated aqueous solution. (Voit, *Ann. Ch. u. Pharm.*, **104.** 365. Soluble in solutions of iodide of potassium, either neutral or alkaline, or in presence of dilute acids. (Melsens, *Ann. Ch. et Phys.*, (3.) **26.** 221.)

ALBUMINATE OF POTASH.

a.) Soluble in boiling water, and in alcohol.

b.) $C_{144}H_{110}K_2N_{18}S_2O_{44} + 2\,Aq$ Insoluble in boiling water, alcohol, or ether.

ALBUMINATE OF SILVER.
$C_{144}H_{111}AgN_{18}S_2O_{44} + 2\,Aq$ (?)

ALBUMINATE OF SODA.

a.) *acid.* More soluble in water than pure albumen.
$C_{144}H_{111}NaN_{18}S_2O_{44} + 2\,Aq$

b.) *normal.* Almost insoluble in cold water.
$C_{144}H_{110}Na_2N_{18}S_2O_{44} + 2\,Aq$

ALBUMINATE OF STRONTIA. Insoluble in water.

ALBUMINATE OF ZINC. Insoluble in water, and alcohol.
$C_{144}H_{110}Zn_2N_{18}S_2O_{44} + 2\,Aq$ (?)

ALBUMININ (of Courbe). Insoluble in water, alcohol, ether, or acetic acid. Soluble in chlorhydric acid, and in aqueous alkaline solutions. (Courbe.)
(*Oonin.*)

ALKARSIN. *Vid.* Oxide of Cacodyl.

ALCOHOL. Absorbs water from the air. Miscible in all proportions with water, heat being evolved ; contraction of volume also occurs, and this augments till the mixture contains 116 pts. of water to 100 pts. of alcohol. (Rudberg.) Miscible in all proportions with wood-spirit, chloroform, ether, acetic acid, formic acid, most of the essential oils, methylal, sulphide, bisulphide, and sulphocarbonate of methyl, &c. ; absolute alcohol is also miscible in all proportions with naphtha, and benzin.
(*Hydrate of Ethyl. Hydrated Oxide of Ethyl.*
$C_4H_6O_2 = \left.\begin{matrix}C_4H_5O\\HO\end{matrix}\right\}$

1 vol. of ordinary alcohol dissolves in about 3 vols. of nitrotoluene when this has been warmed by the hand. (C. M. Warren.)

It can be said, in general terms, that alcohol is a good solvent for substances which contain much hydrogen, as resins, ethers, essential oils, including those which are oxygenated, fats, the alkaloids, coloring matters, and many organic acids. It does not dissolve the sulphates or carbonates of the metallic oxides. It also dissolves sugars and soaps.

"Those gases which are abundantly absorbed by water likewise dissolve in considerable quantity in alcohol ; and those which are sparingly absorbed by water are also taken up in small quantity only by alcohol ; but alcohol generally takes up a greater quantity of a gas, bulk for bulk, than water. Among the elementary substances, alcohol dissolves only a few, such as phosphorus $\frac{1}{240}$, sulphur $\frac{1}{200}$, bromine, iodine, &c., all of the non-metallic class. With respect to inorganic substances, it may be stated as a law, that all compounds soluble in alcohol are also soluble in water, but that there are some compounds soluble in water which are not soluble in alcohol ; moreover, that compounds which are soluble in both liquids, dissolve more abundantly in water than in hydrated alcohol, and in the latter more than in absolute alcohol. Such is the case with metallic sulphides,

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iodides, bromides, and chlorides, and with certain oxygen salts. There are, however, certain exceptions: thus, corrosive sublimate ($HgCl$) dissolves more abundantly in alcohol, especially in absolute alcohol, than in water, and, according to Kirwan, nitrate of magnesia dissolves more freely in alcohol of 0.817 sp. gr. than in alcohol of 0.900 sp. gr. Compounds sparingly soluble in water are, for the most part, quite insoluble in alcohol; so likewise are efflorescent compounds. But all deliquescent compounds, excepting carbonate of potash, phosphate of potash, and a few others, are soluble in alcohol." (Gmelin's *Handbook*, **8.** 257.)

"Alcohol dissolves only those metallic oxides which possess either an alkaline or an acid character. Of the metallic sulphides it dissolves only those of potassium and sodium; of the iodides and bromides it dissolves a somewhat greater, and of the chlorides a still greater number. The carbonates, borates, phosphites, phosphates, hyposulphites, sulphites, hyposulphates, sulphates, iodates, and periodates, it dissolves either not at all or in very small quantity. The only sulphates which dissolve readily in alcohol are those of ferric and platinic oxide. On the other hand, alcohol dissolves many hypophosphites, a still greater number of bromates, chlorates, and perchlorates, and very many nitrates." (Gmelin, *Ibid.*, p. 265.)

"With regard to the comportment of alcohol with *organic* compounds, the following general observations may be made:—

"Alcohol dissolves all Hydrocarbons, and therefore the primary Nuclei, and any compounds which those nuclei may form with hydrogen.—Among the compounds which likewise contain oxygen, alcohol dissolves especially those in which the number of atoms of all the elements together is comparatively small, and the oxygen is in comparatively small proportion; hence it is more inclined to dissolve aldides (in which class may be included many volatile oils, camphors, and resins), and acids of small atomic weight, than acids of greater atomic weight, or richer in oxygen. Acids which are but slightly soluble or quite insoluble in alcohol likewise yield salts of similar character. Acids containing but little oxygen, and their salts, often dissolve in alcohol more readily than in water. Compounds in which hydrogen is replaced by iodine, bromine, or chlorine, do not appear to have their solubility in alcohol diminished by the substitution; even the chlorides of carbon are all soluble in alcohol. All compounds of carbon, hydrogen, and nitrogen, *e. g.* the non-oxygenated alkaloids, are soluble in alcohol; but with regard to compounds of this nature containing oxygen, the observations above made concerning the influence of oxygen likewise hold good." (Gmelin, *loc. cit.*, p. 273.)

"Alcohol of 0.835 sp. gr. = 85%, called Druggists' Alcohol, is an excellent solvent for resins, camphor, benzoic acid, tannic acid, the balsams, grape-sugar, the vegetable alkalies, and castor-oil; also for iodine, carbonate of ammonia, chloride of ammonium, caustic potash or soda, nearly all deliquescent and a few other inorganic salts. It mixes freely in all proportions with water, ether, acetic acid, and most of the essential oils."

"Diluted Alcohol," of 0.935 sp. gr., "consists of equal vols. of druggists' alcohol and water. It dissolves gums, vegetable albumen, and many coloring matters; also, to a certain extent, resinous matters, essential oils, and vegetable alkalies; also sugar and tannic acid." (Parrish's *Pharmacy*, pp. 130, 131.)

Dilute alcohol (a mixture of equal vols. alcohol of 0.835 sp. gr. and of water) is a better solvent of resinous matters, and the extractive principles of plants, than the same quantity of these two liquids employed separately. (J. Personne, *Amer. J. Pharm.*, **18.** pp. 21, 103; cited by Parrish, *Pharm.*, *loc. cit.*)

An aqueous solution containing per cent, by vol., of alcohol of 0.7947 sp. gr. at 15° (the sp. gr. of water at 15° = 1).	Is of sp. gr. at 15°.	An aqueous solution containing per cent, by vol., of alcohol of 0.7947 sp. gr. at 15° (the sp. gr. of water at 15° = 1).	Is of sp. gr. at 15°.
100	0.7947	60	0.9141
95	0.8168	55	0.9248
90	0.8346	50	0.9348
85	0.8502	45	0.9440
80	0.8645	40	0.9523
75	0.8779	35	0.9595
70	0.8907	30	0.9656
65	2.9027	0	1.0000

(Gay-Lussac, in Berzelius's *Lehrb.*) For the elaborate tables which Gay-Lussac has constructed from these data we must refer the reader to his treatise entitled *Instruction pour l'usage de l'Alcoomètre centésimal et des Tables qui l'accompagnent.* Paris, 1824; in *Handwörterbuch der Chemie*, **1.** 235 *et seq.* See also Ure's *Dict. of Arts.* These tables which refer to the centesimal alcohometer of their author [compare Maroseau's table below] indicate the percentage by volume of alcohol, reduced to 15°, for every degree of temperature from 0° to 30° C. A tolerably close approximation to the figures of Gay-Lussac's table may be obtained by the formula of Francoeur (*Handwörterbuch*, **1.** 253); in which c being the number of per cents by volume indicated by the alcohometer in any spirit at the temperature t; x, the true percentage by volume of absolute alcohol at 15°, which is contained in the spirit in question, is found by the equation

$$x = c \mp 0.4\, t.$$

The temperature t is taken as positive above and as negative below 15°. Tables indicating the amount of water required in order to reduce strong alcohol to any required degree have also been given by Gay-Lussac. (*Handwörterbuch der Chem.*, **1.** 257, *et seq.*)

A MIXTURE OF ALCOHOL AND WATER

Containing per cent, *by volume*, of absolute alcohol of 0.7939 sp. gr. at 15.56° (the sp. gr. of water at 4.35° being equal to 1.000).	Is of sp. gr. at 15.56° (= 60° F.)	Difference between the sp. grs.
0	0.9991	0
1	0.9976	15
2	0.9961	15
3	0.9947	14
4	0.9933	14
5	0.9919	14
6	0.9906	13
7	0.9893	13
8	0.9881	12
9	0.9869	12
10	0.9857	12
11	0.9845	12
12	0.9834	11
13	0.9823	11
14	0.9812	11
15	0.9802	10
16	0.9791	11
17	0.9781	10
18	0.9771	10
19	0.9761	10

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Containing per cent, *by volume*, of absolute alcohol of 0.7939 sp. gr. at 15.56° (the sp.gr. of water at 4.35° being equal to 1.000).	Is of sp. gr. at 15.56° (= 60° F.)	Difference between the sp. grs.
20	0.9751	10
21	0.9741	10
22	0.9731	10
23	0.9720	11
24	0.9710	10
25	0.9700	10
26	0.9689	11
27	0.9679	10
28	0.9668	11
29	0.9657	11
30	0 9646	11
31	0 9634	12
32	0.9622	12
33	0.9609	13
34	0.9596	13
35	0.9583	13
36	0.9570	13
37	0.9556	14
38	0.9541	15
39	0.9526	15
40	0.9510	16
41	0.9494	16
42	0.9478	16
43	0.9461	17
44	0.9444	17
45	0.9427	17
46	0.9409	18
47	0.9391	18
48	0.9373	18
49	0.9354	19
50	0.9335	19
51	0.9315	20
52	0.9295	20
53	0.9275	20
54	0.9254	21
55	0.9234	20
56	0.9213	21
57	0.9192	22
58	0.9170	22
59	0.9148	22
60	0.9126	22
61	0.9104	22
62	0.9082	22
63	0.9059	23
64	0.9036	23
65	0.9013	23
66	0.8989	24
67	0.8965	24
68	0.8941	24
69	0.8917	24
70	0.8892	25
71	0.8867	25
72	0.8842	25
73	0.8817	25
74	0.8791	26
75	0.8765	26
76	0.8739	26
77	0.8712	27
78	0.8685	27
79	0.8658	27
80	0.8631	27
81	0.8603	28
82	0.8575	28
83	0.8547	28
84	0.8518	29
85	0.8488	30
86	0.8458	30
87	0.8428	30
88	0.8397	31
89	0.8365	32
90	0.8332	33
91	0.8299	33
92	0.8265	34
93	0.8230	35
94	0.8194	36
95	0.8157	37
96	0.8118	39
97	0.8077	41
98	0.8034	43
99	0.7988	46
100	0.7939	49

(Tralles, *Gilbert's Annalen der Phys.*, 1811, **38.** 368.) Tralles (*Ibid.*, pp. 374, 378, 386, *et seq.*) also gives tables of corrections for temperature (for every 5° between 30° and 100°) and for the expansion of the instrument employed in determining the sp. gr.

A very complete abstract of Tralles's Memoir, with all his tables, may be found in McCulloh's *Report on Sugar and Hydrometers*, Washington, 1848, pp. 454 – 472

To obtain the percentage *by weight* of alcohol from the data above given, the found per cent by volume is to be multiplied by the sp. gr. of absolute alcohol (0.7939), and the product divided by the sp. gr. of the liquid under examination. (Tralles, *loc. cit.*, p. 372.) See also McCulloh's table below, comparing the two.

An aqueous solution of sp. gr. (at 20°).	Contains per cent *by weight* of alcohol.
0.7920	100
0.8600	74.71
0.9010	56.60
0.9340	41.00
0.9525	32.14

(Richter, *Ueber die neueren Gegenstände der Chemie*, *St.* 8, p. 74 ; cited in *Handwörterbuch der Chem.*, I. 214.)

Per cent (*by weight*) of		Sp. gr.	
Alcohol (of 0.791 sp. gr. at 20°).	Water.	at 20° (= 68° F.)	at 15.56° (= 60° F.)
100	0	0.791	0 796
99	1	0.794	0.798
98	2	0.797	0.801
97	3	0.800	0.804
96	4	0.803	0.807
95	5	0.805	0.809
94	6	0.808	0.812
93	7	0 811	0.815
92	8	0.813	0.817
91	9	0.816	0.820
90	10	0.818	0.822
89	11	0.821	0.825
88	12	0.823	0.827
87	13	0.826	0.830
86	14	0.828	0.832
85	15	0.831	0.835
84	16	0.834	0.838
83	17	0.836	0.840
82	18	0.839	0.843
81	19	0.842	0.846
80	20	0.844	0.848
79	21	0.847	0.851
78	22	0.849	0.853
77	23	0.851	0 855
76	24	0.853	0.857
75	25	0.856	0.860
74	26	0-859	0.863
73	27	0.861	0.865
72	28	0.863	0.867

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Per cent (*by weight*) of		Sp. gr.	
Alcohol (of 0.791 sp. gr. at 20°).	Water.	at 20° (= 68° F.)	at 15.56° (= 60° F.)
71	29	0.866	0.870
70	30	0.868	0.872
69	31	0.870	0.874
68	32	0.872	0.875
67	33	0.875	0.879
66	34	0.877	0.881
65	35	0.880	0.883
64	36	0.882	0.886
63	37	0.885	0.889
62	38	0.887	0.891
61	39	0.889	0.893
60	40	0.892	0.896
59	41	0.894	0.898
58	42	0.896	0.900
57	43	0.899	0.902
56	44	0.901	0.904
55	45	0.903	0.906
54	46	0.905	0.908
53	47	0.907	0.910
52	48	0.909	0.912
51	49	0.912	0.915
50	50	0.914	0.917
49	51	0.917	0.920
48	52	0.919	0.922
47	53	0.921	0.924
46	54	0.923	0.926
45	55	0.925	0.928
44	56	0.927	0.930
43	57	0.930	0.933
42	58	0.932	0.935
41	59	0.934	0.937
40	60	0.936	0.939
39	61	0.938	0.941
38	62	0.940	0.943
37	63	0.942	0.945
36	64	0.944	0.947
35	65	0.946	0.949
34	66	0.948	0.951
33	67	0.950	0.953
32	68	0.952	0.955
31	69	0.954	0.957
30	70	0.956	0.958
29	71	0.957	0.960
28	72	0.959	0.962
27	73	0.961	0.963
26	74	0.963	0.965
25	75	0.965	0.967
24	76	0.966	0.968
23	77	0.968	0.970
22	78	0.970	0.972
21	79	0.971	0.973
20	80	0.973	0.974
19	81	0.974	0.975
18	82	0.976	0.977
17	83	0.977	0.978
16	84	0.978	0.979
15	85	0.980	0.981
14	86	0.981	0.982
13	87	0.983	0.984
12	88	0.985	0.986
11	89	0.986	0.987
10	90	0.987	0.988
9	91	0.988	0.989
8	92	0.989	0.990
7	93	0.991	0.991
6	94	0.992	0.992
5	95	0.994	
4	96	0.995	
3	97	0.997	
2	98	0.998	
1	99	0.999	
0	100	1.000	

(Lowitz, *Crell's Chemische Annalen*, Band I. of the year 1796, p. 202; the 4th column of the table, in which the sp. grs. are reduced for the temperature of 15.56°, is from Mohr, Redwood, and Procter's *Pharmacy*, p. 567.)

An aqueous solution containing per cent *by weight* of alcohol of 0.8119 sp. gr. at 0° (the sp. gr. of water at 0° = 1).	Is of sp. gr. At 0°.	At 18°.	At 36°.	At 54°.
0	1.00000	0.99855	0.99351	0.98721
5	0.99130	0.98983	0.98520	0.97736
10	0.98504	0.98261	0.97684	0.96805
15	0.98007	0.97587	0.96853	0.96050
20	0.97596	0.96974	0.96084	0.95054
25	0.97145	0.96312	0.95254	0.94097
30	0.96579	0.95588	0.94395	0.93166
35	0.95886	0.94682	0.93453	0.92133
40	0.95066	0.93781	0.92402	0 91058
45	0.93994	0.92733	0.91303	0.89963
50	0.93047	0.91682	0.90259	0.88801
55	0.92039	0.90605	0.89044	0.87594
60	0.90909	0.89474	0.87962	0.86382
65	0.89791	0.88338	0.86763	0.85194
70	0.88649	0.87180	0.85582	0.84047
75	0.87496	0.85974	0.84386	0.82884
80	0.86325	0.84834	0.83191	0.81693
85	0.85111	0.83561	0.81975	0.80414
90	0.83840	0.82310	0.80722	0.79099
95	0.82522	0.80974	0.79385	0.77790
100	0.81190	0.79539	0.78013	0.76436

(Delezenne, from *Recueil des Travaux de la Soc. d. Sci. Agric. et Arts, de Lille*, 1823 - 24, p. 1, in *Ferrusac's Bulletin*, 1827, 8. 132.) In his original memoir Delezenne is said to have given tables, by interpolation, for every per cent, both by weight and by volume, for each of the degrees of temperature indicated above.

A solution of sp. gr. at 15° (sp. gr. of water at 15°=1).	Contains per cent *by weight* of alcohol (of 0.7951 sp.gr.)	A solution of sp. gr. at 15° (sp gr. of water at 15°=1).	Contains per cent *by weight* of alcohol (of 0.7951 sp.gr.)
1.00000	0.0	0.99453	3.1
0.99982	0.1	0 99436	.2
0.99964	0.2	0.99419	.3
0.99946	0.3	0.99402	.4
0 99928	0.4	0.99385	.5
0.99910	0.5	0.99368	.6
0.99892	0.6	0.99351	.7
0.99874	0.7	0.99334	.8
0.99856	0.8	0.99317	.9
0.99838	0.9	0.99300	4.0
0.99820	1.0	0.99283	.1
0.99802	.1	0.99266	.2
0.99784	.2	0.99249	.3
0.99766	.3	0.99232	.4
0.99748	.4	0.99215	.5
0.99730	.5	0.99198	.6
0.99712	.6	0.99181	.7
0.99694	.7	0.99164	.8
0.99676	.8	0.99147	.9
0.99658	.9	0.99130	5.0
0.99640	2.0	0.99115	.1
0.99623	.1	0.99100	.2
0.99606	.2	0.99085	.3
0.99589	.3	0 99070	.4
0.99572	.4	0.99055	.5
0.99555	.5	0.99040	.6
0.99538	.5	0.99025	.7
0.99521	.7	0 99010	.8
0.99504	.8	0.98995	.9
0.99487	.9	0.98980	6.0
0.99470	3.0	0.98965	.1

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A solution of sp. gr. at 15° (sp. gr. of water at 15°=1).	Contains per cent *by weight* of alcohol (of 0.7951 sp.gr.)	A solution of sp. gr. at 15° (sp.gr. of water at 15°=1).	Contains per cent *by weight* of alcohol (of 0.7951 sp.gr.)
0.98950	6.2	0.98512	9.2
0.98935	.3	0.98498	.3
0.98920	.4	0.98484	.4
0.98905	.5	0.98470	.5
0.98890	.6	0.98456	.6
0 98875	.7	0.98442	.7
0.98860	.8	0.98428	.8
0.98845	.9	0.98414	.9
0.98830	7.0	0.98400	10.0
0.98815	.1	0.98387	.1
0.98800	.2	0.98374	.2
0.98785	.3	0.98361	.3
0.98770	.4	0.98348	.4
0.98755	.5	0.98335	.5
0.98740	.6	0.98322	.6
0.98725	.7	0.98309	.7
0.98710	.8	0.98296	.8
0.98695	.9	0.98283	.9
0.98680	8.0	0.98270	11.0
0.98666	.1	0.98257	.1
0.98652	.2	0.98244	.2
0.98638	.3	0.98231	.3
0.98624	.4	0.98218	.4
0.98610	.5	0.98205	.5
0.98596	.6	0.98192	.6
0.98582	.7	0.98179	.7
0.98568	.8	0.98166	.8
0.98554	.9	0.98153	.9
0.98540	9.0	0.98140	12.0
0.98526	.1		

(Pohl, *Denkschriften der Wiener Akad., math-nat. classe*, 1851, **2.** pp. 27, 61 of the memoir.)

An aqueous solution of sp. gr. at 15.56° (sp.gr. of water at 15.56°=1).	Contains per cent *by weight* of alcohol (of 0.7938 sp. gr. at 15.56°).	An aqueous solution of sp. gr. at 15.56° (sp.gr. of water at 15.56°=1).	Contains per cent *by weight* of alcohol (of 0.7938 sp. gr. at 15.56°).
0.9991	0.5	0.9511	34
0.9981	1	0.9490	35
0.9965	2	0.9470	36
0.9947	3	0.9452	37
0.9930	4	0.9434	38
0.9914	5	0.9416	39
0.9898	6	0.9396	40
0.9884	7	0.9376	41
0.9869	8	0.9356	42
0.9855	9	0.9335	43
0.9841	10	0.9314	44
0.9828	11	0.9292	45
0.9815	12	0.9270	46
0.9802	13	0.9249	47
0.9789	14	0.9228	48
0.9778	15	0.9206	49
0.9766	16	0.9184	50
0.9753	17	0.9160	51
0.9741	18	0.9135	52
0.9728	19	0.9113	53
0.9716	20	0.9090	54
0.9704	21	0.9069	55
0.9691	22	0.9047	56
0.9678	23	0 9025	57
0.9665	24	0 9001	58
0.9652	25	0.8979	59
0.9638	26	0.8956	60
0.9623	27	0.8932	61
0.9609	28	0.8908	62
0.9593	29	0.8886	63
0.9578	30	0.8863	64
0.9560	31	0.8840	65
0.9544	32	0.8816	66
0.9528	33	0.8793	67
0.8769	68	0.8357	85
0.8745	69	0.8331	86
0.8721	70	0.8305	87
0.8696	71	0.8279	88
0.8672	72	0.8254	89
0.8649	73	0.8228	90
0.8625	74	0.8199	91
0.8603	75	0.8172	92
0.8581	76	0.8145	93
0.8557	77	0.8118	94
0.8533	78	0.8089	95
0.8508	79	0.8061	96
0.8483	80	0.8031	97
0.8459	81	0.8001	98
0.8434	82	0.7969	99
0.8408	83	0.7938	100
0.8382	84		

(Fownes, *Phil. Trans.*, 1847, pp. 250, 251, and fig.)

An aqueous solution of sp. gr. at 15.56° (sp.gr. of water at 15.56°=1).	Contains per cent *by weight* of alcohol (of 0.7938 sp. gr.)	An aqueous solution of sp. gr. at 15.56° (sp.gr. of water at 15.56°=1).	Contains per cent *by weight* of alcohol (of 0.7938 sp. gr.)
0.9999	0.05	0.9952	2.62
0.9998	0.11	0.9951	2.68
0.9997	0.16	0.9950	2.74
0.9996	0.21	0.9949	2.79
0.9995	0.26	0.9948	2.85
0.9994	0.32	0.9947	2.91
0.9993	0.37	0.9946	2.97
0.9992	0.42	0.9945	3.02
0.9991	0.47	0.9944	3.08
0.9990	0.53	0.9943	3.14
0.9989	0.58	0.9942	3.20
0.9988	0.64	0.9941	3.26
0.9987	0.69	0.9940	3.32
0.9986	0.74	0.9939	3.37
0.9985	0.80	0.9938	3.43
0.9984	0.85	0.9937	3.49
0.9983	0.91	0.9936	3.55
0.9982	0.96	0.9935	3.61
0.9981	1.02	0.9934	3.67
0.9980	1.07	0.9933	3.73
0.9979	1.12	0.9932	3.78
0.9978	1.18	0.9931	3.84
0.9977	1.23	0.9930	3.90
0.9976	1.29	0.9929	3.96
0.9975	1.34	0.9928	4.02
0.9974	1.40	0.9927	4.08
0.9973	1.45	0.9926	4.14
0.9972	1.51	0.9925	4.20
0.9971	1.56	0.9924	4.27
0.9970	1.61	0.9923	4.33
0.9969	1.67	0.9922	4.39
0.9968	1.73	0.9921	4.45
0.9967	1.78	0.9920	4.51
0.9966	1.83	0.9919	4.57
0.9965	1.89	0.9918	4.64
0.9964	1.94	0.9917	4.70
0.9963	1.99	0.9916	4.76
0.9962	2.05	0.9915	4.82
0.9961	2.11	0.9914	4.88
0.9960	2.17	0.9913	4.94
0.9959	2.22	0.9912	5.01
0.9958	2.28	0.9911	5.07
0.9957	2.34	0.9910	5.13
0.9956	2.39	0.9909	5.20
0.9955	2.45	0.9908	5.26
0.9954	2.51	0.9907	5.32
0.9953	2.57	0.9906	5.39

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An aqueous solution of sp. gr. at 15.56° (sp.gr. of water at 15.56°= 1).	Contains per cent *by weight* of alcohol (of 0.7938 sp. gr.)	An aqueous solution of sp. gr. at 15.56° (sp.gr. of water at 15.56°= 1).	Contains per cent *by weight* of alcohol (of 0.7938 sp. gr.)
0.9905	5.45	0.9871	7.71
0.9904	5.51	0.9870	7.78
0.9903	5.58	0.9869	7.85
0.9902	5.64	0.9868	7.92
0.9901	5.70	0.9867	7.99
0.9900	5.77	0.9866	8.06
0.9899	5.83	0.9865	8.13
0.9898	5.89	0.9864	8.20
0.9897	5.96	0.9863	8.27
0.9896	6.02	0.9862	8.34
0.9895	6.09	0.9861	8.41
0.9894	6.15	0.9860	8.48
0.9893	6.22	0.9859	8.55
0.9892	6.29	0.9858	8.62
0.9891	6.35	0.9857	8.70
0.9890	6.42	0.9856	8.77
0.9889	6.49	0.9855	8.84
0.9888	6.55	0.9854	8.91
0.9887	6.62	0.9853	8.98
0.9886	6.69	0.9852	9.05
0.9885	6.75	0.9851	9.12
0.9884	6.82	0.9850	9.20
0.9883	6.89	0.9849	9.27
0.9882	6.95	0.9848	9.34
0.9881	7.02	0.9847	9.41
0.9880	7.09	0.9846	9.49
0.9879	7.16	0.9845	9.56
0.9878	7.23	0.9844	9.63
0.9877	7.30	0.9843	9.70
0.9876	7.37	0.9842	9.78
0.9875	7.43	0.9841	9.85
0.9874	7.50	0.9840	9.92
0.9873	7.57	0.9839	9.99
0.9872	7.64	0.9838	10.07

(Drinkwater, *Phil. Mag.*, 1848, (3.) **32.** 129.) Drinkwater states that the above table was prepared in order to have one more correct than that of Lowitz, which, according to D., is incorrect in several particulars.

An aqueous solution of sp. gr. at 18° (the sp. gr. of water at 4.2° = 1).	Contains per cent *by volume* of alcohol (of 0.79335 sp.gr. at 18°).	An aqueous solution of sp. gr. at 18° (the sp. gr. of water at 4.2° = 1).	Contains per cent *by volume* of alcohol (of 0.79335 sp.gr. at 18°).
0.98981	5	0.90539	55
0.98257	10	0.89394	60
0.97599	15	0.88233	65
0.96971	20	0.87067	70
0.96316	25	0.85895	75
0.95563	30	0.84661	80
0.94700	35	0.83405	85
0.93743	40	0.82152	90
0.92719	45	0.79335	100
0.91711	50		

(McCulloh, in his *Report in Relation to Sugar and Hydrometers*, U. S. Senate, 30th Congress, 1st Session, Ex. Doc. No. 50, Washington, 1848, p. 514.)

Degrees of Gay-Lussac's Alcoholometer = Sp. gr.

Per cent of alcohol *by volume* indicated by Gay-Lussac's Alcoholometer (at 15°).	Sp. gr.	Per cent of alcohol *by volume* indicated by Gay-Lussac's Alcoholometer (at 15°).	Sp. gr.
0	1.000	7	0.990
1	0.999	8	0.989
2	0.997	9	0.988
3	0.996	10	0.987
4	0.994	11	0.986
5	0.993	12	0.984
6	0.992	13	0.983
14	0.982	58	0.920
15	0.981	59	0.918
16	0.980	60	0.915
17	0.979	61	0.913
18	0.978	62	0.911
19	0.977	63	0.909
20	0.976	64	0.906
21	0.975	65	0.904
22	0.974	66	0.902
23	0.973	67	0.899
24	0.972	68	0.896
25	0.971	69	0.893
26	0.970	70	0.891
27	0.969	71	0.888
28	0.968	72	0.886
29	0.967	73	0.884
30	0.966	74	0.881
31	0.965	75	0.879
32	0.964	76	0.876
33	0.963	77	0.874
34	0.962	78	0.871
35	0.960	79	0.868
36	0.959	80	0.865
37	0.957	81	0.863
38	0.956	82	0.860
39	0.954	83	0.857
40	0.953	84	0.854
41	0.951	85	0.851
42	0.949	86	0.848
43	0.948	87	0.845
44	0.946	88	0.842
45	0.945	89	0.838
46	0.943	90	0.835
47	0.941	91	0.832
48	0.940	92	0.829
49	0.938	93	0.826
50	0.936	94	0.822
51	0.934	95	0.818
52	0.932	96	0.814
53	0.930	97	0.810
54	0.928	98	0.805
55	0.926	99	0.800
56	0.924	100	0.795
57	0.922		

(Maroseau, *Ann. de Pharm.*, 1830, **16.** 490.)

Comparison of per cents by weight with those by volume, at 15.56°.*

Per cent by volume.	Per cent by weight.	Per cent by weight.	Per cent by volume.
1	0.796	1	1.256
2	1.594	2	2.509
5	4.002	5	6.247
10	8.054	10	12.416
15	12.149	15	18.520
20	16.283	20	24.565
25	20.462	25	30.550
30	24.691	30	36.450
35	28.995	35	42.248
40	33.392	40	47.915
45	37.899	45	53.432
50	42.523	50	58.792
55	47.286	55	63.973
60	52.196	60	68.971

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* The second column of the table was deduced from the table of Tralles, by means of the formula

$$p = \frac{d}{D} v,$$

in which p denotes the ratio of the masses, v the ratio of the volumes, and D d the densities. The fourth column being then obtained by interpolation.

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Per cent by volume.	Per cent by weight.	Per cent by weight.	Per cent by volume.
65 . . .	57.255	65 . . .	73.793
70	62.498	70	78.402
75	67.932	75	82.803
80	73.586	80	86.973
85	79.502	85	90.878
90	85.755	90	94.455
95	92.461	95	97.609
100 . . .	100.000	100 . . .	100.000

(McCulloh, in his *Report on Sugar and Hydrometers*, p. 502.)

The experiments of Gouvernain (*Table exacte de la Pesanteur Spécifique de Mélanges d'Alcool et d'Eau, etc.*; par M. de Gouvernain, 8vo, pp. 16 *et* 4 *tableaux*, Dijon, 1825; cited in *Ferrusac's Bulletin*, 1827, **7.** 147) being admitted to be of inferior accuracy, his table is not given here. The same remark applies to the tables of Meissner (in his *Aræometrie*, Wien, 1826, II. pp. 27, 30), which are frequently cited in German works (for example, *in extenso*, in Balling's *Gährungschemie*, Prag, 1854, **1.** table VII., facing page 118), which have been shown by Prof. R. S. McCulloh (in his *Report*, pp. 472 - 475, 498) to be less worthy of confidence than those of Gilpin, Delezenne, Tralles, Gay-Lussac, &c.

No reference to the subject of alcohometry, however slight, can be made without some allusion to the very remarkable determinations of Blagden & Gilpin, which are to be found in the *Philosophical Transactions of the Royal Society of London* for the year 1794, vol. **84.** p. 275. The tables of specific gravities given by these observers indicate the amounts *by weight* of alcohol and water in any mixture, and are computed for every degree of temperature between 30° and 80° of Fahrenheit's thermometer, and for the addition or subtraction of every one part in a hundred of water or alcohol. The alcohol employed by Blagden & Gilpin was, however, not absolutely anhydrous, having been of 0.825 sp. gr. at 60° F. (= 15.56° C.) the sp. gr. of water at 60° F. being taken as = 1. (Compare Blagden & Gilpin's earlier papers in *Phil. Trans.*, 1790, **80.** 321; and 1792, **82.** 425.) Tralles's tables, on the other hand, refer to alcohol of 0.7946 sp. gr. at 60° F. (water at 60° F. equalling 1). (Gilbert's *Ann. der Phys.*, 1811, **38.** pp. 365 - 369.) Subsequent researches have indeed shown that a slight correction must be made on this account, but the accuracy of Gilpin's determinations has only been made more clearly manifest by the rigid scrutiny to which they have been repeatedly subjected.

In his *Report in Relation to Sugar and Hydrometers*, Ex. Doc. No. 50, 30th Congress, 1st Session, Washington, 1848, to which we would here refer the reader as a work replete with valuable information upon the subject of this article, and very carefully compiled, Prof. McCulloh has constructed (pp. 495 - 497) tables of comparison between the results of Blagden & Gilpin and those of Delezenne which are shown to agree in a very remarkable manner; he has also (p. 497) verified the table of Tralles, and compared it (p. 498, *et seq.*) with the determinations of Gay-Lussac, Meissner, and Gouvernain, showing that, while the results of Gay-Lussac accord very closely with those of Tralles, those of Meissner and Gouvernain differ from them considerably, and by the method of curves are found to be improbable. On p. 514 of his Report, McCulloh gives a table comparing his own results with those of Delezenne.

In a preliminary notice of a memoir (which is said to have been published *in extenso* in the *Mémoires de l'Académie des Sciences de Paris*, **30.** 425) upon the density of alcohol and that of its mixtures with water, Pouillet remarks that the sp. gr. of absolute alcohol given by Lowitz is true to within $\frac{8}{10000}$, and that for all the mixtures between water and absolute alcohol the densities observed by Lowitz do not differ more than a thousandth or a thousandth and a half from those of Gay-Lussac. The results of Blagden and Gilpin are not less remarkable: on reducing them to the same standard as those of Gay-Lussac, they are found to agree with the latter for all the mixtures, and for each degree of temperature between 0° and 30°, in the thousandths places, the differences not exceeding some ten-thousandths. Pouillet himself found by direct experiment, in one instance, identically the same sp. gr. for absolute alcohol as Gay-Lussac (0.7947 at 15° referred to water = 1 at 15°), and in another experiment obtained a result a few ten-thousandths higher. Like many others who have carefully examined the matter, Pouillet expresses his conviction that the densities of mixtures of alcohol and water are sufficiently well known for all practical purposes, and that there is no occasion for new researches upon this subject. (*C. R.* 1859, **48.** 929.)

V. Baumhauer, in Holland, has, nevertheless, seen fit to repeat the labors of his predecessors, and has published an extended memoir (referred to by Pouillet as having been presented to the Amsterdam Academy May 27, 1860, and published by that Academy). The following is a comparison of his principal results with those of Gay-Lussac, and of Gilpin & Blagden: —

Per cent by weight of alcohol, of 0.7940 at 15° (sp. gr. of water at its maximum = 1).	Sp. gr. of the mixture at 15° (referred to water at its maximum).	Sp. gr. of the mixture at 15° (referred to water at 15°=1).		
	Baumhauer.	Baumhauer.	Gay-Lussac.	Gilpin.
100	0.7941	0.7948	0.7947	
95	0.8089	0.8096	0.8093	
90	0.8225	0.8232	0.8232	0.8232
85	0.8357	0.8364	0.8363	0.8362
80	0.8484	0.8491	0.8488	0.8487
75	0.8602	0.8610	0.8610	0.8608
70	0.8720	0.8728	0.8729	0.8727
65	0.8838	0.8846	0.8847	0.8845
60	0.8954	0.8962	0.8963	0.8962
55	0.9068	0.9076	0.9077	0.9075
50	0.9179	0.9187	0.9188	0.9187
45	0.9288	0.9296	0.9296	0.9295
40	0.9387	0.9395	0.9398	0.9397
35	0.9482	0.9490	0.9493	0.9492
30	0.9569	0.9577	0.9578	0.9578
25	0.9642	0.9650	0.9652	0.9653
20	0.9706	0.9715		0.9721
15	0.9766	0.9775		0.9776
10	0.9830	0.9839		0.9840
5	0.9903	0.9912		0.9913

The agreement is complete, since the differences are in general comprised between 2 and 3 ten-thousandths. (Cited by Pouillet, *C. R.*, 1860, **51.** 1006.) The previous hasty assertions of Baumhauer (*Verslagen en Mededeelingen der* [*Amsterdam*] *Akademie* (*Natuurkunde*), Feb. 25, 1860, **10.** 317, and *Comptes Rendus*, of the French Academy, 1860, **50.** 591; compare p. 251 of the *Verslagen*), that considerable errors exist in the table which Pouillet calculated from the observations of Gilpin and Gay-Lussac, are now admitted by Baumhauer himself to be false; the error having been one of incorrect comparison on his own part. (See *C. R.*, 1860, **51.** 1004.)

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When the temperature of the vapor going over from an ordinary still is °C	The per cent by volume of alcohol (after Tralles)	
	in the liquid in the still is	in the distillate is
77.2°	92	93
77.5°	90	92
77.81°	85	91
78.12°	80	90.5
78.75°	75	90
79.38°	70	89
80°	65	87
81.25°	50	85
82.5°	40	82
83.75°	35	80
85°	30	78
86.25°	25	76
87.5°	20	71
88.75°	18	68
90°	15	66
91.25°	12	61
92.50°	10	55
93.75°	7	50
95°	5	42
96.25°	3	36
97.5°	2	28
98.75°	1	13
100	0	0

(Grœning, *Brandes's Archiv.*, 1823, **6.** 200; from G.'s brochure entitled *Die vortheilhafte Anwendung des Thermometers, zugleich als Alkoholometer bei dem Brenn- und Destillations-geschäfte*, etc., 8vo, Copenhagen, 1822. Another brochure by Grœning is entitled *Das neue ThermoAlkohometer nebst Barometer*, Post 8vo, Berlin, 1827.)

For Grœning's table of the quantities and strengths of alcohol which distil over at various temperatures from his patent apparatus, see *Edin. Phil. J.*, 1822, **7.** 214; also *Brandes's Archiv.*, 1823, **6.** 198.

Alcohol containing per cent of absolute alcohol (of 0.791 sp. gr. at 20°).	Boils at °C. (Bar. = 720mm. at 0°).
94	75.72°
95	75·74°
96	75 68° (Repeated.)
97	75.60°
98	75.60° (Repeated.)
99	75.65°
100	75.78° (Repeated.)

These experiments, in showing that alcohol, which contains 2 @ 2.5% of water, boils more easily than that which is completely anhydrous, corroborate those of v. Sœmmering, who found that, when very strong alcohol is subjected to distillation, the portions which first pass off contain more water than those which distil over at a later period. (v. Yelin & Fuchs, *Kastner's Archiv.*, 1824, **2.** pp. 347, 343, 349; compare Duflos, *Ibid.*, 1828, **14.** 291.)

In the research cited above, v. Yelin found that absolute alcohol boiled at 75.78° @ 76.9° under pressures of 720 and 759mm. of mercury, and argued therefrom that the statements of earlier text-books, which put the boiling-point of absolute alcohol at 78.75° @ 80°, were erroneous. In a subsequent elaborate set of experiments he corrects this, and fixes the boiling-point more accurately at 77.25° under a pressure of 0m.7216. (*Kastner's Archiv.*, 1824, **3.** 373.) [Compare Kopp's table below.]

Alcohol of sp. gr. (at 15.56°).	Boils at °C.	Alcohol of sp. gr. (at 15.56°).	Boils at °C.
0.9200	81.44°	0.9665	85.33°
0.9821	82.08°	0.9729	87.22°
0.9420	82.44°	0.9786	88.78°
0.9516	83.33°	0.9850	91.33°
0.9600	84.11°	0.9920	94.44°

(Ure, in his *Dict. of Arts*, Boston, 1853; cited from *Pharm. J. Trans.*, **7.** 166.)

Alcohol of sp. gr.	Boils at °C.	Alcohol of sp. gr.	Boils at °C.
0.9335	94°	0.8458	80.5°
0.9234	92.8°	0.8397	79.4°
0.9126	91.7°	0 8332	78 6°
0.9013	90°	0.8265	78°
0.8892	87.8°	0.8194	76.1°
0.8875	86.1°	0.8118	75.8°
0.8765	84°	0.8034	75.5°
0.8630	82.8°	0.7939	75.8°
0.8518	81.7°		

(Casoria, *J. Chim. Méd.*, 1846, p. 467; cited by Pohl.)

Pohl finds that on heating hydrated alcohol the thermometer rises rapidly until the liquid begins to boil, when the temperature suddenly remains fixed during some seconds, after which the mercury slowly rises again, and in a short time reaches a second fixed point, at which it remains constant for a greater number of seconds than before, and then begins to rise again, and continues to rise, with several short cessations, until all the alcohol has been driven off. Pohl takes the second fixed point as the proper boiling-point, because it lasts longer than the first, and because its temperature was found to be more nearly constant when several samples of alcohol of the same composition were compared with each other. The temperatures of the second stationary interval are given in the following table:—

An aqueous solution containing per cent *by weight* of alcohol (of 0.7951 sp. gr).	Is of sp. gr. (at 15°) [sp. gr. of water at 15=1].	And boils at °C. (Bar.=760mm.
0	1 0000	100°
1	0.9982	98.79°
2	0.9964	97.82°
3	0.9947	96.85°
4	0.9930	95.90°
5	0.9913	95.02°
6	0.9898	94.21°
7	0.9883	93.43°
8	0.9868	92.70°
9	0.9854	92.03°
10	0.9840	91.40°
11	0.9827	90.83°
12	0.9814	90.27°

(Pohl, *Denkschriften der Wiener Akad.*, *math-nat. classe*, 1851, vol. **2.** p. 12 of the memoir.

The presence of even 15% of sugar (extract of malt) in hydrated alcohol does not appear to exert any perceptible influence on the boiling-point of the latter. (*Ibid.*, p. 15.)

In his very elaborate memoir in the Vienna *Denkschriften*, 1851, **2.** 200, Pohl also gives tables of correction for temperature of the relation of per cent by volume to per cent by weight, &c., &c.

Boiling-Point of Absolute Alcohol.

Observer.	°C at	Bar. mm.	°C reduced to 760mm. Bar.
Dumas & Boullay,	76°	745	76.6°
Gay-Lussac,	78.4°	760	78.4°
Pierre,	78.3°	758	78.4°
Yelin,	77.3°	722	78.7°
Kopp (earlier),	78.8°	752	79.1°
Kopp (best),	77.7°	748	78.4°

(H. Kopp, *Pogg. Ann.*, 1847, **72.** 56.)

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An ethereal solution of sp. gr.	Contains (by experiment) per cent of alcohol (of 0.809).	An ethereal solution of sp. gr.	Contains (by experiment) per cent of alcohol (of 0.809).
0.729	0	0.779	60
0.737	10	0.786	70
0.756	30	0.801	90
0.765	40	0.809	100

From these data Schiff calculates the following table, by means of the formula,—

$$D = 0.729 + 0.000966\,p - 0.00000222\,p^2,$$

in which $D =$ the sp. gr. of the solution and p the percentage of alcohol contained in the solution.

An ethereal solution of sp. gr.	Contains per cent of alcohol (of 0.809).	An ethereal solution of sp. gr.	Contains per cent of alcohol (of 0.809).
0.729	0	0.775	55
0.734	5	0.779	60
0.738	10	0.782	65
0.742	15	0.786	70
0.747	20	0.789	75
0.752	25	0.798	80
0.756	30	0.796	85
0.760	35	0.800	90
0.765	40	0.804	95
0.768	45	0.809	100
0.772	50		

The sp. grs. corresponding to per cents of ether in the solution may be found by means of the formula,—

$$D = 0.809 - 0.000733\,p - 0.00000111\,p^2.$$

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **111.** 374.)

Alcoholate of Baryta. $Ba\,O, C_4\,H_6\,O_2$ (?) Somewhat soluble in absolute alcohol: 10 c. c. of the saturated solution containing 0.77 grm. of it. Water precipitates it from its solution in absolute alcohol; but this precipitate is soluble in an excess of pure water. A precipitate falls also when the solution in absolute alcohol is boiled, but dissolves again as the liquid cools. (Berthelot, *Ann. Ch. et Phys.*, (3.) **46.** 180.)

Alcohol with Chloride of Calcium.

$$\left.\begin{array}{l} \text{I.)}\ 2\,C_4\,H_6\,O_2\,;\ Ca\,Cl \\ \text{II.)}\ 2\,C_4\,H_6\,O_2\,;\ 3\,Ca\,Cl + 2\,Aq \end{array}\right\}\ \text{Soluble in alcohol.}$$

Alcohol with Chloride of Manganese $C_4\,H_6\,O_2\,;\ Mn\,Cl$ The solution in absolute alcohol saturated at 11.25° contains 58.2% of it, and the same quantity at 37.5°; at 76.25° (boiling) it contains 62.7% of it. If Graham's (*Ann. Phil*, **1.** 333) composition of the salt be admitted, then the alcoholic solution saturated at 76.25° would contain 79% of the compound. (Brandes, *Pogg. Ann.*, 1831, **22.** 271.)

Alcohol with ***bi*****Chloride of Tin.** $C_4\,H_6\,O_2\,;\ Sn\,Cl_2$ Soluble in absolute alcohol. (Robiquet.) Easily soluble in alcohol. (Lewy, *Ann. Ch. et Phys.*, (3.) **16.** 310.)

Alcohol with Chloride of Zinc. $C_4\,H_6\,O_2\,;\ Zn\,Cl$ Soluble in alcohol, from which it crystallizes on cooling.

Alcohol with Nitrate of Magnesia. $3\,C_4\,H_6\,O_2\,;\ Mg\,O, NO_5$ Soluble in hot absolute alcohol, crystallizing out as the solution cools. Decomposed by water. (Chodnew.)

Alcornin (from the bark of *Alchornea latifolia*). Easily soluble in alcohol, ether, and oil of turpentine. Insoluble in dilute acids, and in alkaline solutions. (Bilz, Frenzel.)

Aldehydate of ***X.*** *Vid.* Acetylide of *X.*

Aldehyde. *Vid.* Hydride of Acetyl.

AldehydeAmmonia. *Vid.* Acetylide of Ammonium.

AldehydeResin. When precipitated from its alcoholic solution by water, it dissolves again on washing; but when precipitated from the solution in potash, by means of dilute sulphuric acid, it is completely insoluble in water and only partially soluble in alcohol, and ether. (Liebig.) Sparingly soluble in water. Soluble in alcohol, and ether. Scarcely at all soluble in alkaline solutions. (Weidenbusch.)

"**Aldehydic Acid**" was a mixture of Aldehyde and Acetic Acid.

Alixia Camphor. See under **Camphors.**

Alizaric Acid. *Vid.* Phthalic Acid.

Alizarin. (*Lizaric Acid. Madder-Red.*) $C_{20}\,H_6\,O_6$ & $+ 4\,Aq$ Sparingly soluble in boiling water. Soluble in alcohol, and ether. Readily soluble in alkaline lyes, and in solutions of the alkaline carbonates. Unacted on by chlorhydric, and scarcely at all by nitric acid. Insoluble, or very sparingly soluble, in water acidulated with chlorhydric or sulphuric acid. Soluble in cold concentrated sulphuric acid, from which water precipitates it. Its compounds with the alkaline earths are sparingly soluble, those with the metallic oxides insoluble, in water. (Schunk, *Rep. Br. Assoc.*, 1846, p. 26.) Tolerably soluble in alcohol. Soluble in ether. Easily soluble in solutions of the fixed alkalies and alkaline carbonates, also in solutions of ammonia and carbonate of ammonia. Insoluble in cold, sparingly soluble in boiling solution of alum. (Strecker, *J. Ch. Soc.*, **3.** 245.) Very slightly soluble in cold, more readily soluble in boiling water. (Colin & Robiquet.) Difficultly moistened by cold water. (Wolff & Strecker.) The boiling aqueous solution deposits nothing on cooling (Gaultier & Persoz), but is precipitated by acids. (Kuhlmann.)

100 pts. of water at 100° dissolve 0.034 pt. of it; at 150°, 0.035 pt., the solubility in water rapidly increasing when the mixture is heated above 200° in a sealed tube: 100 pts. of water dissolve 0.82 pt. of it at 200°; 1.70 pts. at 225°: and 3.16 pts. at 250°. (Plessy & Schuetzenberger.) It is not affected by weak acids (Gaultier & Persoz); when boiled with dilute acids it dissolves, and is redeposited on cooling. (Runge.) Soluble in concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water. (Colin & Robiquet, and others.)

Soluble in cold, and more abundantly in boiling alcohol. (Wolff & Strecker.) Soluble in alcohol in almost every proportion. (Colin & Robiquet.) Soluble in 210 pts. of alcohol at 12°. (Zenneck.) The hot alcoholic solution does not deposit crystals on cooling, but on dilution. (Schunck.) Precipitated from the alcoholic solution on the addition of water, or acids. (Kuhlmann.)

More readily soluble in ether than in alcohol. (Colin & Robiquet, and others.) Soluble in 160 pts. of ether, of 0.73 sp. gr., at 12°. (Zenneck.) Soluble in bisulphide of carbon, oil of turpentine, rock-oil, and the fatty oils. (Zenneck.) Slowly soluble in cold, rapidly and more abundantly soluble in hot glycerine. (Arnodon.) Sparingly soluble in boiling acetic acid. (Schunck.) Soluble in boiling bisulphide of carbon, from which it crystallizes on cooling. (Vilmorin.) Soluble in wood-spirit. In ammonia-water. (Runge, Colin & Robiquet, Schiel, Schunck, Strecker.) In sulphide of ammonium. (Gaultier & Persoz.) Soluble in aqueous solutions of the caustic alkalies.

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(Colin & Robiquet, Gaultier & Persoz, Runge, Schiel.) In aqueous solutions of the alkaline carbonates. (Gaultier & Persoz, Schiel.) But insoluble in a cold solution of bicarbonate of soda; on heating, carbonic acid is evolved and the alizarin dissolves. (Zenneck.) Soluble in aqueous solutions of arsenite, arseniate, and silicate of potash. (Gaultier & Persoz.) Scarcely at all soluble in an aqueous solution of alum (Colin & Robiquet); insoluble therein (Gaultier & Persoz, and others). Soluble in a warm aqueous solution of ammonia-alum. (Vilmorin.) Soluble in an aqueous solution of aluminate of potash. (Gaultier & Persoz.) Readily soluble in an aqueous solution of protochloride of tin, also abundantly soluble in a solution of protoxide of tin in caustic potash (Gaultier & Persoz); with reduction (Schunck).

Alizarin combines with salifiable bases, forming compounds which are insoluble in water, and alcohol, with the exception of the potash, soda, and ammonia salts. (Debus.) Insoluble in a very concentrated solution of caustic potash; its compounds with the alkalies are also insoluble in concentrated saline solutions.

Alizarite of Alumina. Insoluble in water or alcohol. (Schunck.)

Alizarite of Ammonia. Soluble in water.

Alizarite of Baryta.

I.) *din.* Insoluble in water or alcohol. (Wolff & Strecker.)
$C_{20}H_6O_8; 2(BaO, HO)$

II.) *sesquibasic.*
$2C_{20}H_6O_6; 3(BaO, HO)$

III.) *sesquiacid.*
$3C_{20}H_6O_6; 2BaO$

Alizarite of Copper. Ppt.

Alizarite of Gold. Ppt.

Alizarite of Iron. Ppt.

Alizarite of Lead.

I.) Ppt., in alcohol.
$2C_{20}H_5O_5.3PbO$

II.) Insoluble in water or alcohol. Soluble in acetic acid and in an aqueous solution of caustic potash. (Debus.)
$3C_{20}H_5O_5, 4PbO$

Alizarite of Lime. Ppt.
$2C_{20}H_6O_6; 3(CaO, HO)$

Alizarite of Magnesia. Ppt.

Alizarite of Mercury. Ppt.

Alizarite of Potash. Easily soluble in water, and absolute alcohol. Insoluble in ether, or in cold saline solutions. (Strecker, *J. Ch. Soc.*, **3.** 246.)

Alizarite of Silver. Ppt.

Alizarite of Soda. Easily soluble in water, and absolute alcohol. Insoluble in ether, in cold saline solutions, or in concentrated soda-lye. (Strecker, *J. Ch. Soc.*, **3.** 246.)

Alizarite of Strontia. Ppt.

Alizarite of Tin.

Alizarite of Zinc. Ppt., in alcohol, and ether.

Alkaloids. Some alkaloids, as nicotin and picolin, and most of the compound ammonias, mix with water in all proportions; others dissolve in it but sparingly, many requiring several hundred or thousand parts. Alcohol dissolves the alkaloids much more freely; ether dissolves many of them readily, but several of those which contain oxygen, cinchonin, and morphin, for example, are nearly insoluble in this liquid. Certain alkaloids are soluble in caustic alkalies, *e. g.* morphin and atropin. (Gmelin.)

"Most of the alkaloids are sparingly soluble in water, but dissolve freely in alcohol, especially when this is hot. Some dissolve in ether, and in the fixed and essential oils, and almost all in benzin, bisulphide of carbon, and chloroform." (Parrish's *Pharm.*, p. 386.) Many alkaloids are soluble in creosote. (Reichenbach.) Alcohol seems to be the best and most general solvent of the alkaloids. (Graham, *et al.*, *J. Ch. Soc.*, **8.** 136.) The non-volatile alkaloids are generally much less soluble in ether than the volatile. Most salts of the alkaloids are entirely insoluble in ether, but soluble in alcohol. (Otto.)

Alkanet Green. Easily soluble in ether; more difficultly soluble in spirit.

Alkanet Red. *Vid.* Anchusin.

Alkargen. *Vid.* Cacodylic Acid.
$C_4AsH_7O_4$

Alkarsin. *Vid.* Oxide of Cacodyl.

Allantoic Acid. *Vid.* Allantoin.

Allantoin. Permanent. Soluble in 160 pts. of water at 20°, and in 30 pts. of boiling water. (Liebig & Wœhler.) Soluble in 400 pts. of cold water. (Lassaigne.) Decomposed by water when heated therewith to 110° @ 140° in a closed tube. (Pelouze, *Ann. Ch. et Phys.*, (3.) **6.** 72.) More soluble in alcohol than in water. (Vauquelin & Buniva.) Also soluble in aqueous solutions of potash, and of the carbonated alkalies.
(*Allantoic Acid. Amniotic Acid.*)
$C_8H_6N_4O_6$

Allantoin with Cadmium. Insoluble in alcohol. Partially soluble, with decomposition in water. (Limpricht, *Ann. Ch. u. Pharm.*, **88.** 100.)
$C_8H_5CdN_4O_6$

Allantoin with Copper. Soluble in water.
$CuO, 3C_8H_5N_4O_5$

Allantoin with Lead. Soluble in water.
$2PbO, C_8H_5PbN_4O_5$

Allantoin with Mercury.

I.) Insoluble in cold, sparingly soluble in hot water. Insoluble in cold spirit. Readily soluble in chlorhydric, nitric, and sulphuric acids. (Limpricht, *Ann. Ch. u. Pharm.*, **88.** 94.)
$5HgO; 3C_8H_5N_4O_5$

II.) Decomposed by water.
$3HgO, 5C_8H_5N_4O_5$

III.) Insoluble in water.
$4HgO, 3C_8H_5N_4O_5$

IV. Ppt.
$5HgO, 2C_8H_5N_4O_5$

Allantoin with Silver. Ppt.
$C_8H_5N_4AgO_6$

Allantoin with Zinc. Soluble in water, from which alcohol precipitates it. (Limpricht.)
$ZnO, C_8H_5ZnN_4O_6$

Allanturic Acid. Deliquescent. Soluble in water. Almost insoluble in alcohol. (Pelouze, *Ann. Ch. et Phys.*, (3.) **6.** 71.)
(*Leucoturic Acid? Compare Lantanuric Acid.*)
$C_6H_4N_2O_6 = N_2\left\{\begin{matrix}C_6O_4''\\H_4\end{matrix}\right\}O_2$

Allanturate of Lead. Ppt. Soluble in an aqueous solution of acetate of lead, and in acids. (Pelouze, *loc. cit.*)

Allanturate of Silver. Ppt. Soluble in an aqueous solution of nitrate of silver, and in acids. (Pelouze, *loc. cit.*)

Allituric Acid. Soluble in 15 @ 20 pts. of boiling water. Soluble in concentrated
$C_6H_3N_2O_4$

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sulphuric acid, from which it is reprecipitated, unchanged, on the addition of water. Unacted upon by warm nitric acid. Soluble in ammonia-water. (Schlieper.)

ALLOPHANIC ACID. Not known in the free state.
(*Cyano Carbamic Acid. Ureo-Carbonic Acid.*
$C_4H_4N_2O_6 = C_4H_3N_2O_5, HO$

ALLOPHANATE OF AMYL. Insoluble in cold, readily soluble in boiling water. Very soluble in alcohol. (Schlieper.) Tolerably soluble in ether, from which solution it is precipitated by water. (Liebig.)
("*Cyanurate of Amyl.*")
$C_{14}H_{14}N_2O_6 = C_4H_3(C_{10}H_{11})N_2O_6$

ALLOPHANATE OF BARYTA. Slowly but completely soluble in water. Decomposed by boiling. (Liebig & Wœhler.)
$C_4H_3BaN_2O_6$

ALLOPHANATE OF ETHYL. Scarcely at all soluble in cold, but tolerably easily soluble in boiling water, from which it crystallizes on cooling. May also be crystallized from alcohol. More soluble in ammonia-water than in pure water, but does not combine therewith. (Liebig, *Ann. der Pharm.*, 1837, **21.** 125, *note.*) Somewhat soluble in cold, and very easily soluble in boiling alcohol. Very sparingly soluble in ether, even when this is boiling. Soluble, apparently without decomposition, in boiling dilute sulphuric, nitric, and chlorhydric acids. (Wœhler & Liebig, Debus.)
("*Cyanurate of Ethyl.*" "*Cyanic Ether.*")
$C_8H_8N_2O_6 = C_4H_3(C_4H_5)N_2O_6$

ALLOPHANATE OF LIME. Sparingly soluble in water. (Liebig & Wœhler.)

ALLOPHANATE OF METHYL. Soluble, especially in warm water, alcohol, wood-spirit, and ether. (Richardson.)
("*Cyanurate of Methyl.*")
$C_6H_6N_2O_6 = C_4H_3(C_2H_3)N_2O_6$

ALLOPHANATE OF PHENYL. Insoluble in water. Soluble in boiling alcohol.
$C_{16}H_8N_2O_6 = C_4H_3(C_{12}H_5)N_2O_6$

ALLOPHANATE OF POTASH. Soluble in alcohol.

ALLOPHANATE OF SODA. Soluble in water. Sparingly soluble in alcohol.

ALLOXAN. The anhydrous crystals are permanent, the hydrate effloresces. Very easily soluble in water, from which it is precipitated on the addition of strong nitric acid, being insoluble in nitric acid. (Schlieper.) Readily soluble in alcohol. (Brugnatelli.) The concentrated aqueous solution is slowly decomposed on boiling.
(*Erythrischic Acid.*)
$C_8H_4N_2O_{10}$ & $+ 2\,Aq$ & $8\,Aq$

ALLOXANIC ACID. Permanent. Readily soluble in water, the solution undergoing decomposition when boiled; less soluble in 5 @ 6 pts. of alcohol; and still less soluble in ether. The aqueous solution is decomposed on boiling. The alkaline alloxanates are soluble in water. Most alloxanates are insoluble in alcohol, and many of them may be precipitated by it from their aqueous solutions.

$$C_8H_4N_2O_{10} = N_2\left\{\begin{matrix} C_2O_2'' \\ C_6O_6'' \\ H_2 \end{matrix}\right., 2\,HO$$

ALLOXANATE OF AMMONIA.

I.) *normal.* Very easily decomposed.

II.) *acid.* Soluble in 3 @ 4 pts. of water. Insoluble in alcohol. (Schlieper.)
$C_8H_3(NH_4)N_2O_{10}$

ALLOXANATE OF BARYTA.

I.) *normal.* Very sparingly soluble in cold, more readily in hot water. Very readily soluble in acids. (Liebig & Wœhler.)
$C_8H_2Ba_2N_2O_{10} + Aq$ & $9\,Aq$

II.) *acid.* More soluble in water than the normal salt, and still more soluble in an aqueous solution of alloxanic acid. Soluble in alcohol. (Schlieper.)
$C_8H_3BaN_2O_{10} + 2\,Aq$

ALLOXANATE OF CADMIUM.

I.) *basic.* Ppt.

II.) *acid.* Soluble in water.

ALLOXANATE OF COBALT. Partially soluble in water.

ALLOXANATE OF COPPER.

I.) *normal.* Soluble in 5 @ 6 pts. of water.
$C_8H_2Cu_2N_2O_{10} + 8\,Aq$

II.) *basic.* Insoluble in water. (Schlieper.)
$CuO, C_8H_2Cu_2N_2O_{10} + Aq$

ALLOXANATE OF LEAD.

I.) *terbasic.* Insoluble in water. Soluble in alloxanic acid, and in the acids generally.
$PbO, C_8H_2Pb_2N_2O_{10}$

II.) *normal.* Insoluble in water.
$C_8H_2Pb_2N_2O_{10} + 2\,Aq$

III.) *acid.* Tolerably soluble in water. Decomposed by alcohol. (Schlieper.)
$C_8H_3PbN_2O_{10} + 2\,Aq$

ALLOXANATE OF LIME.

I.) *normal.* More soluble in water than the baryta salt. Insoluble in alcohol. Very soluble in acetic acid. (Schlieper.)
$C_8H_2Ca_2N_2O_{10} + 10\,Aq$

II.) *acid.* Efflorescent. Soluble in 20 pts. of cold water. Soluble in spirit. (Schlieper.)
$C_8H_3CaN_2O_{10} + 6\,Aq$

ALLOXANATE OF MAGNESIA.

I.) *normal.* Tolerably soluble in water. Sparingly soluble in alcohol. (Schlieper.)
$C_8H_2Mg_2N_2O_{10} + 10\,Aq$

ALLOXANATE OF MANGANESE. Deliquescent. Somewhat soluble in water. Insoluble in spirit. (Schlieper.)

ALLOXANATE OF MERCURY (HgO). Insoluble in water, or alcohol. (Schlieper.)
$C_8H_2Hg_2N_2O_{10} + 4\,Aq$

ALLOXANATE OF POTASH.

I.) *normal.* Very soluble in water. Insoluble in alcohol, or ether.
$C_8H_2K_2N_2O_{10} + 6\,Aq$

II.) *acid.* Rather difficultly soluble in water. Sparingly soluble in spirit.
$C_8H_3KN_2O_{10}$

ALLOXANATE OF NICKEL.

I.) *normal.* Deliquescent. Soluble for the most part in water, a portion of basic salt remaining undissolved. Insoluble in alcohol or ether.
$C_8H_2N_2Ni_2O_{10} + 4\,Aq$

II.) *basic.* Permanent. Insoluble in water. (Schlieper.)
$C_8H_2Ni_2N_2O_{10}; NiO, HO$

ALLOXANATE OF SILVER.

I.) *normal.* Ppt.
$C_8H_2AgN_2O_{10}$

ALLOXANATE OF SODA.

I.) *normal.* Deliquescent. Very soluble in water. Alcohol precipitates a concentrated solution of the salt from its dilute aqueous solution.

ALLOXANATE OF STRONTIA.

I.) *normal.*
$C_8H_2Sr_2N_2O_{10} + 8\,Aq$

ALLOXANATE OF ZINC.

I.) *terbasic.* Slowly soluble in water; dissolving with especial slowness when dry. Readily soluble in alloxanic acid. (Schlieper.)
$ZnO, C_8H_2Zn_2N_2O_{10} + 8\,Aq$

II.) *acid.* Tolerably soluble in water. Sparingly soluble in spirit. (Schlieper.)
$C_8H_3ZnN_2O_{10} + 4\,Aq$

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Alloxantin. Permanent. Very sparingly soluble in cold, somewhat more soluble in boiling water. Insoluble or very sparingly soluble in alcohol. (Liebig & Wœhler.)
(*Uroxin.*)
$C_{16}H_8N_4O_{16} + 4Aq$

Its aqueous solution is very readily decomposed even in the cold, but especially on boiling.

10 grammes of alloxantin washed with 1 kilogramme of water at 10° lost 3 grammes. It is considerably more soluble in aqueous solutions of the alkaline chlorides than in pure water. 5 grammes of it having been dissolved in 100 c. c. of water at 100° and the solution cooled immediately to 20°, 81.81% of the alloxantin was deposited. This experiment being repeated with a saturated solution of chloride of sodium in place of water, only 48.17% of the alloxantin was deposited. Nearly insoluble in alcohol, and ether. (J. M. Merrick, *Thesis of the Lawrence Scientific School*, Cambridge, 1859.)

Alloxantin with Urea.
$2C_2H_4N_2O_2, C_8H_5N_2O_{10} + Aq$

Allyl. Not isolated.
(*Acryl.*)
C_6H_5 or $\left.\begin{matrix}C_6H_5\\C_6H_5\end{matrix}\right\}$

Allylamin.
(*Acrylamin.*)
$C_6H_7N = N\left\{\begin{matrix}C_6H_5\\H_2\end{matrix}\right.$

***Din*Allylamin.**
$C_{12}H_{11}N = N\left\{\begin{matrix}(C_6H_5)_2\\H\end{matrix}\right.$

***Tri*Allylamin.**
$C_{18}H_{15}N = N\left\{(C_6H_5)_3\right.$

AllylAmyl.
$C_{16}H_{16} = \begin{matrix}C_{10}H_{11}\\C_6H_5\end{matrix}$

AllylAmylic Ether. *Vid.* Oxide of Allyl & of Amyl.

AllylAnilin Urea. *Vid.* PhenylAllyl Urea.

***Tetr*AllylArsonium.** *Vid.* Arsen*tetr*Allylium.

AllylEther. *Vid.* Oxide of Allyl and of Ethyl.

AllylEthyl.
$C_{10}H_{10} = \begin{matrix}C_6H_5\\C_4H_5\end{matrix}$

Allylic Alcohol. *Vid.* Hydrate of Allyl.

Allylic Ether. *Vid.* Oxide of Allyl.

Allylin.
$C_{12}H_{12}O_6 = \left.\begin{matrix}C_6H_5'''\\H_2 . C_6H_5\end{matrix}\right\}O_6$.

***Di*Allylin.**
$C_{18}H_{16}O_6 = \left.\begin{matrix}C_6H_5'''\\H(C_6H_5)_2\end{matrix}\right\}O_6$

***Tri*Allylin.** Soluble in ether. (Berthelot & De Luca.)
$C_{24}H_{20}O_6 = \left.\begin{matrix}C_6H_5'''\\(C_6H_5)_3\end{matrix}\right\}O_6$

***Tetr*Allylium.**
$C_{24}H_{20}N = N\left\{(C_6H_5)_4\right.$

AllylNaphthylSulphoCarbamid. *Vid.* NaphthylThiosinamin.

AllylOxamic Acid. *Vid.* Oxamate of Allyl.

AllylPhenylSulphoCarbamid. *Vid.* PhenylThiosinamin.

AllylSulphoCarbamic Acid. Not isolated.
(*Sulpho Sinapic Acid. Sulphydrate of Sulpho Cyanide of Allyl.*)
$C_8H_7NS_4 = N\left\{\begin{matrix}C_2S_2''\\C_6H_5 . S, HS\\H\end{matrix}\right.$

AllylSulphoCarbamate of Ammonia. Easily decomposed.
$C_8H_6(NH_4)NS_4$

AllylSulphoCarbamate of Baryta.

I.) Very soluble in water, and in alcohol.
$C_8H_6BaNS_4 + 4Aq$

II.) Soluble in water. More difficultly soluble in alcohol than No. I.
$C_8H_5NS_2, 2BaS + 2HO$

AllylSulphoCarbamate of Lead. Ppt.
$C_8H_6PbNS_4$

AllylSulphoCarbamate of Lime. Soluble in alcohol.

AllylSulphoCarbamate of Potash.

I.) Partially decomposes in the air. Soluble in water. Soluble in absolute alcohol.
$C_8H_6KNS_4$

II.) $C_8H_5K_2NS_4$ III.) $2C_8H_6NS_4$; $2KS$

AllylSulphoCarbamate of Soda. Soluble in water. (Will, *Ann. Ch. u. Pharm.*, **92.** 59.)
$C_8H_6NaNS_4 + 6Aq$

AllylSulphoCarbanilid. *Vid.* PhenylThiosinamin.

AllylSulphuric Acid. Soluble in water.
(*SulphallylicAcid. Sulphate of Allyl & of Hydrogen.*)
$C_6H_6S_2O_8 = C_6H_5, H, S_2O_8$

AllylSulphate of Baryta. Easily soluble in water.
$C_6H_5BaO_2, S_2O_6$

AllylUrea. Easily soluble in water, and alcohol. (Cahours & Hofmann.)
$C_8H_8N_2O_2 = N_2\left\{\begin{matrix}C_2O_2''\\C_6H_5\\H_3\end{matrix}\right.$

***Di*AllylUrea.** *Vid.* Sinapolin.

AllylXanthic Acid. *Vid.* OxySulphoCarbonate of Allyl.

"**Aloeretic**" (or Aloeresinic) **Acid** (of Schunck). *Vid.* Chrysatric Acid.

Aloeretic Acid. Soluble in water, and alcohol. (Mulder.)
$C_{14}H_8NO_{12} + Aq$

Aloeretate of Baryta. Soluble in water.

Aloeretate of Copper. Insoluble in water.

Aloeretate of Lead. Insoluble in water.

Aloeretate of Lime. Soluble in water and in alcohol.

Aloeretate of Potash. Soluble in water.

Aloeretate of Silver. Insoluble in water.

Aloeretate of Soda. Soluble in water. (Mulder.)

Aloes (dry sap of *Aloe spicata, perfoliata*, &c.). When treated with water a portion of it (bitter of aloes) dissolves; while from 26 to 42% of a resinous matter remains undissolved. See under **Resins.**

Aloetamid. Much more soluble than chrysamid. (Mulder.)
$C_{14}H_5N_3O_{10}$

Aloetic Acid. Soluble in 125 pts. of cold water. (Bracannot.) Soluble in 850 pts. of water at 100°. (Boutin.) Sparingly soluble in cold, more soluble in hot water. Tolerably soluble in alcohol. (Mulder.) Soluble in 70 @ 80 pts. of cold alcohol of 36°. (Boutin.) Most of its salts are easily soluble in water.
(*Polychromatic Acid. Artificial Bitter of Aloes. Chrysammic Acid, q. v., has also been called Aloetic Acid.*)
$C_{14}H_3(NO_4)_2O_3, HO$

Aloetate of Baryta. Nearly insoluble in water. (Mulder.)
$C_{14}H_3Ba(NO_4)_2O_4$

Aloetate of Lead. Insoluble in water. (Mulder.)
$C_{14}H_2Pb_2(NO_4)_2O_4$

Aloetate of Potash. Readily soluble in water.

Aloetate of Silver. Sparingly soluble in cold, readily in hot water. (Boutin.)

Aloetate of Soda. Readily soluble in water.

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Aloetin. Soluble in 10 pts. of water at 10°, (*Aloin. Bitter of Aloes.*) in 2 pts. of alcohol of 36° B. at 10°, and in 8 pts. of ether of 66° B. at 10°. (Robiquet, in Wittstein's *Handw.*, from *J. de Pharm.*, **29.** 241.) Very soluble in water, and alcohol. (Robiquet, *Ann. Ch. et Phys.*, (3.) **20.** 484.) Easily soluble in water, and dilute spirit. But not at all soluble in ether or in absolute alcohol. Soluble without notable decomposition in concentrated sulphuric acid. (Braconnot.) Insoluble in oils.

Aloin (of Smith). Permanent. Sparingly $C_{34}H_{18}O_{14}+Aq$ soluble in cold, much more readily soluble in warm water, and alcohol. Easily soluble in aqueous solutions of the caustic and carbonated alkalies, as well as of ammonia and carbonate of ammonia; but these solutions are gradually decomposed on boiling and on exposure to the air.

Soluble in 60 pts. of cold water; soluble in 5 pts. of boiling water; extremely soluble in alcohol, and in chlorhydric and acetic acids, as well as alkaline solutions. Insoluble in ether, benzin, oil of turpentine, chloroform, or olive oil. (Parrish's *Pharm.*, p. 429.)

Aloisic Acid. Insoluble in water. Easily $C_{16}H_{12}O_8$? soluble in alcohol, and ether. (Robiquet, *Ann. Ch. et Phys.*, (3.) **20.** 488.)

Aloisol. Completely insoluble in water. Sol- $C_{16}H_{12}O_6$ uble in all proportions in alcohol, and ether. (Robiquet, *Ann. Ch. et Phys.*, (3.) **20.** 488.)

AlphaOrsellinic Acid. *Vid.* Orsellic Acid.

AlphaOrsellesic Acid. *Vid.* Orsellic Acid.

AlphaOrsellic Acid. *Vid.* Lecanoric Acid.

AlphaToluic Acid. — AlphaToluyl, &c. See under Toluic Acid, &c., as *alpha*Toluic Acid.

Althein. *Vid.* Asparagin.

Althionic Acid.
$C_4H_6S_2O_8 = C_4H_5S_2O_7, HO$

Althionate of Ammonia. Deliquescent.
$C_4H_5(NH_4)S_2O_8$ Extremely soluble in water.

Althionate of Baryta. Permanent. Much $C_4H_5BaS_2O_8$ more soluble in water than the ethyl sulphate. More readily soluble in alcohol, especially in hot, than the isethionate.

Althionate of Copper.

Althionate of Lime. Soluble in water.

Alum (Ammonia). *Vid.* Sulphate of Alumina and of Ammonia.

Alum (Potash). *Vid.* Sulphate of Alumina and of Potash.

Alumina. *Vid.* Oxide of Aluminum.

Aluminic Acid. *Vid.* Oxide of Aluminum.
Al_2O_3

The aluminates of metallic oxides are all insoluble in water excepting those of potash and soda. (Fremy.)

Aluminate of Baryta. Insoluble in water.
$a = BaO, Al_2O_3$ (Vauquelin, Unverdorben.)
b = *ditto, with excess of baryta* (*hydrated*). Soluble in water. (Vauquelin.)

Aluminate of Cobalt.

Aluminate of Copper.

Aluminate of Glucina. "Chrysoberyl."
GlO, Al_2O_3

Aluminate of Iron (Fe O). As it occurs in nature, acids have scarcely any action upon it.

Aluminate of Lime. Insoluble in water.
CaO, Al_2O_3 (Unverdorben, Kuhlmann.)

Aluminate of Magnesia. Insoluble in wa- (*Spinelle.*) ter. Chlorhydric acid dissolves very MgO, Al_2O_3 little spinelle, and nitric acid none at all. (Abich.)

Aluminate of Nickel.

Aluminate of Potash.
a = *anhydrous.* Soluble in water and in acids.

b = *hydrated.* Very soluble in water. Insolu- KO, Al_2O_3+8Aq ble in alcohol. A certain quantity of water decomposes it; Al_2O_3 being pptd. while a very alkaline aluminate remains in solution. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 362.) Decomposed by the carbonic acid of the air.

Aluminate of Soda. Decomposed by the NaO, Al_2O_3 carbonic acid of the air. Very soluble in water. (Schaffgotsch,)

Aluminate of Strontia.
a = Similar to the baryta salt.
b = *ditto, with excess of strontia.* Similar to the baryta salt. (Vauquelin.)

Aluminate of Zinc.
a = Insoluble in acids and alkaline solutions.
(*Gahnite.*)
ZnO, Al_2O_3
b = *precipitated.* Soluble in aqueous solutions of caustic potash and ammonia. (Berzelius, *Lehrb.*, **2.** 647.)

Aluminum. Unacted on by water. Unacted Al on by nitric acid, either concentrated or dilute, at ordinary temperatures, but is slowly dissolved therein on boiling. Scarcely at all acted upon by cold dilute sulphuric acid. Very easily soluble in chlorhydric acid, either dilute or concentrated, but especially in concentrated. Soluble in aqueous solutions of chloride of sodium. (Deville, *Ann. Ch. et Phys.*, (3.) **43.** 14.) Soluble in alkaline solutions. (Wœhler.) Only slightly acted upon by cold, but is dissolved by hot acetic acid. Most compounds of aluminum are soluble in water.

Amalic Acid. *Vid.* *Di*MethylAlloxantin.

AmAnilin. *Vid.* AmylAnilin.

Amanitin (from *Amanita muscaria*, &c.). Very soluble in water. Insoluble in alcohol or ether. Soluble in acids and in alkaline solutions. (Tellier.)

AmarErythrin. Easily soluble in water; (*Erythrin Bitter.*) less soluble in alcohol. Insoluble $C_{22}H_{13}O_{14}$ in ether. (Heeren, Kane.)

AmarErythrin with Lead. Ppt.
$C_{22}H_{14}O_{14}, 2PbO$

Amarin. Insoluble in water. Readily soluble (*Benzolin. Picramin.*) (*Isomeric with Hydrobenzamid.*) in boiling, less soluble in cold alcohol. $C_{42}H_{18}N_2 = N_2\left\{\begin{matrix}(C_{14}H_5)_3\\ H_3\end{matrix}\right.$ Very easily soluble in ether. The salts of amarin, excepting the acetate, are but sparingly soluble in water. (Laurent, Fownes.)

Amarone. Insoluble in water. Very spar- $C_{28}H_{11}N$ ingly soluble in alcohol; somewhat more readily soluble in ether. Soluble in hot, less soluble in cold naphtha. Sparingly soluble in hot, less soluble in cold nitric acid. Soluble in cold concentrated sulphuric acid without decomposition. (Laurent.)

Amaryl (of Laurent). *Vid.* Nitrate of Lophin.

Amarythrin. *Vid.* AmarErythrin.

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Amasatin. *Vid.* Isamid.

Amber. *(Succinum.)* Water dissolves out a little succinic acid. Alcohol dissolves about 10% of a soft resin, besides any succinic acid which may be present. Ether and the fatty and essential oils also dissolve only a small portion of it. But it is soluble in oil of turpentine, and alcohol, when heated with either of these in a sealed tube.

Only slightly soluble in hot oil of amber ("ambereupion"). (Dœpping.) Completely soluble, with decomposition, in concentrated sulphuric or nitric acid. Alkaline solutions dissolve it with the exception of a peculiar bituminous matter, called succinin by John. According to Pelletier & Walter (*Ann. Ch. et Phys.*, 1843, (3.) **9.** 89), amber furnishes, when distilled,

I. Oils.

II. A yellowish substance; insoluble in water or cold alcohol. Scarcely soluble in boiling alcohol, or in ether. Unacted upon by cold, but soluble in warm concentrated sulphuric acid. (*Loc. cit.*, pp. 94, 95.) [Pelletier & Walter regard this substance as identical with Laurent's Chrysene.]

III. A white substance, Succisterene, *q. v.*

Ambergris. Consists principally of Ambrein, *q. v.* Ambergris is insoluble in water. Sparingly soluble in cold, more readily soluble in hot alcohol. Readily soluble in ether, and the volatile oils. Feebly acted upon by acids, excepting nitric acid.

Ambreic Acid. Very sparingly soluble in water. Easily soluble in alcohol, and ether. The alkaline salts of ambreic acid are readily soluble in water, but the others are only sparingly soluble or insoluble.

Ambrein (from *Ambergris*). Insoluble in water. Easily soluble in hot, less soluble in cold alcohol. Readily soluble in ether, and in the fatty and essential oils.

AmidAnisic Acid. *Vid.* Anisamic Acid.

Amid. Hypothetical.
NH_2

Ami*di*NitroPhenic Acid. *Vid.* Picramic Acid.

AmidoBenzoic Acid. *Vid.* Benzamic Acid.

***Bi*AmidoBenzoic Acid.** *(Oxide of Benzicylbiamid.)* Soluble in alcohol, ether, and, with especial ease, in water. (Voit.)

$C_{14}H_8N_2O_4 = C_{14}H_7N_2O_3, HO, \text{or } N_2\left\{\begin{matrix}C_{14}H_4O_2'' \\ H_4\end{matrix}\right\}O_2$

AmidoChloride of Mercury. *Vid.* Chloride of Mercurammonium.

AmidoChrysammic Acid. *Vid.* Chrysammidic Acid.

AmidoCuminic Acid. *Vid.* Cuminamic Acid.

***Bi*AmidoCuminic Acid.** Soluble in water.
$C_{20}H_{14}N_2O_4$ (Boullet.)

***Bi*AmidoCuminate of Lead.** Ppt.

***Bi*AmidoCuminate of Soda.** Soluble in water.

AmidoHippuric Acid. *Vid.* Hippuramic Acid.

***Bi*AmidoMeconic Acid.** Difficultly soluble in cold water, and in dilute acids. Decomposed by caustic alkalies. (How.)

$C_{14}H_6N_2O_{10} = N_2\left\{\begin{matrix}C_{14}HO_6''' \\ H_3 . H\end{matrix}\right. . O, HO$

AmidoNitrAnilin. *Vid.* NitrAzoPhenylamin.

AmidoNitroCitraconanil. *Vid.* CitraconAzoPhenylimid.

AmidoNitrOxanil. *Vid.* NitrAzoPhenylOximid.

AmidoNitrOxanilic Acid. *Vid.* NitrAzoPhenylOxamic Acid.

AmidoPhenase. *Vid.* Anilin.

AmidoPhenol. *Vid.* Oxide of Anilin.

AmidoOxyChloride of Mercury. *Vid.* Chloride of *tetra*MercurAmmonium.

AmidoPropionic Acid. *Vid.* Alanin.

AmidoSulphoBenzid. *(Amido Sulpho Benzol. Amido Sulpho Benzene.) (Isomeric with Sulpho-Phenanilid.)* Sparingly soluble in cold, readily soluble in boiling water. Readily soluble in alcohol. Soluble in acids with combination. (Gericke, *Ann. Ch. u. Pharm.*, **100.** 210.)

$C_{24}H_9(NH_2)S_2O_4$

***Bi*AmidoSulphoBenzid.** Readily soluble in boiling, sparingly soluble in cold water, or alcohol. Insoluble in alkalies. Soluble in acids with combination. (Gericke, *loc. cit.*)

$C_{24}H_8(NH_2)_2S_2O_4$

AmidoSulphoBenzoic Acid. Easily soluble in hot water, less soluble in spirit. Scarcely at all soluble in ether. Very easily soluble in ammonia-water.

$C_{14}H_7NS_2O_{10} = N\left\{\begin{matrix}C_{14}H_4O_2'' \\ H_2\end{matrix}\right. . O, HO, 2SO_3$

AmidoSulphoBenzoyl. *Vid.* SulphoBenzamid.

Amidulin. Easily and completely soluble in hot water. (Schulze.)

AmiNitroPhenic Acid. *Vid.* NitroPhenamic Acid.

Ami*bi*NitroPhenic Acid. *Vid.* Picramic Acid.

Amisatin. Insoluble in water. Almost insoluble in alcohol. Soluble in boiling alcohol containing a little potash in solution. (Laurent.)

$C_{96}H_{30}N_{11}O_{18}$

Ammelid. Completely insoluble in all neutral solvents, like water, alcohol, or ether. Easily soluble in acids, as sulphuric, nitric, and chlorhydric acids, with decomposition on boiling; and still more easily in an aqueous solution of caustic potash, especially if this be hot. Ammonia-water dissolves only an insignificant quantity, and acetic acid no trace of it. (Knapp, *Ann. der Pharm.*, 1837, **21.** 244.)

$C_6H_4N_4O_4 = N_3\left\{\begin{matrix}(C_2O_2'')_2 \\ C_2N \\ H_4\end{matrix}\right.$

Ammelid with Oxide of Silver. *Vid.* ArgentAmmelid.

Ammelide *sulfuré*. *Vid.* SulphoMellonic Acid.

Ammelin. Insoluble in water, alcohol, or ether. Soluble in solutions of the caustic alkalies, from which it is precipitated by acetic acid, chloride of ammonium, or carbonate of ammonia. Easily soluble in most acids, with combination. Most of its acid solutions are partially decomposed by water.

$C_6H_5N_5O_2 = N_3\left\{\begin{matrix}C_2O_2'' \\ (C_2N)_2 \\ H_5\end{matrix}\right.$

Ammelin with Oxide of Silver. *Vid.* Argent Ammelin.

Ammeline anilique. *Vid.* PhenylAmmelin.

Ammolin (of Unverdorben). *(Probably a mixture of Lutidin and Collidin.)* Soluble in 200 pts. of cold, and 40 pts. of boiling water. Soluble in all proportions in alcohol, and ether. (Unverdorben.)

Ammonia. *(Volatile alkali.)* $N H_3$ Soluble in water with great evolution of heat; at + 10°, under a pressure of 29.8 inches water absorbs at the most 670 vols. — nearly half its weight — of ammonia ($N H_3$). The sp. gr. of the solution obtained is 0.875. (J. Davy.) At lower temperatures water absorbs more than ½ its weight, the sp. gr. falling to 0.850. (Dalton.) At 24°, 100 pts. of water absorb 8.41 pts. of it, and at 55°, 5.96 pts. of it. (Osann.) Water can take up 780 times its volume, 6 measures of the water becoming 10 measures of saturated solution of ammonia, and 1 vol. of water saturated with the gas containing 468 vols. of $N H_3$. (T. Thompson, in his *System of Chem.*, London, 1831, 1. 140.) 100 vols. of water at 15° absorb 450 vols., *i. e.* 1 pt. water absorbs ⅓ pt. of ammonia. (Dumas.) At ordinary temperatures 1 vol. of water absorbs about 700 vols. of ammonia. (Otto-Graham.) 100 pts. of water placed in an atmosphere of ammonia gas, between 0° and 15° absorb 47.7 pts. (by weight) of it. (Berzelius, *Lehrb.*, **2.** 108.) 1 measure of water by absorbing 505 measures of ammonia is increased to 1.5 measures; the solution is of 0.900 sp. gr. (Ure.)

1 vol. of water under a pressure of 0m.76 of mercury at °C.	Dissolves of $N H_3$ gas: — vols. reduced to 0° and 0m.76 pressure of mercury.	1 vol. of water under a pressure of 0m.76 of mercury at °C.	Dissolves of $N H_3$ gas: — vols. reduced to 0° and 0m.76 pressure of mercury.
0°	1049.60	13°	759.55
1°	1020.78	14°	743.11
2°	993.26	15°	727.22
3°	966.98	16°	711.82
4°	941.88	17°	696.85
5°	917.90	18°	682.26
6°	894.99	19°	667.99
7°	873.09	20°	653.99
8°	852.14	21°	640.19
9°	831.98	22°	626.54
10°	812.76	23°	612.98
11°	794.32	24°	599.46
12°	776.60	25°	585.94

(Carius, *Ann. Ch. u. Pharm.*, 1856, **99.** p. 144, and fig.; also in Bunsen's *Gasometry*, pp. 289, 128, 169.) [Compare the memoir of Roscoe & Dittmar, *loc. inf. cit.*]

1 pt. by weight of water, under a pressure of 0m.760 of mercury,

At °C.	Dissolves pts. of $N H_3$.	At °C.	Dissolves pts. of $N H_3$.	At °C.	Dissolves pts. of $N H_3$.
0°	0.899	34°	0.378	68°	0.202
2°	0.853	36°	0.363	70°	0.194
4°	0.809	38°	0.350	72°	0.186
6°	0.765	40°	0.338	74°	0.178
8°	0.724	42°	0.326	76°	0.170
10°	0.684	44°	0.315	78°	0.162
12°	0.646	46°	0.304	80°	0.154
14°	0.611	48°	0.294	82°	0.146
16°	0.578	50°	0.284	84°	0.138
18°	0.546	52°	0.274	86°	0.130
20°	0.518	54°	0.265	88°	0.122
22°	0.490	56°	0.256	90°	0.114
24°	0.467	58°	0.247	92°	0.106
26°	0.446	60°	0.238	94°	0.098
28°	0.426	62°	0.229	96°	0.090
30°	0.408	64°	0.220	98°	0.082
32°	0.393	66°	0.211	100°	0.074

(Sims, *Ann. Ch. u. Pharm.*, 1861, **118.** 348.)

Solubility of $N H_3$ *in Water at 0°, at various pressures. By experiment.*

Under a pressure of metres of mercury,	1 pt. by weight of water absorbs pts. of $N H_3$.	Under a pressure of metres of mercury,	1 pt. by weight of water absorbs pts. of $N H_3$.	1 pt. by weight of water absorbs pts. of NH_3 when the pressure = 0m.760.	Under a pressure of metres of mercury,	1 pt. by weight of water absorbs pts. of $N H_3$.
0.018	0.074	0.753	0.870	0.875	0.904	0.955
0.097	0.274	0.759	0.869	0.869	0.912	0.994
0.241	0.463	0.759	0.882	0.883	1.261	1.292
0.268	0.478	0.761	0.877	0.876	1.264	1.268
0.452	0.652	0.762	0.864	0.863	1.266	1.246
0.707	0.845	0.768	0.889	0.887	1.281	1.290
0.712	0.855	0.763	0.878	0.876	1.960	2.134
		0.769	0.891	0.885	1.963	2.137

From these determinations the following table was obtained by interpolation.

Under a pressure of metres of mercury,	1 pt. by weight of water absorbs pts. of $N H_3$.	Under a pressure of metres of mercury,	1 pt. by weight of water absorbs pts. of $N H_3$.	Under a pressure of metres of mercury,	1 pt. by weight of water absorbs pts. of $N H_3$.	Under a pressure of metres of mercury,	1 pt. by weight of water absorbs pts. of $N H_3$.
0.00	0.000	0.25	0.465	0.85	0.937	1.45	1.469
0.01	0.044	0.30	0.515	0.90	0.968	1.50	1.526
0.02	0.084	0.35	0.561	0.95	1.001	1.55	1.584
0.03	0.120	0.40	0.607	1.00	1.037	1.60	1.645
0.04	0.149	0.45	0.646	1.05	1.075	1.65	1.707
0.05	0.175	0.50	0.690	1.10	1.117	1.70	1.770
0.75	0.228	0.55	0.731	1.15	1.161	1.75	1.835
0.100	0.275	0.60	0.768	1.20	1.208	1.80	1.906
0.125	0.315	0.65	0.804	1.25	1.258	1.85	1.976
0.150	0.351	0.70	0.840	1.30	1.810	1.90	2.046
0.175	0.382	0.75	0.872	1.35	1.361	1.95	2.120
0.200	0.411	0.80	0.906	1.40	1.415	2.00	2.196

(Roscoe & Dittmar, *Ann. Ch. u. Pharm.*, 1859, **112.** p. 353, and fig.) From this it appears that the amount of $N H_3$ absorbed by water at 0° is not directly proportional to the pressure. A result different from that at which Carius arrived. For Roscoe and Dittmar's explanation of this discrepancy, see their memoir, p. 349.

Solubility of $N H_3$ *in Water at a constant pressure, — the temperatures varying.*

Height of Bar.	At the observed Temperature.	1 pt. by weight of water absorbed pts. of $N H_3$.
0.760	0.0°	0.875
0.766	6.2°	0.756
0.749	6.9°	0.723
0.749	6.9°	0.726
0.742	15.4°	0.586
0.755	15.4°	0.589
0.744	24.1°	0.465
0.751	24.1°	0.471
0.768	35.3°	0.350
0.760	35.3°	0.354
0.768	54.2°	0.202

From these results the following provisional table has been constructed.

At 0m.76 pressure of mercury and °C.	1 pt. by weight of water absorbs pts. of $N H_3$.	At 0m.76 pressure of mercury and °C.	1 pt. by weight of water absorbs pts. of $N H_3$.
0°	0.875	30°	0.403
2°	0.833	32°	0.382
4°	0.792	34°	0.362
6°	0.751	36°	0.343
8°	0.713	38°	0.324
10°	0.679	40°	0.307
12°	0.645	42°	0.290
14°	0.612	44°	0.275
16°	0.582	46°	0.259
18°	0.554	48°	0.244
20°	0.526	50°	0.229
22°	0.499	52°	0.214
24°	0.474	54°	0.200
26°	0.449	56°	0.186
28°	0.426		

(Roscoe & Dittmar, *Ann. Ch. u. Pharm.*, 1859, **112.** p. 354, and fig.)

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Solubility of Ammonia in Water at various Pressures,—by Experiment.

At 0°.			At 20°.			At 40°.			At 100°.		
P.	G at P.	G at 760mm.	P.	G at P.	G at 760mm.	P.	G at P.	G at 760mm.	P.	G at P.	G at 760mm.
20.7	0.084	3.101	45.5	0.100	1.666	75.8	0.050	0.497	688.4	0.067	0.074
97.0	0.274	2.147	206.1	0.263	0.871	184.3	0.112	0.461	1078.0	0.104	0.073
241.0	0.463	1.460	735.4	0.508	0.525	701.1	0.322	0.349	1419.0	0.135	0.073
452.0	0.652	1.096	1525.0	0.811	0.404	1599.0	0.522	0.248			
749.6	0.888	0.900	2076.0	1.018	0.373	2129.0	0.599	0.241			
757.7	0.900	0.903									
1963.0	2.137	0.827									

From these results the following table was obtained by interpolation:—

	At 0°.		At 20°.		At 40°.		At 100°.	
P.	G at P.	G at 760.	G at P.	G at 760.	G at P.	G at 760.	G at P.	G at 760.
20	0.082	3.113						
30	0.117	2.960						
40	0.148	2.820						
60	0.199	2.522	0.119	1.513				
80	0.240	2.280	0.141	1.337	0.052	0.497		
100	0.280	2.127	0.158	1.200	0.064	0.490		
120	0.316	2.000	0.173	1.095	0.076	0.483		
140	0.346	1.880	0.187	1.017	0.088	0.476		
160	0.375	1.780	0.202	0.962	0.099	0.470		
180	0.398	1.684	0.217	0.918	0.109	0.462		
200	0.421	1.598	0.232	0.881	0.120	0.455		
250	0.472	1.434	0.266	0.810	0.145	0.440		
300	0.519	1.315	0.296	0.750	0.168	0.426		
350	0.563	1.223	0.325	0.705	0.191	0.414		
400	0.606	1.152	0.353	0.670	0.211	0.402		
450	0.650	1.100	0.378	0.638	0.232	0.392		
500	0.692	1.052	0.403	0.612	0.251	0.382		
550	0.732	1.012	0.425	0.587	0.269	0.372		
600	0.770	0.975	0.447	0.566	0.287	0.363		
650	0.809	0.946	0.470	0.550	0.304	0.355		
700	0.850	0.923	0.492	0.534	0.320	0.347	0.068	0.074
750	0.891	0.903	0.514	0.521	0.335	0.339	0.073	0.074
760	0.899	0.899	0.518	0.518	0.338	0.338	0.074	0.074
800	0.937	0.888	0.535	0.508	0.349	0.332	0.078	0.074
850	0.980	0.876	0.556	0.497	0.363	0.325	0.083	0.074
900	1.029	0.869	0.574	0.485	0.378	0.319	0.088	0.074
950	1.077	0.862	0.594	0.475	0.391	0.313	0.092	0.073
1000	1.126	0.855	0.613	0.466	0.404	0.307	0.096	0.073
1050	1.177	0.852	0.632	0.457	0.414	0.300	0.101	0.073
1100	1.230	0.850	0.651	0.450	0.425	0.294	0.106	0.073
1150	1.283	0.848	0.669	0.442	0.434	0.287	0.110	0.073
1200	1.336	0.846	0.685	0.433	0.445	0.282	0.115	0.073
1250	1.388	0.844	0.704	0.428	0.454	0.276	0.120	0.073
1300	1.442	0.843	0.722	0.422	0.463	0.271	0.125	0.073
1350	1.496	0.842	0.741	0.417	0.472	0.266	0.130	0.073
1400	1.549	0.841	0.761	0.413	0.479	0.260	0.135	0.073
1450	1.603	0.840	0.780	0.409	0.486	0.255		
1500	1.656	0.839	0.801	0.406	0.493	0.250		
1600	1.758	0.835	0.842	0.400	0.511	0.242		
1700	1.861	0.832	0.881	0.394	0.530	0.237		
1800	1.966	0.830	0.919	0.388	0.547	0.231		
1900	2.070	0.828	0.955	0.382	0.565	0.226		
2000			0.992	0.377	0.579	0.220		
2100					0.594	0.215		

P = "Partial pressure," *i. e.* the total pressure, minus the tension of aqueous vapor at the given temperature. G = weight of NH_3, in grammes, which is dissolved in 1 gramme of water at the pressure P. (Sims, *Ann. Ch. u. Pharm.*, 1861, **118**. p. 346 and fig.)

In proportion as the temperature is higher, so much the more nearly does the solubility of NH_3 in water conform to the law of Henry & Dalton, but only obeys it completely when the temperature has reached 100°. (Sims, *loc. cit.*, p. 348.)

An aqueous solution of sp. gr. (at 14°),	Contains per cent of NH_3.	An aqueous solution of sp. gr. (at 14°),	Contains per cent of NH_3.
0.8844	36.0	0.8898	33.4
0.8848	35.8	0.8903	33.2
0.8852	35.6	0.8907	33.0
0.8856	35.4	0.8911	32.8
0.8860	35.2	0.8916	32.6
0.8864	35.0	0.8920	32.4
0.8868	34.8	0.8925	32.2
0.8872	34.6	0.8929	32.0
0.8877	34.4	0.8934	31.8
0.8881	34.2	0.8938	31.6
0.8885	34.0	0.8934	31.4
0.8889	33.8	0.8948	31.2
0.8894	33.6	0.8953	31.0

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An aqueous solution of sp. gr. (at 14°),	Contains per cent of NH_3.	An aqueous solution of sp. gr. (at 14°),	Contains per cent of NH_3.
0.8957	30.8	0.9366	16.4
0.8962	30.6	0.9373	16.2
0.8967	30.4	0.9380	16.0
0.8971	30.2	0.9386	15.8
0.8976	30.0	0.9393	15.6
0.8981	29.8	0.9400	15.4
0.8986	29.6	0.9407	15.2
0.8991	29.4	0.9414	15.0
0.8996	29.2	0.9420	14.8
0.9001	29.0	0.9427	14.6
0.9006	28.8	0.9434	14.4
0.9011	28.6	0.9441	14.2
0.9016	28.4	0.9449	14.0
0.9021	28.2	0.9456	13.8
0.9026	28.0	0.9463	13.6
0.9031	27.8	0.9470	13.4
0.9036	27.6	0.9477	13.2
0.9041	27.4	0.9484	13.0
0.9047	27.2	0.9491	12.8
0.9052	27.0	0.9498	12.6
0.9057	26.8	0.9505	12.4
0.9063	26.6	0.9512	12.2
0.9068	26.4	0.9520	12.0
0.9073	26.2	0.9527	11.8
0.9078	26.0	0.9534	11.6
0.9083	25.8	0.9542	11.4
0.9089	25.6	0.9549	11.2
0.9094	25.4	0.9556	11.0
0.9100	25.2	0.9563	10.8
0.9106	25.0	0.9571	10.6
0.9111	24.8	0.9578	10.4
0.9116	24.6	0.9586	10.2
0.9122	24.4	0.9593	10.0
0.9127	24.2	0.9601	9.8
0.9133	24.0	0.9608	9.6
0.9139	23.8	0.9616	9.4
0.9145	23.6	0.9623	9.2
0.9150	23.4	0.9631	9.0
0.9156	23.2	0.9639	8.8
0.9162	23.0	0.9647	8.6
0.9168	22.8	0.9654	8.4
0.9174	22.6	0.9662	8.2
0.9180	22.4	0.9670	8.0
0.9185	22.2	0.9677	7.8
0.9191	22.0	0.9685	7.6
0.9197	21.8	0.9693	7.4
0.9203	21.6	0.9701	7.2
0.9209	21.4	0.9709	7.0
0.9215	21.2	0.9717	6.8
0.9221	21.0	0.9725	6.6
0.9227	20.8	0.9733	6.4
0.9233	20.6	0.9741	6.2
0.9239	20.4	0.9749	6.0
0.9245	20.2	0.9757	5.8
0.9251	20.0	0.9765	5.6
0.9257	19.8	0.9773	5.4
0.9264	19.6	0.9781	5.2
0.9271	19.4	0.9790	5.0
0.9277	19.2	0.9799	4.8
0.9283	19.0	0.9807	4.6
0.9289	18.8	0.9815	4.4
0.9296	18.6	0.9823	4.2
0.9302	18.4	0.9831	4.0
0.9308	18.2	0.9839	3.8
0.9314	18.0	0.9847	3.6
0.9321	17.8	0.9855	3.4
0.9327	17.6	0.9863	3.2
0.9333	17.4	0.9873	3.0
0.9340	17.2	0.9882	2.8
0.9347	17.0	0.9890	2.6
0.9353	16.8	0.9899	2.4
0.9360	16.6	0.9907	2.2

An aqueous solution of sp. gr. (at 14°),	Contains per cent of NH_3.	An aqueous solution of sp. gr. (at 14°),	Contains per cent of NH_3.
0.9915	2.0	0.9959	1.0
0.9924	1.8	0.9967	0.8
0.9932	1.6	0.9975	0.6
0.9941	1.4	0.9983	0.4
0.9950	1.2	0.9991	0.2

(Carius, *Ann. Ch. u. Pharm.*, 1856, **99**. pp. 164, 163, 148.)

An aqueous solution of sp. gr. (at 16° C.)	Contains per cent of dry NH_3.	An aqueous solution of sp. gr. (at 16° C.)	Contains per cent of dry NH_3.
0.9517	12.000	0.9650	8.500
0.9521	11.875	0.9654	8.375
0.9526	11.750	0.9659	8.250
0.9531	11.625	6.9664	8.125
0.9536	11.500	0.9669	8.000
0.9540	11.375	0.9673	7.875
0.9545	11.250	0.9678	7.750
0.9550	11.125	0.9683	7.625
0.9555	11.000	0.9688	7.500
0.9556	10.950	0.9692	7.375
0.9559	10.875	0.9697	7.250
0.9564	10.750	0.9702	7.125
0.9569	10.625	0.9707	7.000
0.9574	10.500	0.9711	6.875
0.9578	10.375	0.9716	6.750
0.9583	10.250	0.9721	6.625
0.9588	10.125	0.9726	6.500
0.9593	10.000	0.9730	6.375
0.9597	9.875	0.9735	6.250
0.9602	9.750	0.9740	6.125
0.9607	9.625	0.9745	6.000
0.9612	9.500	0.9749	5.875
0.9616	9.375	0.9754	5.750
0.9621	9.250	0.9759	5.625
0.9626	9.125	0.9764	5.500
0.9631	9.000	0.9768	5.375
0.9636	8.875	0.9773	5.250
0.9641	8.750	0.9778	5.125
0.9645	8.625	0.9783	5.000

(Otto, in his *Lehrbuch.*)

An aqueous solution of sp.gr.	Contains per cent by weight of NH_3.	An aqueous solution of sp.gr.	Contains per cent by weight of NH_3.
0.8914	27.940	0.9363	15.900
0.8937	27.633	0.9410	14.575
0.8967	27.038	0.9455	13.250
0.8983	26.751	0.9510	11.925
0.9000	26.500	0.9564	10.600
0.9045	25.175	0.9614	9.275
0.9090	23.850	0.9662	7.950
0.9133	22.525	0.9716	6.625
0.9177	21.200	0.9768	5.300
0.9227	19.875	0.9828	3.975
0.9275	18.550	0.9887	2.650
0.9320	17.225	0.9945	1.325

(Ure, in his *Dict. of Arts*, p. 63.)

An aqueous solution of sp. gr.	Contains per cent by weight of Ammonia.	Boiling-point of the liquid.	Vol. of gas condensed in a given vol. of liquid.
0.85	35.3	−3.3°	494
0.86	32.6	+3.3°	456
0.87	29.9	10°	419
0.88	27.3	16.6°	382
0.89	24.7	23.3°	346
0.90	22.2	30°	311
0.91	19.8	36.6°	277
0.92	17.4	43.3°	244
0.93	15.1	50°	211

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An aqueous solution of sp. gr.	Contains per cent by weight of Ammonia.	Boiling-point of the liquid.	Vol. of gas condensed in a given vol. of the liquid.
0.94	12.8	56.6°	180
0.95	10.5	63.3°	147
0.96	8.3	70°	116
0.97	6.2	78.3°	87
0.98	4.1	86.1°	57
0.99	2.0	91.1°	28

(Dalton, in his *New System*, Pt. **2.** p. 422.)

Sp. Gr.	Ammonia per cent.	Sp. Gr.	Ammonia per cent.
0.8750	32.3*	0.9435	14.53
0.8857	29.25	0.9476	13.46
0.9000	26	0.9513	12.40
0.9054	25.37*	0.9545	11.56
0.9166	22.07	0.9573	10.82
0.9255	19.54	0.9597	10.17
0.9326	17.52	0.9616	9.6
0.9385	15.88	0.9632	9.5*

(H. Davy, *Elements*, **1.** 241; cited by Gmelin, *Handbook*, **2.** 425.)

The aqueous solution saturated at °C	Is of sp. gr.	The aqueous solution saturated at °C	Is of sp. gr.
0°	0.8535	13°	0.8823
1°	0.8561	14°	0.8841
2°	0.8587	15°	0.8858
3°	0.8611	16°	0.8874
4°	0.8635	17°	0.8889
5°	0.8658	18°	0.8903
6°	0.8681	19°	0.8916
7°	0.8703	20°	0.8928
8°	0.8725	21°	0.8940
9°	0.8746	22°	0.8952
10°	0.8766	23°	0.8963
11°	0.8785	24°	0.8974
12°	0.8804	25°	0.8984

(Carius, *Ann. Ch. u. Pharm.*, 1856, **99.** 141.)

Soluble in 3 pts. of alcohol, of 38° B. (Boullay.) 1 vol. of alcohol of 0.829 sp. gr. absorbs about 50 vols. of ammonia; this is expelled when the solution is gently heated. (J. Davy.) Readily soluble in ether.

Soluble in 0.4 vol. of rock-oil from Amiano. (De Saussure.)

1 vol. of oil of turpentine absorbs 7.25 vols. of it at 16°; 1 vol. of oil of lemons absorbs 8.5 vols. of it at 16°; 1 vol. of oil of rosemary absorbs 9.75 vols. of it at 29°; 1 vol. of oil of lavender absorbs 47 vols. of it at 20°. (Saussure.) 1 vol. of caoutchin absorbs 3 vols. of it. (Himly.) Valerol absorbs much of it. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **7.** 278.)

AmmoniaAlum. *Vid.* Sulphate of Alumina & of Ammonia.

Ammonia *X* of *Y*. *Vid.* Ammonio *X* of *Y*.

Ammonia with Iodine. Soluble, with decom-
NH_3I position, in water. Readily soluble in alcohol. (Millon, Bineau.)

Ammonia with Sulphuric Acid. *Vid.* Sulphamid.

Ammonia with Sulphurous Acid. *Vid.* Sulphurylamin.

Ammoniac, *Gum*. See under **Resins.**

AmmonioAcetate of Copper. Efflorescent. (Coulon.)

AmmonioAcetate of Mercury. *Vid.* Acetate of Mercurammonium.

AmmonioArsenite of Silver. Insoluble in
$4NH_3, 2AgO, AsO_3$ water or alcohol. (Girard.)

AmmonioAzoPhosphate of Iron (Fe_2O_3). Very soluble in water. (Gladstone.)

AmmonioBromate of Cadmium. Decom-
$3NH_3, 2(CdO, BrO_5)$ posed by water. (Rammelsberg.)

AmmonioBromate of Cobalt (?). Deliques-
$7NH_3 . Co_2O_3, 6BrO_5 + 12Aq$ cent. Soluble in water. (Rammelsberg.)

AmmonioBromate *of dinoxide* of Mercury. Soluble, with decomposition, in chlorhydric acid.

Ammonio*sesqui*Bromide of Cobalt. Soluble
$3Co_2O_3, 2Co_2Br_3, 15NH_3 + 20Aq$ (?) in water. (Rammelsberg.)

Ammonio*di*Bromide of Copper.

Ammonio*proto*Bromide of Copper.

I.) $5NH_3, 2CuBr$ Soluble in a small quantity of water, but this solution is decomposed when more water is added; hydrate of copper being deposited. (Rammelsberg.)

II.) $3NH_3, 2CuBr$ Behaves like the preceding with water. Insoluble in alcohol.

AmmonioBromide of Cyanogen. *Vid.* Bromide of Cyanamin.

AmmonioBromide of Phosphorus. Slowly
$5NH_3, 3PBr_3$ but completely soluble, with decomposition, in water.

AmmonioBromide of Platinum. *Vid.* Bromide of Platinamin.

AmmonioBromide of Strontia. Soluble in
$4SrBr, NH_3$ (?) water. (Rammelsberg.)

AmmonioBromoChloride of Platinum.
$2NH_3, PtClBr$ Nearly insoluble in cold water.

AmmonioCarbonate of Mercury. Insolu-
$NH_3, 4HgO, CO_2$ ble in cold water. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 407.)

AmmonioCarbonate of Silver. Easily soluble in water. Soluble in ammonia-water, from which it is precipitated on the addition of absolute alcohol. When this precipitate is washed with alcohol it is slowly decomposed, ammonia being dissolved out. (Berzelius's *Lehrb.*)

AmmonioChloride of Aluminum.

I.) $3NH_3, Al_2Cl_3$

II.) NH_3, Al_2Cl_3 Soluble, without residue, in water. (H. Rose, Persoz.)

Ammonio*ter*Chloride of Antimony. Not
$NH_3, SbCl_3$ readily deliquescent.

Ammonio*penta*Chloride of Antimony. De-
$6NH_3, SbCl_5$ composed by water. (Persoz.)

AmmonioChloride of Arsenic.

I.) $2NH_3; AsCl_3$ Soluble, apparently without decomposition, in water, and alcohol. (Persoz.)

II.) $4NH_3, AsCl_3$ Soluble in water; those crystals which have formed in alcohol being especially soluble. Soluble in alcohol. (Liebig & Wœhler.)

AmmonioChloride of Bismuth.

AmmonioChloride of Boron. Decomposed
$3NH_3, 2BCl_3$ by water.

AmmonioChloride of Calcium. Soluble in
$4NH_3, CaCl$ water, with decomposition, ammonia being evolved.

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* By direct experiment. The other numbers were obtained by calculation, making no allowance for the condensation which occurs when ammonia-water is diluted.

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AmmonioChloride of Cyanogen. *Vid.* Chloride of Cyan*bi*amin.

Ammonio*proto*Chloride of Iron. Decomposed by water. (Faraday.)

Ammonio*sesqui*Chloride of Iron. Deliques-
$N\,H_3, Fe_2\,Cl_3$ ces, but less rapidly than perchloride of iron. Soluble in water, with evolution of heat. (H. Rose.)

AmmonioChloride of Lead.

AmmonioChloride of Palladium. *Vid.* Chloride of Palladammonium.

Ammonio*ter*Chloride of Phosphorus.
Ammonio*quinqui*Chloride of Phosphorus.
$5\,N\,H_3, P\,Cl_3$; & $5\,N\,H_3, P\,Cl_5$ Both are insoluble, as such, in water, but are slowly decomposed, with solution, by boiling water. More easily soluble, with decomposition, in acids. Solutions of the fixed caustic alkalies appear to have no action at first, but on boiling decomposition ensues. (Berzelius's *Lehrb.*)

Ammonio*proto*Chloride of Platinum. *Vid.* Chloride of Platin(*ous*)*bi*amin.

Ammonio*bi*Chloride of Platinum. *Vid.* Chloride of Platin(*ic*)*bi*amin.

Ammonio*sesqui*Chloride of Rhodium. Slightly soluble in water. (Vauquelin.)

AmmonioChloride of Silicon. Decom-
$4\,N\,H_3, Si\,Cl_3$ (?) posed by water. (Persoz.)

AmmonioChloride of Silver.
$3\,N\,H_3, 2\,Ag\,Cl$

AmmonioChloride of Strontium.
$4\,N\,H_3, Sr\,Cl$

Ammonio*di*Chloride of Sulphur. Perma-
$2\,N\,H_3, S_2\,Cl$ nent in dry air. Insoluble in water, but is gradually decomposed thereby. Soluble, without decomposition, in absolute alcohol. If a little water be added to the alcoholic solution, the greater part of the compound will be precipitated, while that which remains in solution will be decomposed as if no alcohol were present. (Mertens, Berzelius's *Lehrb.*, **3.** 286.)

Ammonio*proto*Chloride of Sulphur.

I.) $N\,H_3, S\,Cl$ Soluble in water, with subsequent decomposition. Soluble in absolute alcohol, and in anhydrous ether. (H. Rose, *Ibid.*)

II.) $2\,N\,H_3, S\,Cl$ Decomposed by water. Slightly soluble in absolute alcohol, and anhydrous ether. On evaporating these solutions, a small portion of it is decomposed.

The Ammoniochlorides of Sulphur, of Marten & Soubeiran ($Cl\,S, N\,H_2$), and of H. Rose ($Cl\,S_2, N\,H_3$), do not exist! (Fordos & Gélis, *Ann. Ch. et Phys.*, 1851, (3.) **32.** 409.)

AmmonioChloride of Uranium.
$N\,H_3, 3\,Ur\,Cl$

Ammonio*ter*Chloride of Vanadium.

AmmonioChloride of Zirconium.
$N\,H_3, Zr\,Cl$

AmmonioChlorOxyCarbonic Acid. Deli-
$2\,N\,H_3, CO\,Cl$ quescent. (J. Davy.) Soluble in alcohol, but insoluble in ether. (Regnault.) Decomposed by acids.

AmmonioChromate of Copper. Easily de-
$5\,N\,H_3, 3\,Cu\,O, 2\,Cr\,O_3, 2\,HO$ composes in the air. Decomposed by water at ordinary temperatures. Sparingly soluble, or insoluble in alcohol, ether, or an aqueous solution of ammonia. (Malaguti & Sarzeau, *loc. inf. cit.*, p. 434.) Decomposed by hot water. Insoluble in alcohol. (Bœttger.)

AmmonioCyanate of Silver.

Ammonio*proto*Cyanide of Gold.

AmmonioCyanide of Mercury. Soluble in water. (H. Rose.)

AmmonioCobaltiCyanide of Copper. In-
$2\,N\,H_3, Cu_3\,Co_2\,Cy_6 + 5\,Aq$ soluble in water. Decomposed by acids.

AmmonioCobaltiCyanide of Nickel. In-
$2\,N\,H_3, Ni_3\,Co_2\,Cy_6 + 7\,Aq$ soluble in water. Readily soluble in ammonia-water, from which alcohol precipitates it. (Zwenger.)

AmmonioCobaltiCyanide of Silver. In-
$N\,H_3, Ag_3\,Co_2\,Cy_6 + Aq$ soluble in water.

AmmonioCyanide of *X*. *Vid.* Cyanide of *X*-ammonium.

AmmonioFerricyanide of Nickel. Solu-
$2\,N\,H_3, 3\,Ni\,Cy, Fe_2\,Cy_3 + Aq$ ble in ammonia-water. (Reynoso, *Ann. Ch. et Phys.*, (3.) **30.** 254.)

AmmonioFerrocyanide of Copper. Wa-
$4\,N\,H_3, C_6\,N_3\,Fe\,Cu_2$ ter decomposes it, dissolving out the ammonia. (Vauquelin.)

AmmonioFerrocyanide of Magnesium.

I.) $2\,Mg\,Cy, Fe\,Cy$; $2\,N\,H_3\,Cy, Fe\,Cy + 2\,Aq$

II.) $7\,(2\,Mg\,Cy, Fe\,Cy)$; $5\,(2\,N\,H_3\,Cy, Fe\,Cy) + 6\,Aq$ Soluble in 260 pts. of cold, and in 178 pts. of boiling water. (Bunsen.)

AmmonioFerrocyanide of Mercury. De-
$N\,H_3, Hg_2\,Fe\,Cy_3 + Aq$ composed by water, and by acids. (Bunsen.)

AmmonioFerroCyanide of Nickel.

I.) $5\,N\,H_3, Ni_2\,Fe\,Cy_3 + 4\,Aq$ Decomposed by boiling with water. Also decomposed by alkalies and by acids, even weak. (Reynoso, *Ann. Ch. et Phys.*, (3.) **30.** 253.)

II.) "*biAmmonio ditto.*" *Vid.* Ferrocyanide of Nickelammonium.

AmmonioFluoride of Arsenic. Sparingly
$3\,N\,H_3, As\,Fl_3$ soluble in boiling water. (Unverdorben.)

AmmonioFluoride of Boron. Soluble in
1, 2 & $3\,N\,H_3$, with $B\,Fl_3$ water, with decomposition.

Ammonio*ter*Fluoride of Chromium.

AmmonioFluoride of Silicon. Soluble,
$2\,N\,H_3, 2\,Si\,Fl_3$ with decomposition, in water. (Davy.)

AmmonioFluoride of Tungsten.

AmmonioHypoSulphate *of protoxide* of Co-
$5\,N\,H_3, Co\,O, S\,O_3$ balt. Soluble in ammonia-water, but the solution is decomposed by evaporation. (Rammelsberg.)

AmmonioHypoSulphate *of sesquioxide* of
$5\,N\,H_3, Co_2\,O_3, 2\,S_2\,O_5$ Cobalt. Partially soluble, with decomposition, in water. Soluble, with decomposition, in chlorhydric acid. (Rammelsberg.)

AmmonioIodate of Zinc. Decomposed by
$4\,N\,H_3, 3\,Zn\,O, I\,O_5$ water. Soluble in ammonia-water. Alcohol precipitates it from the ammoniacal solution. (Rammelsberg.)

AmmonioIodide of Aluminum. Soluble in hot water, and in chlorhydric acid. (Reade, *Rep. Br. Assoc.*, 1857, p. 57.)

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AmmonioIodide of Cadmium (&c.). *Vid.* Iodide of Cadmium(&c.)amin.

AmmonioIodide of Cyanogen. *Vid.* Iodide of Cyanamin.

Ammonio*per*Iodide of Gold. Readily soluble in water. (Reade, *Rep. Br. Assoc.*, 1857, p. 56.)

AmmonioIodide (&c.) **of Lead.** *Vid.* Iodide (&c.) of Plumbammonium.

AmmonioIodide of Nitrogen.

I.) NH_3, NI_3 Decomposed by water. Insoluble in absolute alcohol. Soluble, with decomposition, in chlorhydric acid. (Bunsen.)

II.) $NH_3, 4NI_3$ Insoluble in water, but is gradually decomposed thereby.

Ammonio*prot*Iodide of Platinum. *Vid.* Iodide of Platin(*ous*)*bi*amin.

AmmonioNitrate of Cobalt. Partially soluble, with decomposition, in water. Soluble in ammonia-water. (Hess.)

Ammonio*proto*Nitrate of Platinum. *Vid.* Nitrate of Platin(*ous*)*bi*amin.

AmmonioNitrate of Silver. *Vid.* Nitrate of Argent*bi*amin.

AmmonioNitrite of Silver.

AmmonioOsmiamate of Zinc. Decomposed $2NH_3, ZnO, (Os_2NO_5)$ by water even in the cold. Insoluble in ammonia-water.

AmmonioOxalate of Cobalt.

I.) *of protoxide of Cobalt* (CoO). Efflorescent. "$9(NH_3, C_2O_3); CoO, C_2O_3 + 24Aq$" Sparingly soluble in cold, but soluble in all proportions in boiling water. (Winckelblech.)

II.) *of sesquioxide of Cobalt* (Co_2O_3). Scarcely $12NH; C_{12}Co_4O_{24} + 6Aq$ at all soluble in water, or ammonia-water; but tolerably soluble in an aqueous solution of carbonate of ammonia. (L. Gmelin.)

III.) *of cobaltoso-cobaltic oxide* (CoO, Co_2O_3). Easily soluble in water. (Winckelblech.)

AmmonioOxalate of Silver. *Vid.* Oxalate of Argent*bi*amin.

AmmonioOxide of Gold. *Vid.* Aurate of Ammonia.

Ammonio*sesquioxide of* Osmium. Insoluble in NH_3, Os_2O_3 water. Sparingly soluble in acids. (Berzelius.)

AmmonioOxide of Platinum. *Vid.* Oxide of Platinamin.

AmmonioPerChlorate of Silver.

AmmonioPicrate of X. *Vid.* Picrate of X-amin (as of Cobaltamin).

AmmonioPlatinoCyanide of X. *Vid.* Cyanide of X-ammonium (*e. g.* of Cobaltammonium) with *proto*Cyanide of Potassium.

AmmonioSulphate of Copper. Soluble in $5NH_3, 2CuO, SO_3$ water. (H. Rose.)

***Basic*AmmonioSulphate *of binoxide* of Platinum.** Insoluble in water. Soluble in hot chlorhydric, or sulphuric acid. (E. Davy.)

AmmonioSulphate of Zinc. Soluble, with $5NH_3, 2(ZnO, SO_3)$ partial decomposition, in water. (H. Rose.)

Ammonio*ter*Sulphide of Arsenic. Decomposed by water.

Ammonio*quinqui*Sulphide of Arsenic. Soluble in water, the solution subsequently undergoing decomposition.

AmmonioSulphide of Phosphorus. Decomposed by water. (Bineau.) NH_3, PS_3

Ammonium. Known only in combination. The NH_4 salts of ammonium are generally soluble in water. They not only undergo slight decomposition, with loss of ammonia when exposed to the air, but when treated with boiling water they evolve a small quantity of ammonia, and the solutions thus obtained exhibit an acid reaction. (Emmett, *Am. J. Sci.*, 1830, (1.) **18.** 255.)

AmmoniumAmalgam. Decomposed by water, more easily in presence of naphtha, alcohol, or ether.

Amniotic Acid. *Vid.* Allantoin.

Ampelic Acid. Almost insoluble in cold, $C_{14}H_6O_6$ sparingly soluble in boiling water. Tolerably soluble in boiling, less soluble in cold alcohol, and ether. Soluble in warm concentrated sulphuric acid, from which it is precipitated unaltered by water. (Laurent.)

Ampelate of Ammonia. Soluble in water, and alcohol. (Laurent.)

Ampelate of Baryta.	Ppts.
" **Copper.**	
" **Lead.**	
" **Lime.**	
" **Magnesia.**	
" **Nickel.**	
" **Silver.**	
" **Strontia.**	

Ampelin. Soluble in all proportions in water, if it be mixed with 40 or 50 times its volume of that liquid. From the aqueous solution it separates on the addition of sulphuric acid, carbonate of potash, and other acids and salts. Soluble in alcohol and in all proportions in ether. (Laurent.)

Amygdalic Acid. Hygroscopic. Easily sol- $C_{40}H_{26}O_{24}$ uble in water. Insoluble in cold, and only very slightly soluble in hot alcohol of 94%. Insoluble in ether.

Amygdalate of Baryta. Soluble in water. $C_{40}H_{25}BaO_{24} + Aq$

Amygdalate of Ethyl. Tolerably soluble in water, especially if this be warm, but is decomposed by warm water. Soluble in ether. (Wœhler.)

Amygdalate of Lead. Sparingly soluble in water.

Amygdalate of Lime. Soluble?

Amygdalate of Zinc. Soluble?

Amygdalin. Readily soluble in water. Scarce- $C_{40}H_{27}NO_{22} + 6Aq$ ly at all soluble in cold absolute alcohol, but easily soluble in hot alcohol. Soluble in 240 pts. of cold alcohol of 94%. Insoluble in ether. Soluble, without decomposition, in cold baryta-water, but the solution is decomposed on boiling.

Amyl. Insoluble in water. Soluble in all pro- $C_{10}H_{11}$. or $\left\{\begin{matrix} C_{10}H_{11} \\ C_{10}H_{11} \end{matrix}\right.$ portions in alcohol, and ether. (Frankland, *J. Ch. Soc.*, **3.** 34.) Insoluble in monohydrated or in fuming sulphuric acid, but it is decomposed by the latter after a time. Slowly decomposed by nitric acid. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **44.** 283.)

Amyl (or Amylic) **Alcohol.** *Vid.* Hydrate of Amyl.

AmylAldehyde. *Vid.* Hydride of Valeryl.

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AMYLAMIN. Miscible in all proportions with water. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 491.)
(*Valeramin.*)
$C_{10}H_{13}N = N\left\{\begin{matrix}C_{10}H_{11}\\H_2\end{matrix}\right.$

*Din***AMYLAMIN.** Very sparingly soluble in water. Soluble in acids, with combination. Its salts are generally sparingly soluble in cold, more readily soluble in boiling water. (Hofmann.)
$C_{20}H_{23}N = N\left\{\begin{matrix}C_{10}H_{11}\\C_{10}H_{11}\\H\end{matrix}\right.$

*Tri***AMYLAMIN.** Resembles *din*amylamin.
$C_{30}H_{33}N = N\left\{(C_{10}H_{11})_3\right.$

*Tetr***AMYLAMMONIUM.** Not isolated. Compare Hydrate of Amylammonium.
(*Tetramylamin.*)

AMYLAMMONIA. *Vid.* Amylamin.

AMYLANILIN. Soluble in ether, and in bromide of amyl.
(*AmylPhenylamin. Amanilin. Mylanilin.*)
$C_{22}H_{17}N = N\left\{\begin{matrix}C_{12}H_5\\C_{10}H_{11}\\H\end{matrix}\right.$

*Din***AMYLANILIN.** Its salts are nearly insoluble in water, and in dilute chlorhydric, or sulphuric acid.
(*DiAmylPhenylamin. BiAmanilin.*)
$C_{32}H_{27}N = N\left\{\begin{matrix}C_{12}H_5\\(C_{10}H_{11})_2\end{matrix}\right.$

AMYLATE OF *X*. *Vid.* Oxide of Amyl and of *X*.

AMYLBUTYL.
$\begin{matrix}C_{10}H_{11}\\C_8H_9\end{matrix}$

AMYLCARBONICCHLORIDE. *Vid.* ChloroCarbonate of Amyl.

AMYL*chloré*. *Vid.* ChlorAmyl.

AMYLCHINOLIN. Not isolated.
$C_{28}H_{17}N$

AMYLCITRIC ACID. Soluble in all proportions in water, alcohol, and ether. Its salts are generally soluble in water. (Breunlin, *Ann. Ch. u. Pharm.*, **91.** 318.)
$C_{22}H_{18}O_{14} = C_{12}H_5(C_{10}H_{11})O_{12}, 2HO$

AMYLCITRATE OF AMMONIA.
I.) *normal.* Very readily soluble in water. Soluble in spirit, but insoluble in absolute alcohol.
$C_{22}H_{16}(NH_4)_2O_{14}$

AMYLCITRATE OF ETHYL. Insoluble, or very sparingly soluble in water. Soluble in ether.
$C_{22}H_{17}(C_4H_5)O_{14}$

AMYLCITRATE OF LEAD.
I.) *basic.* Insoluble, or very sparingly soluble in water.

AMYLCITRATE OF LIME.
I.) *acid.* Sparingly soluble in cold, easily soluble in boiling water.
$C_{22}H_{17}CaO_{14}$

AMYLCITRATE OF POTASH.
I.) *acid.* Extremely soluble in water; less soluble in spirit.
$C_{22}H_{17}KO_{14}$

AMYLCITRATE OF SILVER. Soluble in water.

AMYLCITRATE OF SODA.
I.) *acid.* Extremely soluble in water; less soluble in spirit.
$C_{22}H_{17}NaO_{14}$

AMYLCYANAMID. *Vid.* CyanAmylamin.

AMYLCYANANILIN.
(*Amyl Cyan Phenylamin.*)
$C_{24}H_{16}N_2 = N\left\{\begin{matrix}C_{12}H_4(C_2N)\\C_{10}H_{11}\\H\end{matrix}\right.$

AMYLENE. Insoluble in water. Easily soluble in fuming sulphuric acid, and in bromine.
(*Valerene. Paramylene.*)
$C_{10}H_{10}$

AMYLETHYLANILIN, &c. *Vid.* EthylAmylAnilin, &c.

AMYLGLYCOL. *Vid.* Hydrate of Amylene.

AMYLHYPOSULPHUROUS ACID. *Vid.* AmylSulphurous Acid.

AMYLIAQUE. *Vid.* Amylamin.

AMYLICALCOHOL. *Vid.* Hydrate of Amyl.

AMYLICETHER. *Vid.* Oxide of Amyl.

AMYLICMERCAPTAN. *Vid.* Sulphydrate of Amyl.

AMYLIDE OF ZINC. *Vid.* ZincAmyl.

AMYLMALIC ACID. Easily soluble in water, alcohol, and ether. Its salts are generally soluble in water. (Breunlin, *Ann. Ch. u. Pharm.*, **91.** 323.)
(*Malamylic Acid.*)
$C_{18}H_{16}O_{10} = C_8H_4(C_{10}H_{11})O_9, HO$

AMYLMALATE OF AMMONIA. Soluble in water, and in spirit.
$C_{18}H_{15}(NH_4)O_{10}$

AMYLMALATE OF BARYTA. Soluble in water. Insoluble, or very sparingly soluble in alcohol.
$C_{18}H_{15}BaO_{10}$

AMYLMALATE OF LEAD. Insoluble in water.

AMYLMALATE OF LIME. More soluble in hot than in cold water.
$C_{18}H_{15}CaO_{10} + Aq$

AMYLMALATE OF POTASH. Soluble in water, and in alcohol.

AMYLMALATE OF SODA. Soluble in water, and in alcohol.

AMYLMERCAPTAN. *Vid.* Sulphydrate of Amyl.

AMYLMUCIC ACID. Abundantly soluble in hot, but sparingly soluble in cold water, and alcohol.
$C_{22}H_{20}O_{16} = C_{12}H_9(C_{10}H_{11})O_{16}$

AMYL NICOTIN. *Vid.* Hydrate of AmylNicotin.

AMYLNITROPHENIDIN. *Vid.* Oxide of AmylNitroPhenylamin.

AMYL*o*—**ACID.** *Vid.* Amyl—Acid.

AMYLOID. Soluble in water, in dilute acids, and in a dilute solution of caustic potash. Alcohol precipitates it from the aqueous solution. (Schleiden.)

AMYLOXALIC ACID. The aqueous solutions of its salts are quickly decomposed on boiling.
(*Oxamylic Acid. Oxalamylic Acid.*)
$C_{14}H_{12}O_8$

AMYLOXALATE OF AMYL. Decomposed by water.
$C_{14}H_{11}(C_{10}H_{11})O_8$

AMYLOXALATE OF LIME. More soluble in hot than in cold water. (Balard, *Ann. Ch. et Phys.*, (3.) **12.** 309.)
$C_{14}H_{11}CaO_8 + 2Aq$

AMYLOXALATE OF POTASH. Soluble in water. (Balard, *loc. cit.*)

AMYLOXALATE OF SILVER. Sparingly soluble in water. (Balard, *loc. cit.*)
$C_{14}H_{11}AgO_8$

*Di***AMYLOXAMID.** Insoluble in water. Soluble in boiling alcohol, from which it is for the most part deposited on cooling. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 495.)
(*AmylOxamid.*)
$C_{24}H_{24}N_2O_4 = N_2\left\{\begin{matrix}C_4O_4''\\(C_{10}H_{11})_2\\H_2\end{matrix}\right.$

AMYLOXANTHIC ACID. *Vid.* OxySulphoCarbonate of Amyl.
$C_{12}H_{12}O_2S_4$

AMYLOXYSULPHOCARBONIC ACID. *Vid.* OxySulphoCarbonate of Amyl.

AMYLPHENYLAMIN. *Vid.* AmylAnilin.

AMYLPHLORETIC ACID. Soluble in alcohol, and ether. Water precipitates it from these solutions. (Hlasiwetz.)
(*Phloretate of Amyl.*)
$C_{28}H_{20}O_6 = C_{18}H_9(C_{10}H_{11})O_6$

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AmylPhosphoric Acid. Deliquescent. Soluble in water, and alcohol. Insoluble in ether, which precipitates it from the concentrated alcoholic solution.
$C_{10}H_{13}PO_8 = C_{10}H_{11}O, 2\,HO, cPO_5$

Of its salts, those of the alkalies are soluble, the others are sparingly soluble, or insoluble, in water. They are, however, in general, more soluble than the corresponding terbasic phosphates. They all dissolve readily in nitric, and chlorhydric acids.

AmylPhosphate of Ammonia. Soluble in water, and alcohol.
$2\,NH_4O, C_{10}H_{11}O, cPO_5 + x\,Aq$

AmylPhosphate of Baryta. Insoluble, or very sparingly soluble, in water.
$2\,BaO, C_{10}H_{11}O, cPO_5$

AmylPhosphate of Copper. Insoluble in water. Soluble in chlorhydric acid.
$2\,CuO, C_{10}H_{11}O, cPO_5$

AmylPhosphate of Lead. Insoluble in water. Readily soluble in chlorhydric, and acetic acids.
$2\,PbO, C_{10}H_{11}O, cPO_5$

AmylPhosphate of Mercury (HgO). Ppt.

AmylPhosphate of Potash. Deliquescent. Soluble in all proportions in water, either hot or cold. Easily soluble in warm alcohol. Insoluble in ether.
$2\,KO, C_{10}H_{11}O, cPO_5$

Amyl Phosphate of Silver. Appreciably soluble in warm, less soluble in cold water. It is decomposed when boiled for a long time with water. (Guthrie, *J. Ch. Soc.*, **9.** 131.)
$2\,AgO, C_{10}H_{11}O, cPO_5$

***Di*AmylPhosphoric Acid.** Only very sparingly soluble in water. Easily soluble in alcohol, and ether.
$C_{20}H_{23}PO_8 = 2\,C_{10}H_{11}O, HO, cPO_5$

Its alkaline salts are easily soluble in water, those of the alkaline earths are difficultly soluble in water, but more easily soluble in alcohol. They are all decomposed on boiling their aqueous solution.

***Di*AmylPhosphate of Ammonia.** Deliquescent. Soluble in water.

***Di*AmylPhosphate of Baryta.** Only sparingly soluble either in hot or cold water. Easily soluble in boiling alcohol. The aqueous solution is partially decomposed by boiling.
$BaO, 2\,C_{10}H_{11}O, cPO_5$

***Di*AmylPhosphate of Copper.** Ppt.

***Di*AmylPhosphate of Ethyl.**
$C_4H_5, 2\,C_{10}H_{11}O, cPO_5$

***Di*AmylPhosphate *of sesquioxide* of Iron.** Insoluble in water, or alcohol.
$Fe_2O_3, 6\,C_{10}H_{11}O, 3cPO_5 + 9\,Aq$

***Di*AmylPhosphate of Lead.**

I.) *normal.* Insoluble in water, or alcohol.
$PbO, 2\,C_{10}H_{11}O, cPO_5$

II.) *basic.* Ppt.
$PbO, 2\,C_{10}H_{11}O, cPO_5 + PbO, HO$

***Di*AmylPhosphate of Lime.** Easily soluble in water, and very easily soluble in alcohol.

***Di*AmylPhosphate of Magnesia.** Soluble in water.

***Di*AmylPhosphate of Manganese.** Ppt.

***Di*AmylPhosphate *of dinoxide* of Mercury.** Ppt.

***Di*AmylPhosphate of Potash.** Deliquescent. Soluble in water.

***Di*AmylPhosphate of Silver.** Ppt.

***Di*AmylPhosphate of Soda.** Deliquescent. Soluble in water.

AmylPhosphorous Acid. When recently prepared it is entirely soluble in pure water, from which solution it is precipitated by chlorhydric acid. But after it has been kept for some time it can no longer be completely dissolved by water. Even when directly prepared from a sample of its soda salt which has been kept for any length of time it is apt to be insoluble in water. The aqueous solution soon decomposes in any case. Readily soluble in alkaline solutions, with combination. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **16.** 228.) Readily soluble in alcohol.
$C_{10}H_{13}PO_6 = \left.\begin{matrix} C_{10}H_{11}O \\ HO \\ HO \end{matrix}\right\} PO_3$

AmylPhosphite of Amyl. *Vid. tri*Phosphite of Amyl.

AmylPhosphite of Baryta. Deliquescent. Very soluble in water. (Wurtz, *loc. cit.*)

AmylPhosphite of Lead. Sparingly soluble in water, and alcohol. (Wurtz, *loc. cit.*)

AmylPhosphite of Potash. Soluble in water. (Wurtz, *loc. cit.*)

AmylPhosphite of Soda. Soluble in water. (Wurtz, *loc. cit.*)

AmylPhosphorous Ether. *Vid.* Phosphite of Amyl.

AmylPiperidin. Less soluble in water than methylpiperidin or ethylpiperidin. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 99.)
$C_{20}H_{21}N = N\left\{\begin{matrix} C_{10}H_{10}'' \\ C_{10}H_{11} \end{matrix}\right.$

AmylSalicylic Acid. Insoluble in water. (Drion.)
$C_{24}H_{16}O_6 = C_{10}H_{11}O, C_{14}H_5O_5$

AmylSalicylate of Potash.

AmylSolanin. Resembles EthylSolanin.
$C_{58}H_{45}NO_{14} = N\left\{\begin{matrix} C_{42}H_{33}O_{14} \\ C_{10}H_{11} \\ H \end{matrix}\right.$

AmylSulphuric Acid. (*SulphAmylic Acid.*) Very readily soluble in water, and alcohol. (Cahours.) When concentrated, these solutions are decomposed by ebullition.
$C_{10}H_{12}S_2O_8 = C_{10}H_{11}O, S_2O_6, HO$

Its salts are soluble in water. (Cahours.) Most of them are also soluble in alcohol and, very sparingly, in ether. (Kekulé.)

AmylSulphate of Alumina. Very deliquescent, with decomposition. Soluble in water, alcohol, and ether. (Kekulé.)

AmylSulphate of Ammonia. Slightly deliquescent in damp air. Very readily soluble in water; less soluble in alcohol. Insoluble in ether. (Kekulé.)
$C_{10}H_{11}(NH_4)S_2O_8$

AmylSulphate of Baryta. Effloresces in dry air. Very readily soluble in water. Soluble in warm, less soluble in cold alcohol. The solutions are decomposed by prolonged ebullition. Insoluble in ether. (Cahours.)
$C_{10}H_{11}BaS_2O_8 + 2\,Aq$

Pasteur finds the baryta salt of the active modification 2.5 more soluble than that of the inactive modification.

AmylSulphate of Cobalt. Very soluble in water. (Cahours.)

AmylSulphate of Copper. Permanent. Readily soluble in water, and spirit; less soluble in absolute alcohol. Insoluble in ether. (Kekulé.)
$C_{10}H_{11}CuS_2O_8 + 4\,Aq$

AmylSulphate *of protoxide* of Iron. Soluble in water, alcohol, and ether. (Kekulé.)

AmylSulphate *of sesquioxide* of Iron. Deliquescent. Readily decomposed. Soluble in water. (Kekulé.)

AmylSulphate of Lead.

I.) *normal.* Very readily soluble in water. (Cahours.) Readily soluble in alcohol. Insoluble in ether. (Kekulé.)
$C_{10} H_{11} Pb S_2 O_8 + 2 Aq$

II.) *basic.* Soluble in water. (Kekulé.)
$C_{10} H_{11} Pb S_2 O_8 ; Pb O, HO$

AmylSulphate of Lime. Effloresces in dry air. Readily soluble in *cold*, less easily soluble in hot water. (Cahours.) The hot aqueous solution solidifies on cooling. Soluble in alcohol, almost as well in cold as in hot. Insoluble in ether. (Kekulé.)
$C_{10} H_{11} Ca S_2 O_8 + 2 Aq$

AmylSulphate of Magnesia. Soluble in water, and alcohol. Insoluble in ether. (Kekulé.)
$C_{10} H_{11} Mg S_2 O_8 + 4 Aq$

AmylSulphate of Manganese. Permanent. Soluble in water, and alcohol. Insoluble in ether. (Kekulé.)
$C_{10} H_{11} Mn S_2 O_8 + 4 Aq$

AmylSulphate of Mercury ($Hg O$). Deliquesces in moist air. Soluble in water. (Kekulé.)
$C_{10} H_{11} Hg S_2 O_8 + 2 Aq$

AmylSulphate of Nickel. Deliquesces in moist air. Soluble in water, and alcohol. Insoluble in ether. (Kekulé.)
$C_{10} H_{11} Ni S_2 O_8 + 2 Aq$

AmylSulphate of Potash. Readily soluble in water, and spirit. Difficultly soluble in cold absolute alcohol. (Cahours.) Insoluble in ether. (Kekulé.) Soluble, without alteration, in ammonia water.
$C_{10} H_{11} K S_2 O_8 + Aq$

AmylSulphate of Silver. Undergoes alteration when exposed to the air. Readily soluble in water, and alcohol. Insoluble in ether. (Kekulé.)
$C_{10} H_{11} Ag S_2 O_8$

AmylSulphate of Soda. Readily soluble in cold, and in all proportions in hot water. Soluble in boiling, less soluble in cold alcohol. Insoluble in ether. (Kekulé.)
$C_{10} H_{11} Na S_2 O_8 + 3 Aq$

AmylSulphate of Strontia. Readily soluble in water, and spirit. Sparingly soluble in absolute alcohol. Insoluble in ether. (Kekulé.)
$C_{10} H_{11} Sr S_2 O_8 + 2 Aq$

AmylSulphate of Zinc. Soluble in water, and alcohol. (Kekulé.)
$C_{10} H_{11} Zn S_2 O_8 + 2 Aq$

AmylSulphide of *X*. *Vid.* Sulphide of Amyl & of *X*.

AmylSulphurous Acid. (*SulphoAmylicAcid. BiSulphAmylic Acid. Amyldithionic Acid. HypoSulphAmylic Acid.*) Deliquescent. Readily soluble in water. (Danson, *J. Ch. Soc.*, **3.** 159.) Its salts are soluble in water, and alcohol.
$C_{10} H_{12} S_2 O_6 = C_{10} H_{11} O. S_2 O_4, HO$

AmylSulphite of Ammonia. Readily soluble in water, and alcohol. (Erdmann & Gerathewohl.)

AmylSulphite of Baryta. Soluble in 10 pts. of water at 19°, more soluble in hot water. Soluble in alcohol. (Erdmann & Gerathewohl.) Very soluble in water, and alcohol. (Danson.) Extremely soluble both in water and in alcohol. (Medlock, *J. Ch. Soc.*, **1.** 376.)
$C_{10} H_{11} Ba S_2 O_6$

AmylSulphite of Copper. Soluble in water, and alcohol. (Medlock, *loc. cit.*, p. 377.)
$C_{10} H_{11} Cu S_2 O_6$

AmylSulphite of Lead. Extremely soluble in water. (Medlock.) Very readily soluble in hot alcohol, the solution solidifying on cooling. (Erdmann & Gerathewohl.)
$C_{10} H_{11} Pb S_2 O_6$

AmylSulphite of Lime. Easily soluble in water, and alcohol. (Erdmann & Gerathewohl.)

AmylSulphite of Potash. Readily soluble in water, and alcohol. (Erdmann & Gerathewohl.)

AmylSulphite of Silver. Soluble in water. (Erdmann & Gerathewohl.)
$C_{10} H_{11} Ag S_2 O_6$

Amyl*di*SulphoCarbonate of *X*. *Vid.* OxySulphoCarbonate of Amyl & of *X*.

AmylSulphydric Acid. *Vid.* Sulphydrate of Amyl.

AmylTartaric Acid. (*Tartramylic Acid.*) Very difficultly soluble in a small quantity of water, from which solution it is precipitated when more water is added. Easily soluble in alcohol; more difficultly soluble in ether. (Breunlin, *Ann. Ch. u. Pharm.*, **91.** 314.) Most of its salts are soluble in water, though some of them dissolve with difficulty.
$C_{18} H_{16} O_{12} = C_8 H_5 (C_{10} H_{11}) O_{12}$

AmylTartrate of Baryta.

I.) *amorphous.* Insoluble, or very sparingly soluble, in water. Soluble in boiling alcohol, from which solution it is precipitated by water.
$C_{18} H_{15} Ba O_{12}$

II.) *crystalline.* Soluble in water. (Breunlin, *Ann. Ch. u. Pharm.*, **91.** 315.)
$C_{18} H_{15} Ba O_{12} + 2 Aq$

AmylTartrate of Lead.

I.) *basic.*

AmylTartrate of Lime. Readily soluble in water.
$C_{18} H_{15} Ca O_{12}$

AmylTartrate of Potash. Sparingly soluble in cold, readily soluble in boiling water. (Breunlin.)
$C_{18} H_{15} K O_{12} + 2 Aq$

AmylTartrate of Silver. Sparingly soluble in water. (Balard.)
$C_{18} H_{15} Ag O_{12}$

AmylTartrate of Soda. Readily soluble in water. (Breunlin.)
$C_{18} H_{15} Na O_{12}$

Amyl*Di*Thionic Acid. *Vid.* AmylSulphurous Acid.

AmylThiosinamin.

AmylUrea.

$$C_{12} H_{14} N_2 O_2 = N_2 \left\{ \begin{matrix} C_2 O_2'' \\ C_{10} H_{11} \\ H_3 \end{matrix} \right.$$

AmylUrethan. *Vid.* Carbamate of Amyl.

AmylXanthic Acid. *Vid.* OxySulphoCarbonate of Amyl.

AmylXanthogenamid. *Vid.* XanthAmylamid.

Amyrin. See Resin of Canarium; under Resins.

Anacardic Acid. Sparingly soluble in cold water. Easily soluble in alcohol, and ether. Easily soluble in concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water.
$C_{44} H_{32} O_7 = C_{44} H_{30} O_5, 2 HO$

Anacardate of Ammonia. Soluble in water.

Anacardate of Baryta. Ppt.

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Anacardate of Cobalt. Ppt.

Anacardate *of protoxide* **of Iron.** Ppt.

Anacardate *of sesquioxide* **of Iron.** Insoluble in water or alcohol. Soluble in ether.
$C_{132} H_{90} (Fe_2''')_2 O_{21} ; Fe_2 O_3, 3 HO + 6 Aq$

Anacardate of Lead.
I.) *normal.* Insoluble in alcohol.
$C_{44} H_{30} Pb_2 O_7$
II.) *acid.* Soluble in ether, the solution gradually undergoing decomposition.

Anacardate of Lime.
$C_{44} H_{30} Ca_2 O_7 + 2 Aq$

Anacardate of Nickel. Ppt.

Anacardate of Potash.
I.) *normal.* Soluble in water.
$C_{44} H_{30} K_2 O_7$
II.) *acid.* Easily soluble in water, and alcohol. Also soluble in ether.
$C_{44} H_{31} K O_7$

Anacardate of Silver.
I.) *acid.* Sparingly soluble in alcohol; but very easily soluble in acidulated alcohol.
$C_{44} H_{31} Ag O_7$

Anamartic Acid. Soluble in boiling spirit.
(*Stearophanic Acid. Identical with Stearic Acid.*) (*Heintz.*)

Anamartate of Ethyl.

Anamartate of Silver. Easily soluble in caustic ammonia.

Anamartate of Soda. Forms a jelly with a small quantity of water, but is decomposed by a large quantity. Soluble in boiling absolute alcohol.

Anamirtin. Insoluble in water. Sparingly soluble in alcohol. Easily soluble in warm ether. (Francis, *Phil. Mag.*, (3.) **21.** 168.)
(*Stearophanin.*)
$C_{38} H_{26} O_4$

Anchietin. Insoluble in water. Easily soluble in alcohol. Insoluble in ether. Its salts are soluble in water. (Parrish's *Pharm.*, p. 399.)
(*From the root of Anchieta salutaris.*)

Anchoic Acid. Sparingly soluble in cold, but soluble in almost all proportions in hot water. Sparingly soluble in cold ether. (Buckton.) Less soluble than suberic acid in water. 100 pts. of water at 18° dissolve 0.46 pt. of it, or 1 pt. of it is soluble in 217.4 pts. of water at 18°. More soluble than suberic acid in ether. (Wirz, *Ann. Ch. u. Pharm.*, **104.** 265.)
(*Lepargic Acid. Lepargylic Acid.*)
$C_{18} H_{16} O_8$

Anchoate of Ammonia. Very soluble in water, and dilute alcohol.

Anchoate of Baryta. Very soluble in water. Insoluble in alcohol or ether.
$C_{18} H_{14} Ba_2 O_8$

Anchoate of Copper. Insoluble in water.

Anchoate of Ethyl. Almost entirely insoluble in water. Readily miscible with alcohol, and ether.

Anchoate *of protoxide* **of Iron.** Ppt.

Anchoate *of peroxide* **of Iron.** Ppt.

Anchoate of Lead. Insoluble in water. Soluble in dilute nitric acid, without decomposition. (Buckton.)

Anchoate of Lime. Ppt.

Anchoate *of dinoxide* **of Mercury.** Ppt.

Anchoate *of protoxide* **of Mercury.** Ppt.

Anchoate of Potash.
I.) *normal.* Very soluble in water.
II.) *acid.* Permanent. Soluble in about 3 pts. of cold water. Exceedingly soluble in hot water. Readily soluble in wood-spirit. (Buckton.)
$C_{18} H_{15} K O_8$

Anchoate of Silver. Very sparingly soluble in water. Soluble in dilute acids. (Buckton.)
$C_{18} H_{14} Ag_2 O_8$

Anchoate of Soda. Soluble in water.

Anchoate of Zinc. Ppt. (Buckton, *J. Ch. Soc.*, **10.** 170.)

Anchusin. Insoluble in water. Soluble in alcohol, and especially soluble in ether. Soluble in oil of turpentine, and in the fatty oils. Soluble in concentrated sulphuric acid, without decomposition. Also soluble in alkaline solutions.
(*Alkanet Red. Anchusic Acid.*)
$C_{36} H_{20} O_8$ (?)

Anchusate of Baryta. Soluble in water; less soluble in alcohol, and ether.

Anchusate of Lead.
I.) *basic.* Tolerably soluble in alcohol.

Anchusate of Lime.
" **Potash.**
" **Soda.**
" **Strontia.**
} Soluble in water; less soluble in alcohol, and ether.

Anemonic Acid (of Lœwig & Weidmann). Hygroscopic. Soluble in water. Very sparingly soluble in alcohol. Insoluble in ether.

Anemonic Acid (of Schwartz). Scarcely at all soluble in water, alcohol, ether, or the essential oils. Soluble in alkaline solutions.
$C_{30} H_{14} O_{14}$

Anemonin. Sparingly soluble in boiling water. Sparingly soluble in cold, much more soluble in hot alcohol. Sparingly soluble in ether. Soluble in fatty and essential oils. Soluble, without decomposition, in chlorhydric acid, but is decomposed by sulphuric acid. Easily soluble, with decomposition in alkaline solutions.
$C_{30} H_{12} O_{12}$

Anemonin with **Oxide of Lead.** Tolerably soluble in boiling, less soluble in cold water. Insoluble in alcohol.
$C_{30} H_{12} O_{11}, 2 Pb O$

Anethol. There are two varieties of Anethol:
(*Anisœl. Isomeric with Anisoïn and Cuminol.*)
$C_{20} H_{12} O_2$

a. = *solid.* (From the essential oils of anise, fennel, and star-anise.) Permanent. Anethol is slightly soluble in water, the solid variety dissolving less easily than the liquid. On cooling the boiling aqueous solution the solid variety crystallizes out. (Guenther.) Solid anethol is less soluble in alcohol than the liquid variety; the solution is not precipitated by water. (Guenther.) Solid anethol (from anise-oil) is soluble in 4 pts. of alcohol, of 0.806 sp. gr., at 10°, and in 0.6 pt. of the same alcohol at 15°. (Saussure.) Anethol is soluble in 10 pts. of oil of turpentine, and in an equal quantity of oil of almonds on heating, crystallizing out as the solution cools. (Guenther.) It is soluble in all proportions in ether.
(*Anise, or Fennel, Camphor. Stearoptene of Oil of Anise.*)

b. = *liquid.* (From the same sources as *a*, and also from oil of tarragon.) See also under *a*.

Soluble in an equal volume of warm alcohol. (Laurent.) When mixed with small quantities of concentrated sulphuric acid, oil of anise becomes heated and is converted into anisoïn. It dissolves, however, completely in 3 @ 4 pts. of oil of vitriol, and after standing for 24 hours water separates a portion of unaltered oil. (Cahours.) Unacted

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upon by boiling aqueous solutions of potash, or ammonia, or by dilute sulphuric, or chlorhydric acids, even when these are hot. Decomposed by hot concentrated nitric acid.

ANGELIC ACID (Anhydrous). Is acidified by water only after having been for a long time in contact therewith. Readily acidified by warm strong alkaline solutions. (Chiozza, *Ann. Ch. et Phys.*, (3.) **39.** 211.)
(*Angelic Angelate.*)
$C_{20}H_{14}O_6 = \left.\begin{matrix} C_{10}H_7O_2 \\ C_{10}H_7O_2 \end{matrix}\right\} O_2$

ANGELOACETIC ACID (Anhydrous). Unites with water very slowly. (Chiozza.)
$C_{14}H_{10}O_6 = \left.\begin{matrix} C_{10}H_7O_2 \\ C_4H_3O_2 \end{matrix}\right\} O_2$

ANGELOBENZOIC ACID (Anhydrous). Is acidified very slowly when exposed to moist air. Scarcely attacked by cold, but readily soluble, with acidification, in hot alkaline solutions. (Chiozza, *Ann. Ch. et Phys.*, (3.) **39.** 212.)
(*Angelic Benzoate.*)
$C_{24}H_{12}O_6 = \left.\begin{matrix} C_{10}H_7O_2 \\ C_{14}H_5O_2 \end{matrix}\right\} O_2$

ANGELIC ACID. Sparingly soluble in cold, abundantly soluble in boiling water. Very soluble in alcohol, ether, oil of turpentine, and the fatty oils. Its salts are generally soluble in water and in alcohol. (Meyer & Zenner.)
(*Angelicic Acid. Sambulolic Acid. Sumbulic Acid.*
$C_{10}H_8O_4 = C_{10}H_7O_3, HO$

ANGELATE OF AMMONIA. Soluble in water, and alcohol. (M. & Z.)

ANGELATE OF BARYTA. Soluble in water. (Reinsch.) Insoluble in alcohol.

ANGELATE OF COPPER. Sparingly soluble in water.

ANGELATE OF ETHYL.
$C_{10}H_7(C_4H_5)O_4$

ANGELATE *of sesquioxide* OF IRON. Insoluble in water. (Meyer, Buchner, Reinsch.)

ANGELATE OF LEAD.
I.) *normal.* Sparingly soluble in water. (Buchner.)
$C_{10}H_7PbO_4$
II.) *basic.*

ANGELATE OF LIME. Readily soluble in water. (M. & Z.) Insoluble in alcohol.
$C_{10}H_7CaO_4 + 2Aq$

ANGELATE OF MAGNESIA. Soluble in water. (Reinsch.)

ANGELATE *of dinoxide* OF MERCURY. Ppt.

ANGELATE *of protoxide* OF MERCURY. Apparently soluble in water.

ANGELATE OF OREOSELONE. *Vid.* Peucedanin.

ANGELATE OF POTASH. Readily soluble in water. Tolerably soluble in alcohol. (Reinsch.)

ANGELATE OF SILVER. Sparingly soluble in water, the solution undergoing change after a time. (Buchner.) Soluble in alcohol. (M. & Z.)
$C_{10}H_7AgO_4$

ANGELATE OF SODA. Deliquescent. (Reinsch.) Easily soluble in water, and alcohol. (Meyer.)

ANGELIC ALDEHYDE. *Vid.* Hydride of Angelicyl.

ANGELICANILID. Insoluble in water. Soluble in spirit. (Chiozza, *Ann. Ch. et Phys.*, (3.) **39.** 211.)
$C_{22}H_{13}NO_2 = N \left\{\begin{matrix} C_{10}H_7O_2 \\ C_{12}H_5 \\ H \end{matrix}\right.$

ANGELICIC ACID. *Vid.* Angelic Acid.

ANGELICIN. Soluble in alcohol, and ether.
(*From Archangelica officinalis.*)

ANGUSTURIN. *Vid.* Cusparin.

ANILAMID. *Vid.* NitroSalicylamic Acid.

ANILANISAMID. *Vid.* PhenylAnisylamid.

ANILATE OF METHYLENE. *Vid.* MethylNitroSalicylic Acid.

ANILIC ACID. *Vid.* NitroSalicylic Acid; and Anilotic Acid.

ANILIC AMMELIN. *Vid.* PhenylAmmelin.

ANILIN OR PHENYLAMIN. Readily soluble in water. (Runge.) Sparingly soluble in water. (Fritzsche.) Insoluble in water. (Zinin.) Very sparingly soluble in water at ordinary temperatures, and but sparingly soluble in hot water. It can itself dissolve a little water. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 141.)
(*Krystallin. Kyanol (of Runge). Benzidam. Phenylammonia. Phenic Amid. Phenamid. Amidophenase.*)
$C_{12}H_7N = N \left\{\begin{matrix} C_{12}H_5 \\ H_2 \end{matrix}\right.$

Miscible in all proportions with alcohol, ether, bisulphide of carbon, wood-spirit, aldehyde, acetone, and the fixed and volatile oils. Ether removes it from the aqueous solution. (Hofmann, *loc. cit.*) It may also be separated from its solution in water by the addition of caustic or carbonated alkalies, chloride of sodium, or sulphate of magnesia. (Hofmann.)

When obtained by the fractional distillation of the bases from coal-tar, anilin — still containing impurities — comports itself towards water very differently from the pure anilin obtained by decomposing purified oxalate of anilin.

The anilin obtained by fractional distillation is largely soluble in water, a portion of the latter being also dissolved by it. At the temperature of +12° the solution separates into two layers, of which the inferior is an aqueous solution of anilin, while the superior layer consists of hydrated anilin (containing about three equivalents of water). Perfectly pure anilin, from the oxalate, dissolves very much less water than this. Pure anilin dissolves the more readily in water in proportion as the temperature is more elevated, and a portion of the anilin separates out when the solution is cooled. On the other hand, a saturated cold aqueous solution of impure anilin becomes cloudy when it is heated, even when heated by holding it in the hand, — this cloudiness augments with the temperature, and when the liquid begins to boil it separates into two layers, the lower of which contains water almost pure, while the original anilin floats above. When sulphuric, or oxalic, acid is added to an aqueous solution of the impure anilin, the latter separates in drops, and the liquid does not become clear until an excess of acid has been added. A solution of pure anilin does not exhibit this reaction. (Hofmann, *loc. cit.*, p. 141 *et seq.*)

The salts of anilin are almost all soluble in water, and alcohol.

ANILIN with *proto*CHLORIDE OF MERCURY.
I.) $NC_{12}H_7; HgCl$ Insoluble, or very difficultly soluble, in alcohol.

II.) $NC_{12}H_7; 3HgCl$ Very sparingly soluble in cold water; partially decomposed when boiled with water. Sparingly soluble in boiling, less soluble in cold alcohol. Easily soluble in hot, less soluble in cold chlorhydric acid. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 153.)

ANILIN with *proto*CHLORIDE OF PALLADIUM. Ppt. Permanent. Insoluble in anilin.

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Anilin with *proto***Chloride of Platinum.**

$a = N C_{12} H_7, Pt Cl$

$b =$ ditto.

$c = 2 N C_{12} H_7, Pt Cl$

$d = N C_{12} H_7, H Cl, Pt Cl$

AnilinAmmelin. *Vid.* PhenylAmmelin.

AniloBenzamid. *Vid.* PhenylBenzoylamid.

AnilinUrea. *Vid.* PhenylCarbamid, and PhenylUrea.

AniloCuminamid. *Vid.* PhenylCuminamid.

AniloCyanic Acid. *Vid.* Cyanate of Phenyl.

AniloUrea. *Vid.* PhenylCarbamid.

Anilotic Acid. (*Isomeric, but not identical, with NitroSalicylic Acid.*) $C_{14} H_4 NO_9, HO + 3 Aq$ Very sparingly soluble in cold, somewhat more soluble, though still sparingly, in warm water. Boiling water dissolves a portion of it and removes the water of crystallization from the remainder, which is left as an insoluble powder. Easily soluble in alcohol, and ether. Soluble, without decomposition in warm concentrated sulphuric acid, separating out again as the solution cools.

Most of its salts are soluble in water.

Anilotate of Ammonia. Soluble in water.

Anilotate of Potash. Soluble in water.

Anilotate of Silver. Insoluble in water. (Piria, *Ann. Ch. u. Pharm.*, **97.** 253.)

Animin (of Unverdorben). (*Supposed to have been a mixture of Lutidin and Collidin.*) Soluble in 20 pts. of water, the solution becoming turbid when heated, and depositing animin, which redissolves as the liquor cools. Soluble in all proportions in alcohol, ether, and the fatty and essential oils. Its salts are soluble in water. (Unverdorben.)

AnisAlcohol. *Vid.* Hydrate of Anisoyl.

AnisAldehyde. *Vid.* Hydride of Anisyl.

Anisamic Acid. (*AmidAnisic Acid. Oxide of Anisylamid.*) $C_{16} H_9 NO_6 = C_{16} H_8 NO_5, HO$ Soluble in 800 pts. of boiling water; less soluble in cold water. Readily soluble in hot alcohol. Sparingly soluble in ether. Soluble, without alteration, in boiling, moderately strong, acetic and chlorhydric acids, — separating out again unchanged as the solutions cool. (Zinin.)

Sparingly soluble in water. Tolerably readily soluble in alcohol, and ether, especially when these are hot. Very easily soluble in alkaline liquids, and in acids, with combination in both cases. (Cahours, *Ann. Ch. et Phys.*, (3.) **58.** 341.)

Anisamate of Ammonia. Very soluble in water. (Zinin; Cahours, *l. c.*)

Anisamate of Baryta. Appears to be soluble in water.

Anisamate of Cadmium. Ppt.

Anisamate of Ethyl. $C_{16} H_8 (C_4 H_5) NO_6$ Easily soluble in alcohol, especially when this is warm. Less readily soluble in ether. Insoluble in aqueous solutions of caustic potash, soda, or ammonia. Soluble in acids, with combination, forming salts which are soluble in alcohol. (Cahours, *loc. cit.*, p. 346.)

Anisamate of Lead. Ppt.

Anisamate of Lime. Appears to be soluble in water.

Anisamate of Methyl. $C_{16} H_8 (C_2 H_3) NO_6$ Easily soluble in alcohol, and ether. Insoluble in alkaline liquids. Very easily soluble, with combination, in acids. (Cahours, *loc. cit.*, p. 350.)

Anisamate of Silver. $C_{16} H_8 Ag NO_6$ Insoluble in water. Readily soluble in acids, and in ammonia-water.

Anisamid. (*Anisylamid.*) $C_{16} H_9 NO_4 = N \left\{ \begin{matrix} C_{16} H_7 O_4 \\ H_2 \end{matrix} \right.$ Soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **23.** 353.)

Anisanilid. *Vid.* PhenylAnisylamid.

Anisic Acid(Anhydrous). (*Anisic Anhydride.*) $C_{32} H_{14} O_{10} = \left. \begin{matrix} C_{16} H_7 O_4 \\ C_{16} H_7 O_4 \end{matrix} \right\} O_2$ Insoluble in cold water. Acidified by long-continued boiling with water. Readily soluble in alcohol, and ether, especially when these are warm; still more easily soluble in a mixture of alcohol and ether. Insoluble in cold, but is acidified by warm aqueous solutions of caustic potash, and ammonia. (Pisani.)

Anisic Acid. (*Anisylic Acid. Draconic Acid. Dracic Acid. Ombellic Acid. Badianic Acid.*) $C_{16} H_8 O_6 = C_{16} H_7 O_5, HO$ Permanent. Scarcely at all soluble in cold, tolerably soluble in boiling water. Very soluble in alcohol, and ether, especially when these are hot. Most of its salts are soluble in water.

"According to Persoz, ombellic acid is but slightly soluble in cold ether, while badianic acid is easily soluble. Hempel found no difference between the dissolved and the undissolved portions." (Gmelin.)

Anisate of Alumina. Somewhat soluble in water.

Anisate of Ammonia. $C_{16} H_7 (N H_4) O_6$ Easily soluble in water. Soluble in alcohol.

Anisate of Baryta. $C_{16} H_7 Ba O_6$ Sparingly soluble in water. (Engelhardt.)

Anisate of Cadmium. Soluble in hot water. Sparingly soluble in ordinary alcohol. (Schiff.)

Anisate of Cobalt. Appears to be soluble in water.

Anisate of Copper. Soluble, with decomposition, in boiling acetic acid. Insoluble in ether.

Anisate of Ethyl. (*Anisic Ether.*) $C_{20} H_{12} O_6 = C_{16} H_7 (C_4 H_5) O_6$ Insoluble in water. Easily soluble in alcohol, and ether. Insoluble in caustic ammonia, but is decomposed by long-continued contact therewith. (Cahours, *Ann. Ch. et Phys.*, (3.) **14.** 492.)

Anisate *of protoxide* **of Iron.** Soluble in water.

Anisate *of sesquioxide* **of Iron.** Ppt.

Anisate of Lead.

I.) *normal.* $C_{16} H_7 Pb O_6 + Aq$ Soluble in boiling water, crystallizing out on cooling. (Engelhardt.) Insoluble in cold, sparingly soluble in boiling water. (Cahours, *loc. cit.*)

II.) *bibasic.* Ppt.
$C_{16} H_7 Pb O_6 ; Pb O, HO$

Anisate of Lime. Somewhat soluble in water.
$C_{16} H_7 Ca O_6 + Aq$

Anisate of Magnesia. $C_{16} H_7 Mg O_6 + 4 Aq$ Readily soluble in water, and alcohol.

Anisate of Manganese.

Anisate *of dinoxide* **of Mercury.** Ppt.

Anisate *of protoxide* **of Mercury.** Insoluble in cold, sparingly soluble in boiling water.

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Anisate of Methyl. (*Anisate of Methylene. Methyl Anisic Ether.*) $C_{16}H_{10}O_6 = C_{16}H_7(C_2H_3)O_6$ Insoluble in water, even when this it hot. Readily and abundantly soluble in alcohol, and ether, especially when these are warm. (Cahours, *loc. cit.*, p. 494.)

Anisate of Nickel. Appears to be soluble in water.

Anisate of Potash. $C_{16}H_7KO_6$ Soluble in water. Soluble in warm, less soluble in cold hydrate of anisyl (Canizzaro & Bertagnini), and ordinary spirit.

Anisate of Silver. $C_{16}H_7AgO_6$ Insoluble in cold, sparingly soluble in boiling water.

Gmelin and Kolbe say: "But slightly soluble in cold, more soluble in hot water. (Cahours.)"

Anisate of Soda. $C_{16}H_7NaO_6 + Aq$ & $10\,Aq$ The 10-hydrated salt is very efflorescent. Soluble in water. Soluble in boiling, less soluble in cold alcohol.

Anisate of Strontia. $C_{16}H_7SrO_6 + Aq$ Difficultly soluble in water.

Anisate of Zinc. Ppt.

Anise Camphor. *Vid.* Anethol.

AnisEugenic Acid (Anhydrous). (*AnisEugenyl.*) $C_{36}H_{18}O_8 = \left.\begin{matrix}C_{20}H_{11}O_2\\ C_{16}H_7O_4\end{matrix}\right\}O_2$ Insoluble in an aqueous solution of caustic potash. (Cahours.)

Anishydramid. *Vid.* Hydride of AzoAnisyl.

Anisidin. *Vid.* MethylPhenidin.

Anisin. $C_{48}H_{24}N_2O_6$ Scarcely at all soluble in boiling water. Soluble in alcohol. Sparingly soluble in ether. (Bertagnini, *Ann. Ch. u. Pharm.*, **87.** 128.)

Anisoic Acid. $C_{20}H_{18}O_{12} = C_{20}H_{17}O_{11}, HO$ Very easily soluble in water, spirit, and ether. (Limpricht, *Ann. Ch. u. Pharm.*, **97.** 355.)

Anisoate of Baryta. $C_{20}H_{17}BaO_{12}$ Easily soluble in water. (Limpricht, *ib.*)

Anisoate of Silver. $C_{20}H_{17}AgO_{12}$ Easily soluble in water. (Limpricht, *ib.*)

Anisoate of Soda. $C_{20}H_{17}NaO_{12}$ Easily soluble in water. (Limpricht, *ib.*)

Anisœl. *Vid.* Anethol.

Anisoin. (*Isomeric with Anethol and Cuminol.*) $C_{20}H_{12}O_2$ Insoluble in water. Scarcely at all soluble in alcohol, even when this is warm; more soluble in ether, and the essential oils. Alcohol precipitates it from the ethereal solution. Unacted upon by dilute acids, or by boiling aqueous solutions of caustic potash, or ammonia. Soluble in strong sulphuric acid, from which it is precipitated on the addition of water.

Anisol. *Vid.* Phenate of Methyl.

AnisoNitrAnisic Acid. (*Nitrodraconasic Acid.*) $C_{32}H_{15}NO_{16}$ Nearly insoluble in water. Tolerably readily soluble in alcohol, and ether. (Laurent.)

AnisoNitrAnisate of Ammonia. Sparingly soluble in water. Soluble in boiling, less soluble in cold alcohol.

AnisoSalicyl. $C_{20}H_{12}O_8$ Scarcely at all soluble either in hot or in cold water. Tolerably soluble in alcohol, especially when this is boiling, and in ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **52.** 199.)

Anisoyl. $C_{16}H_9O_2$ Not isolated.

AnisSalicylous Acid (Anhydrous). *Vid.* AnisoSalicyl.

Anisuric Acid. $C_{20}H_{11}NO_8$ Soluble in alcohol. Decomposed by boiling with acids. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 357.)

Anisurate of Silver. $C_{20}H_{10}AgNO_8$

Anisyl. $C_{16}H_7O_4$ Not isolated.

Anisyl Alcohol. *Vid.* Hydrate of Anisoyl.

Anisylamid. *Vid.* Anisamid.

Anisylous Acid. *Vid.* Hydride of Anisyl.

Annotto. (*"Arnotto" or "Arnatto"— "Rocou" or "Roucou" of the French. "Orlean" of the Germans. Inspissated extract from the seeds of Bixa orellana.*) More easily soluble in alcohol and in alkaline solutions than in water. Water dissolves from it only a little yellow coloring-matter; but it is soluble in alcohol, ether, fatty and essential oils (as of turpentine), and in alkaline solutions.

Anthokirrin. (*Yellow coloring-matter from flowers of Antirrhinum linaria.*) Difficultly soluble in water; more readily soluble in alcohol, ether, and the essential oils. Soluble in acids, and in alkaline solutions. (Riegel.)

Anthokyan. *Vid.* Cyanin.

AnthoXanthin. *Vid* Xanthin, & Xanthein.

Anthracene. *Vid.* ParaNaphthalin.

Anthracoxene. See under **Resins.**

Anthranilic Acid. *Vid.* PhenylCarbamic Acid.

Anthropic Acid }
Anthropin } (of Heintz). Consisted of a mixture of stearic and margaric acids.

Antiarin. (*Anthiarin.*) $C_{20}H_{20}O_{10} + 4\,Aq$ Permanent. Soluble in 254 [251] pts. of water at 22.5°, and in 27.4 pts. of boiling water.. In 70 pts. of alcohol at 22.5°; and in 2792 pts. of ether at 22.5°. Soluble in dilute acids, as, for example, sulphuric, nitric, chlorhydric, and acetic acids. Soluble in concentrated nitric, and chlorhydric acids at the ordinary temperature. Decomposed by strong sulphuric acid. Soluble in dilute aqueous solutions of caustic potash, and ammonia. It is much more readily soluble in dilute acids and alkaline solutions than in pure water. Very easily soluble in an aqueous solution of sugar, also easily soluble in water containing extractive matters. (Mulder, *Pogg. Ann.*, 1838, **44.** pp. 424, 428; and *J. pr. Chem.*, **15.** pp. 425, 428.)

AntimonEthyl, &c. *Vid.* StibEthyl, &c.

Antimonic Acid. SbO_5 There are two allotropic modifications:

I.) *ordinary* Antimonic Acid, and
II.) *met* Antimonic Acid.

I.) *ordinary.* SbO_5, HO [or $SbO_5, 5\,HO$ according to Fremy] Insoluble in water. (Berzelius.) Sparingly soluble in water. (Capitaine.) Soluble, with combination, in boiling aqueous solutions of the alkalies, and in warm ammonia-water. (Berzelius.) Soluble in an excess of an aqueous solution of triethyltoluenylammonium.

Readily soluble in tartaric acid. (Buchner.) Slightly soluble in water acidulated with nitric acid. (Ansell, *J. Ch. Soc.*, **5.** 211.) Insoluble

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in other acids. (Berzelius.) Soluble in concentrated chlorhydric acid: if a small quantity of water be added to this solution, a precipitate is formed, but if a large quantity of water be at once quickly added, no precipitate will form. (L. Gmelin.) Each of the oxides of antimony is almost insoluble in nitric acid. (H. Rose, *Tr.*) Completely insoluble in ammonia-water. It appears to dissolve in acids more slowly than metantimonic acid. (Fremy, *loc. inf. cit.*)

Of the antimoniates, only those of the more soluble alkalies are soluble in water. They are all decomposed even by weak acids. All acid antimoniates are difficultly soluble or insoluble in water.

II.) *meta.* Completely soluble in a large quantity of cold water, from which solution it is precipitated by acids. When in contact with water it is very easily transformed into ordinary antimonic acid.
$SbO_5, 4\,HO$

Slowly soluble in cold ammonia-water. It appears to dissolve more readily in acids than ordinary antimonic acid. The normal metantimoniates are only stable when in presence of a large excess of alkali, being decomposed by solvents with separation of acid salts. (Fremy, *Ann. Ch. et Phys.*, (3.) **23.** 407.

Antimoniate of Alumina. Ppt. Insoluble in an aqueous solution of antimoniate of potash, but somewhat soluble in solutions of alumina salts. (Berzelius, *Lehrb.*, **3.** 489.)
$Al_2O_3, 3SbO_5$

Antimoniate of Ammonia.

I.) *ordinary.* Completely insoluble in water. (Fremy, *Ann. Ch. et Phys.*, (3.) **23.** pp. 406, 411.)
$NH_4O, SbO_5 + 4\,Aq$

II.) *meta.* Soluble in water; this solution is decomposed by boiling. Insoluble in alcohol. (Fremy, *loc. cit.*)
a = mono. $NH_4O, SbO_5 + 6\,Aq$

b = din. $2NH_4O, SbO_5$ Soluble in a dilute solution of ammonia; from which alcohol precipitates the preceding compound. (Fremy, *loc. cit.*)

Antimoniate of Antimony. Scarcely at all soluble in water. Very difficultly soluble in chlorhydric acid. Insoluble in sulphide of ammonium. (Fresenius, *Quant.*, p. 154.) Rather more soluble in water than antimonic acid. (Capitaine.) Insoluble in water, alcohol, or the oxygen acids. It is not dissolved when digested with concentrated sulphuric acid, only a small portion of oxide of antimony being dissolved out. Difficultly soluble in concentrated chlorhydric acid, and is reprecipitated therefrom on the addition of a small quantity of water. But if a large quantity of water be added at once, oxide of antimony alone is precipitated, the greater part of the antimonic acid remaining in solution. Soluble in a boiling aqueous solution of bitartrate of potash. (Berzelius, *Lehrb.*, **2.** 292.) Soluble in a boiling solution of sulphide of potassium, also in a boiling solution of Schlippe's salt ($3\,NaO, SbS_5 + 18\,Aq$). Sparingly soluble in a few acids, as nitric acid, and still more soluble, though still very sparingly, in concentrated chlorhydric acid. (Dumas, *Tr.*) A quantity of chlorhydric acid capable of dissolving 100 pts. of SbO_3 dissolves only 33 pts. of SbO_4, and the latter is precipitated from this solution on the addition of water. (Dumas, *Tr.*) Each of the oxides of antimony is scarcely at all soluble in nitric acid. (H. Rose, *Tr.*) Soluble, with decomposition, in alkaline solutions. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 496.)
(*Antimonious Acid* (*Improperly.*) *Deutoxide of Antimony.*)
$2(SbO_4, HO) = SbO_3, SbO_5 + 2\,Aq$

Antimoniate of Baryta. Permanent. Scarcely at all soluble in water. (Berzelius.) Soluble to a certain extent in an aqueous solution of chloride of barium. (Wackenroder.)
BaO, SbO_5

Antimoniate of Cobalt. Slightly soluble in water. (Berzelius.) Almost as soluble as the zinc salt. (Dumas, *Tr.*) Somewhat soluble in boiling aqueous solutions of cobalt salts. After ignition it is not acted upon by acids or by alkaline solutions.
CoO, SbO_5

Antimoniate of Copper. Insoluble in water. (Berzelius.) After having been ignited, it is not acted upon by acids or by alkaline solutions.
$CuO, SbO_5 + x\,Aq$

Antimoniate *of protoxide* of Iron. Slightly soluble in water. (Berzelius.)

Antimoniate *of sesquioxide* of Iron. Insoluble in water. (Berzelius, *Lehrb.*)

Antimoniate of Lead.

a = mono. Completely insoluble in water. Incompletely decomposed by acids, even when recently precipitated. (Berzelius, *Lehrb.*, **3.** 751.)
PbO, SbO_5 & $+ x\,Aq$
(*Naples Yellow.*)

b = tris.
$3\,PbO, SbO_5 + 4\,Aq$

Antimoniate of Lime. Very slightly soluble in water. (Berzelius.)
CaO, SbO_5

Antimoniate of Lithia. Difficultly soluble in cold, more soluble in hot water. Much more easily soluble than the soda salt. (Berzelius, *Lehrb.*)
LiO, SbO_5

Antimoniate of Magnesia. Ppt. Soluble in an aqueous solution of sulphate of magnesia, but insoluble in a solution of antimoniate of potash. (Berzelius, *Lehrb.*)
$MgO, SbO_5 + x\,Aq$

Antimoniate of Manganese. Permanent. Very sparingly soluble in water. (Berzelius.)
MnO, SbO_5

Antimoniate *of dinoxide* of Mercury. Insoluble in water. (Berzelius.)

Antimoniate *of protoxide* of Mercury. Ppt. Scarcely attacked by alkalies or by acids. Slightly soluble in hot sulphuric and chlorhydric acids.
HgO, SbO_5

Antimoniate of Nickel. Insoluble in water. (Berzelius.)
$NiO, SbO_5 + 6\,Aq$

Antimoniate of Potash.

I.) *ordinary.* Insoluble in cold water. When boiled for a long time with water it is dissolved, with combination. (Fremy, *Ann. Ch. et Phys.*, (3.) **23.** 406.)
a = KO, SbO_5

b = $KO, SbO_5, + Aq$ Cold water dissolves no trace of it. By long boiling with water it is dissolved, with decomposition. (Fremy, *Ibid.*, (3.) **23.** 406.)

c = $KO, SbO_5 + 3\,Aq$ Completely insoluble in cold water. Decomposed, with solution, by long boiling with water. (Fremy, *Ibid.*, p. 406.)

d = "*Gummy Antimoniate of Potash.*" $KO, SbO_5 + 5\,Aq$ Slowly soluble in cold, readily soluble in hot water, from which solution acids, even carbonic acid, precipitate the bi-antimoniate. It is all precipitated by a solution of chloride of ammonium. (Fremy, *Ibid.*, (3.) **12.** 502.)

II.) *bi.*

"*Insoluble Antimoniate of Potash.*" $KO, 2\,SbO_5$, & $+ 6\,Aq$ Insoluble in water. Soluble in solutions of the preceding (gummy) compound, from

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which it may again be precipitated by adding almost any soluble salt. Soluble in a boiling concentrated solution of caustic potash, but is deposited again almost entirely on cooling; the last portions which remain in solution may be precipitated by adding some soluble potash salt. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 499.) Almost insoluble in water. (Berzelius.)

III.) *meta.* Permanent. Slowly soluble in cold water. Soluble in a solution of chloride of ammonium. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 502.) The aqueous solution decomposes by standing.

a = "*Granular Antimoniate of Potash.*" $KO, SbO_5 + 7 Aq$

b = (*Bibasic metantimoniate. Normal metantimoniate* (of Fremy). *Deliquescent antimoniate.*) $2 KO, SbO_5$ Very deliquescent. Decomposed by water, even when this is cold. Soluble in water containing potash, and in alkaline liquors generally; the solutions undergoing decomposition when boiled or evaporated. It is stable only when in presence of a great excess of potash. (Fremy, *loc. cit.*, (3.) **12.** 502, and (3.) **23.** 408.)

Antimoniate of Potash with SulphAntimoniate of Potash. $KO, SbO_5 ; 3 KS, SbS_5 + 10 Aq$ Decomposed by cold water, which dissolves out the sulphur salt and leaves the oxygen salt, but is completely dissolved by boiling water. (Rammelsberg, in Berzelius's *Lehrb.*, **3.** 202.)

Antimoniate of Quinine. Soluble in hot, less soluble in cold water. Soluble in alcohol. (Parrish's *Pharm.*, p. 402.)

Antimoniate of Silver. AgO, SbO_5 Insoluble in water. (Berzelius.)

Antimoniate of Soda. (*Acid metantimoniate of Soda.*) $NaO, SbO_5 + Aq$ & $7 Aq$ Almost insoluble in cold, very sparingly soluble in boiling water. Insoluble in alcohol. Soluble in alkaline solutions. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 501, *et seq.*) Somewhat soluble in a solution of carbonate of potash: — thus the solution of one part of a soda salt in 350 pts. of water may still be precipitated by antimoniate of potash, even when the solution contains 100 pts. of carbonate of potash to one part of carbonate of soda; but in a larger excess of carbonate of potash the antimoniate of soda is slightly soluble. (Fremy, *C. R.*, **16.** 187.)

Antimoniate of Strontia. SrO, SbO_5 Very difficultly soluble in water; so much so that a solution of sulphate of strontia is made cloudy by the addition of antimoniate of potash. (Berzelius, *Lehrb.*)

Antimoniate of Tin (SnO_2).

Antimoniate of Uranium. $5 UrO, 3 SbO_5 + 15 Aq$ Ppt. Soluble in hot concentrated chlorhydric acid, and in an aqueous solution of sesquichloride of uranium. (Rammelsberg.)

Antimoniate of Zinc. ZnO, SbO_5 Permanent. Very slightly soluble in water. (Berzelius.) Soluble in solutions of the salts of zinc. Sensibly soluble in water. (Dumas, *Tr.*)

Antimonide of Amyl. *Vid.* StibAmyl.

Antimonide of Bismuth.

Antimonide of Ethyl. *Vid.* StibEthyl.

Antimonide of Mercury.

Antimonide of Nickel. $SbNi_2$ Insoluble in simple acids. Easily soluble in aqua-regia.

Antimonide of Nickel with Sulphide of Nickel. $NiSb, NiS_2$ Soluble in nitric acid, with separation of sulphur, and in aqua-regia.

Antimonide of Potassium. Decomposed by water.

Antimonide of Potassium with Arsenide of Potassium. $(SbAs)K_3$ Decomposed by water.

Antimonide of Silver. $SbAg_4$ Decomposed, with partial solution, by nitric acid.

Antimonide of Sodium. Decomposed by water.

Antimonide of Zinc.

I.) *bi.* $SbZn_2$ (*StibiobiZincyl.*) Does not decompose boiling water except very feebly. It is not attacked by dilute mineral acids, but is decomposed by strong chlorhydric, and nitric acids. (J. P. Cooke, *Mem. Amer. Acad.*, 1855, [N. S.] **5.** 348.)

II.) *ter.* $SbZn_3$ (*StibiotriZincyl.*) Decomposes water very rapidly at the temperature of boiling, especially when it has previously been treated with a solution of bichloride of platinum or with chlorhydric acid, and afterwards washed. Decomposed with great violence by dilute chlorhydric and sulphuric acids. Nitric acid also decomposes it violently. Completely soluble in chlorhydric acid mixed with a little nitric acid. (Cooke, *loc. cit.*, pp. 342, 345.)

"Antimonious Acid." SbO_4 *Vid.* Antimoniate of Antimony.

Antimonious Acid. SbO_3 *Vid. ter* Oxide of Antimony.

Antimonite of Alumina. Insoluble in water. (Berzelius, *Lehrb.*)

Antimonite of Ammonia.

I.) *bi.* Slightly soluble in water, inasmuch as this abstracts ammonia, in a solution of which the compound is sparingly soluble. (Berzelius, *Lehrb.*, **3.** 327.)

Antimonite of Baryta. Permanent. Difficultly soluble in water. Decomposed by acids. (Berzelius.)

Antimonite of Cobalt. Slightly soluble in water. (Berzelius.) Much more soluble in water than the antimoniate. (Dumas, *Tr.*)

Antimonite *of dinoxide* **of Copper.** Soluble in chlorhydric acid, more completely than in any other acid. (Hausmann & Stromeyer.)

Antimonite *of protoxide* **of Copper.** Insoluble in water. (Berzelius; Dumas, *Tr.*)

Antimonite *of protoxide* **of Iron.** Ppt. More soluble than the antimoniate in water. (Dumas, *Tr.*)

Antimonite of Lime. Insoluble in water. (Berzelius.)

Antimonite of Manganese. More soluble than the antimoniate in water. (Dumas, *Tr.*)

Antimonite of Potash. KO, SbO_3 Decomposed by water, only a very small portion of it being dissolved. (Berzelius, *Lehrb.*, **3.** 189.) Fremy denies its existence. When a solution of antimonious acid (SbO_3) in an excess of caustic potash is allowed to stand for a very long time out of contact with the air, all of the antimonious acid finally separates from the solution in crystals; the same statement applies to the solution in carbonate of potash. (H. Rose *Tr.*, **1.** 266.)

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Antimonite of Potash with *ter***Sulphide of Antimony.** (*Kermes mineral*) KO, SbO_3 ; $2SbS_3+Aq$ (*or a mixture of these two ingredients, or of antimoniate of soda and sulphide of antimony, in other proportions.*) Soluble in great part, with decomposition, in water. Soluble in a hot concentrated aqueous solution of caustic potash, and in concentrated chlorhydric acid.

Antimonite of Soda. Similar to the potash salt. (Berzelius.) A solution of antimonious acid in carbonate of soda, on being left to itself deposits the antimonious acid completely after a time. (H. Rose, *Tr.*)

Antimonite of Stib*tri*Amyl. $(C_{10}H_{11})_3SbO_2, 2SbO_3$ (?) Insoluble in water, alcohol, or ether. Imperfectly soluble in nitric acid. Slowly soluble in aqua-regia. Insoluble in chlorhydric acid. (Berlé.)

Antimonite of Stib*tri*Ethyl. $(C_4H_5)_3SbO_2, 2SbO_3$ Difficultly soluble in ether; more readily soluble in water, and alcohol. (Lœwig.)

Antimonite of Zinc. More soluble than the antimoniate in water. (Dumas, *Tr.*)

Antimoniuretted Hydrogen. Not sensibly absorbed by water, but is decomposed by long-continued contact therewith. Neither absorbed nor altered by concentrated potash lye, or concentrated nitric acid. (F. Simon.) Soluble, with subsequent decomposition, in an alcoholic solution of caustic potash. (Meissner.)

Antimony. Sb Insoluble in, and unacted upon by water, or alkaline solutions. But when exposed to the simultaneous action of air and water it oxidizes slowly, and a portion of the oxide dissolves. It is not attacked by any of the dilute acids excepting nitric acid and aqua-regia. Warm concentrated sulphuric acid converts it into sulphate of antimony. Oxidized, but not dissolved, by strong nitric acid. Scarcely at all acted upon by boiling concentrated chlorhydric acid. Completely soluble in warm aqua-regia, which is its best solvent. Antimony is attacked with extreme slowness by pure concentrated nitric acid of 1.512 @ 1.419 sp. gr.; acid weaker than this has no marked action, whether it contains nitrous acid or not. Nor does a mixture of nitric and chlorhydric acids have any action upon the metal so long as the acids, either from being too dilute or at too low a temperature, cannot react upon each other; but if the antimony is treated with a mixture of these acids in an extremely diluted state and a few drops of a solution of nitrite of potash be added to the mixture an action will commence at once. (Millon, *Ann. Ch. et Phys.*, (3.) **6.** 101.) Solutions of the salts of antimony when mixed with tartaric acid can no longer be precipitated by water, or the caustic alkalies. (H. Rose.)

Antirrhic Acid. (from *Digitalis purpurea.*) Difficultly soluble in water. Easily soluble in alcohol. (Morin.)

AntiTartaric Acid. *Vid.* Tartaric Acid, (*left.*)

Apiin. $C_{24}H_{14}O_{13}+2Aq$ & $4Aq$ Scarcely at all soluble in cold, easily soluble in boiling water. Soluble in boiling alcohol, the liquid gelatinizing on cooling. Soluble in alkaline solutions, even the weakest, *ex. gr.* in lime-water, solution of magnesia, very dilute ammonia, or bicarbonate of potash. Its solution in caustic potash is not decomposed by long-continued boiling. Decomposed by boiling sulphuric acid, even dilute; also by other acids. (Braconnot, *Ann. Ch. et Phys.*, (3.) **9.** 250.) Its aqueous solution is decomposed by long-continued boiling, and more rapidly if it be acidulated with sulphuric, or chlorhydric acid. Insoluble in ether.

Soluble in 8500 pts. of cold water, and 389 pts. of cold alcohol. Easily soluble in alkaline solutions. (*v.* Planta & Wallace, in *Wittstein's Handw.*)

Apiol (from *Apiŭm petroselinŭm*). Insoluble in water. Easily soluble in alcohol of from 50 to 90%. Soluble in all proportions in ether, and chloroform. Completely soluble in acetic acid. (Homolle & Joret.)

Apirin. *Vid.* Apyrin.

Apocrenic Acid. $C_{48}H_{12}O_{24}$ (?) Sparingly soluble in water; more soluble in absolute alcohol. On the addition of chloride of ammonium it is precipitated from the aqueous solution. Readily soluble in solutions of the alkaline acetates. The alkaline apocrenates are soluble in water, the others are difficultly soluble, or insoluble.

Apocrenate *of protoxide* **of Iron.** Soluble in water.

Apocrenate *of sesquioxide* **of Iron.** Insoluble in water. (Berzelius.)

Apoglucic Acid. (*Perhaps identical with Assamar.*) (*Gerhardt, Tr.*, **2.** 565.) $C_{18}H_{10}O_{10}$ Readily soluble in water, from which it is not precipitated by alcohol. Sparingly soluble in alcohol. Insoluble in ether. Soluble, without decomposition, in dilute sulphuric, or concentrated chlorhydric acid. Soluble in cold concentrated sulphuric acid. (Mulder.)

Apoglucate of Ammonia. Soluble in water.

Apoglucate of Baryta. Soluble in water.

Apoglucate of Copper. Ppt.

Apoglucate of Lead. $C_{18}H_9PbO_{10}$ Sparingly soluble in water.

Apoglucate of Lime. $C_{18}H_9CaO_{10}$ Soluble in water. Insoluble in alcohol.

Apoglucate of Potash. Soluble in water.

Apoglucate of Silver. $C_{18}H_9AgO_{10}$ Sparingly soluble in water.

Apoglucate of Soda. Soluble in water.

Apophyllic Acid. $C_{16}H_7NO_8 = C_{16}H_6NO_7, HO$ Slowly and very difficultly soluble in cold water. Insoluble in alcohol, and ether. Soluble in concentrated sulphuric acid. Decomposed by nitric acid. Its salts are all very easily soluble in water.

Apophyllate of Ammonia. Readily soluble in water.

Apophyllate of Baryta. Soluble in water; less soluble in dilute alcohol.

Apophyllate of Lead. Soluble in water.

Apophyllate of Silver. $C_{16}H_6AgNO_8$ Readily soluble in water. Insoluble in alcohol or ether. (Anderson.)

Apophyllate of Silver with Nitrate of Silver. $C_{16}H_6AgNO_8 ; AgO, NO_5$ Sparingly soluble in water.

Aporetin. Insoluble in water. Nearly insoluble in alcohol, ether, benzin, or chloroform. Insoluble in dilute chlorhydric acid. Readily soluble in tolerably concentrated potash lye, and in ammonia-water.

Aposepedin. *Vid.* Leucin.

Apyrin (from *Cocos lapidea*). Sparingly sol-

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uble in water, but more soluble in *cold* than in hot water. Soluble in ammonia-water. (Bizio.)

ARABIC ACID. (*Arabin*) Easily soluble in water so long as it is moist, but after having become dry it is insoluble even in boiling water; it swells up, however, somewhat, and then dissolves in solutions of the alkalies and alkaline earths. Its aqueous solution is not precipitated by alcohol; but is precipitated at once by alcohol containing a few drops, or even a trace, of chlorhydric, or nitric acid, or of a saline solution.

ARABATE OF LIME.
" **MAGNESIA.**
" **POTASH.**
" **SODA.**
&c.
} Soluble in water, from which alcohol precipitates them. (Neubauer, *Ann. Ch. u. Pharm.*, **102.** 105.)

ARABIN. *Vid.* Arabic Acid; see also under **GUM.**

ARACHAMID. *Vid.* Arachinamid.

ARACHIC ACID. *Vid.* Arachidic Acid.

ARACHIDIC ACID. (*Arachic Acid. Butic Acid.*) $C_{40}H_{40}O_4 = C_{40}H_{39}O_3, HO$ Insoluble in water. Exceedingly sparingly soluble in cold spirit. Sparingly soluble in cold, readily soluble in boiling absolute alcohol. Very easily soluble in ether. The alkaline salts of arachidic acid are soluble in water, and alcohol; the other salts are insoluble in water, but soluble in boiling alcohol. (Gœssmann, *Ann. Ch. u. Pharm.*, **89.** 1.)

ARACHIDATE OF AMMONIA. $C_{40}H_{39}(NH_4)O_4$ Soluble in alcohol.

ARACHIDATE OF AMYL. $C_{50}H_{50}O_4 = C_{40}H_{39}(C_{10}H_{11})O_4$ Insoluble in water. Easily soluble in hot alcohol and in cold ether. (Caldwell.)

ARACHIDATE OF BARYTA. $C_{40}H_{39}BaO_4$ Insoluble in water. Sparingly soluble in boiling alcohol.

ARACHIDATE OF COPPER. $C_{40}H_{39}CuO_4$ Sparingly soluble in boiling alcohol.

ARACHIDATE OF ETHYL. $C_{44}H_{44}O_4 = C_{40}H_{39}(C_4H_5)O_4$ Insoluble in water. Soluble in alcohol. (Gœssmann, *Ann. Ch. u. Pharm.*, **89.** 10.)

ARACHIDATE OF GLYCERYL. *Vid.* Arachin.

ARACHIDATE OF LEAD. Soluble in an alcoholic solution of acetic acid.

ARACHIDATE OF LIME. $C_{40}H_{39}CaO_4$ Insoluble in water.

ARACHIDATE OF MAGNESIA.

I.) *normal.* $C_{40}H_{39}MgO_4$ Insoluble in water. Sparingly soluble, with partial decomposition, in hot alcohol.

II.) *basic.* Insoluble in water, and alcohol.

ARACHIDATE OF METHYL. $C_{42}H_{42}O_4 = C_{40}H_{39}(C_2H_3)O_4$ Insoluble in water. Easily soluble in alcohol, and ether. (Caldwell.)

ARACHIDATE OF POTASH. $C_{40}H_{39}KO_4$ Soluble in 15 @ 20 pts. of boiling water. When this solution is diluted with much water, an acid salt separates. Soluble in strong alcohol.

ARACHIDATE OF SILVER. $C_{40}H_{39}AgO_4$ Tolerably soluble in boiling, less soluble in cold alcohol. (Scheven & Gœssmann, *Ann. Ch. u. Pharm.*, **97.** 257.)

ARACHIDATE OF SODA. $C_{40}H_{39}NaO_4$ Soluble in strong alcohol.

ARACHIDATE OF STRONTIA. $C_{40}H_{39}SrO_4$ Insoluble in water. Somewhat more soluble than the baryta salt in boiling alcohol.

ARACHIN. (*Arachidate of Glyceryl.*) $C_{126}H_{124}O_{14} = \left.\begin{array}{l} C_6H_5''' \\ (C_{40}H_{39}O_2)_3 \end{array}\right\} O_6 + 2\,Aq$ Very sparingly soluble in alcohol of 90 %; more readily soluble in absolute alcohol. Especially soluble in ether. (Gœsmann & Scheven, *Ann. Ch. u. Pharm.*, **94.** 230.) "The 'Arachin' of Scheven & Gœssmann is nothing but free arachidic acid." (Berthelot, *Ann. Ch. et Phys.*, (3.) **47.** 355.)

*Mono*ARACHIN. $C_{46}H_{46}O_8 = C_6H_5O_3, 2\,HO, C_{40}H_{39}O_3$ Almost insoluble in cold, sparingly soluble in boiling ether. (Berthelot, *loc. cit.*)

*Di*ARACHIN. $C_{86}H_{86}O_{12} = C_6H_5O_3, 3\,HO, 2\,C_{40}H_{39}O_3$ Almost insoluble in cold, very sparingly soluble in warm ether; more soluble in bisulphide of carbon. (Berthelot, *loc. cit.*)

*Tri*ARACHIN. $C_{126}H_{122}O_{12} = C_6H_5O_3, 3\,C_{40}H_{39}O_3$ Like the preceding, it is very sparingly soluble in ether. (Berthelot, *loc. cit.*)

ARACHAMID. $C_{40}H_{41}NO_2 = N\left\{\begin{array}{l} C_{40}H_{39}O_2 \\ H_2 \end{array}\right.$ Insoluble in water. Tolerably easily soluble in hot, less soluble in cold alcohol of 95 %. (Scheven & Gœssmann, *Ann. Ch. u. Pharm.*, **97.** 263.)

ARBUTIN (GLUCOSIDE OF HYDROKINONE). $C_{24}H_{16}O_{14} = \left.\begin{array}{l} C_{12}H_4'' \\ H.C_{12}H_{11}O_{10} \end{array}\right\} O_4 \;\&\; + Aq$ Very easily soluble in boiling, less soluble in cold water. Less soluble in alcohol. Almost insoluble in ether.

ARCTUVIN. *Vid.* HydroKinone.

ARETHOSE. C_4H_5As Miscible in all proportions with water, and alcohol.

ARGENTACETAMID. Soluble in water. (Strecker, *Ann. Ch. u. Pharm.*, **103.** 324.)

ARGENTAMMELID. $C_6H_3.AgN_4O_4 = N_3\left\{\begin{array}{l} (C_2O_2'')_2 \\ C_2N \\ H_3 \\ Ag \end{array}\right.$ Very hygroscopic. Completely insoluble in water. Easily soluble in nitric acid and in ammonia-water. (Knapp, *Ann. der Pharm.*, 1837, **21.** 252.)

ARGENTAMMELIN. $C_6H_4AgN_5O_2 = N_3\left\{\begin{array}{l} C_2O_2'' \\ (C_2N)_2 \\ H_4 \\ Ag \end{array}\right.$ Ppt.

ARGENTATE OF POTASH. Insoluble in water. (Dumas, *Tr.*)

ARGENTOBROMATE(&c.) OF AMMONIA. *Vid.* AmmonioBromate(&c.) of Silver.

ARGENTOCYANIDE OF X. *Vid.* Cyanide of X and of Silver.

ARICIN. (*Cinchovatin. Cusconin. Isomeric with Brucin.*) $C_{46}H_{26}N_2O_8 = N_2\left\{C_{46}H_{26}O_8^{vi}\right.$ Almost insoluble in water. Readily soluble in alcohol, but much more in hot than in cold; less easily soluble in ether. Soluble in acids, with combination, forming salts which are generally tolerably easily soluble in water. (Manzini, *Ann. Ch. et Phys.*, (3.) **6.** 127.) Less soluble in an aqueous solution of chloride of sodium than in water. Sparingly soluble in ammonia-water. Its salts are generally readily soluble in water, and alcohol, but insoluble in ether.

ARISTOLOCHIN. (*Serpentarin, from Aristolochia Serpentaria.*) Soluble in water, and alcohol. (Chevallier.)

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ARNATTO. *Vid.* Annotto.

ARNICIN. Very sparingly soluble in water. Soluble in all proportions in alcohol. Soluble in ether. (Lebourdais, *Ann. Ch. et Phys.*, (3.) **24.** 63.) Sparingly soluble in water; more abundantly soluble in alcohol, and ether. Decomposed by caustic alkalies. Soluble in chlorhydric acid, with combination. (Bastick.)

ASCLEPIADIN.

ARSEN*tetr*ALLYLIUM. (*Tetrallylarsonium.*) $C_{24}H_{20}As = As(C_6H_5)_4$

ARSENAMYL (?). Soluble in water. (W. Gibbs.)

ARSENBUTYL. Soluble in water. (W. Gibbs.) (*Cacodyl of Valeric acid.*)

ARSEN*di*ETHYL. (*Vinocacodyl. DiArsenide of Ethyl. Ethylcacodyl.*) $As(C_4H_5)_2$ Insoluble in water. Readily soluble in ether and in absolute alcohol; water precipitates it from the alcoholic solution. (Landolt, *Ann. Ch. u. Pharm.*, **89.** 319.)

ARSEN*tri*ETHYL. (*Arsen Ethyl. TriArsenEthylamin.*) $C_{12}H_{15}As = As\begin{cases}C_4H_5\\C_4H_5\\C_4H_5\end{cases}$ Insoluble in water. Soluble in absolute alcohol. Easily soluble in spirit, and ether. (Landolt, *Ann. Ch. u. Pharm.*, **89.** 322.)

ARSENETHYLIC ACID. (*Ethyl Cacodylic Acid. MetArsenMethylic Acid*) $C_8H_{11}AsO_4 = (C_4H_5)_2AsO_3, HO$ Very deliquescent. Easily soluble in water, and alcohol. Very sparingly soluble in ether. Only slightly attacked by acids.

ARSENETHYLATE OF BARYTA. Deliquescent. Very easily soluble in water; more difficultly soluble in alcohol.

ARSENETHYLATE OF COPPER. Ppt.

ARSENETHYLATE *of sesquioxide* OF IRON. Ppt. Difficultly soluble in chlorhydric acid.

ARSENETHYLATE OF LEAD. Ppt.

ARSENETHYLATE *of dinoxide* OF MERCURY. Ppt.

ARSENETHYLATE *of protoxide* OF MERCURY. Deliquescent.

ARSENETHYLATE OF SILVER. Ppt. Soluble in ammonia-water.

ARSENETHYLIUM. $(C_4H_5)_4As$ Not isolated. Its salts are readily soluble in water.

ARSENIC ACID. AsO_5 On allowing a portion of the anhydrous acid to deliquesce in the air, the deliquium being poured off twice a day and kept by itself, and finally concentrating this solution by heat, until on cooling it to 12.5° a portion of solid acid separated out, a clear liquid of 2.55 sp. gr. was obtained: on exposure to the air this liquid absorbed moisture, and after a few days its sp. gr. had fallen to 1.935. On cooling the concentrated solution, of 2.55 sp. gr., to — 26.25° by means of a freezing mixture, and keeping it at this temperature during half an hour, it exhibited no tendency to solidify, but remained perfectly fluid. 100 pts. of this strong solution were found to contain 71 pts. of AsO_5, hence 1 pt. of the acid is soluble is 0.405 pt. of water at 12.5°; or 100 pts. of water at 12.5° dissolve 244.81 pts. of it. (A. Vogel, *Kastner's Archiv.*, 1826, **9.** 319.) Soluble in 0.5 pt. of water. (Thènard.) Soluble in 6 parts of cold water, and, more quickly in 2 parts of hot water. (Bucholz.) 100 pts. of water at 15.56° dissolve 150 pts. of arsenic acid. (Ure's *Dict.*) The aqueous solution saturated at 15° contains 15% of it. (M. R. & P.) When anhydrous arsenic acid is treated with water, a portion dissolves at once, but the remainder separates as a powder, which, however, dissolves completely after long-continued digestion with water, especially if the mixture is frequently agitated. Easily soluble in alcohol. Only very slightly soluble in the fatty oils, 1000 pts. of oil dissolving only 0.2 pt. of it in the cold, and about 1 pt. of it, with partial decomposition, when boiling. (Berzelius, *Lehrb.*, **2.** 259.) 1000 pts. of boiling poppy-oil dissolve 27 pts. of it. 1000 pts. of boiling castor-oil dissolve 34 pts. of it. (Heimpel & Grundner.) Much more soluble in alcohol than arsenious acid. (L. Gmelin.) It is not precipitated by sulphuretted hydrogen from solutions containing citric acid. (Spiller.)

E. Kopp distinguishes several definite hydrates of arsenic acid, as follows:

$a =$ *anhydrous.* AsO_5 Permanent. Insoluble in water or in ammonia-water.

$b = AsO_5, HO$ Slowly soluble in cold water. Tolerably easily soluble in slightly warm water, with evolution of heat.

$c = AsO_5, 2HO$ Tolerably easily soluble in water, with evolution of much heat.

$d = AsO_5, 3HO$ Easily soluble in water, without notable change of temperature.

$e = AsO_5, 4HO$ Extremely deliquescent. Instantly soluble in water, with production of cold. (E. Kopp, *Ann. Ch. et Phys.*, (3.) **48.** 106.)

Of the trisarseniates, water dissolves only those of the more soluble alkalies; the others are soluble in acids and in solutions of ammoniacal salts.

Most of them are soluble in arsenic acid. (Dumas, *Tr.*)

An aqueous solution of sp. gr. (at 15°)	Contains (by experiment) per cent of $3HO, AsO_5$.
1.0495	7.5
1.1052	15.0
1.1666	22.5
1.2350	30
1.3973	45
1.7346	67.4

From these results Schiff deduces the formula: $D = 1 + 0.006634\,p + 0.00001964\,p^2 + 0.0000006474\,p^3$, in which $D =$ the sp. gr. of the solution and p the percentage of substance in the solution, by means of which Ott has calculated the following table: —

Sp. Gr. (at 15°)	Per Cent of $3HO, AsO_5$.	Per Ct. of AsO_5.
1.0066	1	0.81
1.0133	2	1.62
1.0201	3	2.43
1.0269	4	3.24
1.0337	5	4.05
1.0406	6	4.86
1.0476	7	5.67
1.0546	8	6.48
1.0618	9	7.29
1.0690	10	8.10
1.0762	11	8.91
1.0835	12	9.72
1.0910	13	10.53
1.0985	14	11.34
1.1061	15	12.15
1.1138	16	12.96
1.1216	17	13.77
1.1295	18	14.58
1.1376	19	15.39
1.1457	20	16.20
1.1540	21	17.01
1.1624	22	17.82
1.1708	23	18.63
1.1794	24	19.44
1.1882	25	20.25
1.1971	26	21.06
1.2062	27	21.87
1.2154	28	22.68
1.2247	29	23.49
1.2342	30	24.30
1.2438	31	25.11
1.2536	32	25.92
1.2636	33	26.73
1.2737	34	27.54

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Sp. Gr. (at 15°).	Per Cent of $3HO, AsO_5$.	Per Ct. of AsO_5.	Sp. Gr. (at 15°).	Per Cent of $3HO, AsO_5$.	Per Ct. of AsO_5.
1.2840	35	28.35	1.5031	53	42.93
1.2945	36	29.16	1.5174	54	43.74
1.3051	37	29.97	1.5320	55	44.55
1.3160	38	30.78	1.5468	56	45.36
1.3270	39	31.59	1.5618	57	46.17
1.3382	40	32.40	1.5771	58	46.98
1.3496	41	33.21	1.5927	59	47.79
1.3612	42	34.02	1.6086	60	48.60
1.3730	43	34.83	1.6247	61	49.41
1.3850	44	35.64	1.6411	62	50.22
1.3973	45	36.45	1.6578	63	51.03
1.4097	46	37.26	1.6747	64	51.84
1.4224	47	38.07	1.6919	65	52.65
1.4352	48	38.88	1.7095	66	53.46
1.4483	49	39.69	1.7274	67	54.27
1.4617	50	40.50	1.7455	68	55.08
1.4753	51	41.31	1.7639	69	55.89
1.4891	52	42.12	1.7827	70	56.70

(H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113**. 193.)

ARSENIATE OF ALUMINA.

I.) Insoluble in water, soluble in acids.
$2Al_2O_3, 3AsO_5$ (Berthier.)

II.) *acid*. Easily soluble in water. (Berzelius, *Lehrb.*)

ARSENIATE OF AMMONIA.

I.) *tris*. Difficultly soluble in water. Less
$3NH_4O, AsO_5$ soluble in water than the dinarseniate.

II.) *din*. Effloresces, with decomposition. More
$2NH_4O, HO, AsO_5 + Aq$ soluble in water than the trisarseniate. (Mitscherlich.)

III.) *mono*. Permanent. Very easily soluble in
$NH_4O, 2HO, AsO_5$ water.

ARSENIATE OF AMMONIA & OF BARYTA.

I.) $= NH_4O, BaO, HO, AsO_5$ Easily efflorescent. Insoluble in water. (Baumann.)

II.) $= NH_4O, 2BaO, AsO_5 + 4Aq$ Ppt.

ARSENIATE OF AMMONIA & OF COPPER.
$3NH_4O, CuO, AsO_5 + Aq$ Permanent. Soluble in ammonia-water.

ARSENIATE OF AMMONIA & OF LIME. Ppt.

I.) NH_4O, CaO, HO, AsO_5

II.) Efflorescent. Slightly soluble in water,
$NH_4O, 2CaO, AsO_5 + 18Aq$ and in a solution of chloride of ammonium. Sparingly soluble in ammonia-water. (Wach.)

ARSENIATE OF AMMONIA & OF MAGNESIA.
$2MgO, NH_4O, AsO_5 + 12Aq$ Slowly efflorescent. Very difficultly soluble in water, easily soluble in acids. (Wach.)

Very difficultly soluble in ammonia-water. (Levol.) Of the salt dried at 100° ($= 2MgO, NH_4O, AsO_5 + Aq$), 1 part dissolves in 4926. pts. water at 15°; and of the anhydrous salt, 1 pt. requires 5154 pts. water at 15°. It is much more difficultly soluble in ammoniacal water: 1 pt. of the salt dried at 100° requiring 9260 pts. of a mixture of 1 pt. of solution of ammonia (of 0.96 sp. gr.) and 7 pts. water, at 15°; 1 pt. of the anhydrous salt requires 9709 pts. of the same mixture at 15°. It is much more soluble in water which contains chloride of ammonium: — 1 pt. of the anhydrous salt requiring 1600 pts. of a solution of 1 pt. chloride of ammonium in 70 pts. water, and 1044 pts. of a solution of 1 pt. chloride of ammonium in 7 pts. water. The presence of ammonia diminishes its solubility in solutions of chloride of ammonium: — 1 pt. of the anhydrous salt requiring for its solution 2790 pts. of a liquor containing 60 pts. water, 10 pts. ammonia (of 0.96 sp. gr.) and 1 pt. chloride of ammonium, and 1810 pts. of a mixture of 1 pt. chloride of ammonium, 1 pt. caustic ammonia solution, and 6 pts. water. (Frænkel, in Fresenius's *Quant.*, p. 156; from *J. pr. Chem.*, **56**. 33.)

ARSENIATE OF AMMONIA & OF MANGANESE.
$2MnO, NH_4O, AsO_5, + 12Aq$ Insoluble in water, and alcohol. Readily soluble in dilute acids. (Otto.)

ARSENIATE OF AMMONIA & OF SODA. Soluble in water.
$NH_4O, NaO, HO, AsO_5 + 8Aq$

ARSENIATE OF AMMONIA & OF STRONTIA.
$2SrO, NH_4O, AsO_5 + Aq$ Ppt.

ARSENIATE OF AMMONIA with MOLYBDIC ACID.
$3NH_4O, AsO_5; 6(HO, 4MoO_3)$ Insoluble in water, and in nitric or other acid, or in solutions of salts, when in presence of a tolerable excess of molybdate of ammonia mixed with excess of acid. (Seligsohn, cited by Fresenius, *Quant.*, p. 157.)

ARSENIATE OF ANTIMONY. Ppt. Decomposed by water. (Berthier.) Insoluble in water. Insoluble in acids after it has once been ignited; but when recently precipitated it is soluble in concentrated boiling chlorhydric and sparingly soluble in nitric acid. (Dumas, *Tr.*)

ARSENIATE OF BARYTA.

I.) *tris*. Permanent. Very sparingly soluble
$3BaO, AsO_5 \& + 4Aq$ in water; somewhat more soluble in ammonia-water.

Soluble in an aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41**. 315.) Its solubility in water is not increased by the presence of salts of ammonia, soda, or potash (Laugier); but arseniate of baryta is not precipitated from solutions containing citrate of soda. (Spiller.) Readily soluble in cold nitric or chlorhydric acid (Berzelius), or tartaric, or acetic acid. (Anthon.)

II.) *din*. Very difficultly soluble in water, but
$2BaO, HO, AsO_5 + 8Aq$ is decomposed to an insoluble basic and a soluble acid salt when washed with water. (Berzelius.) Insoluble in water. (Dumas, *Tr.*) Sparingly soluble in cold acids. (Kotschouby.)

III.) *mono*. Easily soluble in water. (Berze-
$BaO, 2HO, AsO_5$ lius, Mitscherlich.)

IV.) The crystals of the monacid salt (III.)
$BaO, 4HO, 2AsO_5$ are decomposed by cold water, but this bin-acid salt is scarcely decomposed by boiling water. (Setterberg.)

V.) *Compound of Nos*. I. & II. Ppt. (Ber-
$3BaO, AsO_5; 2BaO, HO, AsO_5$ zelius, *Lehrb.*, **3**. 378.)

ARSENIATE OF BISMUTH. Insoluble in water,
$BiO_3''', AsO_5 + 2Aq$ or nitric acid. Soluble in chlorhydric acid. (Thènard.) Very soluble in arsenic acid. (Dumas, *Tr.*)

ARSENIATE *of protoxide* OF CERIUM. Insoluble
$2CeO, AsO_5$ in water. Soluble in arsenic acid (Berzelius), and in the acids generally.

ARSENIATE *of sesquioxide* OF CHROMIUM.

I.) *Ppt*. Insoluble in water. Soluble in an aqueous solution of chloride of chromium, but insoluble in a solution of arseniate of soda. (T. Thompson, *Phil. Trans.*, 1827, Part I. p. 212.)

II.) *acid*. Decomposed by water. (*Ibid.*)

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Arseniate *of protoxide* **of Cobalt.**

I.) *tris.* Permanent. Insoluble, even in boiling water. Easily soluble in chlorhydric, and nitric acids, and in ammonia-water. (Proust.) Soluble in arsenic acid. Soluble in a weak aqueous solution of protosulphate of iron. (Kersten.)
$3\,CoO, AsO_5 + 8\,Aq$ (*Cobalt bloom.*)

II.) *acid.* Soluble in water. (Kersten.)

Arseniate *of sesquioxide* **of Cobalt.** Ppt.

Arseniate *of protoxide* **of Chromium.**

Arseniate of Cinchonin. Readily soluble in water.

Arseniate *of dinoxide* **of Copper.**

I.) *acid.* Known only in solution.

II.) *tris?* Ppt. Soluble in ammonia-water.

Arseniate *of protoxide* **of Copper.**

I. *tris.* Insoluble in water. Easily soluble in the stronger acids, and even in sulphurous acid; also soluble in ammonia-water. (A. Vogel.)
$3\,CuO, AsO_5$

Arseniate of Copper & of Uranium.
$CuO, Ur_2O_3, AsO_5 + 8\,Aq$

Arseniate of Didymium. Insoluble or very nearly insoluble in water. Sparingly soluble in weak acids. (Marignac, *Ann. Ch. et Phys.*, (3.) **38.** 164.)
$5\,DiO, 2\,AsO_5 + 2\,HO$

Arseniate of Ethyl.
(*diEthyl Arsenic Acid.*)

Arseniate of Ethyl & of Baryta.

Arseniate of Glucina. Insoluble in water. Soluble in arsenic acid, a soluble acid salt being formed. (Berzelius, in his *Lehrb.*)
$2\,Gl_2O_3, 3\,AsO_5$

Arseniate of Iridium (IrO_2). Ppt.

Arseniate *of protoxide* **of Iron.**

I.) *tris.* Insoluble in water.
$3\,FeO, AsO_5 + 6\,Aq$

II.) *din.* Sparingly soluble in ammonia-water. Insoluble in solutions of arseniate of ammonia or of other ammonia salts. (Wittstein.)
$2\,FeO, HO, AsO_5$

Arseniate *of protoxide & of peroxide* **of Iron.** Insoluble in water. Readily soluble in chlorhydric, and nitric acids. Decomposed by caustic potash.
$FeO, Fe_2O_3, AsO_5 + 6\,Aq$

Arseniate *of sesquioxide* **of Iron.**

I.) "*proto.*" Easily soluble in acids. Insoluble in ammonia-water. (Berzelius.)
$Fe_2O_3, AsO_5 + 5\,Aq$

II.) "*neutral.*" Insoluble in water. When recently precipitated it is soluble in caustic ammonia, more slowly after having once become dry. (Dœbereiner, Wittstein, Berzelius.) Soluble in chlorhydric, and nitric acids. Insoluble in acetic acid, in arseniate of ammonia, or in other ammoniacal salts. (Wittstein.) Soluble in warm sulphurous acid, and in a warm solution of sulphite of ammonia, with decomposition. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 79.)
$2\,Fe_2O_3, 3\,HO, 3\,AsO_5 + 9\,Aq$

III.) *din.* Insoluble in water, or ammonia-water.
$2\,Fe_2O_3, AsO_5 + 12\,Aq$

IV.) Insoluble in water, or ammonia-water. (Berzelius.)
$16\,Fe_2O_3, AsO_5 + 24\,Aq.$

Arseniate *of sesquioxide* **of Iron & of Lime.**

Arseniate & Sulphate *of sesquioxide* **of Iron & of Manganese.**
$(Mn_2O_3, 6\,Fe_2O_3)\,3\,AsO_5, 4\,SO_3 + 45\,Aq$

By long-continued boiling with water it is decomposed, sulphuric acid being removed. Easily soluble in chlorhydric, and nitric acids. (Laugier.)

Arseniate of Lead.

I.) *tris.* Insoluble in water. Insoluble in ammonia-water, and in solutions of ammoniacal salts. (Wittstein.) "Arseniate of lead" is not precipitated from solutions containing citrate of soda (Spiller); it is soluble in a saturated aqueous solution of chloride of sodium. (Becquerel, *C. R.*, 1845, **20.** 1523.)
$3\,PbO, AsO_5$

II.) *din.* Insoluble in water, or acetic acid. Soluble in chlorhydric, and nitric acids.
$2\,PbO, AsO_5$

Arseniate of Lead with Chloride of Lead.
$3\,(3\,PbO, AsO_5);\ PbCl$

Arseniate of Lime.

I.) *tris.* Insoluble in water. Soluble in arsenic acid.
$3\,CaO, AsO_5 + 3\,Aq$

II.) *din.* Insoluble in water. Soluble in chlorhydric, and nitric acids; also in aqueous solutions of sulphate, nitrate, and acetate of ammonia, and of chloride of ammonium. (Pfaff.) Soluble in arsenic acid.
$2\,CaO, HO, AsO_5 + 8\,Aq$

Soluble in an aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 315.)

III.) *mono.* Soluble in water.
$CaO, 2\,HO, AsO_5 + Aq$

IV.) *basic.*
$6\,CaO, AsO_5 + 6\,Aq$

Arseniate of Lime & of Magnesia. Soluble in nitric acid. (Kuehn.)
$3\,CaO, AsO_5;\ 3\,MgO, AsO_5$

Arseniate of Magnesia.

I.) *din.* Insoluble in water. Previous to ignition it is easily soluble in nitric acid, but after ignition it is insoluble. (Graham.) 1000 pts. of boiling water dissolve 1.5 pts. of it. (T. Thompson, in his *System of Chem.*, London, 1831, **2.** 533.)
$2\,MgO, HO, AsO_5 + 14\,Aq$

[Compare Bergman, *Essays*, **1.** 446.]

II.) *mono.* Easily soluble in water.
MgO, HO, AsO_5

III.) *tris.* Ppt.
$3\,MgO, AsO_5 + 15\,Aq$

Arseniate of Magnesia & of Potash. Partially decomposed by water. (H. Rose.)
$2\,MgO, KO, AsO_5$

Arseniate of Magnesia & of Soda.

Arseniate of Manganese.

I.) *din.* Insoluble in water. Soluble in nitric, and sulphuric acids. (Liebig.) Soluble in arsenic acid. (John.)
$2\,MnO, HO, AsO_5$

II.) *tris.* Ppt.

Arseniate *of dinoxide* **of Mercury.**

I.) *din.* Insoluble in water, alcohol, acetic acid, or ammonia-water. Soluble in arsenic, and nitric acids. Sparingly soluble in nitrate of ammonia. (Simon.)
$2\,Hg_2O, HO, AsO_5 + Aq$

II.) *mono.* Insoluble in water, alcohol, or acetic acid. Less soluble in nitric acid than the di-salt. (Simon.)
Hg_2O, AsO_5

Arseniate *of dinoxide* **of Mercury with Nitrate** *of dinoxide* **of**
$2\,Hg_2O, AsO_5;\ Hg_2O, NO_5$

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Mercury. Insoluble in water, or acetic acid. Soluble in nitric acid. (Simon.)

Arseniate *of protoxide* **of Mercury.** $2 Hg O, As O_5$ Insoluble in water. Soluble in arsenic, and nitric acids. (Bergman.)

Arseniate *of protoxide* **of Molybdenum.** $2 Mo O, H O, As O_5$ Soluble in an excess of protochloride of molybdenum.

Arseniate *of binoxide* **of Molybdenum.**

I.) *mono.* Ppt. $Mo O, H O, As O_5$

II.) *acid.* Soluble in arsenic acid, and ammonia-water.

Arseniate of Molybdic Acid.

I.) *crystals.* Soluble in water. Decomposed at first, but finally dissolved by alcohol. (Berzelius, *Lehrb.*)

II.) *basic.* Insoluble in water.

Arseniate of Nickel.

tris. $3 Ni O, As O_5 + 8 Aq$ Insoluble in water. Easily soluble in ammonia-water. Soluble in arsenic acid, and in the stronger mineral acids.

Arseniate of Palladium. Ppt.

Arseniate *of binoxide* **of Platinum.** Easily soluble in nitric acid. (Thompson.)

Arseniate of Potash.

I.) *tris.* $3 K O, As O_5$ Deliquescent. Soluble in water. (Graham.) "Arseniate of potash" is soluble in 26.666 pts. of strong boiling alcohol. (Wenzel, in his *Verwandtschaft*, p. 300. [T.].)

II.) *din.* $2 K O, H O, As O_5$ Deliquescent. Soluble in water. (Scheele, in Dumas's *Tr.*)

III.) *mono.* Very soluble in water, especially

a = anhydrous. $K O, As O_5$ in hot water. (Dumas, *Tr.*, **6.** 223.)

b = hydrated. $K O, 2 H O, As O_5$ Permanent. Soluble in 5.3 pts. of water at 6°. 100 pts. of water at 5.5° dissolve 19.047 pts. of it, forming a solution of 1.1134 sp. gr. (at 15.5°). Much more soluble in hot than in cold water. Insoluble in alcohol. (Thompson.)

Arseniate of Potash & of Soda. $K O, Na O, H O, As O_5 + 16 Aq$ Similar to the corresponding phosphate. Soluble in water.

Arseniate of Quinine. Soluble in water. It resembles the phosphate.

Arseniate *of binoxide* **of Rhodium.** Ppt.

Arseniate of Silver.

I.) *tris.* $3 Ag O, As O_5$ Insoluble in water. Soluble in ammonia-water, and in acids. (Scheele.) Readily soluble in a solution of carbonate of ammonia, but not in solutions of sulphate, nitrate, or succinate of ammonia, even when these are hot. (Wittstein.) Very sparingly soluble in a solution of nitrate of ammonia; more freely soluble in acetic acid. (Graham.) Soluble in aqueous solutions of the soluble hyposulphites, though less readily than the phosphate, chloride, carbonate, oxalate, borate, or sulphite of silver. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 397.) Arseniate of silver is not precipitated from solutions containing citrate of soda. (Spiller.)

II.) *acid.* Decomposed by water.

Arseniate of Silver with Sulphate of Silver. $2 Ag O, As O_5 ; Ag O, S O_3$ Decomposed by water, and dilute sulphuric acid. (Setterberg.)

Arseniate of Soda.

I.) *tris.* $3 Na O, As O_5 + 24 Aq$ Permanent in dry air. Soluble in 3.57 pts. of water at 15.5° (Graham); or 100 pts. of water at 15.5° dissolve 28 pts. of it. (Berzelius, *Lehrb.*) Melts in its water of crystallization at 85.5°.

Soluble in 3.75 pts. of water at 17°; or 100 pts. of water at 17° dissolve 26.7 pts. of it; or, the aqueous solution saturated at 17° contains 21.1% of it, or 10.4% of the anhydrous salt, and is of 1.1186 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 350.)

An aqueous solution of sp. gr. (at 17°)	Contains (by experiment) per cent of $3 Na O, As O_5 + 24 Aq$.
1.0226	4.22
1.0460	8.44
1.0577	10.55
1.0938	16.88
1.1186	21.10

From these results Schiff deduces the formula: $D = 1 + 0.005331\,p + 0.00001351\,p^2$, in which D = the sp. gr. of the solution and p the percentage of substance in the solution, by means of which Ott has calculated the following table: —

Sp. Gr. (at 17°).	Per Cent of $3 Na O, As O_5 + 24 Aq$.	Per cent of $3 Na O, As O_5$.
1.0053	1	0.491
1.0107	2	0.981
1.0161	3	1.472
1.0215	4	1.962
1.0270	5	2.453
1.0325	6	2.944
1.0380	7	3.434
1.0435	8	3.925
1.0491	9	4.415
1.0547	10	4.906
1.0603	11	5.396
1.0659	12	5.887
1.0716	13	6.378
1.0773	14	6.868
1.0830	15	7.359
1.0887	16	7.849
1.0945	17	8.340
1.1003	18	8.831
1.1061	19	9.321
1.1120	20	9.812
1.1179	21	10.302
1.1238	22	10.793

(H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 195.)

"Arseniate of Soda" is soluble in 60 pts. of boiling alcohol. (Wenzel, in his *Verwandtschaft*, p. 300. [T.].)

II.) *din.*

a = anhydrous. $2 Na O, As O_5$ Less soluble in water than the mono-arseniate.

b = $2 Na O, H O, As O_5 + 15 Aq$ Permanent. Soluble in water. (L. Gmelin.)

c = $2 Na O, H O, As O_5 + 24 Aq$ Quickly efflorescent. Readily soluble in water. (Mitscherlich.) Soluble in 1.79 pts. of water at 14°; or 100 parts of water at 14° dissolve 56 pts. of it; or an aqueous solution saturated at 14° contains 35.9% of it, or 16.5% of the anhydrous salt, and is of 1.1722 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 350.) 100 pts. of water at 7.2° dissolve 22.268 pts. of it. Insoluble in alcohol. When heated it melts in its water of crystallization. (Thompson? [T.].)

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An aqueous solution of sp. gr. (at 14°)	Contains (by experiment) per cent of $2 NaO, HO, AsO_5 + 24 Aq.$
1.0169	4.0
1.0344	8.0
1.0525	12.0
1.0714	16.0
1.1102	23.9
1.1722	35.9

From these results Schiff deduces the formula: $D = 1 + 0.00416\,p + 0.00001805\,p^2$, in which D = the sp. gr. of the solution and p the percentage of substance contained in it, by means of which Ott has calculated the following table: —

Sp. Gr. (at 14°).	Per Cent of $2 NaO, HO, AsO_5 + 24Aq.$	Per Cent of the anhydrous salt.
1.0042	1	0.463
1.0084	2	0.925
1.0126	3	1.388
1.0168	4	1.850
1.0212	5	2.313
1.0256	6	2.776
1.0300	7	3.238
1.0344	8	3.701
1.0389	9	4.163
1.0434	10	4.626
1.0479	11	5.089
1.0525	12	5.551
1.0571	13	6.014
1.0618	14	6.476
1.0665	15	6.939
1.0712	16	7.402
1.0759	17	7.864
1.0807	18	8.327
1.0855	19	8.789
1.0904	20	9.252
1.0953	21	9.715
1.1002	22	10.177
1.1052	23	10.640
1.1102	24	11.102
1.1153	25	11.565
1.1204	26	12.028
1.1255	27	12.490
1.1306	28	12.953
1.1358	29	13.415
1.1410	30	13.878
1.1463	31	14.341
1.1516	32	14.803
1.1569	33	15.266
1.1623	34	15.728
1.1677	35	16.191
1.1731	36	16.654
1.1786	37	17.116
1.1841	38	17.579
1.1896	39	18.041
1.1952	40	18.504

(H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 194.)

III.) *mono.* Permanent. More soluble in water than the dinarseniate. (Mitscherlich.)
$NaO, 2 HO, AsO_5 + 2 Aq$

ARSENIATE OF SODA & OF URANIUM. Ppt.
$NaO, 2 Ur_2O_3, AsO_5 + 5 Aq$

ARSENIATE OF SODA with FLUORIDE OF SODIUM. Soluble in 9.5 pts. of water at 25°. Soluble in 2 pts. of water at 75°. (Briegleb, in Wittstein's *Handw.*)
$3 NaO, AsO_5; NaFl + 24 Aq$

ARSENIATE OF SODA with SULPHATE OF SODA.
$a = 2 NaO, AsO_5; NaO, SO_3$ Permanent.
$b = 4 NaO, 3 AsO_5; 2 (NaO, SO_3)$

ARSENIATE OF STRONTIA.

I.) *din.* Insoluble in cold water. Decomposed by hot water to a basic, and a soluble acid salt. Soluble in acetic acid, and very easily in chlorhydric acid. (Kotschoubey.) 100 pts. of water at 15.5° dissolve 0.284 pt. of it. (T. Thompson, in his *System of Chem.*, London, 1831, **2.** 500.) Soluble in nitric acid.
$2 SrO, HO, AsO_5 + 8 Aq$

II.) *mono.* Easily soluble in arsenic acid.

ARSENIATE OF THORIA. Insoluble in water, or arsenic acid. (Berzelius.)
$2 ThO, AsO_5$

ARSENIATE *of protoxide* OF TIN. Insoluble in water.

ARSENIATE *of binoxide* OF TIN. Insoluble in water, and in dilute nitric acid. (Haeffely, *Phil. Mag.*, (4.) **10.** 291.)
$2 SnO_2, AsO_5 + 10 Aq$

ARSENIATE OF TITANIUM. Insoluble in water. Soluble in chlorhydric, titanic, and arsenic acids; also soluble in solutions of titanium salts. (H. Rose.)

ARSENIATE *of protoxide* OF URANIUM.

I.) *tris.*

II.) *din.* Ppt. Easily soluble in chlorhydric acid, and is not precipitated from this solution on the addition of water. (Rammelsberg.)
$2 UrO, HO, AsO_5 + 8 Aq$

ARSENIATE *of sesquioxide* OF URANIUM.

I.) *din.* Insoluble in water. (Berzelius.) Soluble in an aqueous solution of carbonate of potash. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** 220.)
$2 Ur_2O_3, HO, AsO_5 + 8 Aq$

II.) *mono.*
$Ur_2O_3, 2 HO, AsO_5 + 3 Aq$

ARSENIATE OF VANADIUM.

I.) "*basic.*" Easily soluble in water.

II.) *mono.* Very slowly soluble even in boiling water, or in water acidulated with arsenic acid, but when once dissolved it does not separate out again on cooling the solution. Insoluble in alcohol. Quickly soluble in chlorhydric acid. (Berzelius.)
VO_2, HO, AsO_5

ARSENIATE *of teroxide* OF VANADIUM (VANADIC ACID). Resembles the phosphate.
$2 VO_3, 3 HO, 3 AsO_5$

ARSENIATE OF YTTRIA.

I.) *tris.* Insoluble in water or ammonia-water. Soluble in nitric acid.

II.) *din.* Insoluble in water. Easily soluble in nitric acid. Ammonia water decomposes it to the tris-salt.
$2 YO, AsO_5$

III.) *mono.* Soluble in arsenic acid, the solution being decomposed on boiling.

ARSENIATE OF ZINC.

I.) *tris.* Insoluble in water. Soluble in arsenic, and nitric acids.

II.) "*acid.*"

ARSENIATE OF ZINC & OF ZINCAMMONIUM. Insoluble in water. Soluble in acids, and in aqueous solutions of caustic potash, and ammonia. (Bette.)
$N\left\{\begin{matrix}H_3\\Zn\end{matrix}\right. O, 2 ZnO, AsO_5 + 8 Aq$

ARSENIATE OF ZIRCONIUM. Insoluble in water. (Berzelius.)

ARSENIC. Insoluble in water. Decomposed by water which contains air, arsenious acid being formed and dissolved. Unacted upon by chlorhydric acid when out of contact with the
As

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air, but when the two are exposed to the atmosphere a small quantity of chloride is formed. Oxidized, with violence, by nitric acid, and aqua-regia, also oxidized by concentrated sulphuric acid.

Insoluble in alcohol, or ether, but soluble in many fatty oils, when heated therewith.

Arsenic is not attacked at the ordinary temperature, 20°, by nitric acid of any degree of concentration whether pure or contaminated with nitrous acid. Nor is it attacked by a mixture of nitric and chlorhydric acids, so long as these, either from being dilute or on account of a low temperature, cannot react upon each other; but if the arsenic is treated with a mixture of these acids in a state of extreme dilution and a few drops of an aqueous solution of nitrite of potash added, an action will commence at once. (Millon, *Ann. Ch. et Phys.*, (3.) **6.** 101.) All the metallic arsenides are insoluble in water; but those of the alkalies are decomposed by water, and many of the others are decomposed by weak acids.

Arsenide of Aluminum. Slowly decomposed by cold, rapidly by hot water.

Arsenide of Antimony.

Arsenide of Bismuth.

Arsenide of Butyl. *Vid.* ArsenButyl.

Arsenide of Cobalt.
$Co\,As$

Arsenide of Cobalt with Sulphide of
(*Cobalt Glance.*) **Cobalt.** Soluble, with decom-
$Co\,As, Co\,S$ position, in nitric acid.

Arsenide of Ethyl. *Vid.* ArsenEthyl.

Arsenide of Glucinum. Decomposed by water.

Arsenide of Hydrogen. *Vid.* Arseniuretted Hydrogen.

Arsenide of Iron. Soluble, with decomposition, in nitric acid.

***Proto*Arsenide of Iron with *bi*Sulphide of**
$Fe\,As; Fe\,S_2$ **Iron.** Soluble, with decomposition, in strong nitric acid, and aqua-regia.

Arsenide of Manganese. Slowly soluble
$Mn_3\,As$ in nitric acid. Soluble in aqua-regia. (Kane.)

Arsenide of Mercury with Chloride of Mercury.

I.) Decomposed by boiling water. (Capitaine.)
$Hg\,As; Hg\,Cl$

II.) ? Unacted upon by water or chlorhydric
(*Brown sublimate.*) acid. Decomposed by alkaline solutions. (Berzelius, *Lehrb.*)

Arsenide of Methyl. *Vid.* Cacodyl.

Arsenide of Nickel.

Arsenide of Nickel with *bi*Sulphide of
$Ni\,As; Ni\,S_2$ **Nickel.** Soluble, with decomposition, in nitric acid.

Arsenide of Platinum.

Arsenide of Potassium. Decomposed by
$As\,K_3$ water.

Arsenide of Propyl. *Vid.* ArsenPropyl.

Arsenide of Sodium. Decomposed by water.

Arsenide of Tin. Decomposed by acids.

Arsenide of Zinc.

Arsenious Acid. Occurs in two allotropic
$As\,O_3$ modifications: —

α = Crystalline (octohedral), white, or opaque.

β = Amorphous, transparent, or glassy.

Both modifications are very slowly soluble in cold, more quickly soluble in boiling water.

The remarkable variations in the results of the different chemists who have attempted to determine the solubility of arsenious acid is not merely dependent upon the fact that the two modifications are of unlike solubility, but also upon the slowness with which the acid dissolves, and upon the circumstance that it does not completely dissolve in the space of time usually allotted to similar experiments when a portion of it is boiled with very many times as much water as is required for its ultimate solution, by which many observers have doubtless been deceived. (Berzelius, *Lehrb.*, **2.** 256.) The hot aqueous solution contains 1 pt. of $As\,O_3$ in 10 @ 12 pts. of water; on cooling the solution a portion of arsenious acid separates out, leaving a solution which contains 1 pt. of the acid in every 20 @ 30 pts. of water.

1 pt. of $As\,O_3$ is soluble in 10.55 pts. of boiling water. (Wenzel, in his *Lehre von d. Verwandtschaft*, p. 444. [K.].) In 11.34 pts. of boiling water. (Fischer.) Soluble in 11.86 pts. of water after having been boiled therewith during ¼ of an hour; the saturated boiling solution containing 7.78% of it. (Klaproth, *loc. inf. cit.*) Soluble in 12.2 pts. of boiling water (Bucholz); in 15 pts. (Brandt, Justi; Bergman, *Opusc.*, II. p. 192 [N.]); in 16 pts. (Vogel); in 24 pts. (Lametherie); in 40 pts. (Pœrner); in 64 pts. (Baumé); in 80 pts. (Navier, *Gegengifte des Arseniks*, I. 12 [N.]); in 200 pts. (Aschof & Nasse, *Schweigger's Journ. für Ch. u. Phys.*, 1812, **5.** 218); in 640 pts. (Hagen, *Gründsätze der Chemie*, Königsberg, 1796, p. 456 [K.]; in 7.72 pts., if it has previously become opaque, and in 9.33 pts., if it is still transparent (Guibourt); in 21 pts., if it is transparent, and in 24 pts., if opaque. (Taylor.) 1 pt. of arsenious acid is soluble in 53.3 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm*, **8.** 201, in Canstatt's *Jahresbericht, für* 1854, p. 75.) Soluble in 30 pts. of water at ?. (Mussembrock, cited in *Ann. de Chim.*, **28.** 288.) To dissolve 1 pt. of arsenious acid in 12 pts. of water it is necessary to boil an excess of it with the water; if one part of the acid is boiled with only 12 pts. of water a considerable quantity remains undissolved; even with 1 pt. of the acid in 50 or 60 parts of water, long-continued boiling is necessary to effect complete solution. If a clear solution, saturated by long boiling with excess of acid, and then poured off from the undissolved portion, be boiled down continuously to one half of its original bulk, the whole of the acid remains dissolved, so that the concentrated liquid contains 1 pt. of the acid in 6 pts. of water. (Fischer.) After this solution has been left to stand for some time at ordinary temperatures, 1 pt. of arsenious acid remains dissolved in 16 pts. of water at 16°, and in 20 pts. of water at 7° (Bucholz); in 33 pts. of water (Klaproth); in 38.45 pts. of water after three days, in 55 pts. of water after eight days, and in 64.50 pts. of water after two or three weeks at 10° (Fischer); in 33.52 pts. of water if the acid had become opaque before it was dissolved, and in 55.06 pts. of water if it was transparent at the time of solution (Guibourt); in 38 pts. of water, after half a year, if it was opaque, and in 53 @ 71 parts of water, after forty-eight hours, if it was transparent. (Taylor.)

When pulverized arsenious acid in excess is left to digest for several days in cold water, 1 pt. of it dissolves in 50 pts. of the water (Bucholz); 1 pt.

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of it dissolves in 66 pts. of the water (Fischer); 1 pt. of it dissolves in 80 pts. of the water at 15° (Bergman, *Opusc.*, II. p. 192 [N.]); 1 pt. of it dissolves in 80 pts. of water, if it had become opaque, and in 103 pts., if it was still transparent (Guibourt); 1 pt. of it dissolves in 96 pts. of water at 10° (Spelman); 1 pt. of it dissolves in 96 pts. of water at 35.55° (Hahneman, *Ueber die Arsenikvergiftung*, p. 10 [N.]); 1 pt. of it dissolves in 320 pts. of water at 20°. (Aschof & Nasse, *Schweigger's Journ. für Ch. u. Phys.*, 1812, **5.** 218.)

100 pts. of water, after boiling ¼ hour, dissolve 8.434 pts. of it. After being in contact with it, with frequent agitation, during 24 hours, 0.25 pt., and when a boiling saturated solution is cooled to about 15° and kept at this temperature during 3 days, 0.3 pt. (Klaproth, *Schweigger's Journ. für Ch. u. Phys.*, 1812, **6.** 231.) "According to Klaproth, boiling water dissolves from 7 @ 8% of white oxide of arsenic, but on cooling it retains only about 3%; and this I find is gradually deposited on the sides of the vessel till it is reduced to 2% or less in cold weather, and by some months standing. Water of 15.56°, or under, dissolves no more than ¼% of the oxide." (Dalton, in his *New System*, **2.** 63.) 100 pts. of the aqueous solution of the transparent modification saturated at 15° contain 0.96 pt. of it, and 9.68 pts. when the solution is saturated at the boiling-point. If one part of pulverized arsenious acid be digested for 10 days at 19° to 25° in from 5 to 10 parts of water, the resulting solution contains 1 pt. of the acid in 50 pts. of water; a solution of the same strength is obtained in 25 days by digesting one part of the acid in 40 pts. of water. If 1 pt. of the acid be immersed in 80 pts. of water, the resulting solution contains $\frac{1}{90}$; with 160 pts. of water $\frac{1}{180}$; with 240 pts. of water $\frac{1}{280}$; with 1000 pts. of water $\frac{1}{1200}$; and even when 1 pt. of acid is digested at ordinary temperatures for several days with 16000 to 100,000 pts. of water a portion still remains undissolved. Pulverized opaque arsenious acid was immersed in various proportions of water, and the liquid set aside in closed bottles and in a cool place. After 18 years, the following results were obtained: 1 pt. of AsO_3 in 1000 pts. of water: perfect solution; the liquid contained nothing but arsenious acid and arsenic acid. 1 pt. AsO_3 in 100 pts. of water: 0.017 pt. of the acid remained undissolved. 1 pt. of the acid in 35 pts. of water: the undissolved portion amounted to 0.35 pt., so that the solution contained 1 pt. of acid in 54 pts. of water. (L. Gmelin, in his *Handbook*, **4.** 257.) 100 pts. of the aqueous solution of the opaque modification saturated at 15° contain 1.25 pts. of it, and 11.47 pts. when the solution is saturated at the boiling-point. When the boiling solution has become cold 2.90% of arsenious acid is retained in solution.

Berzelius (*Lehrb.*, **2.** 255), citing [Guibourt?], remarks: the porcelaneous modification is much the more soluble in water. 100 pts. of water at the ordinary temperature dissolve 0.96 pt. of the glassy modification and 1.25 pts. of that which has become opaque; 100 pts. of boiling water dissolve 9.68 pts. of the former and 11.47 pts. of the latter, and when the temperature of this solution has fallen to 15° the solution prepared with the glassy modification retains 1.78 pts. while that prepared with the opaque acid retains 2.9 pts.

Bussy finds that the vitreous acid dissolves more quickly and more abundantly in water than that which has become opaque; the same quantity of water which at 12° or 13° will take up 36 @ 38 pts. of the former, will not dissolve more than 12 or 14 pts. of the latter. By long boiling with water, the opaque acid is converted into the transparent variety, — that is to say, it acquires the solubility of the latter, so that a litre of the fluid takes up 110 grms. of the acid. On the other hand by the continued action of water and of a low temperature, the vitreous acid is converted into the opaque, — that is to say, the solution after a while becomes weaker, retaining only the proportion of acid which corresponds to the solubility of the opaque variety. Comminution diminishes the solubility of the opaque and increases that of the vitreous acid. Arsenious acid which has been rendered opaque by the action of ammonia, and that which has been crystallized from an aqueous solution, are equally soluble in water. The anomalies relating to the solubility of arsenious acid in water may perhaps be due to the simultaneous occurrence of both modifications of it in the solution. (Bussy, *C. R.*, **24.** 774.) Very sparingly soluble in absolute alcohol at ordinary temperatures. (A. Vogel.) Soluble in 80 pts. of highly rectified alcohol. (Wenzel, in his *Verwandtschaft*, p. 300. [T.].) When 1 pt. of powdered arsenious acid is digested for 30 days in from 10 to 40 pts. of alcohol a solution is formed containing 1 pt. of acid in 60 pts. of alcohol; when 1 pt. of the acid is digested with from 60 to 150 pts. of alcohol a solution is formed containing 1 pt. of acid in 124 @ 140 pts. of alcohol. (N. Fischer.) Soluble in 70 @ 80 pts. of alcohol. Soluble in oils. (Thompson's *System*.) Insoluble in ether.

Readily soluble in an aqueous solution of arsenite of ammonia (or in caustic ammonia) when digested therewith at 70° @ 80°, crystallizing out again in a state of purity as the solution cools. (Berzelius, *Lehrb.*, **2.** 253.) Slightly soluble without alteration in the fatty oils, but the degree of solubility varies with the different oils; castor-oil dissolves the most of any, 1000 pts. of this oil dissolving 1.33 pts. of AsO_3 at the ordinary temperature, and 9 pts. at the temperature of boiling. Other oils dissolve in 1000 pts. 0.6 @ 0.8 pt. of it in the cold, and about 1.7 pts. at the temperature of boiling. (Berzelius, *Lehrb.*, **2.** 256.) Insoluble in quinolein (leukol), or in anilin. (*Ann. Ch. et Phys.*, (3.) **9.** pp. 143, 169.) Soluble in chlorhydric acid; in smaller quantity in sulphuric, or nitric acid, and in still smaller in acetic acid.

The vitreous modification dissolves more rapidly in chlorhydric acid than the opaque. (Bussy, *loc. cit.*) Much more easily and abundantly soluble in acids than in water. Some of the acids dissolve it when hot, and deposit it entirely on cooling; but some of the vegetable acids as well as chlorhydric acid retain a considerable quantity even in the cold.

Readily soluble in a hot aqueous solution of benzoic acid, with combination; the compound formed being readily soluble in hot water. (Trommsdorff.) Soluble in aqueous solutions of tartaric and phosphoric acids.

Easily soluble in a cold aqueous solution of oxalic acid. (Bergman, *Essays*, **1.** 327.) When finely pulverized, it dissolves in a concentrated boiling solution of oxalic acid, but separates again on cooling, not appearing to combine with it. A hot solution of binoxalate of potash dissolves arsenious acid much more readily, with combination. (Souchay & Lennssen.) Soluble to a considerable extent in anhydrous terchloride of arsenic. (Penny & Wallace.) Readily soluble in potash and soda lye. More readily soluble in ammonia-water than in pure water.

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Some of the arsenites are soluble in water, those of the alkalies being easily soluble; those of the alkaline earths are difficultly soluble or insoluble, and the others all insoluble in water. But all are soluble in chlorhydric acid, and several are soluble in aqueous solutions of sulphate, or nitrate of ammonia, and of chloride of ammonium.

Arsenite of Ammonia.

I.) *basic.* Soluble in ammonia-water.

II.) *din.* $2NH_4O, AsO_3$ Soon decomposes when exposed to the air. Insoluble in alcohol or ether. (J. Stein.)

III.) *mono.* Soluble in water, with loss of some of its ammonia. (Pasteur.)

IV.) *acid.* Soluble in water; less easily soluble in a large excess of ammonia-water. (Fischer.) When an aqueous solution of arsenite of ammonia is exposed to the air, the ammonia gradually evaporates [to a certain extent], and crystals of arsenious acid are deposited. (Berzelius, *Lehrb.*, **2.** 253.)

Arsenite of Antimony. Soluble in a small amount of water, but is insoluble in a large quantity. (Berzelius.) Completely soluble in potash lye. (Reynoso.)

Arsenite of Baryta.

I.) *din.* $2BaO, AsO_3 + 4Aq$ Sparingly soluble in water. Also somewhat soluble in alcohol. (J. Stein.) Sparingly soluble in aqueous solutions of arsenious acid, and of caustic baryta. (Dumas, *Tr.*) Soluble in an aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 316.) Arsenite of baryta is not precipitated from solutions containing citrate of soda. (Spiller.)

II.) *mono.* BaO, AsO_3 Easily soluble in water when recently precipitated, but is insoluble after having once become dry. It is precipitated from its aqueous solution when the latter is boiled. (Filhol.)

"**Arsenite of Bromide of Arsenic.**" $AsBr_3, AsO_3$ Water dissolves out some of the arsenious acid. Insoluble in alcohol. (Sérullas.)

Arsenite of Cobalt. $3CoO, 2AsO_3 + 4Aq$ Easily soluble in chlorhydric, and nitric acids, and in ammonia-water. (Proust.) Completely soluble in potash lye. (Reynoso.)

Arsenite of Copper. (*Scheele's Green.*) $2CuO, AsO_3$ Insoluble in water, Easily soluble in most acids, in alkaline solutions, and ammonia-water. (Berzelius.) It is not precipitated from solutions containing citrate of soda. (Spiller.)

Arsenite of Copper with Butyrate of Copper. $2(CuO, AsO_3); C_8H_7CuO_4$ Ppt.

"**Arsenite of Iodide of Arsenic.**" AsI_3, AsO_3 Very sparingly soluble in water, though more soluble in hot than in cold. Still less soluble in alcohol. (Sérullas.)

"**Arsenite of Iodide of Potassium.**" $KI, 3AsO_3$ Soluble in 19 pts. of boiling water. (Emmet.) Soluble in 20 pts. of boiling, and in 40 pts. of cold water. (Emmet, in Wittstein's *Handw.*) Boiling water dissolves 5% of its weight of it, of which one half separates out again as the solution cools. (Berzelius, *Lehrb.*)

Arsenite *of protoxide* **of Iron.** $2FeO, AsO_3$ Ppt. Soluble in ammonia-water. Insoluble in solutions of arsenite of ammonia, or of other ammoniacal salts. (Wittstein.)

Arsenite *of sesquioxide* **of Iron.**

I.) *din.* $2Fe_2O_3\ 3AsO_3\ \& + 7Aq$ Partially soluble in an aqueous solution of caustic potash. (Damour.) Completely soluble in potash lye. (Reynoso.) Soluble in an aqueous solution of caustic soda, and the residue left when this solution is evaporated to dryness is completely soluble in water. (Guibourt.)

II.) *tetra.* $4Fe_2O_3, AsO_3 + 5Aq$ Unacted on by acetic acid. Dissolved with decomposition by other acids. (Bunsen.)

Arsenite of Lead.

I.) *tris.* Ppt. $3PbO, AsO_3$

II.) *din.* $2PbO, AsO_3 + x\,Aq$ Insoluble in water, ammonia-water, an aqueous solution of arsenite of ammonia, or of other ammonical salt. (Wittstein.)

III.) *mono.* $PbO, AsO_3 + x\,Aq$ Slightly soluble in water. (Berzelius.) Insoluble in potash, but soluble in soda-lye.

Arsenite of Lime.

I.) *din.* Sparingly soluble in water. $2CaO, AsO_3 + Aq$ Insoluble in water, especially if this contain hydrate of lime in solution. (Berzelius, *Lehrb.*, **3.** 424.) It is no longer precipitated if 4000 @ 5000 pts. of water are present. (Harting, Lassaigne.) It is not precipitated from solutions which contain ammoniacal salts; and the precipitated salt is itself dissolved by aqueous solutions of sulphate, nitrate, and acetate of ammonia, and of chloride of ammonium (Gieseke & Schweigger); also by a solution of succinate of ammonia, but by solutions of carbonate and phosphate of ammonia it is decomposed without being dissolved. (Wittstein.) When recently precipitated it is soluble in an aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 316.) Soluble in an aqueous solution of arsenite of ammonia, if too great an excess of alkali be avoided. (Schweigger.) Soluble in an aqueous solution of chloride of calcium. (J. M. Ordway.) "About 3000 or 4000 parts of chloride of potassium or chloride of sodium, dissolved in water, slightly increase its solubility." (Gmelin's *Handbook*, **4.** 303.) Readily soluble in dilute and weak acids.

Arsenite of lime is not precipitated from solutions containing citrate of soda. (Spiller.)

II.) *mono.* Somewhat soluble in water. (Simon.) $CaO, AsO_3\ \& + \frac{1}{2}\,Aq$ Soluble in a large excess of lime-water or of an aqueous solution of arsenious acid. (Dumas, *Tr.*)

III.) *basic.* Soluble in an aqueous solution of $3CaO, 2AsO_3 + 3Aq$ arsenious acid. (J. Stein.)

Arsenite of Magnesia. Ppt. $3MgO, AsO_3$

Arsenite of Manganese. Ppt. $3MnO, 2AsO_3 + 5Aq$

Arsenite *of dinoxide* **of Mercury.** $2Hg_2O, AsO_3$ Insoluble in water. Soluble in nitric acid.

Arsenite *of protoxide* **of Mercury.** $2HgO, AsO_3$ Insoluble in water. Soluble in nitric acid, and in an aqueous solution of arsenite of potash.

Arsenite of Nickel.

I.) $2NiO, AsO_3$ Insoluble in water. Easily soluble in ammonia-water, and chlorhydric acid. (Proust.) Completely soluble in potash-lye. (Reynoso.)

II.) $3NiO, 2AsO_3 + 4Aq$ Ppt. (Girard.)

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Arsenite of Potash.

I.) *din.* Hygroscopic. Soluble in water. (Dumas, *Tr.*) Insoluble in alcohol. (Pasteur.)
$2KO, AsO_3$

II.) *mono.* Slightly soluble in alcohol. (Pasteur.)
KO, AsO_3

III.) *bin.* Sparingly soluble in alcohol. (Pasteur.)
$KO, 2AsO_3 + 2Aq$

Some of the above, if not all of them, are soluble in water. (Simon.)

Arsenite of Potash with Iodide of Potassium.

I.) Tolerably readily soluble, especially in boiling water, and alcohol. Decomposed by acids.
$3(KO, HO, AsO_3); KI$

II.) Difficultly soluble in water. (Harms, *Ann. Ch. u. Pharm.*, **91.** 372.)
$KO, HO, 3AsO_3; KI$

Arsenite of Quinine. Soluble in hot, less soluble in cold water. Soluble in alcohol at 80° (C.).

Arsenite of Silver. Insoluble in water. Soluble in acids, for example, in nitric acid. When recently precipitated it is soluble, but after having been dried is insoluble in ammonia-water. (Marcet.) More readily soluble in acetic acid than phosphate of silver. (H. Rose.) Partially, but imperfectly, soluble in aqueous solutions of carbonate, sulphate, or nitrate of ammonia. (Wittstein.) Decomposed by a solution of chloride of ammonium. When in presence of 20,000 pts. of water it ceases to be precipitated. (Harting.) It is not precipitated in solutions containing any of the soluble citrates. (Spiller.) Completely soluble in potash-lye, from which it is not precipitated on the addition of chloride of potassium. This alkaline solution gradually decomposes, metallic silver separating out. (Reynoso.) Contrary to Reynoso's statement, it is not soluble in a solution of caustic potash; when treated therewith it remains unaltered at first, but is partially decomposed after a time. (Kuehn.) Soluble in an aqueous solution of arsenite of potash. (Kuehn.)
$3AgO, AsO_3$

Arsenite of Soda.

I.) *din.* Soluble in water.
$2NaO, AsO_3$

II.) *mono.* Soluble in water.
NaO, AsO_3

III.) *bin.* Soluble in water. (Pasteur.)
$NaO, 2AsO_3$

Arsenite of Strontia. Sparingly soluble in water, and in aqueous solutions of caustic strontia, and arsenic acid. (Dumas, *Tr.*) Tolerably soluble in water. Very sparingly soluble in spirit. (J. Stein.)
$SrO, AsO_3 + 4Aq$

Arsenite *of protoxide* **of Tin.** Ppt.

Arsenite *of binoxide* **of Tin.** Insoluble in water.
SnO_2, AsO_3

Arseniuretted Hydrogen (Gas). Water absorbs $\frac{1}{8}$ of its own volume of the gas.
AsH_3

It is absorbed rapidly by oil of turpentine, slightly by fixed oils, and not at all by alcohol, ether, or aqueous solutions of the alkalies. (Gm.) No more soluble in alkaline solutions than in pure water. (Berzelius, *Lehrb.*) Insoluble in an alcoholic solution of caustic potash. (Meissner.) Decomposed by strong acids.

Arsen*di*Methyl. *Vid.* Cacodyl.

Arsen*tri*Methyl.
$As(C_2H_3)_3$

ArsenMethylic Acid. Permanent in dry air. Very soluble in water. Dissolves in absolute alcohol much more readily than cacodylic acid. Soluble in ether. (Bæyer.)
(*MethylArsenious Acid.*)
$C_2H_5AsO_6 = C_2H_3AsO_4, 2HO$

ArsenMethylate of Ammonia.

ArsenMethylate of Baryta. Soluble in water. Insoluble in alcohol.
$C_2H_3Ba_2AsO_6, \& + 10Aq$

ArsenMethylate of Silver. Ppt.
$C_2H_3Ag_2AsO_6$

ArsenMethylEthylium. Not isolated.
$As\left\{\begin{matrix}(C_2H_3)_2\\(C_4H_5)_2\end{matrix}\right.$

ArsenMethylium. Not isolated.
$As(C_2H_3)_4$

ArsenPropyl.
(*Cacodyl of Butyric Acid.*)

ArsenSulphuric Acid. Not isolated.
HO, AsS_2O_3

ArsenSulphate of Potash. Permanent. Slightly soluble in water, the solution soon undergoing decomposition, especially on boiling. (Bouquet & Cloez.)
$KO, 2HO, AsS_2O_3$

Arthanitin. Soluble in 500 pts. of cold water; more easily soluble in acidulated water. Easily soluble in alcohol. Insoluble in ether, or in the fatty or essential oils. Partially decomposed by boiling water, or alcohol, being less soluble in alcohol after such treatment. Decomposed by concentrated sulphuric and nitric acids.
(*Cyclamin. From Cyclamen europæum.*)

Asarone (from *Asarum europæum*). Insoluble, or only very slightly soluble, in water. Easily soluble in alcohol. Also soluble in ether, and the essential oils. Soluble in cold concentrated sulphuric acid, without immediate decomposition, and may be re-precipitated by water if this be added soon after its solution, but the solution in sulphuric acid soon decomposes.
(*Asarin. Asarit. Camphor of Asarum.*)
$C_{40}H_{26}O_{10}$

Asbolin. Somewhat soluble in water. Easily soluble in alcohol, and ether. Insoluble in oil of turpentine, or the fatty oils. Easily soluble in nitric acid. (Braconnot.)

Asclepiadin (from *Asclepias vincetoxicum*). Easily soluble in water, alcohol, and a mixture of alcohol and ether. (Feneulle.)
(*Asclepin.*)

Asclepion. Entirely insoluble in water, or alcohol. Easily soluble in ether; less soluble in oil of turpentine, naphtha, and concentrated acetic acid. (C. List.)
$C_{40}H_{34}O_6$

Asparagic Acid. *Vid.* Aspartic Acid.

Asparagin.
(*Asparamid. Althein. Isomeric with Malamid.*)

a = anhydrous. Insoluble in ether.
$C_8H_6N_2O_6 = N_2\left\{\begin{matrix}C_8H_4O_6''\\H_4\end{matrix}\right.$

b = hydrated. (ordinary.) Permanent. Very sparingly soluble in cold water. (Pasteur.) Sparingly soluble in cold, more soluble in hot water.
$C_8H_8N_2O_6 + 2Aq$

Soluble in 58 pts. of water at 13°; the saturated solution containing 1.7% of it. (Plisson & Henry.) Soluble in about 60 pts. of cold water. (Leroy.) Soluble in 40 pts. of cold, and in 4 pts. of boiling water (Wittstein's *Handw.*); soluble in 11 pts. of cold, and in 4.44 pts. of boiling water (Biltz);

soluble in 40 parts of water at 18.75°. (Abl, from *Oesterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) Less readily soluble when contaminated with aspartate of lime or of magnesia. (Regimbeau.) Insoluble in cold, sparingly soluble in warm absolute alcohol (Plisson & Henry); it is the more soluble in spirit in proportion as this is more dilute. Alcohol precipitates it after a while from the saturated aqueous solution.

Soluble in 700 pts. of boiling alcohol of 98%; soluble in 290 pts. of boiling alcohol of 80%; soluble in 40 pts. of boiling alcohol of 60%; soluble in 1000 pts. of cold alcohol of 80%; soluble in 500 pts. of cold alcohol of 60%. (Biltz.) Insoluble in ether, and in the fixed or essential oils. (Plisson & Henry.) Easily soluble in aqueous solutions of caustic potash, soda, and ammonia. More easily soluble in acids than in water. On boiling these solutions for a long time the asparagin is decomposed. The aqueous solution also is gradually decomposed by long-continued ebullition.

Asparagin with **Cadmium**. Soluble in hot water. (Dessaignes & Chautard.)
$C_8 H_7 Cd N_2 O_6$

Asparagin with **Chloride of Mercury**.
$C_8 H_8 N_2 O_6 ; 4 Hg Cl$ Soluble in water.

Asparagin with **Copper**. Almost insoluble in cold, sparingly soluble in boiling water. Very soluble in acids and in ammonia-water. (Piria, *Ann. Ch. et Phys.*, (3.) **22.** 164.)
$C_8 H_7 Cu N_2 O_6$

Asparagin with **Lead**. Soluble in water.

Asparagin with **Lime**. Soluble in water.
$C_8 H_7 Ca N_2 O_6 + Aq$

Asparagin with *protoxide of* **Mercury**.
I.) $C_8 H_7 Hg N_2 O_6$ Soluble in water; the concentrated aqueous solution is decomposed by the addition of much water, a basic compound being precipitated. (Dessaignes.)

II.) $2 Hg O, C_8 H_7 N_2 O_5$ Insoluble in water.

Asparagin with **Potash**. Sparingly soluble in water. Insoluble in alcohol.
$C_8 H_7 K N_2 O_6 + Aq$

Asparagin with **Silver**. Soluble in hot water.
$C_8 H_7 Ag N_2 O_6$

Asparagin with **Nitrate of Silver**. Soluble in water.
$C_8 H_8 N_2 O_6 ; 2 Ag O, N O_5$

Asparagin with **Zinc**. Soluble in hot water.
$C_8 H_7 Zn N_2 O_6$

Asparamic Acid. *Vid.* Aspartic Acid.

Asparamid. *Vid.* Asparagin.

Aspartic Acid.
(*Asparagic Acid.*
Asparamic Acid.)

$C_8 H_7 N O_8 = N \left\{ \begin{matrix} C_8 H_4 O_6'' \\ H_2 \end{matrix} \right. . O, H O$

α = *active modification.* Dissolves in 364 pts. of water at 11°. If a hot saturated solution be allowed to cool, it will be found that 1 pt. is held in solution in 232 pts. of water at 6°. (Pasteur, *Ann. Ch. et. Phys.*, (3.) **34.** 33.) Soluble in 128 pts. of water at 8.5°; and much more abundantly soluble in hot water, from which it separates as the solution cools. (Plisson.) Much less soluble in water than asparagin.

Insoluble in alcohol of 0.817 sp. gr. at the ordinary temperature. Less soluble in dilute alcohol than in water, and is insoluble in absolute alcohol. (Plisson.) Soluble, without decomposition, in cold oil of vitriol. Tolerably soluble in chlorhydric, and nitric acids, also in alkaline solutions. (Plisson.)

β = *inactive modification.* Very sparingly soluble in water; yet much more soluble than the active modification. Dissolves in 208 pts. of water at 13.5°; but if a saturated solution be allowed to cool supersaturation will occur, as with the active modification. (Pasteur, *Ann. Ch. et Phys.*, (3.) **34.** 36.) Very soluble in nitric, and chlorhydric acids. (Pasteur.) Aspartic acid is very soluble in chlorhydric acid. (Piria, *Ann. Ch. et Phys.*, (3.) **22.** 170.)

Most of the metallic aspartates are soluble in water; though their solubility differs accordingly as they have been prepared with the active or inactive modification.

Aspartate of Ammonia. Very soluble in water. (Plisson & Henry.)

Aspartate of Baryta.

I.) α (*active.*) Easily soluble in water.
$C_8 H_6 Ba N O_8 + 4 Aq$

II.) β (*inactive.*)

III.) *basic.* Soluble in water. (Dessaignes.)
$C_8 H_5 Ba_2 N O_8 + 6 Aq$

Aspartate of Copper.

I.) *normal.* Known only in solution.
α (*active.*)

II.) *basic.* Very sparingly soluble in cold, easily soluble in hot water. Soluble in warm aspartic acid, and in an aqueous solution of aspartate of soda. (Plisson & Henry.)
$C_8 H_6 Cu N O_8, Cu O, + 9 Aq$

Aspartate *of sesquioxide* **of Iron.** Soluble in aqueous solutions of terchloride of iron, and of basic aspartate of magnesia.

Aspartate of Lead.

I.) *bibasic.*
α (*active.*)
β (*inactive.*) Somewhat soluble in water. (Pasteur, *Ann. Ch. et Phys.*, (3.) **34.** 43.)
$C_8 H_6 N O_7, 2 Pb O$

II.) *normal.* Soluble in aqueous solutions of acetate of lead, and of aspartate of potash. Easily soluble in nitric acid. (Plisson.)
$C_8 H_6 Pb N O_8$

Aspartate of Lead with **Nitrate of Lead.** Very sparingly soluble in cold, decomposed by warm water. (Piria, *Ann. Ch. et Phys.*, (3.) **22.** 172.)
$C_8 H_6 Pb N O_8 ; Pb O, N O_5$

Aspartate of Lime.

I.) *normal.*
$C_8 H_6 Ca N O_8 + Aq$
$\left. \begin{matrix} \alpha = \textit{active.} \\ \beta = \textit{inactive.} \end{matrix} \right\}$ Very soluble in water.

II.) *bibasic.* Soluble in water. (Boutron & Pelouze.)
$C_8 H_5 Ca_2 N O_8 + 8 Aq$

Aspartate of Magnesia.

I.) *normal.* Very soluble in water. Soluble in 16 pts. of boiling water. (Wittstock.) Soluble in weak alcohol, but insoluble in strong alcohol.
$C_8 H_6 Mg N O_8 + Aq$

II.) *basic.* Soluble in water.
$C_8 H_5 Mg_2 N O_8 + 2 Aq$

Aspartate *of dinoxide* **of Mercury.** Ppt. Soluble in aqueous solutions of the aspartates of potash and lime.

Aspartate *of protoxide* **of Mercury.**

I.) *basic* = $C_8 H_5 Hg_2 N O_8 + Aq$ Insoluble in warm water. Easily soluble in aqueous solutions of the aspartates of potash and soda.

Aspartate of Morphine. Soluble in water.

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Aspartate of Nickel. Easily soluble in water.

Aspartate of Potash. $C_8H_6KNO_8$ Deliquescent. Very soluble in water. Alcohol precipitates it from the concentrated aqueous solution.

Aspartate of Silver.

I.) *normal.* $C_8H_6AgNO_8$ Soluble in water, the aqueous solution undergoing decomposition when boiled. Insoluble in alcohol. (Laurent, in his *Chemical Method*, p. 251.)

II.) *bibasic.* $C_8H_5Ag_2NO_8 + Aq$ Insoluble in water. (Laurent, *loc. cit.*) Soluble in aqueous solutions of aspartate of potash, or of soda, and of nitrate of silver.

Insoluble in an aqueous solution of nitrate of silver. (Pasteur.)

Aspartate of Soda.

I.) *normal.*

α (*active.*) $C_8H_6NaNO_8 + 2Aq$ 100 pts. of water at 12.2° dissolve 89.194 pts. of it; or 1 pt. of the salt is soluble in 1.12 pts. of water at 12.2°. (Pasteur, *Ann. Ch. et Phys.*, (3.) **34.** 41.)

β (*inactive.*) 100 pts. of water at 12.5° dissolve 83.791 pts. of it; or, 1 pt. of it is soluble in 1.19 pts. of water at 12.5°. (Pasteur, *loc. cit.*)

Aspartate of Zinc. Permanent. Soluble in water.

AsperTannic Acid. (*from Asperula odorata.*) $C_{28}H_{18}O_{18} = C_{28}H_{16}O_{16}, 2HO$ Very hygroscopic. Easily soluble in water, and alcohol. Difficultly soluble in ether. (Schwarz.)

AsperTannate of Lead. Ppt.

Asphaltene. $C_{40}H_{30}O_6$ Insoluble in water or alcohol. Soluble in ether, the fatty oils, and oil of turpentine. (Boussingault.)

Asphaltum (native). (*Asphalten.*) Insoluble in absolute alcohol. Readily soluble in ether, and oil of turpentine. Alcohol precipitates it from the ethereal solution. Insoluble in caustic lyes. (Vœlckel, *Ann. Ch. u. Pharm.*, **87.** 139.)

Asphaltum is insoluble in water. Absolute alcohol dissolves only 5% of a yellow resin, which is also soluble in ether. From the portion insoluble in alcohol, ether dissolves out 70%. Asphaltum is entirely soluble in naphtha, and in oil of turpentine. (Wittstein's *Handw.*)

The asphaltum of Albania is insoluble in water, alcohol, acids, or alkalies; but soluble in oils, petroleum, and ether. Soluble in 5 pts. of cold rectified petroleum. (Klaproth, in his *Beitræge*, **3.** 315. [T.].)

Assafœtida. Much more soluble in alcohol than in water. [See under **Resins & Essences.**]

Assamar. Very hygroscopic. Very easily soluble in water. Also soluble in alcohol. Insoluble in ether. Slightly soluble in a mixture of alcohol and ether. (Reichenbach.)

Athamantin. (*Valerianate of Peucedyl. Valerianate of Oreoselon.*) $C_{24}H_{15}O_7$ Insoluble in water. Easily soluble in alcohol, even when this is dilute, and ether. Abundantly soluble in oil of turpentine, and in the fixed oils. Decomposed by acids, and by alkaline solutions. (Schnedermann & Winckler.)

Athmerythrin. Insoluble in water. Soluble in alcohol. (Kane.)

Atropic Acid. Soluble in water.

Atropate of Ammonia. Soluble in water.

Atropate of Potash. Soluble in water (Richter.)

Atropin. (*Daturin.*) $C_{34}H_{23}NO_6 = N\left\{C_{34}H_{23}O_6'''\right.$ Permanent. Sparingly soluble in water. Soluble in 299 pts. of water at ordinary temperatures. (v. Planta.) Soluble in 500 pts. of cold water, and 30 pts. of boiling water; 1 pt. of the saturated cold solution containing 0.2% of it. (Geiger & Hesse.) Soluble in 280 pts. of cold water, and in 72 pts. of water at 100°; the saturated cold solution contains 0.36% of it, and the saturated boiling solution 1.25%. (Mohr, Redwood & Procter's *Pharmacy*.) Soluble in 200 pts. of cold water, and in 50 pts. of boiling water without crystallizing out on cooling; by continued boiling it dissolves in 30 pts. of water, from which solution the greater part of the alkaloid crystallizes, as it cools. (Parrish's *Pharm.*, p. 411.) Soluble in 3 @ 8 pts. of cold alcohol; in 21 @ 63 pts. of cold, and in 32 pts. of warm ether. Also soluble in fatty and essential oils. (Wittstein's *Handw.*) Easily soluble in alcohol, less soluble in ether. Soluble in 1.5 pts. of cold alcohol. The solution in 6 pts. of boiling ether gelatinizes on cooling. (Parrish's *Pharm.*, p. 411.) Very easily soluble in hot alcohol. More readily soluble in ether than in water. Soluble in aqueous solutions of the caustic and carbonated alkalies. (v. Planta.) Soluble in chloroform. (Rabourdin.) 100 pts. of chloroform dissolve 51.69 pts. of it. (Michael Pettenkofer, *Kopp & Will's Jahresbericht für* 1858, p. 363.) 100 pts. of chloroform dissolve 33 pts. of it. (Schlimpert, *Kopp & Will's Jahresbericht für* 1859, p. 405.) 100 pts. of olive-oil dissolve 2.62 pts. of it. (M. Pettenkofer, *loc. cit.*)

Soluble in concentrated sulphuric acid, apparently with subsequent decomposition. (Parrish's *Pharm.*, p. 411.) Easily soluble in most acids, with combination.

Its salts are permanent; ordinarily soluble in water, alcohol, and a mixture of alcohol and ether; but insoluble in pure ether. Easily soluble in alkaline solutions.

They are freely soluble in glycerin. (Parrish's *Pharm.*, p. 236.)

[In the experimental results above given, the lower numbers, with the exception of v. Planta's and Schlimpert's all refer to Daturin, which was formerly regarded as distinct from Atropin; these differences are now explained by referring to the gradual decomposition which atropin undergoes when its solutions are heated during a considerable time.]

Aurantiin. *Vid.* Hesperidin.

Auric Acid. *Vid. ter*Oxide of Gold.

Most metallic aurates are insoluble in water.

"**Aurate of Ammonia.**" (*Fulminating gold.*) $2NH_3, AuO_3$ Insoluble in water. Sparingly soluble without decomposition in boiling chlorhydric acid. Unacted on by cold, but decomposed by boiling concentrated sulphuric acid. Unacted on by boiling dilute sulphuric, or nitric acids. Alkalies, most acids, and alcohol, even when heated, have no action upon it. It is soluble in a solution of cyanide of potassium.

Aurate of Baryta.

Aurate of Baryta with **Chloride of Barium.** Soluble in an aqueous solution of chloride of barium.

Aurate of Lime. Insoluble in water. Soluble in an aqueous solution of chloride of calcium. (Fremy, *Ann. Ch. et Phys.*, (3.) **31.** 485.)

Aurate of Magnesia. Insoluble in water. Soluble in an aqueous solution of chloride of magnesium. (Pelletier.)

Aurate of Potash. Very soluble in water. $KO, AuO_3 + 6 Aq$ (Fremy, *Ann. Ch. et Phys.*, (3.) **31.** 483.) Very soluble in water; the solution undergoing decomposition when evaporated. Soluble in alcohol. The alcoholic solution does not decompose on standing, but if heated, even to 50°, it is decomposed. (L. Figuier, *Ann. Ch. et Phys.*, (3.) **11.** 364.)

Aurate of Potash with Chloride of Potassium. Soluble in water.

Aurate of Potash with Sulphite of Potash. $4(KO, 2SO_2); KO, AuO_3 + 5 Aq$ Soluble in water, with decomposition, especially at the temperature of boiling. Nearly insoluble in alkaline solutions. (Fremy, *Ann. Ch. et Phys.*, (3.) **31.** 485.)

Aurate of Soda with Chloride of Sodium.

Aurate of Strontia with Chloride of Strontium. Soluble in an aqueous solution of chloride of strontium. (Oberkampf.)

AuriCyanide of *X*. *Vid.* CyanAurate of *X*.

Aurite of Potash.

AuroCyanide of *X*. *Vid.* Cyanide of Gold and of *X*.

AuroSulphite of *X*. *Vid.* Aurate of *X* with Sulphite of *X*.

AuroSulphuret of *X*. *Vid.* SulphAurate of *X*.

Azadirin (from *Melia azadirachta*).

AzAnilin. *Vid.* AzoPhenylamin.

Azelaic Acid. Most of its properties are $C_{10}H_8O_4, HO$ similar to those of suberic acid (with which it is probably identical, according to Bromeis). But it is more soluble in ether than suberic acid. (Laurent.)

The salts of azelaic acid resemble closely those of suberic acid.

Azelate of Baryta. Soluble in water, and alcohol.

Azelate of Lead. Ppt.

Azelate of Lime. Sparingly soluble in water.

Azelate of Magnesium. Soluble in water, and alcohol.

Azelate of Mercury. Ppt.

Azelate of Silver. Ppt.

Azelate of Strontium. Soluble in water, and alcohol. (Laurent.)

AzErythrin. Insoluble in water. Soluble $C_{22}H_{19}NO_{22}$ in alkaline solutions.

AzErythrin with Oxide of Lead. Insoluble $C_{22}H_{19}NO_{22}, 3PbO$ in alcohol or ether. (Kane.)

AzoBenzid. Very sparingly soluble in boiling water. Easily soluble in alcohol, and ether. Soluble in strong nitric, and sulphuric acids, from which solutions water separates it. Very sparingly soluble in concentrated chlorhydric acid, and in aqueous solutions of caustic potash, and ammonia. (Mitscherlich.)

(*AzoBenzol. AzoBenzene. DiPhenoyl biamin.*)

$C_{24}H_{10}N_2 = N_2 \left\{ \begin{matrix} (C_{12}H_4'')_2 \\ H_2 \end{matrix} \right.$

AzoBenzil. Nearly insoluble in water or in $C_{42}H_{15}NO_2$ aqueous solutions of potash, ammonia, or chlorhydric acid. Soluble in alcoholic solutions of potash, soda, ammonia, and chlorhydric acid, from which it crystallizes unchanged. Soluble in alcohol. (Zinin.)

AzoBenzol. *Vid.* AzoBenzid.

AzoBenzoid. Insoluble in boiling alcohol, or ether. (Laurent, *Ann. Ch. et Phys.*, 1837, (2.) **66.** 191.)

(*Isomeric with Azobenzoydin.*)

AzoBenzoydin. Nearly insoluble in alcohol. $C_{86}N_5H_{37}$ Sparingly soluble in ether. Decomposed by hot acid. (Laurent.)

AzoBenzoyl. Insoluble in water. Not completely soluble in 100 pts. of boiling alcohol. Much more easily soluble in ether. Sparingly soluble in ether and very slightly soluble in alcohol. (Laurent, *Ann. Ch. et Phys.*, 1837, (2.) **66.** pp. 185, 183.)

(*Toluenyl CyanBenzoicyl-Benzoicylamin.*)

$C_{44}H_{16}N_2 = N \left\{ \begin{matrix} C_{14}H_4(C_2N) \\ C_{14}H_5 \\ C_{14}H_7 \end{matrix} \right.$

AzoBenzoylid. Insoluble in alcohol. Very sparingly soluble in ether. Soluble in hot nitric acid, without apparent decomposition.

(*Nitride of Azostilbase.*) $C_{84}H_{33}N_5$

AzoErythrin. *Vid.* AzErythrin.

Azoleic Acid. *Vid.* Oenanthylic Acid.

Azolitmin. Sparingly soluble in boiling water. More soluble in water containing sulphuretted hydrogen than in pure water. Insoluble in alcohol, or ether. Readily soluble in aqueous solutions of potash, and ammonia. (Kane.)

$C_{18}H_{10}NO_{11}$

Azolitmin with Oxide of Lead. Ppt.

$3PbO, C_{18}H_{10}NO_{11}$ (?)

Azolitmin with *protoxide of* Tin. Decomposed when boiled with water acidulated with chlorhydric acid.

I.) $C_{18}H_{10}NO_{11}, 2SnO + 2 Aq$

II.) $C_{18}H_{10}NO_{11}, 4SnO$ Ppt.

Azolitmin with *peroxide of* Tin. Ppt.

$C_{18}H_{10}NO_{11}, 2SnO_2 + 2 Aq$

Azomaric Acid. *Vid.* Nitromaric Acid.

AzoNaphthylamin. Sparingly soluble in water. Readily soluble in alcohol, and ether. (Zinin.) Its solutions are easily decomposed when left in contact with the air. Soluble in most acids, with combination. No more abundantly soluble in cyanhydric acid than in pure water. (Zinin.)

(*Seminaphtalidam. Seminaphtalidin. Naphticylbiamin.*)

$C_{20}H_{10}N_2 = N_2 \left\{ \begin{matrix} C_{20}H_6'' \\ H_4 \end{matrix} \right.$

"**AzoPhenylamin**" (of Gottlieb). *Vid.* NitrAzoPhenylamin.

AzoPhenylamin. Insoluble in water. Soluble in boiling, less soluble in cold alcohol, and ether. (Zinin.)

(*Azanilin. Phenidamin. Semibenzidam. Phenoylbiamin.*)

$C_{12}H_6N_2 = N_2 \left\{ \begin{matrix} C_{12}H_4'' \\ H_4 \end{matrix} \right.$

AzoPhosphoric Acid. Deliquesces in moist $P_2NO_5 = (PN)PO_5$ air. Readily soluble in water, and alcohol. Slightly soluble in ether. (Gladstone, *J. Ch. Soc.*, **3.** 152.) Its alkaline salts are soluble in water, those of the alkaline earths and metals proper are insoluble. (Gladstone, *loc. cit.*, p 365.)

AzoPhosphate of Alumina.

AzoPhosphate of Ammonia. Very soluble in water, and alcohol.

AzoPhosphate of Ammonia & *of peroxide* of Iron. Soluble in cold water. (Gladstone, *J. Ch. Soc.*, **3.** 362.)

$2NH_4O, Fe_2O_3, P_2NO_5 + 5 Aq$

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AzoPhosphate of Baryta.
$3\,Ba\,O, P_2\,N\,O_5 + 2\,Aq$

AzoPhosphate of Cadmium. Ppt.

AzoPhosphate of Chromium. Ppt.

AzoPhosphate of Cobalt. Ppt.

AzoPhosphate of Copper.
$3\,Cu\,O, P_2\,N\,O_5 + 5\,Aq$

AzoPhosphate *of peroxide* of Iron. Insoluble in dilute acids. Easily soluble in ammonia-water. Soluble in cold concentrated sulphuric acid, the solution undergoing decomposition when heated. (Gladstone, *J. Ch. Soc.*, **3**. 142.)
$Fe_2\,O_3, P_2\,N\,O_5 + 4\,Aq$ or $+ 5\,Aq$

AzoPhosphate of Lead. Insoluble in ammonia-water, but is decomposed thereby.
$3\,Pb\,O, P_2\,N\,O_5 + 5\,Aq$

AzoPhosphate of Lime. Ppt.

AzoPhosphate of Magnesia. Ppt.

AzoPhosphate of Manganese. Ppt.

AzoPhosphate *of protoxide* of Mercury.

AzoPhosphate of Nickel. Ppt.

AzoPhosphate of Potash. Deliquesces in moist air. Soluble in water. Insoluble in alcohol.

AzoPhosphate of Silver. Ppt.
$3\,Ag\,O, P_2\,N\,O_5 + 5\,Aq$

AzoPhosphate of Soda. Soluble in water.

AzoPhosphate of Strontia. Ppt.

AzoPhosphate *of protoxide* of Tin. Ppt.

AzoPhosphate of Zinc. Ppt.

***Deut*AzoPhosphoric Acid.** Deliquescent. Very soluble in water. Insoluble, or nearly insoluble, in alcohol. Soluble in ether. Soluble, without decomposition, in cold concentrated sulphuric acid.
$3\,H\,O, P_3\,N_2\,O_5, 5\,H\,O$

Its alkaline salts are soluble in water, those of the alkaline earths are slightly soluble. (Gladstone, *J. Ch. Soc.*, **3**. 353.)

***Deut*AzoPhosphate of Ammonia.** Very deliquescent in damp air. Soluble in water.

***Deut*AzoPhosphate of Baryta.** Somewhat difficultly soluble in water. Its solubility, however, appears to be greatly affected by the presence of different salts in the liquid. Tolerably soluble in ammonia. (Gladstone.)
$3\,Ba\,O, P_3\,N_2\,O_5 + 3\,Aq$

***Deut*AzoPhosphate of Ethyl.** Insoluble in water. Readily soluble in alcohol and in the essential oils. (Gladstone, *Ibid.*, p. 363.)

***Deut*AzoPhosphate of Lime.** Ppt.

***Deut*AzoPhosphate of Magnesia.** Ppt.

***Deut*AzoPhosphate of Silver.** Difficultly soluble in water.

***Deut*AzoPhosphate of Strontia.** Ppt.

AzoSalicylide of Copper; or of Copper & of Cuprammonium. Insoluble in water, or alcohol. Soluble in cold dilute acids, as chlorhydric acid.
(Tri *Copper* tri *Salicoyl teramid.*)
$C_{42}\,H_{18}\,Cu_3\,N_3\,O_6$; or $C_{42}\,H_{15}\,Cu_3\text{-}\left(N\left\{\begin{matrix}H_3\\Cu\end{matrix}\right.\right)N_2O_6$; or $N_3\left\{\begin{matrix}(C_{14}\,H_5\,O_2)_3\\Cu_3\\H_3\end{matrix}\right.$

AzoSalicylide of Iron; or of Iron & of Ferammonium. Partially soluble in alcohol. Soluble in a cold dilute alcoholic solution of chlorhydric acid. Soluble, with decomposition, in hot, strong nitric acid.
(*Ferri*tri *Salicoylteramin.*)
$C_{42}\,H_{18}\,Fe_2\,N_3\,O_6 = N_3\left\{\begin{matrix}(C_{14}\,H_5\,O_2)_3\\Fe_2{}'''\\H_3\end{matrix}\right.$

AzoSalicylide of Lead.

I.) Insoluble in water. Soluble in a hot, but insoluble in a cold mixture of ammonia and hydride of azosalicyl.

II.) Ppt.

AzOxyBenzid. Insoluble in water. Readily soluble in alcohol; and still more soluble in ether. Insoluble in dilute chlorhydric, or sulphuric acid, or in solutions of potash or ammonia. Soluble in concentrated sulphuric acid, apparently with combination. Soluble in an alcoholic solution of chlorhydric acid. (Zinin.)
(*Azoxybenzene. Oxide of di-Phenoylbiamin* [*AzoBenzid*].)
$C_{24}\,H_{10}\,N_2\,O_2 = N_2\left\{\begin{matrix}(C_{12}\,H_4{}'')_2.O_2\\H_2\end{matrix}\right.$

AzOxyBenzid *bromé*. *Vid.* BromAzOxyBenzid.

AzOxyBenzid *nitré*. *Vid.* NitrAzOxyBenzid.

AzUlmic Acid. Insoluble, or but sparingly soluble, in water. (Pelouze & Richardson.) Insoluble, or very sparingly soluble, in alcohol. Insoluble in ether. Readily soluble in acetic acid. (P. & R.)
(*Azulmin.*)

Soluble in concentrated chlorhydric acid; also in concentrated sulphuric acid, from which water precipitates it. (Thaulow.) Easily soluble in solutions of potash, and of carbonate of potash or of ammonia. (Thaulow.)

Azulmin. *Vid.* Azulmic Acid.

B.

Badianic Acid. *Vid.* Anisic Acid.

Baldrianic Acid. *Vid.* Valeric Acid.

Balsams. See under **Resins**, and **Essences**.

The balsams are insoluble in water, but soluble in strong alcohol.

Baregin. *Vid.* Glairin.

Barium. Oxidizes quickly in the air. Decomposes water.
Ba

Baryta. *Vid.* Oxide of Barium.

Bassic Acid. Identical with Stearic Acid, *q. v.*

Bassorin (from *Bassora gum*). Insoluble in water; in which, however, it softens and swells up. Insoluble in alcohol or ether. It is almost entirely dissolved by warm dilute nitric, and chlorhydric acids. Decomposed by concentrated nitric, and sulphuric acids. Soluble in an aqueous solution of potash.
(*Cerasin.*)
$C_{12}\,H_{10}\,O_{10}$

Bdellium (Gum-resin from *Balsamodendron africanum*). Tolerably soluble in alcohol.

Bebeerin. *Vid.* Bebirin.

Bebiric Acid. Deliquescent. Soluble in water, and ether.
(*Bebeeric Acid.*)

Bebirate of Baryta. Very sparingly soluble in water.

Bebirate of Lead. Sparingly soluble in alcohol.

Bebirate of Lime. Very sparingly soluble in water.

Bebirate of Magnesia. Difficultly soluble in water.

Bebirate of Potash. Deliquescent. Soluble in water, and alcohol.

Bebirate of Soda. Deliquescent. Soluble in water, and alcohol.

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Bebirin (from *Nectandra Rodiei*). Permanent. Almost completely insoluble in water. Readily soluble in alcohol, and ether, especially when these are warm.

(*Bebeerin.*)

$C_{38}H_{21}NO_6 = N\left\{C_{38}H_{21}O_6'''\right.$

Soluble in 6650 pts. of cold water. Soluble in 1766 pts. of boiling water. Soluble in 5 pts. of absolute alcohol. Soluble in 13 pts. of ether. Easily soluble in dilute sulphuric, and chlorhydric acids. Decomposed by hot nitric acid. (Wittstein's *Handw.*) Easily soluble in acetic, and chlorhydric acids. Insoluble in dilute nitric acid, by which it is even precipitated from its solutions. Decomposed by strong boiling nitric acid. Very sparingly soluble in alkaline solutions.

Behenic Acid. Soluble in spirit.

(*Acide Benique. Said to be identical with Cetic Acid.*)

$C_{30}H_{30}O_4 = C_{30}H_{29}O_3, HO$

Behenate of Baryta.

Behenate of Ethyl. Easily soluble in alcohol.

$C_{30}H_{29}(C_4H_5)O_4$

Behenate of Lead.

Behenate of Soda. Soluble in absolute alcohol.

Belladonin. Scarcely at all soluble in water. Easily soluble in pure, and in common ether; in absolute and in dilute alcohol. Somewhat soluble in olive-oil. (Parrish's *Pharm.*, p. 412.)

BenzAcetic Acid. *Vid.* (Anhydrous) AcetoBenzoic Acid.

BenzAcetoSulphoPhenamid. *Vid.* SulphoPhenylBenzoylAcetamid.

BenzAlcohol. *Vid.* Hydrate of Toluenyl.

BenzAldehyde. } *Vid.* Hydride of Benzoyl.
Benzaldid. }

Benzamic Acid. Sparingly soluble in cold, abundantly soluble in boiling water. Still more soluble in alcohol, and ether. The solution slowly decomposes, when exposed to the air.

(*Amido Benzoic Acid. Carbanilic Acid. Phenyl Carbamic Acid, with which it is isomeric.*)

$C_{14}H_7NO_4$

Tolerably soluble in cold water, dissolving more readily than benzoic, or nitrobenzoic acids. Very easily soluble in boiling water, in alcohol, and in ether. (Kolbe's *Lehrb.*) But slightly acted upon by ordinary nitric acid even when boiling. Soluble in fuming nitric acid. Easily soluble in concentrated sulphuric acid. The alkaline and earthy salts of benzamic acid are readily soluble in water, and alcohol. (Zinin.)

Benzamate of Baryta. Readily soluble in water. (Voit.)

$C_{14}H_6BaNO_4$

Benzamate of Copper. Insoluble in water or alcohol. Soluble in strong acids.

$C_{14}H_6CuNO_4$

Benzamate of Ethyl. Insoluble in water. Easily soluble in alcohol, from which it is precipitated on the addition of water. (Chancel.) Scarcely at all soluble in water. Soluble in all proportions in alcohol, and ether. Unacted upon by cold, decomposed by boiling potash lye. Also decomposed by ammonia-water. Easily soluble, with combination in acids. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 327.)

(*Phenyl Carbamate of Ethyl. Carbanilethan. Carbanilate of Ethyl.*)

$C_{18}H_{11}NO_4 = C_{14}H_6(C_4H_5)NO_4$

Benzamate of Lead.

I.) Insoluble in water.

II.) Sparingly soluble in water.

III.) Readily soluble in water.

Benzamate of Lime. Readily soluble in water. Soluble in hot alcohol. (Voit.)

$C_{14}H_6CaNO_4$

Benzamate of Magnesia. Rapidly decomposes in the air. Soluble in water. (Voit.)

$C_{14}H_6MgNO_4 + 7Aq$

Benzamate of Methyl. Its properties are similar to those of the ethyl salt. Its compounds with acids are very soluble. (Cahours, *loc. cit.*, p. 331.) Insoluble, or but sparingly soluble in water. Soluble in alcohol. (Chancel.)

(*Phenyl Carbamate of Methyl. Carbanilate of Methyl. Carbanil methylane.*)

$C_{14}H_6(C_2H_3)NO_4$

Benzamate of Silver. Insoluble in boiling water, by which however it is partially decomposed.

$C_{14}H_6AgNO_4$

Benzamate of Soda. Exceedingly soluble in water, from which it is precipitated on the addition of alcohol. (Voit, *Ann. Ch. u. Pharm.*, **99.** 100.)

$C_{14}H_6NaNO_4$

Benzamate of Strontia. Very easily soluble in water. Sparingly soluble in alcohol. (Voit.)

$C_{14}H_6SrNO_4 + 2Aq$

Benzamid. Readily soluble in boiling, almost insoluble in cold water. More soluble in a dilute aqueous solution of ammonia. Easily soluble in alcohol. Easily soluble in boiling, less soluble in cold ether. (Liebig & Wœhler.) Abundantly soluble in warm concentrated chlorhydric acid. (Dessaignes.)

(*Benzoylamid.*)

$C_{14}H_7NO_2 = N\left\{\begin{matrix}C_{14}H_5O_2\\H_2\end{matrix}\right.$

Benzamid with Mercury. Sparingly soluble in water; more soluble in alcohol. (Dessaignes, *Ann. Ch. et Phys.*, (3.) **34.** 146.)

(*Benzoyl Mercuramid.*)

$C_{14}H_6HgNO_2 = N\left\{\begin{matrix}C_{14}H_5O_2\\H\\Hg\end{matrix}\right.$

Benzamil. Almost insoluble even in boiling alcohol, ether, or naphtha. Decomposed when boiled with alcohol, or chlorhydric acid. (Laurent.)

(*Benzanil.*)

$C_{56}H_{20}N_2O_4$

BenzAnilid. *Vid.* PhenylBenzoylamid.

BenzAnilidyl. PhenoylBenzoicyl.

Benzene. *Vid.* Hydride of Phenyl.

BenzEoresic Acid. *Vid.* Benzoic Acid (Amorphous).

BenzEthyl. *Vid.* Toluenyl.

BenzEugenyl. *Vid.* BenzoEugenic Acid.

Benzhydramid. Insoluble in water. Sparingly soluble in cold, more readily soluble in hot alcohol. Very readily soluble in ether. (Laurent.)

$C_{44}H_{18}N_2O_2$

Benzhydrol. Soluble in an aqueous solution of bisulphite of soda. (Rochleder & Schwarz.) [Compare Camphor of Cassia.]

$C_{14}H_8O$

Benzhydrolic Acid. Very difficultly soluble in cold water.

$C_{42}H_{20}O_8 = C_{42}H_{19}O_7, HO + 2Aq$ (?)

Benzhydrolate of Silver. Ppt.

$C_{42}H_{19}AgO_8 + 2Aq$

Benzidam. *Vid.* Anilin.

Benzidin. Permanent. Very sparingly soluble in cold, readily soluble in boiling water. Still more soluble in alcohol, and yet more in ether. Soluble in acids, with combination. (Zinin.)

(*Phenyl Phenoyl biamin.*)

$C_{24}H_{12}N_2 = N_2\left\{\begin{matrix}C_{12}H_4''\\C_{12}H_5\\H_3\end{matrix}\right.$

Benzil. Insoluble in water. Very soluble in alcohol, and ether. Soluble in warm concentrated

(*Suboxide of Stilbese.*)

$C_{28}H_{10}O_4$

sulphuric acid, from which water precipitates it unchanged. Unacted on by boiling concentrated nitric acid, or potash lye. (Laurent.)

Benzilam. $C_{28}H_9N = N\left\{\begin{matrix}C_{28}H_7\\H_2\end{matrix}\right.$ Insoluble in water. Very readily soluble in alcohol, and ether. Readily soluble in concentrated sulphuric acid, from which solution water precipitates it. (Laurent.)

Benzilic Acid. (*Stilbic Acid.*) $C_{28}H_{12}O_6 = C_{28}H_{11}O_5, HO$ Sparingly soluble in cold, more readily soluble in boiling water. Very soluble in alcohol, and ether. Soluble in warm concentrated nitric acid, from which solution water precipitates it unchanged. (Zinin.)

Benzilate of Lead. $C_{28}H_{11}PbO_6$ Permanent. Sparingly soluble in boiling water.

Benzilate of Potash. $C_{28}H_{11}KO_6$ Very easily soluble in water, and alcohol. Insoluble in ether.

Benzilate of Silver. $C_{28}H_{11}AgO_6$ Sparingly soluble in boiling water. (Zinin.)

Benzilim. *Vid.* Benzilimid.

Benzilimid. (*Benzilim. Isomeric with ImaBenzil.*) $C_{56}H_{22}N_2O_4 = N_2\left\{\begin{matrix}(C_{28}H_9O_2)_2\\H_4\end{matrix}\right.$ Somewhat sparingly soluble in alcohol, and ether. Soluble, with decomposition, in concentrated sulphuric, and nitric acids. Unacted upon by chlorhydric acid, or by boiling potash lye. (Laurent.)

Benzimic Acid. Almost insoluble in water. Sparingly soluble in alcohol.

Benzimate of Ammonia. Soluble in water, and alcohol. (Laurent.)

Benzimid. *Vid.* Hydride of CyanoBenzoyl.

Benzin, or Benzine. *Vid.* Hydride of Phenyl.

BenzinSulphuric Acid. *Vid.* PhenylSulphurous Acid.

Benzoic Acid (Anhydrous). (*Benzoic Benzoate.*) $C_{28}H_{10}O_6 = \left.\begin{matrix}C_{14}H_5O_2\\C_{14}H_5O_2\end{matrix}\right\}O_2$ Insoluble in cold water. Acidified by boiling water. Tolerably soluble in alcohol, more readily in warm than in cold. It is decomposed by prolonged contact with alcohol. Tolerably soluble in ether. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** pp. 300, 302.)

Benzoic Acid. $C_{14}H_6O_4 = C_{14}H_5O_3, HO$ Soluble in 607 pts. of water at 0°. (Kolbe & Lautemann, *Ann. Ch. u. Pharm.*, **115.** 187. [K.].) Soluble in 480 pts. of cold water (Lichtenstein); in 200 pts. of water at 18.75°, and in 24.5 pts. at boiling (Bucholz, *Gehlen's Journ. für Ch. Phys. u. Min.*, 1810, **9.** pp. 340, 355); in 500 pts. of cold water (Dörffurt, Bergman); in 24 pts. of boiling water (Dörffurt, Lichtenstein, Bergman); in 400 pts. of cold water (?); in 30 pts. of boiling water (Trommsdorff); in 160 pts. of water at 18.75° (Abl, from *Oesterr. Zeitschrift, für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht, für* 1854, p. 75). 100 pts. of water at 15.5° dissolve 0.208 pt. of it. 100 pts. of water at 100° dissolve 4.17 pts. of it. (Ure's *Dict.*) 100 pts. of the aqueous solution saturated at the ordinary temperature contain 0.5 pt. of it, and 3.25 pts. when saturated at 100°. Readily soluble in water containing 1.5 pts. of phosphate of soda, or 4 pts. of sulphate of soda. (Ure.) Soluble in 1.79 pts. of absolute alcohol at 18.75°, and in rather more than 1 pt. at the temperature of boiling. (Bucholz, *Gehlen's Journ. für Ch. Phys. u. Min.*, 1810, **9.** pp. 342, 355.) Abundantly soluble in alcohol, from which it is precipitated on the addition of water. (Lichtenstein.) Soluble in 1 pt. of boiling alcohol. (Wenzel, in his *Verwandtschaft*, p. 302 [T.].) 100 pts. of cold absolute alcohol dissolve scarcely 56 pts. of it. (Bucholz, cited by Wenzel, *loc. cit.*) Soluble in 25 pts. of ether, either hot or cold. (Bucholz.) 100 pts. of oil of turpentine dissolve 0.4 pt. of it; and at 100° more than their own weight, the acid crystallizing out on cooling. (Lecanu & Serbat.) Readily soluble in fixed and volatile oils, and in benzoic ether.

Soluble in benzin and the other light coal-naphthas. (De la Rue.) Largely soluble in hot caoutchin, a portion crystallizing out again on cooling. (Himly.) Soluble in creosote. (Reichenbach.) Soluble, without decomposition, in cold concentrated sulphuric acid, from which solution water precipitates it. (Lichtenstein.) Also soluble in nitric acid and sulphurous acid. Insoluble in chlorhydric or phosphoric acids. Hot acetic acid dissolves it precisely as water does, but it crystallizes out again when the acid cools. (Lichtenstein.)

Most benzoates are soluble in water; many of them being readily soluble. Many are soluble also in alcohol. The more sparingly soluble benzoates dissolve readily in aqueous solutions of acetate of soda, or of acetate of lead, and of nitrate of soda; but they do not dissolve in solutions of nitrate of potash, or of sulphate of soda, or chloride of sodium. (Lecanu & Serbat.)

Amorphous Benzoic Acid. (*ParaBenzoic Acid. Benzeoresic Acid.*) Easily soluble in boiling, nearly insoluble in cold water. Readily soluble in alcohol, and ether.

Its salts are generally less soluble than the ordinary benzoates. (E. Kopp.)

Benzoate of Allyl. $C_{20}H_{10}O_4 = C_{14}H_5(C_6H_5)O_4$ Insoluble in water. Readily soluble in alcohol, wood-spirit, and ether. (Hofmann & Cahours.)

Benzoate of Alumina. Deliquescent. Tolerably readily soluble in water. (Hisinger.) The hot saturated aqueous solution solidifies on cooling. (Berzelius.)

Benzoate of Ammonia.

I.) *normal.* $C_{14}H_5(NH_4)O_4$ Hygroscopic. Very readily soluble in water, and alcohol. Less readily soluble in alcohol than the potash salt. (Berzelius.)

II.) *acid.* Sparingly soluble in water. Less soluble than the normal salt in absolute alcohol. (Berzelius.)

III.) *of the amorphous acid.*

Benzoate of Ammonia & *of dinoxide* **of Mercury.** Insoluble in water or alcohol. Soluble in acetic acid. (Harff.)

Benzoate of Ammonia & *of protoxide* **of Mercury.** Insoluble in water. Soluble in 1500 pts. of alcohol, and in 2000 pts. of ether. (Harff.)

Benzoate of Amyl. (*Amylbenzoic Ether.*) $C_{24}H_{16}O_4 = C_{14}H_5(C_{10}H_{11})O_4$ Insoluble, or very sparingly soluble, in water.

Benzoate of AmylSalicyl. *Vid.* Salicylate of Amyl & of Benzoyl.

Benzoate of Animin (of Unverdorben). Sparingly soluble in cold, more readily soluble in boiling water. It is less easily decomposed by boiling with water than the benzoate of picolin. (Unverdorben.)

Benzoate of Antimony. Permanent. Soluble in water.

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Benzoate of Baryta. Permanent. Difficultly soluble in cold, more easily soluble in boiling water. (Trommsdorff.)
$C_{14} H_5 Ba O_4 + 2 Aq$

Benzoate of Baryta with Hippurate of Baryta. More soluble in water than the hippurate of baryta. (Schwarz.)
$C_{14} H_5 Ba O_4 ; C_{18} H_8 Ba O_6 + Aq$

Benzoate of Benzol. Insoluble in water. Tolerably soluble in spirit. Easily soluble in ether.
$C_{42} H_{16} O_8 = C_{28} H_{10} (C_{14} H_6'') O_8$

Benzoate of Benzoyl. *Vid.* Benzoic Acid (Anhydrous).

Benzoate of Benzyl. *Vid.* Benzoate of Toluenyl.

Benzoate of Bismuth. Permanent. Soluble, with partial decomposition, in water, and alcohol. Soluble, without decomposition, in benzoic acid. (Trommsdorff.)

Benzoate of Borneol. Soluble in alcohol, and ether. (Berthelot.)
(*Camphol benzoique.*)
$C_{34} H_{22} O_4 = C_{14} H_5 (C_{20} H_{17}) O_4$

Benzoate of BromoPhenyl. Insoluble in water. Readily soluble in ether and in boiling alcohol.
$C_{26} H_9 Br O_4 = C_{14} H_5 (C_{12} H_4 Br) O_4$

Benzoate of ***bi*****BromoPhenyl.** Insoluble in water. Readily soluble in ether and in boiling alcohol.
$C_{26} H_8 Br_2 O_4$

A mixture of $C_{26} H_9 Br O_4$, $C_{26} H_8 Br_2 O_4$, $C_{26} H_7 Br_3 O_4$, was found to be insoluble in water, very sparingly soluble in cold, readily soluble in hot alcohol, and ether.

Benzoate of Cadmium. Soluble in hot water. Sparingly soluble in ordinary alcohol. (H. Schiff, *Ann. Ch. u. Pharm.*, **104.** 325.)
$C_{14} H_5 Cd O_4 + 2 Aq$

Benzoate of Camphol. *Vid.* Benzoate of Borneol.

Benzoate of Cerium. Soluble in water. (Berzelius & Hisinger.)

Benzoate of Cetyl. Difficultly soluble in spirit. Easily soluble in ether. (Becker.)
$C_{14} H_5 (C_{32} H_{33}) O_4$

Benzoate of ChloroPhenyl. Soluble in ether. (Stenhouse.)
$C_{26} H_9 Cl O_4 = C_{14} H_5 (C_{12} H_4 Cl) O_4$

Benzoate of ***ter*****ChloroPhenyl.** Soluble in ether. (Stenhouse.)
$C_{26} H_7 Cl_3 O_4 = C_{14} H_5 (C_{12} H_2 Cl_3) O_4$

Benzoate of Cholesterin. Very sparingly soluble in boiling alcohol. Easily soluble in ether.
$C_{66} H_{48} O_4 = C_{14} H_5 (C_{52} H_{43}) O_4$

Benzoate *of protoxide* **of Chromium.** Ppt.
$C_{14} H_5 Cr O_4$

Benzoate *of sesquioxide* **of Chromium.** Appears to be soluble in water.

When benzoate of potash is dropped into a concentrated aqueous solution of sesquichloride of chromium a green, flocky precipitate falls, but no precipitate is formed when the solution is dilute. (T. Thompson, *Phil. Trans.*, 1827, Part I. p. 203.)

Benzoate of Cobalt. Soluble in water, and alcohol. (Berzelius.)

Benzoate of Copper.

I.) *normal.* Permanent. Somewhat soluble in water. (Berzelius.) Soluble in warm, less soluble in cold dilute acetic acid. Insoluble in alcohol. (Trommsdorff.
$C_{14} H_5 Cu O_4 + x Aq$

II.) *of the amorphous acid.* Ppt.

Benzoate of Cumicyl. Decomposed by water.
(*Benzoate of CuminEther.*) $C_{14} H_5 (C_{20} H_{13}) O_4$

Benzoate of Cumol. Soluble in alcohol, especially when this is hot and anhydrous. Also easily soluble in ether, acetone, and chloroform. Water precipitates it from the alcoholic solution. Soluble in cold concentrated sulphuric acid, the solution undergoing decomposition when heated. Unacted upon by boiling nitric acid. (Tuettscheff.)
$C_{48} H_{22} O_8 = C_{28} H_{10} (C_{20} H_{12}'') O_8$

Benzoate of Cymelene.

Benzoate of Ethyl. Insoluble in cold, slightly soluble in hot water. Readily soluble in alcohol, and ether.
(*Benzoic Ether.*)
$C_{18} H_{10} O_4 = C_{14} H_5 (C_4 H_5) O_4$

Benzoate of Ethylene. Soluble in ether. (Wurtz.)
(*Dibenzoic Glycol.*)
$C_{32} H_{14} O_8 = C_{28} H_{10} (C_4 H_4'') O_8$

Benzoate of EthylSalicyl. *Vid.* Salicylate of Benzoyl & of Ethyl.

Benzoate of Glucina.

I.) *normal.* Soluble in water.

II.) *basic.* Insoluble in water.

Benzoate of Glyceryl.
(*Benzoin.*)

I.) *normal.*
$C_{48} H_{20} O_{12} = C_6 H_8 O_6 . 3 C_{14} H_6 O_4 = C_{42} H_{15} (C_6 H_5''') O_{12}$
(*TriBenzoïcin.*) Soluble in ether. (Berthelot, *Ann. Ch. et Phys.*, (3.) **41.** 290.)

II.) *bibasic.* Insoluble in water. Extremely soluble in alcohol, ether, and benzin. Nearly or quite insoluble in bisulphide of carbon. (Berthelot, *loc. cit.*)
$C_{20} H_{12} O_8 = C_6 H_8 O_6, 2 H O, C_{14} H_6 O_4$
(*MonoBenzoïcin.*)

Benzoate of Gold. Permanent. Sparingly soluble in water. Insoluble in alcohol. (Trommsdorff.)

"**Benzoate of Hydride of Benzoyl.**" *Vid.* Stilbous Acid.

Benzoate of Hydride of Benzoyl. Insoluble in water. Abundantly soluble in alcohol. Very sparingly soluble in cold ether. Easily soluble, with decomposition, in an alcoholic solution of caustic potash. (Liebig.)
$C_{42} H_{18} O_8 = 2 C_{14} H_6 O_2, C_{14} H_5 O_3 + Aq$

Benzoate *of protoxide* **of Iron.** Efflorescent. Soluble in water, and alcohol. (Berzelius.)
$C_{14} H_5 Fe O_4$

Benzoate *of sesquioxide* **of Iron.**

I.) *normal, i. e. teracid.* Soluble in water, and alcohol, with deposition of some of the basic salt. (Berzelius.)

II.) *basic.* Partially soluble in water, with decomposition. Insoluble in aqueous solutions of the alkaline benzoates.

III.) *perbasic.* Insoluble in water. (Berzelius.) Benzoate of sesquioxide of iron is not precipitated from solutions containing citrate of soda. (Spiller.)
$2 Fe_2 O_3, 3 C_{14} H_5 O_3 + 15 Aq$

IV.) *acid.* Soluble in water. (Berzelius.)

Benzoate of Lead.

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I.) *normal.* Soluble in water, and alcohol. (Trommsdorff.) Difficultly soluble in water, and less so in cold than in hot. (Gerland, *Ann. Ch. u. Pharm.*, **91.** 195.) Soluble in boiling, less soluble in cold acetic acid. (Berzelius.)

$C_{14}H_5PbO_4+Aq$

II.) *basic.* Ppt.

$2PbO,C_{14}H_5PbO_4$

III.) *of the amorphous acid.* Insoluble in water.

$2PbO,C_{14}H_5O_3$

Benzoate of Lime.

I.) *normal.* Efflorescent. Soluble in 29 pts. of cold, and in much less hot water. (Lichtenstein.) Soluble in 20 pts. of water at 18.75°; or 100 pts. of water at 18.75° dissolve 5 pts. of it; or the aqueous solution saturated at 18.75° contains 4.76% of it. (Bucholz, *Gehlen's Journ. für Ch. Phys. u. Min.*, 1810, **9.** pp. 352, 357.)

$C_{14}H_5CaO_4+2Aq$

II.) *of the amorphous acid.* Soluble in water.

Benzoate of Lithia. Hygroscopic. Readily soluble in water. (C. G. Gmelin, Berzelius.)

Benzoate of Magnesia. Slightly efflorescent. Easily soluble in water.

$C_{14}H_5MgO_4$

Benzoate of Manganese. Permanent. Soluble in 20 pts. of water at 18.8°, and in much less hot water. (John.) Sparingly soluble in alcohol. (Trommsdorff.)

$C_{14}H_5MnO_4+Aq$

Benzoate of *tri*Mercurammonium.

$C_{14}H_5\left(N\left\{\begin{matrix}H\\Hg_3\end{matrix}\right.\right)O_4+2Aq$

Benzoate *of dinoxide* of Mercury. Insoluble in cold, and is decomposed by boiling water, and alcohol. (Harff, Burckhardt.) Insoluble in ether. Soluble in an aqueous solution of benzoic acid (Harff); insoluble in an aqueous solution of benzoic acid or of benzoate of potash or benzoate of ammonia. (Burckhardt.) Soluble in concentrated aqueous solutions of the alkaline acetates and of chloride of sodium. (Harff.)

$C_{14}H_5Hg_2O_4$

Benzoate *of protoxide* of Mercury.

I.) *normal.* Permanent. Insoluble in cold, rather freely soluble in hot water, without alteration. (Burckhardt.) Boiling water converts it into an insoluble basic salt. (Harff.) Partially soluble in alcohol, with separation of a basic salt. (Burckhardt.) Soluble in 370 pts. of alcohol. (Harff.) Insoluble in ether. (Burckhardt.) It is decomposed by ether to an acid and a basic salt; the acid salt being soluble in 2 pts. of ether. (Harff.)

$C_{14}H_5HgO_4+Aq$

II.) *basic.* Insoluble in water or alcohol.

Benzoate of Methyl. Almost insoluble in water. Easily soluble in alcohol, and ether.

(*Methyl Benzoic Ether.*)

$C_{16}H_8O_4=C_{14}H_5(C_2H_3)O_4$

Benzoate of Methyl Salicyl. *Vid.* Salicylate of Benzoyl & of Methyl.

Benzoate of Nickel. Soluble in water, and alcohol. (Berzelius.)

Benzoate of NitroBenzoyl. *Vid.* BenzoNitroBenzoic Acid (Anhydrous).

Benzoate of *bi*NitroPhenyl. Insoluble in water. Soluble in boiling, almost insoluble in cold alcohol. Tolerably soluble in warm ether. Partially soluble in boiling potash lye. (Laurent & Gerhardt.)

(*BiNitroBenzoPhenid. Benzoate of Phenyl binitré. Benzophenidebinitré.*)

$C_{26}H_8N_2O_{12}=C_{14}H_5(C_{12}H_3[NO_4]_2)O_4$

Benzoate of *ter*NitroPhenyl. Insoluble in water. Less soluble than the preceding in cold alcohol. Very sparingly soluble in cold, somewhat more soluble in hot ether. (Laurent & Gerhardt.) [Compare NitroBenzoate of *bi*NitroPhenyl.]

(*TriNitroBenzoPhenid. Benzoate of Phenyl trinitré. Benzophenidetrinitré.*)

$C_{26}H_7N_3O_{16}=C_{14}H_5[C_{12}H_2(NO_4)_3]O_4$

Benzoate of Œnanthyl. *Vid.* BenzoŒnanthylic Acid (Anhydrous).

Benzoate of Palladium. Somewhat soluble in water. (Hisinger.)

Benzoate of Phenyl. Insoluble in water. Tolerably soluble in cold, and readily soluble in hot alcohol, and ether. Insoluble in a boiling aqueous solution of caustic potash or ammonia. Unacted on by boiling chlorhydric acid.

(*Benzophenid. Phenidin. Benzoyloxyd. Benzoyl.*)

$C_{26}H_{10}O_4=C_{14}H_5(C_{12}H_5)O_4$

Insoluble in water. Somewhat difficultly soluble in cold, very easily soluble in hot spirit. Easily soluble, with decomposition, in concentrated sulphuric acid. (List & Limpricht, *Ann. Ch. u. Pharm.*, **90.** 193.)

Benzoate of Phenyl*bromé*. *Vid.* Benzoate of BromoPhenyl.

Benzoate of Phenyl*chloré*. *Vid.* Benzoate of ChloroPhenyl.

Benzoate of Platinum. Sparingly soluble in water. Insoluble in alcohol. (Trommsdorf.)

Benzoate of Potash.

I.) *normal.* Deliquescent. Very easily soluble in water. (F. D'Arcet.) More readily soluble in water than the acid salt. (Bucholz, *loc. inf. cit.*) Soluble in warm, less soluble in cold hydrate of anisyl. Soluble in alcohol.*

$C_{14}H_5KO_4+Aq$

II.) *acid.* Rather difficultly soluble in water, requiring almost 10 pts. of water at 18.75°, for its solution. (Bucholz, *Gehlen's Journ. für Ch. Phys. u. Min.*, 1810, **9.** 353.) Very sparingly soluble in cold water. Somewhat soluble in boiling, less soluble in cold alcohol. Tolerably soluble in alkaline solutions. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 312.)

$C_{14}H_5KO_4;C_{14}H_6O_4$

Benzoate of Propylenyl. *Vid.* Benzoate of Allyl.

Benzoate of Salicyl. *Vid.* BenzoSalicylic Acid (Anhydrous).

Benzoate of Salicylous Acid. *Vid.* BenzoSalicyl.

Benzoate of Silver.

I.) *normal.* Permanent. Sparingly soluble in boiling, less soluble in cold water. (Wœhler & Liebig.) Soluble in 1.96 pts. of absolute alcohol at 20°. (Mitscherlich.)

$C_{14}H_5AgO_4$

II.) *of the amorphous acid.* Soluble in water.

Benzoate of Soda. Efflorescent. Soluble in water. Sparingly soluble in boiling alcohol. (Berzelius.)

$C_{14}H_5NaO_4+xAq$

Benzoate of Solanin. Soluble in water.

Benzoate of Strontia. Permanent. Sparingly soluble in cold, readily soluble in hot water. (Berzelius.)

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* According to Gregory (*Ann. Ch. u. Pharm.*, **87.** 125), the benzoate of potash obtained by treating oil of bitter almonds with an alcoholic solution of potash is very readily soluble in spirit, while the salt prepared directly from potash and benzoic acid is very sparingly soluble in alcohol of the same strength.

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BENZOATE OF THORIA. Sparingly soluble in water.

BENZOATE *of protoxide* **OF TIN.** Somewhat soluble in water, especially if this be hot. Insoluble in alcohol.

BENZOATE *of binoxide* **OF TIN.** Somewhat soluble in water, especially if this be hot. Insoluble in alcohol. (Berzelius.)

BENZOATE OF TOLUENYL. Soluble in ether.
(*BenzoBenzoic Ether.*)
$C_{28} H_{12} O_4 = C_{14} H_5 (C_{14} H_7) O_4$

BENZOATE *of sesquioxide* **OF URANIUM.** Very slightly soluble in water.

BENZOATE OF UREA. Decomposed by water.
$2 C_2 H_4 N_2 O_2 ; C_{14} H_6 O_4$ Soluble in alcohol. (Dessaignes.)

BENZOATE OF YTTRIA. Insoluble in water. (Berzelius.) Sparingly soluble in water. (Hisinger.) Soluble in 89 pts. of cold, and more readily in warm water. (Berlin.)

BENZOATE OF ZINC. Efflorescent. Readily soluble in water, and alcohol. (Trommsdorff.)

BENZOATE OF ZIRCONIA. Sparingly soluble in water. (Hisinger.)

BENZOCARBOLIC ACID. *Vid.* Benzoate of Phenyl.

BENZOCHLORANILID. *Vid.* ChloroPhenylBenzoylamid.

BENZOCHLORHYDRIN. Insoluble in water.
(*Chlorhydrate of Benzoyl Glyceryl.*)
$C_{20} H_{11} Cl O_6 = C_6 H_5 O_3 . C_{14} H_5 O_3, HCl$ (Berthelot, *Ann. Ch. et Phys.*, (3.) **41.** 301.)

BENZOCINNAMIC ACID (Anhydrous). Slowly acidified when in contact with water. Soluble in carbonate of ammonia. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 307.) [Soluble in ether ?]
(*Benzoate of Cinnamyl: Cinnamate of Benzoyl. BenzoCinnamic Anhydride. Cinnamic Benzoate. Benzoic Cinnamate.*)
$C_{32} H_{12} O_6 = \left.\begin{matrix} C_{14} H_5 O_2 \\ C_{18} H_7 O_2 \end{matrix}\right\} O_2$

BENZOCUMINIC ACID (Anhydrous). Insoluble in water, but is slowly acidified by contact therewith. Decomposed by alcohol. Soluble in ether. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 306.)
(*Cuminate of Benzoyl. Benzoate of Cumyl. Cuminic Benzoate. Benzoic Cuminate.*)
$C_{34} H_{16} O_6 = \left.\begin{matrix} C_{14} H_5 O_2 \\ C_{20} H_{11} O_2 \end{matrix}\right\} O_2$

BENZOENE. *Vid.* Hydride of Toluenyl.

BENZOENE*chloré* (&c.). *Vid.* Hydride of Chloro (&c.) Toluenyl.

BENZŒNANTHYLIC ACID (Anhydrous).
(*Œnanthylo Benzoic Acid. Œnanthylate of Benzoyl. Benzoate of Œnanthyl.*)
$C_{28} H_{18} O_6 = \left.\begin{matrix} C_{14} H_5 O_2 \\ C_{14} H_{13} O_2 \end{matrix}\right\} O_2$

BENZOEUGENIC ACID (Anhydrous). Insoluble in water, either hot or cold. Tolerably soluble in boiling, much less soluble in cold alcohol. Tolerably readily soluble in ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **52.** 203.)
(*Benzeugenyl.*)
$C_{34} H_{16} O_6 = \left.\begin{matrix} C_{20} H_{11} O_2 \\ C_{14} H_5 O_2 \end{matrix}\right\} O_2$

BENZOGLYCOL. *Vid.* Hydrate of Benzol.

BENZOGLYCOLIC ACID. Very sparingly soluble in cold, more soluble in boiling water. It is, however, gradually decomposed by the latter. Easily soluble in alcohol, and ether.
(*Benzoyl Glycolic Acid. Isomeric with Insolinic Acid.*)
$C_{18} H_8 O_8 = C_{18} H_7 O_7, HO = \left.\begin{matrix} C_4 H_2 O_2'' \\ C_{14} H_5 O_2 \\ H \end{matrix}\right\} O_4$

Most of its salts are soluble in water; some of them are also soluble in alcohol.

BENZOGLYCOLATE OF AMMONIA. Soluble in water.

BENZOGLYCOLATE OF BARYTA.
$C_{18} H_7 Ba O_8 + 2 Aq$

BENZOGLYCOLATE OF COPPER. Sparingly soluble in cold, somewhat more readily soluble in boiling water.
$C_{18} H_7 Cu O_8 + x Aq$

BENZOGLYCOLATE OF IRON. Insoluble in water. (Socoloff & Strecker.)
$2 Fe_2 O_3, 8 C_{18} H_7 O_7$

BENZOGLYCOLATE OF LEAD.

I.) *normal.* Sparingly soluble in cold, more soluble in hot water.
$C_{18} H_7 Pb O_8$

II.) *sesquibasic.* Soluble in boiling, sparingly soluble in cold water.
$2 C_{18} H_7 Pb O_8, Pb O + 3 Aq$

III.) *sexbasic.* Very sparingly soluble in boiling water.
$C_{18} H_7 Pb O_8, 5 Pb O + 2 Aq$

BENZOGLYCOLATE OF LIME. Permanent. Soluble in 42.32 pts. of water at 11°, and 7.54 pts. at boiling. It has a great tendency to form supersaturated solutions. Soluble in alcohol. (Socoloff & Strecker.)
$C_{18} H_7 Ca O_8 + Aq$

BENZOGLYCOLATE OF LIME with CHLORIDE OF CALCIUM. Permanent. Decomposed by water, and alcohol.

BENZOGLYCOLATE OF MAGNESIA. Soluble in hot, less soluble in cold water. Soluble in absolute alcohol.

BENZOGLYCOLATE OF POTASH. Very readily soluble in water, and alcohol.

BENZOGLYCOLATE OF SILVER. Sparingly soluble in cold, readily soluble in boiling water. (Socoloff & Strecker.)
$C_{18} H_7 Ag O_8$

BENZOGLYCOLATE OF SODA. Readily soluble in water, and alcohol.
$C_{18} H_7 Na O_8 + 6 Aq$

BENZOGLYCOLATE OF ZINC. Sparingly soluble in cold, somewhat more soluble in hot water.
$C_{18} H_7 Zn O_8 + 4 Aq$

BENZOHELICIN. Soluble in boiling, less soluble in cold water. Slowly soluble in cold concentrated sulphuric acid, the solution being decomposed when water is added. Decomposed by boiling chlorhydric acid. Unacted on by cold, but is decomposed by boiling solutions of the alkalies. (Piria, *Ann. Ch. u. Pharm.*, **96.** 379.)
(*Benzoyl Helicin.*)
$C_{40} H_{20} O_{16} = \left.\begin{matrix} C_{12} H_{11} O_{10} \\ C_{14} H_4 (C_{14} H_5 O_2) O_2 \end{matrix}\right\} O_2$

BENZOIC ALCOHOL. *Vid.* Hydrate of Toluenyl.

BENZOIC ANHYDRIDE. *Vid.* Benzoic Acid (Anhydrous).

BENZOIC ETHER. *Vid.* Benzoate of Ethyl.

BENZOICIN. *Vid.* Benzoate of Glyceryl.

BENZOICNITROBENZOATE. *Vid.* BenzoNitroBenzoic Acid (Anhydrous).

BENZOICSALICYLATE. *Vid.* BenzoSalicylic Acid (Anhydrous).

BENZOICYLSULPHOPHENOYLAMIC ACID. Easily soluble in warm, less soluble in cold water. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **53.** 306.)
(*Benzoyl Sulpho Phenylamic Acid.*)
$C_{26} H_{11} N S_2 O_6 = N \left\{\begin{matrix} C_{14} H_5 \\ C_{12} H_4 S_2 O_4'' \\ H \end{matrix}\right\} O, HO$

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BenzoicylSulphoPhenoylamate of Soda. (*BenzoylSulphoPhenylamidate of Soda.*) $N\left\{\begin{matrix}C_{14}H_5\\C_{12}H_4S_2O_4''\\Na\end{matrix}\right. . O, HO$ Soluble in water, and alcohol. (Gerhardt, *Ibid.*, p. 305.)

BenzoicylSulphoPhenoyl*bi*amid. (*BenzoylSulphoPhenylbiamid. Amid of BenzoylSulphophenylamidyl.*) $C_{26}H_{12}N_2S_2O_4=N_2\left\{\begin{matrix}C_{12}H_4S_2O_4''\\C_{14}H_5\\H_3\end{matrix}\right.$ Insoluble in cold water. Soluble in boiling, less soluble in cold alcohol. Very sparingly soluble even in boiling ammonia-water, which even precipitates it from the alcoholic solution. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **53.** 303.)

Benzoilal. *Vid.* Hydride of Benzoyl.

"**Benzoin**" (Gum). *Vid.* Resins of Benzoin.

"**Benzoin**" (Fat). *Vid.* Benzoate of Glyceryl.

Benzoin(Camphor of Oil of Bitter Almonds). $C_{28}H_{12}O_4=C_{28}H_{11}O_3, HO$ Insoluble in cold, sparingly soluble in boiling water. Tolerably soluble in alcohol, and ether, especially when these are boiling. Soluble in concentrated sulphuric acid. (Wœhler & Liebig.)

Benzoinam. Insoluble in water. Insoluble in $C_{56}H_{24}N_2O_2$ alcohol and in an alcoholic solution of potash. A boiling alcoholic solution of chlorhydric acid dissolves it easily; from this solution it is precipitated by water. Sparingly soluble in ether, and petroleum. (Laurent.) Soluble in warm monohydrated sulphuric acid; in which solution water produces a precipitate. (Laurent.)

Benzoinamid. Insoluble in water. Very $C_{84}H_{36}N_4=N_4\left\{\begin{matrix}(C_{28}H_9)_3\\H_9\end{matrix}\right.$ sparingly soluble in boiling alcohol, somewhat more soluble in boiling ether. (Laurent.)

BenzoLactic Acid. Soluble in 400 pts. of $C_{20}H_{10}O_8=\left.\begin{matrix}C_6H_4O_2''\\C_{14}H_5O_2\end{matrix}\right\}O_3, HO$ cold water; much more soluble in boiling water, by which, however, it is very slowly decomposed. Very readily soluble in alcohol; and in ether, which removes it from the aqueous solution.

Most of the benzolactates are soluble in water. (Strecker, *Ann. Ch. u. Pharm.*, **91.** 361.)

Benzolactate of Baryta. Soluble in water. $C_{20}H_9BaO_8+6Aq$

Benzolactate of Silver. Soluble in boiling, less soluble in cold water. $C_{20}H_9AgO_8$

Benzolactate of Soda. Readily soluble in water. Soluble in boiling absolute alcohol.

"**Benzol**" (or **Benzin**). *Vid.* Hydride of Phenyl. $C_{12}H_6=\left.\begin{matrix}C_{12}H_5\\H\end{matrix}\right\}$

Benzol. Not isolated. $C_{14}H_6''$

Benzol(ic) Alcohol. *Vid.* Hydrate of Benzol.

Benzolin. *Vid.* Amarin.

Benzolone. Insoluble in water or alcohol. $C_{22}H_8O_2$ (?) Unacted upon by an aqueous solution of caustic potash. Soluble in strong nitric acid, from which it is precipitated unchanged on the addition of water. (Rochleder.)

BenzoMyristic Acid(Anhydrous). Soluble in boiling, less soluble in cold ether. (*Myristate of Benzoyl. Benzoate of Myristyl.*) $C_{42}H_{32}O_6=\left.\begin{matrix}C_{14}H_5O_2\\C_{28}H_{27}O_2\end{matrix}\right\}O_2$ (Chiozza, *Ann. Ch. u. Pharm.*, **91.** 104.)

Benzone. *Vid.* BenzoPhenone.

BenzoNitranilid. *Vid.* NitroPhenylBenzoylamid.

BenzoNitranisid. (*BenzoNitrAnisamid. NitroBenzanisidid. Oxide of MethylNitroPhenylBenzoylamid.*) $C_{28}H_{12}N_2O_8=N\left\{\begin{matrix}C_{14}H_5O_2\\C_{12}H_4(NO_4)\\C_2H_3\end{matrix}\right. . O_2$; or $N\left\{\begin{matrix}C_{14}H_5O_2\\C_{14}H_6(NO_4)O_2\\H\end{matrix}\right.$

Completely insoluble in cold or hot water. Scarcely at all soluble in alcohol at the ordinary temperature, but tolerably soluble in boiling alcohol. Sparingly soluble in boiling ether, from which it separates as the solution cools. Soluble in concentrated sulphuric acid when this is gently warmed. (Cahours, *Ann. Ch. et Phys.*, (3.) **27.** 451.)

BenzoNitril. *Vid.* Cyanide of Phenyl.

BenzoNitroBenzoic Acid(Anhydrous). Soluble in warm, less soluble in cold alcohol; decomposed by long-continued contact with alcohol. (*Benzoic NitroBenzoate. Benzoate of NitroBenzoyl. Nitro-Benzoate of Benzoyl.*) $C_{28}H_9NO_{10}=\left.\begin{matrix}C_{14}H_5O_2\\C_{14}H_4(NO_4)O_2\end{matrix}\right\}O_2$ (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 322.)

BenzoNitroCumid.
BenzoNitroCuminamid. } *Vid.* BenzoylNitroCumenylamid.

BenzoPelargonic Acid(Anhydrous). Easily decomposed by alkaline solutions. Soluble in ether. (*BenzoPelargonic Anhydride. Pelargonate of Benzoyl.*) $C_{32}H_{22}O_6=\left.\begin{matrix}C_{18}H_{17}O_2\\C_{14}H_5O_2\end{matrix}\right\}O_2$ (Chiozza, *Ann. Ch. et Phys.*, (3.) **31.** 209.)

BenzoPhenid. *Vid.* Benzoate of Phenyl.

BenzoPhenone. Insoluble in water. Tolerably soluble in alcohol. (*Benzone. CarboBenzid. Phenylide of Benzoyl.*) $C_{26}H_{10}O_2=C_{12}H_5, C_{14}H_5O_2$ Very soluble in ether. Largely soluble, without decomposition, in cold concentrated sulphuric, and nitric acids; from which solutions it is precipitated in its original state by water.

BenzoPhenone *nitré*. *Vid.* NitroBenzoPhenone.

BenzoPiperid. *Vid.* PiperylBenzamid.

BenzoPropylenyl. *Vid.* Benzoate of Allyl.

BenzoResic Acid.
BenzoResinic Acid. } See under Benzoic Acid(Amorphous).

BenzoSalicin. *Vid.* Populin.

BenzoSalicyl. Insoluble in water or in alkaline solutions. Easily soluble in alcohol, and ether. Soluble, without decomposition, in cold concentrated sulphuric acid. Decomposed by nitric acid. (Ettling.) (*ParaSalicyl. Spirin. SalicylBenzoyl. Benzoyl-Salicylous Acid. Salicylide of Benzoyl. Benzoate of Salicylous Acid.*) $C_{28}H_{10}O_6=\left.\begin{matrix}C_{14}H_5O_2\\C_{14}H_5O_2\end{matrix}\right\}O_2$ Sparingly soluble in cold, tolerably soluble in warm alcohol. (Chiozza, *Ann. Ch. et Phys.*, (3.) **36.** 104.)

BenzoSalicylic Acid(Anhydrous). Easily decomposed by boiling water. Soluble in ether. (*Benzosalicylic Anhydride. Benzoate of Salicyl. Salicylate of Benzoyl. Benzoic Salicylate.*) $C_{28}H_{10}O_8=\left.\begin{matrix}C_{14}H_5O_4\\C_{14}H_5O_2\end{matrix}\right\}O_2$ (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 325.)

BenzoStearic Acid. Soluble in boiling anhydrous ether. $C_{48}H_{38}O_6=\left.\begin{matrix}C_{34}H_{33}O_2\\C_{14}H_5O_2\end{matrix}\right\}O_2$ (Chiozza, *Ann. Ch. u. Pharm.*, **91.** 104.)

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BenzoStilbin. Sparingly soluble in alcohol. $C_{62}H_{22}O_4$ Somewhat soluble in ether. Soluble in concentrated sulphuric acid. Unacted on by a strong boiling solution of caustic potash. (Rochleder.)

BenzoSuccinin. Decomposed by continued $C_{28}H_{14}O_{12}$ boiling with water or with alcohol. Also soluble, with decomposition, in solution of caustic potash. (Van Bemmelen.)

BenzoSulphoPhenamid. *Vid.* BenzoylSulphoPhenylamid.

BenzoSulphuric Acid. *Vid.* PhenylSulphurous Acid.

BenzosylAnilid. *Vid.* BenzoylAnilid.

BenzoTartaric Acid. More soluble than benzoic acid in cold water, but less soluble than it in alcohol.

$C_{22}H_{10}O_{14} = C_{22}H_8O_{12}, 2\,HO$

BenzoTartrate of Silver. Ppt.

BenzoValeric Acid. Soluble in ether. Decomposed by alkaline solutions. (Chiozza, *Ann. Ch. et Phys.*, (3.) **39.** 200.)

(*Benzoate of Valeryl. Valerate of Benzoyl. Benzoic Valerate.*)

$C_{24}H_{14}O_6 = \left.\begin{matrix} C_{10}H_9O_2 \\ C_{14}H_5O_2 \end{matrix}\right\} O_2$

Benzoylamid. *Vid.* Benzamid.

Benzoycin. *Vid.* Benzoate of Glyceryl.

Benzoyl. Not isolated. Benzoate of Phenyl $C_{14}H_5O_2$ was at one time mistaken for it.

BenzoylAnilid. *Vid.* PhenylBenzolamin.

***Di*BenzoylAnilid.** *Vid.* Phenyl*di*Benzoylamid.

BenzoylAnilin. *Vid.* PhenylBenzolamin.

BenzoylAzotid. Insoluble in water. Sol- $C_{30}H_{12}N_2$ uble in 350 @ 400 pts. of boiling alcohol. Insoluble in ether. (Laurent.)

BenzoylBenzoin. Insoluble in water. Very sparingly soluble in cold, easily soluble in boiling alcohol. Soluble in 6 pts. of boiling alcohol of 80%. Readily and abundantly soluble especially in hot ether. Easily soluble, without decomposition, in chloride of benzoyl. (Zinin.)

$C_{42}H_{16}O_6 = \left.\begin{matrix} C_{14}H_5O_2 \\ C_{28}H_{11}O_2 \end{matrix}\right\} O_2$

Benzoyl*chloré*. *Vid.* ChloroBenzoyl.

BenzoylHelicin. *Vid.* BenzoHelicin.

***Di*BenzoylImid.** Soluble in boiling alcohol. Almost entirely insoluble in ether, more soluble in wood-spirit, which deposits it on cooling. Soluble in concentrated sulphuric acid, from which it is precipitated on the addition of water. Soluble in hot nitric acid, separating out again as the solution cools, but is decomposed by long-continued boiling with nitric acid. (Robson, *J. Ch. Soc.*, **4.** 226.)

(*Toluenyl Benzoylamid. Toluyl Benzamid.*)

$C_{28}H_{13}NO_2 = N\left\{\begin{matrix} C_{14}H_5O_2 \\ C_{14}H_7 \\ H \end{matrix}\right.$

BenzoylMercuramid. *Vid.* Benzamid with Mercury.

BenzoylNitroCumenylamid. Easily soluble in boiling alcohol, separating out again almost entirely as the solution cools.

(*BenzoNitro Cuminamid. BenzoNitroCumid.*)

$C_{32}H_{16}N_2O_6 = N\left\{\begin{matrix} C_{14}H_5O_2 \\ C_{18}H_{10}(NO_4) \\ H \end{matrix}\right.$

BenzoylPhenylamid. *Vid.* PhenylBenzoylamid.

BenzoylSalicylamic Acid. *Vid.* SalicylBenzamic Acid.

"**BenzoylSalicylamid**" (of Gerhardt). *Vid.* SalicylBenzamic Acid.

BenzoylSalicylimid. *Vid.* SalicylBenzoylamid.

BenzoylSalicylous Acid. *Vid.* BenzoSalicyl.

BenzoylSulphoPhenoylamic Acid. Easily soluble in warm, less soluble in cold water. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **53.** 306.)

(*Acide Benzoilsulfophenylamique.*)

$C_{28}H_{11}NS_2O_8 = N\left\{\begin{matrix} C_{14}H_5O_2 \\ C_{12}H_4S_2O_4''.O, HO \\ H \end{matrix}\right.$

BenzoylSulphoPhenoylamate of Baryta. $C_{26}H_{10}BaNS_2O_8$(?) Soluble in water. (Gerhardt, *loc. cit.*)

BenzoylSulphoPhenylamic Acid. Soluble in alcohol, from which it is precipitated on the addition of water. (Gerhardt & Chiozza, *Ann. Ch. et Phys.*, (3.) **46.** 148.)

(*SulphoPhenylBenzoylamic Acid. SulphoPhenylBenzamic Acid.*)

$C_{26}H_{13}NS_2O_8 = N\left\{\begin{matrix} C_{14}H_5O_2 \\ C_{12}H_5S_2O_4.O, HO \\ H_2 \end{matrix}\right.$

BenzoylSulphoPhenylamate of Ammonia.

I.) *acid.*

$C_{52}H_{29}N_3S_4O_{16} = C_{26}H_{12}(NH_4)NS_2O_8 ; C_{26}H_{13}NS_2O_8$

Readily soluble in water, and alcohol. Insoluble in ether. (Gerhardt & Chiozza.)

BenzoylSulphoPhenylamid. Easily soluble in absolute alcohol. Very sparingly soluble in ether, and still less soluble in water. Easily soluble in cold ammonia-water, with decomposition and in solutions of the fixed alkalies, with combination. (Gerhardt & Chiozza, *Ann. Ch. et Phys.*, (3.) **46.** 145.)

(*Benzo Sulpho Phenamid. Sulpho Phenyl Benzamid.*)

$C_{26}H_{11}NS_2O_6 = N\left\{\begin{matrix} C_{14}H_5O_2 \\ C_{12}H_5S_2O_4 \\ H \end{matrix}\right.$

***Di*BenzoylSulphoPhenylamid.** Not very readily soluble in boiling absolute ether at the ordinary atmospheric pressure; but when subjected to a greater pressure it readily dissolves. [Cold ether appears to retain most of this in solution.] (Gerhardt & Chiozza, *Ann. Ch. et Phys.*, (3.) **46.** 156.)

(*BiBenzoyl Phenyl Sulphitamid. BiBenzo Sulpho Phenamid.*)

$C_{40}H_{15}NS_2O_8 = N\left\{\begin{matrix} (C_{14}H_5O_2)_2 \\ C_{12}H_5S_2O_4 \end{matrix}\right.$

BenzoylSulphoPhenyl*bi*amid. *Vid.* BenzoicylSulphoPhenyl*bi*amid.

BenzoylSulphoPhenylamidate of *X*. *Vid.* BenzoicylSulphoPhenoylamate of *X*.

BenzoylSulphoPhenyl Argentamid. Very sparingly soluble in cold water, more readily soluble in boiling ammoniacal-water. Tolerably readily soluble in boiling alcohol. (Gerhardt & Chiozza, *Ann. Ch. et Phys.*, (3.) **46.** 148.)

$C_{26}H_{10}AgNS_2O_6 = N\left\{\begin{matrix} C_{14}H_5O_2 \\ C_{12}H_5S_2O_4 \\ Ag \end{matrix}\right.$

BenzoylSulphoPhenylArgentAmmoniumamid. Easily soluble in boiling, less soluble in cold water. The aqueous solution is decomposed by long-continued boiling. Easily soluble in ammonia-water. (Gerhardt & Chiozza.)

$C_{26}H_{13}AgN_2S_2O_8 = N\left\{\begin{matrix} C_{14}H_5O_2 \\ C_{12}H_5S_2O_4 \\ N\left\{\begin{matrix} H_3 \\ Ag \end{matrix}\right. \end{matrix}\right.$

BenzoylUrea. Sparingly soluble in water, even when this is boiling. Soluble in 100 pts. of cold, and in 24 pts. of boiling alcohol. Much less soluble in ether or water than in cold alcohol. More soluble in boil-

(*CarbonylBenzoylbiamid. Benz Ureid.*)

$C_{16}H_8N_2O_4 = N_2\left\{\begin{matrix} C_2O_2'' \\ C_{14}H_5O_2 \\ H_3 \end{matrix}\right.$

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ing concentrated chlorhydric acid than in water; from this solution it crystallizes out unchanged, on cooling. Easily soluble in a cold aqueous solution of potash. Unacted upon by ammonia.

BenzoylUreid. Insoluble in water. Soluble in alcohol. Insoluble in ether. Decomposed by boilingacids and alkalies. (Laurent & Gerhardt.)

(*Benzoicyl Urea.*)

$C_{36} H_{22} N_8 O_8 = N_8 \left\{ \begin{matrix} (C_2 O_2'')_4 \\ (C_{14} H_5)_2 \\ H_{12} \end{matrix} \right.$

Benzyl. *Vid.* Toluenyl; also Benzil.

*Tri*Benzilamin. *Vid.* *tri*Toluenylamin.

Benzylate of Ethyl. *Vid.* Oxide of Ethyl & of Toluenyl.

Benzyl(ic) Alcohol. *Vid.* Hydrate of Toluenyl.

Benzyl(ic) Ether. *Vid.* Oxide of Toluenyl.

BenzyloVinicEther. *Vid.* Oxide of Ethyl & of Toluenyl.

Berberin. Only sparingly soluble in cold water.

$C_{42} H_{19} N O_{10} + 10\, Aq = N \left\} C_{42} H_{19} O_{10}''' + 10\, Aq \right.$

Soluble in 500 pts. of water at 12°, and easily soluble in boiling water.

Easily soluble in alcohol, from which solution it is precipitated by ether. (Stenhouse.) Soluble in 250 pts. of cold alcohol, and in all proportions in boiling alcohol. Somewhat soluble in several of the essential and fatty oils. Insoluble in ether, bisulphide of carbon, naphtha, or oil of coal-tar. Decomposed by concentrated sulphuric, and nitric acids. These acids, as well as chlorhydric and phosphoric acids, precipitate it from the aqueous solution. Soluble, without alteration, in the vegetable acids, excepting tannic acid, with which it forms an insoluble compound. Soluble in alkaline solutions. (Wittstein's *Handw.*) About as soluble in a solution of ammonia as in pure water. Soluble in concentrated sulphuric acid. Most of its salts are but sparingly soluble in water.

Bergaptene. Nearly insoluble in water. (Ohme.) Soluble in 2000 pts. of boiling water, from which it separates out as the solution cools, even when the latter is four times diluted. (Kalkbruner.) Soluble in 200 pts. of alcohol, of 0.85 sp. gr., at 15°. (Kalkbruner.) Abundantly soluble in boiling alcohol, so that the solution forms a solid mass on cooling.

(*Bergamot Camphor. Hydrate of Bergamot-Oil. Stearoptene of Bergamot-Oil.*)
$C_6 H_2 O_2$

Difficultly soluble in ether. (Ohme.) Soluble in ether. (Mulder.) Insoluble in dilute, but soluble in warm concentrated acetic acid; from this solution water precipitates it. (Kalkbruner.) Insoluble in chlorhydric, and dilute sulphuric acids. Soluble in monohydrated sulphuric acid, from which it is precipitated by water, but not by alcohol. Soluble in cold concentrated nitric acid, from which solution water precipitates it. (Kalkbruner.) Insoluble in ammonia. (Mulder.) Partially soluble in boiling ammonia. Soluble in solution of potash, from which it is precipitated by acids, but not by water or alcohol. (Kalkbruner.)

BetaOrcein. *Vid.* Orcein.

BetaOrcin. Tolerably soluble in cold water, though much less soluble than orcin. Readily soluble in boiling water. Easily soluble in alcohol, and ether. (Stenhouse.)

$C_{16} H_{10} O_4 = \left. \begin{matrix} C_{16} H_8'' \\ H_2 \end{matrix} \right\} O_4$

BetaOrsellesic Acid. } *Vid.* Orsellic
BetaOrsellinic Acid. } Acid.

BetaResin of *X*. See under Resins.

Betulin. *Vid.* Resin of Birch-Bark.

Bezoaric Acid. *Vid.* Ellagic Acid.

Bi or BinAcetate (&c.) of *X*. See under Acetate (&c.) of *X*, as *bin*Acetate of *X*, *bi*Chloride of *X*, and the like.

Bicolorin. *Vid.* Esculin.

Bile, acids of the. *Vid.* TauroCholic Acid, Cholic Acid, and HyoCholic Acid.

"Bilic Acid." Does not exist: the name was applied to a mixture.

BiliCholic Acid. *Vid.* Cholate of Soda.

Bilifulvic Acid. Insoluble in water or alcohol.

Bilifulvate of Potash & of Soda. Readily soluble in water. Soluble in alcohol. Insoluble in anhydrous ether. (Berzelius.)

(*Bilifulvin.*)

Bilin. *Vid.* Cholate of Soda.

Biliphein. Difficultly soluble in boiling water. Somewhat more easily soluble in boiling alcohol. Very sparingly soluble in boiling chlorhydric acid. Soluble in aqueous solutions of the alkalies and alkaline carbonates.

$C_{32} H_{18} N_2 O_9$

Biliphein with Baryta. Insoluble in water.

Biliphein with Lime. Insoluble in water.

Biliverdin. Insoluble in cold, and nearly insoluble in boiling water. Partially soluble in alcohol. Completely soluble in ether. Easily soluble in solutions of the alkalies and alkaline carbonates. Soluble in sulphuric, chlorhydric, and concentrated acetic acids.

$C_{16} H_9 N O_5$ (?)

BisEthyl. *Vid.* BismuthEthyl.

BismEthyl. *Vid.* BismuthEthyl.

Bismuth. Permanent. Scarcely at all acted upon by water. Very slowly and sparingly soluble in hot concentrated chlorhydric acid; more easily in hot concentrated sulphuric acid, but this acid, when cold or dilute, does not act upon it; and still more easily in nitric acid, which dissolves it even at the ordinary temperature. Bismuth is not attacked by pure nitric acid, of 1.512 @ 1.419 sp. gr., at 20°; a more dilute acid attacks it with extreme violence, but the acid thus becomes more concentrated; this is specially marked with an acid as dilute as that of 1.108 sp. gr. To bring about an action with the strong acid, it is necessary to heat it or to add some nitrous acid. At very low temperatures bismuth behaves like copper (*q. v.*) towards nitric acid. (Millon, *Ann. Ch. et Phys.*, (3.) **6.** pp. 95, 99.)

Bi

BismuthPotassium. Decomposes in the air, and by contact with water. (Breed, *Am. J. Sci.*, (2.) **13.** 404.)

Bismuth Ethyl. Not isolated.

(*BisEthyl.*)
$C_4 H_5 Bi''$

Bismuth*di*Ethyl.

$Bi (C_4 H_5)_2$

Bismuth*tri*Ethyl. Quite insoluble in water. Easily soluble in absolute alcohol. Slightly soluble in ether. (Breed, *Am. J. Sci.*, (2.) **13.** 406.)

(*Bismethyl. Bismuthide of Ethyl. BistriEthyl.*)
$C_{12} H_{15} Bi = Bi (C_4 H_5)_3$

Bismuthic Acid(Anhydrous). Not readily attacked by acids. (Fremy, *loc. cit.*)

$Bi O_4$

Bismuthic Acid(Hydrated). Insoluble in water. Easily decomposed by acids. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 495.) De-

(*Per Oxide of Bismuth.*)
$Bi O_4, H O$

composed by sulphuric acid. Unacted upon by a saturated solution of sulphurous acid. Neither dissolved nor decomposed by dilute nitric acid, but when left in contact with it for some time is converted into an allotropic modification. Partially decomposed by concentrated nitric acid, which also converts a part of it into the yellow insoluble modification. When treated with hot concentrated nitric acid it is slowly but completely dissolved, with decomposition. Slightly soluble in an aqueous solution of caustic potash, acid bismuthate of potash being precipitated when this solution is diluted with water. (Arppe, in Berzelius's *Lehrb.*, **2.** pp. 575 – 578.) Somewhat soluble in boiling solutions of caustic potash and soda.

Bismuthate of Bismuth. Ppt. Decomposed, with partial solution, by nitric acid.

Bismuthate of Potash. Insoluble in water, but is decomposed by boiling therewith. (Fremy, *loc. cit.*)

Bitter Almond Oil. *Vid.* Hydride of Benzoyl.

Bitumens or Alphalts. Insoluble in water. Some are soluble in alcohol, others only partially soluble. Most of them are partially soluble in ether, and oil of turpentine, and other volatile oils, also in the fixed oils.

Bixin. Sparingly soluble in water. Readily soluble in alcohol, and ether. Soluble in oil of turpentine, fatty oils, alkaline solutions, and sulphuric acid. (Preisser.)
(*Coloring matter of Bixa Orellana.*)
$C_{16}H_{12}O_2$ (?)

Bohric Acid. Very deliquescent. Very easily soluble in water; and in all proportions in alcohol. (Rochleder.)
$C_{14}H_{10}O_{12} = C_{14}H_8O_{10}, 2HO$

Boheate of Baryta. Insoluble, or very sparingly soluble, in water or alcohol.
$C_{14}H_8Ba_2O_{12} + 2Aq$

Boheate of Lead.
I.) Insoluble in alcohol.
$C_{14}H_8Pb_2O_{12} + 2Aq$
II.) Ppt.
$C_{14}H_6Pb_2O_{12}, 2PbO$

Boletic Acid. Identical with Fumaric Acid, *q. v.*

Boloretin. Soluble in warm alcohol, separating out again as the solution cools. Soluble in cold ether. (Forchammer.)
$C_{40}H_{33}O_6$

Boracic Acid.
a = anhydrous. Slightly deliquescent.
BO_3

Soluble in	47.01	pts.	of water	at	18.75°
"	27.75	"	"		25°
"	18.73	"	"		37.5°
"	15.13	"	"		50°
"	9.29	"	"		62.5°
"	7.28	"	"		75°
"	5.58	"	"		87.5°
"	4.74	"	"		100°

Or, 100 pts. of water at				
	18.75°	dissolve	2.13	pts. of it.
"	25°	"	3.60	"
"	37.5°	"	4.24	"
"	50°	"	6.61	"
"	62.5°	"	10.76	"
"	75°	"	13.73	"
"	87.5°	"	17.92	"
"	100°	"	21.09	"

(R. Brandes & Firnhaber, *Brandes's Archiv.*, 1824, **7.** 52.)

The saturated aqueous solution boils at 100° (B. & F., *loc. cit.*, p. 55); at 103.3° (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90). Soluble in 4.5 pts. boiling water, less soluble in cold water. (Berzelius, *Lehrb.*, **1.** 662.) Sparingly soluble in water; boiling water scarcely dissolving 0.02 of it, and cold water still less. Soluble in alcohol. (Thompson's *System*, **2.** 19.) Anhydrous boracic acid is insoluble in alcohol; the acid becomes soluble, however, after it has combined with water. (Graham, cited by Persoz, *Ann. Ch. et Phys.*, (2.) **63.** 281.) It is *soluble* in alcohol. (Berzelius, *Lehrb.*, **1.** 663; Ebelmen.) Soluble in oils, in acetic acid, and in several of the strong acids when these are warm, *ex. gr.*, in concentrated sulphuric, nitric, and chlorhydric acids; from these acid solutions it separates on cooling, and on the addition of water.

Largely soluble in sulphuric acid, especially if this be hot.

$b = 3HO, 2BO_3$
$c = 3HO, BO_3$
(*Crystallized Boracic Acid.*)

Soluble in	25.66	pts.	of water	at	18.75°
"	14.88	"	"		25°
"	12.66	"	"		37.5°
"	10.16	"	"		50°
"	6.12	"	"		62.5°
"	4.73	"	"		75°
"	3.55	"	"		87.5°
"	2.97	"	"		100° (the boiling point of a saturated aqueous solution.)

Or, 100 pts. of water at		Dissolve of		
	18.75°	$BO_3, 3HO$	pts.	3.9
"	25°	"	"	6.8
"	37.5°	"	"	7.8
"	50°	"	"	9.8
"	62.5°	"	"	16.0
"	75°	"	"	21.0
"	87.5°	"	"	28.0
"	100°	"	"	34.0

Or, the aqueous solution saturated at	Contains Per Cent of $BO_3, 3HO$
18.75° . . .	3.75
25°	6.27
37.5°	7.32
50°	8.96
62.5°	14.04
75°	17.44
87.5°	21.95
100° . . .	25.17

(Brandes & Firnhaber, *Brandes's Archiv.*, 1824, **7.** 52, and fig.)

Soluble in	33	pts.	of water	at	10°
"	25	"	"		20°
"	3	"	"		100°

(Berzelius's *Lehrb.*, **1.** 662.)

Soluble in 20 pts. of water at 18.75°. (Abl, from *Oesterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) 100 pts. of the aqueous solution saturated at 19° contain 3.75 pts. of it, and 25.18 pts. when saturated at 100°. (M. R. & P.) 100 pts. of water at 100° dissolve 2 pts. of it. (Ure's *Dict.*) An aqueous solution saturated at 8° is of 1.014 sp. gr. (Anthon, *Ann. der Pharm.*, 1837, **24.** 211.) More readily soluble in spirit than in absolute alcohol.

Soluble in 6 pts. of alcohol. (Wittstein's *Handw.*) Soluble in 5 pts. of strong boiling alcohol. (Wenzel, in his *Verwandtschaft*, p. 300. [T.].) Soluble in essential oils.

When the aqueous solution is evaporated a large portion of boracic acid is volatilized. All of the borates, excepting those of the fixed alkalies and

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ammonia are difficultly soluble in water, but are soluble in boracic acid. They are all insoluble or sparingly soluble in alcohol.

They are more soluble in water which contains in solution tartaric acid or tartrate of potash than in pure water. (Soubeiran.) The normal (*mono*) borates of the alkaline earths are soluble to no inconsiderable extent in water, and more readily in hot than in cold water. (Berzelius, *Pogg. Ann.*, 1835, **34.** 568.)

*Sex*Borate of Alumina. Very sparingly soluble in water. (Beudant.)

Borate of Ammolin (of Unverdorben). Very readily soluble in water and in alcohol. Insoluble in ether.

Borate of Ammonia.

I.) $3NH_4O,4BO_3+8Aq$ Soluble in hot, less soluble in a cold solution of ammonia. (Arfvedson.)

II.) *bi.* Efflorescent. Soluble in about 12 pts. $NH_4O,2BO_3+4Aq$ of cold water. The solution loses ammonia on being heated. (Arfvedson.)

III.) $NH_4O,4BO_3+6Aq$ Permanent. Soluble in about 8 pts. of cold water; when boiled the solution gives off ammonia. (L. Gmelin.)

IV.) $NH_4O,5BO_3+8Aq$ Permanent. Soluble in water.

Borate of Ammonia & of Magnesia. Soluble in cold water. The solution becomes turbid on being heated.

Borate of Amyl.

I.) $C_{30}H_{33}O_6B = 3C_{10}H_{11}O,BO_3$ Decomposed by water and by a solution of ammonia. (Ebelmen & Bouquet, *Ann. Ch. et Phys.*, (3.) **17.** 61.)

II.) *bi.* Decomposed by water. Soluble in $C_{10}H_{11}O,2BO_3$ ether. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **16.** 139.)

Borate of Baryta.

I.) BaO,BO_3+10Aq Soluble to no inconsiderable extent in water, and more readily in hot than in cold. (Berzelius, *Pogg. Ann.*, **34.** 568.) Soluble in an aqueous solution of normal citrate of soda. (Spiller.) Insoluble in wood-spirit. (Ebelmen, *Ann. Ch. et. Phys.*, (3.) **16.** 139.)

II.) *bi.* Soluble in 100 pts. of cold, and more $BaO,2BO_3+5Aq$ freely soluble in hot water.

When recently precipitated it is soluble in cold aqueous solutions of chloride of ammonium (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 315; Brett, *Phil. Mag.*, 1837, (3.) **10.** 96), nitrate of ammonia (Brett, *Ibid.*), and chloride of barium. (H. Rose.)

III.) *quadri.*

IV.) *sex.* Sparingly soluble in water. (Lau- $BaO,6BO_3$ rent.) The bi, quadri, and sex salts (Nos. 2, 3, & 4) are all somewhat soluble in water, and still more soluble in solutions of ammoniacal salts, and even of chloride of barium. (Berzelius, *Lehrb.*, **3.** 272.)

Borate of Bismuth. Insoluble in water.

Borate of Cadmium. Difficultly soluble in $CdO,2BO_3$ water. (Stromeyer.) Insoluble in water. Soluble in chlorhydric acid. (Odling.) Easily soluble in a warm aqueous solution of chloride of ammonium. (H. Rose, *Tr.*)

Borate *of protoxide* of Chromium. Soluble in acids. Insoluble in an aqueous solution of biborate of soda. (Moberg.)

Borate *of sesquioxide* of Chromium. Insoluble in water. (Hayes.) Soluble in an aqueous solution of biborate of soda. (Berlin.)

Borate *of sesquioxide* of Chromium & of $6MgO,3Cr_2O_3,2BO_3$ Magnesia. Unacted on by acids. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **33.** 52.)

Borate of Cobalt. Scarcely at all soluble in water.

Borate of Copper (Cu O). Permanent. $CuO,2BO_3$ Slightly soluble in water. Soluble in boracic acid and the acids generally. (Tunnermann.) Soluble in a large excess of a solution of chloride of ammonium when boiled therewith for a long time. (H. Rose, *Tr.*)

Borate of Ethyl.

I.) *mono.* Its properties are similar to those of C_4H_5O,BO_3 No. 3. (Stædeler.)

II.) *bi.* Decomposed by water. Soluble in all $C_4H_5O,2BO_3$ proportions in alcohol, and ether. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **16.** 132.)

III.) *tri.* Readily soluble in water, the solution $C_{12}H_{15}BO_6 = 3C_4H_5O,BO_3$ being decomposed in the course of a few moments. Soluble in all proportions in alcohol, and ether. (Ebelmen & Bouquet, *Ann. Ch. et Phys.*, (3.) **17.** 56.)

IV.) ? *sesqui.* Decomposed by absolute alcohol $2C_4H_5O,3BO_3$ with separation of hydrated boracic acid and formation of No. 3. Not so readily decomposed by water as No. 1. (Stædeler.)

Borate of Fluoride of Sodium. Perma- $3NaFl,HO,BO_3$ nent. Soluble in water. (Berzelius, *Lehrb.*)

Borate *of protoxide* of Iron. Insoluble in $FeO,2BO_3$ water, but is decomposed by washing with water, boracic acid being gradually abstracted. (Berzelius, *Lehrb.*)

Borate *of sesquioxide* of Iron. Insoluble in $Fe_2O_3,3BO_3+3Aq$ water. (Berzelius, *Lehrb.*)

Borate *of sesquioxide* of Iron & of Magne- $6MgO,3Fe_2O_3,2BO_3$ sia. Insoluble in water. Easily soluble in hot concentrated chlorhydric acid. (Ebelmen, *Ann., Ch. et Phys.*, (3.) **33.** 54.)

Borate of Lead.

I.) *normal.* Insoluble in water or alcohol. Ea- PbO,BO_3+Aq sily soluble in dilute nitric, and hot acetic acids.

"Borate of lead" dissolves after long-continued ebullition in a large quantity of a solution of chloride of ammonium. (H. Rose.) It is soluble in a saturated aqueous solution of chloride of sodium. (Becquerel, *C. R.*, 1845, **20.** 1523.)

II.) *bi.* Slightly soluble in pure water, but in- $PbO,2BO_3,+4Aq$ soluble in aqueous solutions of soda salts, of borax for example. (Soubeiran.)

III.) *sesqui.* Ppt. Resembles the normal salt. $2PbO,3BO_3+4Aq$

Borate of Lead with Chloride of Lead. $PbO,BO_3;PbCl+Aq$ Unacted upon by cold, slowly decomposed by boiling water. Insoluble in alcohol. (T. J. Herapath.)

Borate of Lead with Nitrate of Lead.

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$PbO,BO_3;PbO,NO_5+xAq$ Insoluble in alcohol. (T. J. Herapath.)

Borate of Lead with **Silicate of Lead.**

Borate of Lime.

I.) *normal.* CaO,BO_3+2Aq Difficultly soluble in water. (Bergman.) Soluble to no inconsiderable extent in water, and more readily in hot than in cold water. (Berzelius, *Pogg. Ann.*, **34.** 568.) Decomposed to a certain extent by boiling water.

Borate of lime when recently precipitated is soluble, even in the cold, in an aqueous solution of chloride of ammonium (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 315; Brett, *Phil. Mag.*, 1837, (3.) **10.** 96), of nitrate of ammonia (Brett, *Ibid.*), and of chloride of calcium.

II.) *sesqui?* Somewhat soluble, with decomposition, in water.

III.) *bi.* Ppt.
$CaO,2BO_3$

IV.) *sex.* Ppt. (Berzelius, *Lehrb.*, **3.** 420.)
$a = CaO,6BO_3$
$b = 2(CaO,2BO_3)+9Aq$ Slightly soluble in cold, more soluble in hot water. Insoluble in alcohol. (Lecanu.)

Borate of Lime & of Magnesia. (*Hydroboracite.*) $CaO,MgO,3BO_3+6Aq$ Very soluble in warm chlorhydric acid.

Borate of Lime & of Soda. $2CaO,NaO,5BO_3+10Aq$ Scarcely soluble in cold, very sparingly soluble in hot water. (Ulex.)

Borate of Lime with **Silicate of Lime.** $CaO,BO_3;CaO,2SiO_3+2Aq$ Insoluble in water.

Borate of Lime with **Tartrate of Lime.**

Borate of Lithia.

I.) *bi.* Deliquescent. Easily soluble in water.
$LiO,2BO_3$

II.) "*acid salt.*" Less readily soluble in water than the preceding. (C. Gmelin.)

Borate of Magnesia.

I.) *tri.* $3MgO,BO_3$ Unacted on by water. Easily soluble in acids. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **33.** 50.) Very sparingly soluble in cold water. A portion of the acid is removed by boiling water. (Rammelsberg.) When aqueous solutions of sulphate of magnesia and biborate of soda are mixed a precipitate is formed which is abundantly soluble in an excess of the former, but much less soluble, or insoluble, in an excess of the latter. (Berzelius, *Lehrb.*)

II.) *mono.* MgO,BO_3+8Aq Insoluble either in cold or boiling water. Soluble in dilute chlorhydric acid, from which it is reprecipitated unchanged on the addition of ammonia. Concentrated chlorhydric acid decomposes it, magnesia being dissolved and boracic acid deposited. (Wœhler, Berzelius's *Lehrb.*, **3.** 451.)

III.) ($\frac{4}{3}$). (*Boracite.*) $3MgO,4BO_3$ Insoluble in water. Slowly soluble in acids. (Berzelius.)

IV.) *ter.* $MgO,3BO_3+8Aq$ Slowly soluble, but in tolerable quantity, in water. (Wœhler.) Soluble in 75 pts. of water. (Rammelsberg.)

V.) *sex.*
$MgO,6BO_3+18Aq$

Borate of Magnesia & of Potash. Easily soluble in water. (Rammelsberg.)

Borate of Magnesia & of Soda. $NaO,2MgO,5BO_3+30Aq$ Efflorescent. About as soluble as biborate of soda in cold water; the solution becomes turbid when heated, but clears up again on cooling. Decomposed by boiling water. (Rammelsberg.)

Borate of Manganese. $MnO,2BO_3$ Insoluble in water. (Berzelius, *Lehrb.*) Very difficultly soluble in water. (Ot. Gr.) It is decomposed almost immediately by warm water, even when this is acidulated with boracic acid; in the cold the decomposition is more gradual. (Gorgeu, *Ann. Ch. et Phys.*, (3.) **42.** 77.) Soluble in an aqueous solution of sulphate of magnesia. (Berzelius.)

Borate of Methyl.

I.) *tri.* $3C_2H_3O,BO_3$ Miscible with water; but the solution soon decomposes. (Ebelmen & Bouquet, *Ann. Ch. et Phys.*, (3.) **17.** 60.)

II.) *bi.* $C_2H_3O,2BO_3$ Decomposed by water. Soluble in ether. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **16.** 137.)

Borate *of protoxide* **of Molybdenum.** Insoluble in water. Very sparingly soluble in boracic acid. (Berzelius, *Lehrb.*)

Borate *of binoxide* **of Molybdenum.** $MoO_2,2BO_3$ Insoluble in water. Soluble in boracic acid. (Berzelius, *Lehrb.*)

Borate of Molybdic Acid. Soluble in hot boracic acid, somewhat less so in cold. Decomposed by alcohol. (Berzelius.)

Borate of Nickel. $NiO,2BO_3+2Aq$ Insoluble in water. Soluble in sulphuric, chlorhydric, and nitric acids. (Tupputi.) Easily soluble in a solution of chloride of ammonium when this is gently heated. (H. Rose, *Tr.*) Decomposed to a certain extent by washing with water.

Borate of Picolin. Decomposed by boiling with water. (Unverdorben.)

Borate of Potash.

I.) *normal.* KO,BO_3 Very easily soluble in water. (Arfvedson.) It dissolves in a very small quantity of water, from which it crystallizes with difficulty. (Berzelius, *Pogg. Ann.*, 1835, **34.** 568.)

II.) *bi.* Readily soluble in hot, and in cold water.
$a = KO,2BO_3$
$b = KO,2BO_3+5Aq$ Very readily soluble in water. More readily soluble in water than the *ter* or *sex* salt.

III.) *ter.* Permanent.
$KO,3BO_3+8Aq$

IV.) *sex.* $KO,6BO_3+10Aq$ Permanent. Sparingly soluble in cold, but readily soluble in boiling water. (Laurent.) Difficultly soluble in boiling water. (Berzelius, *Lehrb.*, **3.** 163.)

Borate of Potash with **Tartrate of Potash.** *Vid.* Tartrate of Boron & of Potash.

Borate of Quinine. Soluble in hot, less soluble in cold water. (Sérullas, *Ann. Ch. et Phys.*, 1830, (2.) **45.** 282.)

Borate of Silver.

I.) *normal.* AgO,BO_3 Sparingly soluble in water. (H. Rose.) Readily soluble, with decomposition, in aqueous solutions of the soluble hyposulphites. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 397.) When precipitated in the cold, borate of silver is soluble, even at the ordinary temperature, in an aqueous solution of nitrate of ammonia. (H. Rose, *Tr.*)

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II.) *sex.* Sparingly soluble in water. (Laurent.)
$AgO, 6BO_3$

Borate of Soda.

I.) *normal.* Soluble in water, with evolution of heat.

a = *anhydrous*, NaO, BO_3

On slowly cooling the hot aqueous solution the 8 hydrated salt (c) crystallizes out; but if the salt be dissolved in a quantity of water sufficient for the water of crystallization of c the latter crystallizes much more difficultly. (Berzelius, *Pogg. Ann.*, 1835, **34.** 567.)

$b = NaO, BO_3 + 6Aq$

Gradually separates out from the liquor obtained by fusing the 8 Aq salt in its water of crystallization, when this liquor is cooled to 0°. (Berzelius, *Pogg. Ann.*, **34.** pp. 567, 568.)

$c = NaO, BO_3 + 8Aq$

Superficially efflorescent. Soluble in hot, less soluble in cold water. Melts at 57° in its water of crystallization, but does not solidify again on cooling, until after a long time. A portion of it thus melted was kept for several days in a closed vessel, at 0° before any crystals appeared, after which these increased slowly. (Berzelius, *Pogg. Ann.*, 1835, **34.** 567.)

II.) *bi.* Becomes opaque in moist air, being gradually converted into b.

$a = NaO, 2BO_3 + 5Aq$
(*Octohedral Borax.*)

When a hot solution of ordinary borax of 30° B. (= 1.263 sp. gr.) is allowed to cool slowly, the octohedral salt begins to crystallize out as soon as the temperature of the solution has fallen to 79° and continues to separate until the temperature reaches 56°, after which only the ordinary prismatic crystals (b) are formed. (Payen in his *Précis de Chimie Industrielle*, Paris, 1855, p. 325.) If the solution be boiled for some hours it appears to yield more octohedral borax on cooling, even when cooled below 56°. (Buron, Soubeiran & Pellerin.)

$b = NaO, 2BO_3 + 10Aq$
(*Prismatic, or ordinary Borax.*)

Effloresces superficially. Soluble in 12 pts. of cold, and in 2 pts. of boiling water; the saturated cold solution containing 9.23% of it, and the saturated hot solution 33.33%. (Gmelin.) Soluble in 20 pts. of cold, and in 6 pts. of boiling water (Wallerius); in 15 pts. of water at 18.75° (Abl, from *Œsterr, Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.)

100 pts. of water at	Dissolve pts. of the anhydrous salt.	of the cryst. salt $NaO, 2BO_3 + 10Aq$.
0°	1.49	2.83
10°	2.42	4.65
20°	4.05	7.88
30°	6.00	11.90
40°	8.79	17.90
50°	12.93	27.41
60°	18.09	40.43
70°	24.22	57.85
80°	31.17	76.19
90°	40.14	116.66
100°	55.16	201.43

(Poggiale, *Ann. Ch. et Phys.*, (3.) **8.** 467.)

100 pts. of water at 15.5° dissolve 5 pts. of it.
" " 65° " 40 "
" " 100° " 166 "
(Ure's *Dict.*)

The aqueous solution saturated at 15° is of 1.019919 sp. gr. and contains dissolved in every 100 pts. of water at least 3.926 pts. of the salt. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.) 100 pts. of the saturated aqueous solution at its boiling temperature (105.5°), contain 52.5 pts. of the dry salt; or 100 pts. of water dissolve 110.54 pts. of the dry salt at 105.5°; or, 1 pt. of the dry salt is soluble in 0.9047 pts. of water at 105.5°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) A hot aqueous solution of "borate of soda" is liable to become supersaturated on cooling. (Gay-Lussac.) Insoluble in alcohol. (Wenzel.) Nearly insoluble in alcohol. (P. & F.)

III.) *quadri.* Soluble in 5 or 6 pts. of water at ordinary temperatures. (Bolley, *Ann. Pharm.*, **68.** 122.)
$NaO, 4BO_3 + 10Aq$
Unlike borax, it deposits boracic acid on the addition even of dilute acids.

IV.) *sex.* Known only in solution. (Laurent, *Ann. Ch. et Phys.*, **67.** 218.)
$NaO, 6BO_3$

Borate of Soda with Fluoride of Sodium.

I.) "*neutral.*" Decomposed by cold, soluble in boiling water.
$NaO, BO_3; 3NaFl + 8Aq$

II.) "*bi.*" Soluble in water. (Berzelius, *Lehrb.*, **3.** 246.)
$NaO, 2BO_3; 6NaFl + 22Aq$

Borate of Soda with Sucrate of Soda.

Borate of Soda with Tartrate of Soda. *Vid.* Tartrate of Boron & of Soda.

Borate of Strontia.

I.) *bi.* Almost insoluble in cold water. (Berzelius's *Lehrb.*) Soluble in 130 pts. of boiling water. (Hope, *Edin. Trans.*, **4.** 17. [T.].) 100 pts. of boiling water dissolve 7.7 pts. of "sub-borate" of strontia. (Ure's *Dict.*) Readily soluble in cold aqueous solutions of chloride of ammonium and nitrate of ammonia. (Brett.)
$SrO, 2BO_3$

II.) *sex.* Very sparingly soluble in water. (Laurent.)
$SrO, 6BO_3$

Borate of Thoria. Insoluble in water or in a solution of boracic acid. (Berzelius.)

Borate *of protoxide* **of Tin.** Insoluble in water.

Borate *of protoxide* **of Uranium.** Ppt. Easily decomposed by water.

Borate *of sesquioxide* **of Uranium.** Sparingly soluble in water. (Richter.)

Borate *of binoxide* **of Vanadium.** Insoluble in water. Soluble in an aqueous solution of boracic acid.
$VO_2, 4BO_3$

Borate of Yttria. Insoluble in water.

Borate of Zinc. Insoluble in water. Soluble in boracic, and chlorhydric acids. (Wenzel.)
$ZnO, 2BO_3$

Borate of Zirconia. Insoluble in water.

Borax. *Vid. bi*Borate of Soda.

Boride of Iron & of Potassium. Decomposed by water. (H. Davy.)

Boride of Nitrogen. Insoluble in water. Unacted on by nitric or chlorhydric acids, or by concentrated caustic lye.
NB

Boride of Nitrogen & of Potassium. Insoluble in cold or boiling water or in cold caustic lye. Decomposed by boiling aqua-regia. (Balmain, *Phil. Mag.*, **21.** 270.)
$K_3N_3B_2$

Boride of Platinum. Soluble in nitromuriatic acid. (Descotils.)

Borneene. Insoluble, or very sparingly soluble in water. Soluble in alcohol. Unacted upon in the cold by ordinary nitric acid, but is decomposed by boiling therewith. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **7.** 281.) Soluble in ether.
(*Isomeric with oil of Turpentine. "Valerene" (of Pierlot).*)
$C_{20}H_{16}$

Bornenic Acid. *Vid.* Campholic Acid.

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Borneol. (From *Dryobalanops camphora.*) (*Borneol Alçohol. Camphol. Campholic Alcohol. Solid Camphor of Borneo. Oxide of Bornene.*)

I.) *ordinary.* $C_{20}H_{18}O_2 = \left.\begin{matrix}C_{20}H_{17}\\H\end{matrix}\right\}O_2$ Sparingly soluble in water. (Pelouze.) Insoluble in water. (Berthelot.) Readily soluble in alcohol, and ether. (Pelouze. Berthelot.) From a solution of 2 pts. borneol in 10 pts. absolute alcohol, 100 pts. of water separate, after three days' standing, 1.2 pts. of borneol, and on agitating the liquid with ether, this takes up an additional 0.6 pt. of borneol. (Berthelot.)

II.) *Lævo-rotatory.* Sparingly soluble in water. Readily soluble in alcohol, ether, and acetic acid. (Jeanjean).

BoroFluoride of *X*. *Vid.* FluoBorate of *X*.

Boron.
B

a = pulverulent. When freshly prepared it is somewhat soluble in water, and especially in alkaline water; but is insoluble in saline solutions, as of chloride of ammonium, fluoride of potassium, or borate of potash, or in alcohol. Chloride of ammonium also precipitates it from the aqueous solution. After having been heated, boron is no longer soluble, even in boiling water, and is not acted upon by acids or by alkaline solutions, excepting nitric acid and aqua-regia, which oxidize it. (Berzelius, *Lehrb.*, **1.** 315.) Insoluble in hot or cold alcohol, ether or oils.

Soluble in hot concentrated sulphuric acid. (H. Davy.)

b = crystalline. Unacted upon by any acid, or by boiling concentrated alkaline lyes. (Wœhler.)

BoroSilicate of *X*. *Vid.* Borate & Silicate of *X*.

BoroTartrate of *X*. *Vid.* Borate & Tartrate of *X*.

Brassic Acid. (*Supposed to be identical with Darby's Erucic Acid.*) $C_{44}H_{42}O_4 = C_{44}H_{41}O_3, HO$ Insoluble in water. Soluble in 12 pts. of alcohol, of 0.835 sp. gr., at 7°, and in all proportions in the same alcohol at temperatures above 33°. Miscible in all proportions with ether.

The alkaline brassates are soluble, but all the others are insoluble in water.

Brassate of Baryta. Ppt.

Brassate of Lead. Insoluble in water.

Brassate of Silver. Ppt.

Brassate of Soda. $C_{44}H_{41}NaO_4$ Soluble in water, and absolute alcohol.

Brazilin. (*Brazilic Acid. Bresilin.*) $C_{36}H_{14}O_{14}$ Soluble in water, alcohol, and ether.

Brodracasic Acid. *Vid.* BromAnisic Acid.

***Bi*BromAcetamid.**
$C_4H_3Br_2NO_2 = N\left\{\begin{matrix}C_4HBr_2O_2\\H_2\end{matrix}\right.$

BromAcetic Acid. $C_4H_3BrO_4$ Very deliquescent. Very readily soluble in water.

BromAcetate of Ammonia. Very soluble in water.

BromAcetate of Amyl. $C_{14}H_{13}BrO_4 = C_4H_2Br(C_{10}H_{11})O_4$ Insoluble, or very sparing soluble, in water.

BromAcetate of Baryta. Tolerably soluble in alcohol.

BromAcetate of Copper. Very soluble in water.

BromAcetate of Ethyl.
$C_8H_7BrO_4 = C_4H_2Br(C_4H_5)O_4$

BromAcetate of Lead. $C_4H_2BrPbO_4$ Sparingly soluble in cold, tolerably soluble in hot water; but is decomposed when boiled for a long time with water.

BromAcetate of Lime. Very soluble in water.

BromAcetate of Methyl. $C_6H_5BrO_4 = C_4H_2Br(C_2H_3)O_4$ Insoluble, or sparingly soluble, in water.

BromAcetate of Potash. Very soluble in water and in alcohol.

BromAcetate of Silver. $C_4H_2BrAgO_4$ Insoluble, or nearly insoluble, in cold water; decomposed by boiling water.

BromAcetate of Soda. Very soluble in water. Insoluble, or nearly insoluble, in alcohol. (Perkin & Duppa.)

***Bi*BromAcetic Acid.** Soluble in water.
$C_4H_2Br_2O_4$

***Bi*BromAcetate of Ammonia.** $C_4HBr_2(NH_4)O_4 + Aq$ Readily soluble in water, alcohol, and ether.

***Bi*BromAcetate of Amyl.**

***Bi*BromAcetate of Baryta.** Deliquescent.

***Bi*BromAcetate of Ethyl.** $C_4HBr_2(C_4H_5)O_4$ Insoluble, or but sparingly soluble, in water.

***Bi*BromAcetate of Lead.** Very soluble in water, from which alcohol precipitates it.

***Bi*BromAcetate *of protoxide* of Mercury.**

***Bi*BromAcetate of Potash.** Very soluble in water and in alcohol.

***Bi*BromAcetate of Silver.** $C_4HBr_2AgO_4$ Decomposed by boiling with water. (Perkin & Duppa.)

***Mono*BromAcetone.**
$C_6H_5BrO_2$

***Bi*BromAcetone.** *a = (neutral oil.)* $C_6H_4Br_2O_2$ Completely insoluble in water and in alkaline solutions. Soluble in all proportions in alcohol, and ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **19.** 504.)

BromAcetyl. *Vid.* Bromide of Ethylene.

***Ter*BromAcetyl.** Not isolated.
$C_4Br_3O_2$

Bromal. *Vid.* Hydride of *ter*BromAcetyl.

***Di*BromAllylamin.** $C_{12}H_9Br_2N = N\left\{\begin{matrix}C_6H_4Br\\C_6H_4Br\\H\end{matrix}\right.$ Very sparingly soluble in water. Easily soluble in alcohol. Easily soluble in sulphuric, chlorhydric, nitric, and acetic acids, with semi-combination. (Maxwell Simpson.)

***Di*BromAllylEthylamin.** $C_{16}H_{13}Br_2N = N\left\{\begin{matrix}(C_6H_4Br)_2\\C_4H_5\end{matrix}\right.$ Insoluble in water.

BromAloin. $C_{34}H_{15}Br_3O_{14}$ Less soluble than aloin in cold water, and alcohol. Easily soluble in boiling alcohol.

BromAmyl. *Vid.* Bromide of Amyl.

BromAmylene.
$C_{10}H_9Br$

***Bi*BromAmylene.**
$C_{10}H_8Br_2$

***Ter*BromAnethol.** (*Bromanisol. Bromanisal.*) $C_{20}H_9Br_3O_2$ Insoluble in water. Slightly soluble in alcohol; more soluble in ether. (Cahours.)

BromAnil. *Vid. per*BromoKinone.

BromAnilamic Acid. *Vid.* *bi*BromoKinonamic Acid.

BromAnilamid. *Vid.* *bi*BromoKinonamid.

BromAnilic Acid. *Vid.* *bi*BromoKinonic Acid.

BromAnilin. Sparingly soluble in water. Easily soluble in alcohol, ether, wood-spirit, acetone, bisulphide of carbon, and the fatty and essential oils. (Hofmann.)

(*Amabrophenase.*)

$C_{12}H_6BrN = N\left\{\begin{matrix}C_{12}H_4Br\\H_2\end{matrix}\right.$

***Bi*BromAnilin.** Sparingly soluble in boiling, and less soluble in cold water. Soluble in alcohol. (Hofmann.)

$C_{12}H_5Br_2N = N\left\{\begin{matrix}C_{12}H_3Br_2\\H_2\end{matrix}\right.$

***Ter*BromAnilin.** Insoluble in water. Sparingly soluble in cold, readily soluble in boiling alcohol. Readily soluble in ether. Insoluble in dilute acids or in alkaline solutions. Abundantly soluble in hot concentrated sulphuric acid, from which it separates on cooling and upon addition of water. (Fritzsche.)

(*Bromaniloid. AmaBroPhenise.*)

$C_{12}H_4Br_3N = N\left\{\begin{matrix}C_{12}H_2Br_3\\H_2\end{matrix}\right.$

BromAniloid. *Vid.* *ter*BromAnilin.

BromAnisic Acid. Very sparingly soluble even in boiling water. Tolerably soluble in alcohol, especially when this is warm. Easily soluble in ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **14.** 496.)

(*Bromanisylic Acid. Bromodraconesic Acid. Bromodraconic Acid. Brodacasic Acid. Bromadracisic Acid. Bromoanisatic Acid. Bromoaxisic Acid.*)

$C_{16}H_7BrO_6 = C_{16}H_6BrO_5, HO$

BromAnisate of Ammonia. Very readily soluble in water. (Cahours.)

BromAnisate of Baryta. Difficultly soluble in water.

BromAnisate of Ethyl. Insoluble in water. Easily soluble especially in warm alcohol and ether. (Cahours, *Ann. Ch. et. Phys.*, (3.) **14.** 500.)

$C_{16}H_6(C_4H_5)BrO_6$

BromAnisate of Lead. Insoluble in water.

BromAnisate of Lime. Difficultly soluble in water.

BromAnisate of Magnesia. Appears to be soluble in water.

BromAnisate of Methyl. Insoluble in water. Tolerably readily soluble, especially in warm alcohol and wood-spirit; less easily soluble in ether. (Cahours, *loc. cit.*, p. 503.)

(*BromAnisate of Methylene.*)

$C_{16}H_6(C_2H_3)BrO_6$

BromAnisate of Potash. Very readily soluble in water. (Cahours, *loc. cit.*)

BromAnisate of Silver. Insoluble in water.

$C_{16}H_6AgBrO_6$

BromAnisate of Soda. Very readily soluble in water. (Cahours, *loc. cit.*)

BromAnisate of Strontia. Difficultly soluble in water.

BromAnisol. *Vid.* Phenate of BromoMethyl; also BromAnethol.

BromAnisyl. *Vid.* Bromide of Anisyl.

BromAnisoNitranisic Acid. Insoluble in water. Soluble in alcohol, and ether. (Laurent.)

(*NitroBromoDraconesic Acid.*)

$C_{32}H_{14}BrNO_{18}$

BromAnisoNitranisate of Ammonia. Soluble in water.

Bromic Acid. Soluble in water. Decomposed by alcohol, and ether. Most of the metallic bromates are easily soluble in water, a few are difficultly soluble, but none are insoluble.

BrO_5, HO

Bromate of Alumina. Deliquescent. Soluble in water. (Rammelsberg.)

$Al_2O_3, 3BrO_5$

Bromate of Ammonia. Soluble in water.

NH_4O, BrO_5

Bromate of Argent*bi*amin. Decomposed by water. (Rammelsberg.)

(*AmmonioBromate of Silver.*)

$N_2\left\{H_6 . AgO, BrO_5\right.$

Bromate of Baryta. Soluble in 130 pts. of cold, and in 24 pts. of boiling water. (Rammelsberg.)

$BaO, BrO_5 + Aq$

Bromate of Bismuth.

I.) $3BiO_3, 2BrO_5 + 6Aq$ Insoluble in bromic acid.

II.) *acid.* Soluble in bromic acid.

Bromate of Cadmium. Soluble in 0.8 pt. of cold water. (Rammelsberg.)

$CdO, BrO_5 + Aq$

Bromate of Cerium. Permanent. Readily soluble in water. (Rammelsberg.)

$CeO, BrO_5 + 6Aq$

Bromate *of sesquioxide* **of Chromium.** Deliquescent. Soluble in water. (Rammelsberg.)

Bromate of Cobalt. Soluble in 2.2 pts. of cold water. (Rammelsberg.) Soluble in ammonia-water.

$CoO, BrO_5 + 6Aq$

Bromate of Copper.

I.) *normal.* Permanent. Very easily soluble in water.

$CuO, BrO_5 + 5Aq$

II.) *hexa.* Ppt.

$6CuO, BrO_5 + 10Aq$

Bromate of Cupr(*ic*)*bi*amin. Soluble in a small quantity of water, but is decomposed by much water, with separation of hydrate of copper. Insoluble in alcohol. (Rammelsberg.)

(*Ammonio Bromate of Copper.*)

$N_2\left\{H_6 . CuO, BrO_5\right.$

Bromate *of protoxide* **of Iron.** Soluble in water, but the solution is exceedingly liable to decomposition, with separation of a basic salt of the sesquioxide. (Berzelius, *Lehrb.*)

FeO, BrO_5

Bromate *of sesquioxide* **of Iron.**

I.) *normal.* Soluble in water. (Berzelius, *Lehrb.*)

$Fe_2O_3, 3BrO_5$

II.) *basic.* Partially soluble in water, with separation of a portion of a still more basic salt. Soluble in nitric acid. (Rammelsberg.)

$5Fe_2O_3, BrO_5 + 30Aq$

Bromate of Lanthanum. Soluble in water.

$LaO, BrO_5 + 6Aq$

Bromate of Lead. Permanent. Soluble in 75 pts. of cold water. (Rammelsberg.)

$PbO, BrO_5 + Aq$

Bromate of Lead with Carbonate of Lead. Insoluble in water. (Lœwig.)

(*Bromo Carbonate of Lead.*)

Bromate of Lime. Soluble in 1.1 [or 1.5 ?] pts. of cold water forming a syrup. (Rammelsberg.)

$CaO, BrO_5 + Aq$

Bromate of Lithia. Deliquescent. Very easily soluble in water. (Rammelsberg, *Pogg. Ann.*, **55.** 63.) Efflorescent in dry air. Very soluble in water. (Troost.)

LiO, BrO_5

Bromate of Magnesia. Efflorescent. Soluble in 1.4 pts. of water at 15°, and melts in its water of crystallization when heated. (Rammelsberg.)

$MgO, BrO_5 + 6Aq$

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Bromate of Manganese.
MnO, BrO_5

Bromate of ***di*****Mercur(*****ic*****)ammonium** with *prot***Oxide of Mercury.** Ppt.
$N\left\{\begin{matrix}H_2\\Hg_2\end{matrix}\right. O, BrO_5; 2HgO$

Bromate *of dinoxide* **of Mercury.**

I.) *normal.* Insoluble in water, but is decomposed when boiled therewith. Easily soluble in chlorhydric, difficultly soluble in nitric acid. (Rammelsberg.)
Hg_2O, BrO_5

II.) *di.* Insoluble in warm water. (Rammelsberg.)
$2Hg_2O, BrO_5$

Bromate *of protoxide* **of Mercury.** Soluble in 650 pts. of cold, and in 64 pts. of boiling water. (Rammelsberg.) Easily soluble in chlorhydric, slightly soluble in nitric acid.
$HgO, BrO_5 + 2Aq$

Bromate of Nickel. Soluble in 3.58 pts. of cold water. (Rammelsberg.)
$NiO, BrO_5 + 6Aq$

Bromate of Nickelammonium. Partially soluble in water. Insoluble in alcohol. (Rammelsberg.)
$N\left\{\begin{matrix}H_3\\Ni\end{matrix}\right. O, BrO_5$

Bromate of Palladium. Very sparingly soluble in bromic acid.

Bromate of Platinum(PtO_2). Soluble in water, the solution undergoing decomposition when evaporated. (Rammelsberg.)

Bromate of Potash. Soluble in boiling, much less soluble in cold water. (Balard.) Soluble in 15.2 pts. of water at 15°; or 100 pts. of water dissolve 6.58 pts. of it at 15°. (Rammelsberg.) Soluble in 16.2 pts. of water at 15° (in Otto Graham). Soluble in 17.149 pts. of water at 17.1°; or 100 pts. of water at 17.1° dissolve 5.831 pts. of it. (Pohl, *Wien. Akad. Bericht*, **6.** 595.)
KO, BrO_5

Soluble in	29.90	pts. water at	0°
"	18.46	"	10°
"	14.15	"	20°
"	7.23	"	40°
"	4.20	"	60°
"	2.69	"	80°
"	1.95	"	100°

(Kremers, *Pogg. Ann.*, **92.** 499.)

	I.*	II.*	III.*		
Soluble in	29.90	32.13	32.07	pts. of water at	0°
"	14.15	14.44	"	"	20°
"	7.23	7.55	"	"	40°
"	4.20	4.39	"	"	60°
"	2.69	2.95	"	"	80°
"	1.95	2.01	"	"	100°

* The determinations in column I. were made immediately after the solutions had cooled to the given temperatures; those in column II. represent a new series of experiments, in which the solutions stood for an hour at, after having fallen to, the given temperatures, being frequently shaken meanwhile; and those of column III. represent a third series of experiments in which the solutions stood at the indicated temperatures during eleven hours. (Kremers, *Pogg. Ann.*, **97.** 5.)

A solution of 1.0463 sp. gr. (at 19.5°) contains 6.46 pts. of the anhydrous salt in every 100 pts. of water. (Kremers, *Pogg. Ann.*, **95.** 121.) The saturated aqueous solution boils at 102° (Kremers, *Pogg. Ann.*, **92.** 500), at 104°, (Kremers, *Ibid.*, **97.** 5).

If a solution of bromate of potash, not yet saturated, be concentrated by boiling, it will become somewhat supersaturated. A solution thus prepared boiled at 106° just before crystals began to separate, when it fell to its normal, — 104°. (Kremers, *Pogg. Ann.*, **97.** 21.) Very sparingly soluble n alcohol. Insoluble in absolute alcohol.

Bromate of Silver. Insoluble in water. Readily soluble in ammonia-water. Insoluble in nitric acid. (Lœwig.) Slightly soluble in water. (Rammelsberg.)
AgO, BrO_5

Bromate of Soda. Soluble in 2.7 pts. of water at 15°. (Rammelsberg.)
NaO, BrO_5

1 pt. of anhydrous NaO, BrO_5 is

soluble in	3.17	pts. of water at	7.5°
"	2.15	"	30°
"	1.71	"	50°
"	1.29	"	74.4°
"	1.14	"	98°

(Kremers, *Pogg. Ann.*, **94.** 271.)

Supersaturated solutions also may be obtained when boiling saturated solutions are corked up in flasks or sealed up in tubes, which are then hung upon threads and allowed to cool slowly. Solutions thus obtained contained 1 pt. of the anhydrous salt in 0.90 pts. of water at — 1°; in 2.03 pts. of water at + 11°; in 1.38 pts. of water at 43.5°; in 1.06 pts. of water at 65°. (Kremers, *loc. cit.*, pp. 271, 261.)

1 pt. of anhydrous $NaO\ BrO_5$

	I.	II.		
is soluble in	—	3.63	pts. of water at	0°
"	2.50	2.61	"	20°
"	1.92	1.99	"	40°
"	1.54	1.60	"	60°
"	1.26	1.32	"	80°
"	1.12	1.10	"	100°

The determinations in column I. were made immediately after the solution had cooled to the temperatures indicated, those in column II. were obtained from another set of hot solutions the temperatures of which were allowed to fall to the given points, and then maintained thereat during an hour, the flasks containing the solutions being frequently shaken meanwhile. The saturated aqueous solution boils at 109°. (Kremers, *Pogg. Ann.*, **97.** 5.)

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.	An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.0560	7.44	1.2160	30.99
1.1101	15.01	1.2645	38.84
1.1652	23.15		

(Kremers, *Pogg. Ann.*, **95.** 121.)

Bromate of Soda with **Bromide of Sodium.** Decomposed by water, and alcohol. (Fritzsche.)
$3(NaO, BrO_5); 2NaBr + 6Aq$

Bromate of StannEthyl.

Bromate of StannMethyl.

Bromate of StibEthylium.

Bromate of Strontia. Permanent. Efflorescent. Soluble in 3 pts. of cold water. (Rammelsberg.) Less soluble in water than sexhydrated bromide of strontium. (Lœwig.)
$SrO, BrO_5 + Aq$

Bromate *of protoxide* **of Tin.** Insoluble in water. Soluble in chlorhydric acid.

Bromate *of binoxide* **of Tin.**

Bromate of Uranium. With the exception of a small portion, it is completely soluble in water.
$4Ur_2O_3, 3BrO_5 + 16Aq$

Bromate of Yttria. Somewhat difficultly soluble in water. (Berzelius, *Lehrb.*) More soluble than the iodate in water. (Berlin.)

Bromate of Zinc. Permanent. Soluble in 1 pt. of water. (Rammelsberg.)
$ZnO, BrO_5 + 6Aq$

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Bromate of ZincAmmonium. Deliquescent. Decomposed by water, and alcohol. Soluble in ammonia-water. (Rammelsberg.)
$N\left\{\begin{matrix}H_3\\Zn\end{matrix}\right. . O, Br O_5 + 3 Aq$

BromAuric Acid. *Vid. ter*Bromide of Gold.

• **BromAurate of Barium.** Permanent. (v. Bonsdorff, *Pogg. Ann.*, 1830, **19.** 347.)

BromAurate of Magnesium. Deliquescent. (*Ibid.*)

BromAurate of Manganese. Deliquescent. (*Ibid.*)

BromAurate of Potassium. Difficultly soluble in water. More soluble in cold alcohol than in water.
a = anhydrous.
$K Br, Au Br_3$

b = hydrated. Quickly effloresces. (v. Bonsdorff, *Pogg. Ann.*, 1830, **19.** 346; and **33.** 64.
$K Br, Au Br_3 + 5 Aq$

BromAurate of Sodium. Appears to be permanent. Difficultly soluble in water. (v. Bonsdorff, *Pogg. Ann.*, 1830, **19.** 346.)

BromAurate of Zinc. Quickly déliquescent.

BromAzOxyBenzene. *Vid.* BromAzOxyBenzid.

BromAzOxyBenzid. Very sparingly soluble in alcohol. (Laurent & Gerhardt.)
(*Azoxibenzide bromé. BromAzoxybenzene. Oxide of BromoPhenoylPhenoyl biamin.*)
$C_{24} H_9 Br N_2 O_2 = N_2\left\{\begin{matrix}C_{12} H_3 Br''\\C_{12} H_4''\\H_2\end{matrix}\right\}O_2$

BromBenzin. *Vid.* Bromhydrate of *ter*BromoBenzin, and Hydride of BromoPhenyl.

BromBenzinise. *Vid.* Hydride of *ter*BromoPhenyl.

BromElayl. *Vid.* Bromide of Ethylene.

***Bi*BromEthylamin.** Soluble in water; more soluble in ether, which removes it from the aqueous solution. (A. Wurtz, *Ann. Ch. et Phys.*, **30.** 477.)
(*Ethylamine bibromé.*)
$N\left\{\begin{matrix}C_4 H_3 Br_2\\H_2\end{matrix}\right.$

BromEthylene. Tolerably easily soluble in water. (Regnault.) Miscible in all proportions with alcohol, and ether. Very readily soluble in alcohol. Soluble in bromine and in concentrated sulphuric acid. (Berthelot.)
(*Bromide of Acetyl. BromAcetyl. Bromide of Aldehydin. BromAldehydin. BromÆtheroid. Ethylene monobromé.*)
$C_4 H_3 Br$

***Per*BromEthylene.** Slightly soluble in water. Readily soluble in alcohol, and ether. Unacted on by nitric, sulphuric, or chlorhydric acids. (Lœwig.)
(*Ethylene perbromé. Proto (or solid) bromide of carbon.*)
$C_4 Br_4$

***Bi*BromEuxanthic Acid.** Almost insoluble in cold water or alcohol; sparingly soluble in boiling alcohol.
$C_{42} H_{16} Br_2 O_{22}$

It occurs under two modifications: one of which (*amorphous*) is much more soluble in alcohol than the other (*crystalline*).

The acid is easily soluble in ammonia, in which solution carbonate of ammonia produces a precipitate.

***Bi*BromEuxanthate of Baryta.**
" " **Copper.**
" " **Lead.**
" " **Magnesia.**
" " **Potash.**
" " **Soda.**

***Ter*BromEuxanthone.** Insoluble in water.
$C_{40} H_9 Br_3 O_{12}$

BromHelicin. Properties similar to those of chlorhelicin. (Piria, *Ann. Ch. et Phys.*, (3.) **14.** 298.)
$C_{26} H_{15} Br O_{14} + 2 Aq$

***Hemi*BromHydramid.** Insoluble in water, alcohol, ether, or glacial acetic acid. (Berthelot & De Luca.)
$C_{12} H_{12} Br N O_4$

BromHydranil. *Vid. per*BromHydroKinone.

Bromhydric Acid. The gas is rapidly and abundantly absorbed by water, heat being evolved. The saturated solution boils at a temperature lower than 100°, some of the acid being thereby lost. More dilute solutions boil at temperatures above 100°, and become more concentrated.
(*Bromohydric Acid. Hydrobromic Acid.*)
$H Br$

Bromhydrate of Ammonia. Easily soluble in water. (Lœwig.)

Bromhydrate of Amylamin. Permanent. Very soluble in water, and alcohol. Sparingly soluble in ether, which precipitates it from the alcoholic solution. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 494.)
$N\left\{\begin{matrix}C_{10} H_{11}\\H_2\end{matrix}\right., H Br$

Bromhydrate of AmylAnilin. Rather sparingly soluble in water. Soluble in bromide of amyl.

Bromhydrate of *di*AmylAnilin. Nearly insoluble in water.

"**Bromhydrate of Amylene.**" *Vid.* Bromide of Amyl.

Bromhydrate of Anilin. Soluble in water. Somewhat less readily soluble than the chlorhydrate.
$N\left\{\begin{matrix}C_{12} H_5\\H_2\end{matrix}\right., H Br$

Bromhydrate of Anisamate of Ethyl. Soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 346.)

Bromhydrate of Benzamic Acid. Easily soluble in water, and alcohol. Sparingly soluble in bromhydric acid. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 325.)
$N\left\{\begin{matrix}C_{14} H_5 O_2\\H_2\end{matrix}\right. . O_2, H Br$

Bromhydrate of Bromide of Acetyl. *Vid.* Bromide of Ethylene.

Bromhydrate of Bromide of Aldehydin. *Vid.* Bromide of Ethylene.

Bromhydrate of Bromide of Silicium. Decomposed by water.
$Si_2 Br_3, 2 H Br$

Bromhydrate of *ter*BromoBenzin. Insoluble in water. (Mitscherlich.) Very sparingly soluble in boiling ether and in alcohol. (Lassaigne.)
(*Ter Bromide of Benzin. BromBenzin. Hydrobromate of terBromoBenzene.*)
$C_{12} H_6 Br_6 = C_{12} H_3 Br_3, 3 H Br$

Bromhydrate of BromoCaprylene. *Vid.* Bromide of Caprylene.

Bromhydrate of BromoCinchonin. Tolerably soluble in boiling alcohol. (Laurent, *Ann. Ch. et Phys.*, (3.) **24.** 307.)

Bromhydrate & Chlorhydrate of *sesqui* BromoCinchonin. Tolerably soluble in water. Very sparingly soluble in boiling alcohol. Easily soluble in a hot alcoholic solution of ammonia. (Laurent, *Ann. Ch. et Phys.*, (3.) **24.** 311.)
$C_{80} H_{45} Br_3 N_4 O_4, 2 (H Br, H Cl)$

Bromhydrate of BromoCodein. Sparingly soluble in cold, readily in boiling water. (Anderson.)
$C_{36} H_{20} Br N O_6, H Br + 2 Aq$

***Sesqui*Bromhydrate of *ter*BromoCodein.** Very sparingly soluble in cold, more soluble in boiling water. (Anderson.)
$2 C_{36} H_{18} Br_3 N O_6, 3 H Br$

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Bromhydrate of BromoMelAnilin. Soluble in water.

Bromhydrate of BromoNaphthalin. *Vid.* Bromide of BromoNaphthalin.

Bromhydrate of BromoPapaverin. $C_{40} H_{20} Br N O_8, H Br$ Insoluble in water. Soluble in boiling, less soluble in cold alcohol.

Bromhydrate of BromoStilbene. *Vid.* Bromide of Stilbene.

Bromhydrate of Caoutchin.

***Bi*Bromhydrate of *bi*ChloroCinchonin.** $C_{40} H_{22} Cl_2 N_2 O_2, 2 H Br$ Sparingly soluble in water.

Bromhydrate of Coniin. (?) Very soluble in water, and alcohol; less soluble in ether. (Blyth, *J. Ch. Soc.*, 1. 353.)

Bromhydrate of Cumidin.

Bromhydrate of Cuminamate of Ethyl. Easily soluble in water, and alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) 53. 340.)

Bromhydrate of CyanAnilin. $N \left\{\begin{matrix} C_{12} H_5 \\ H_2 \end{matrix}\right. . C_2 N, H Br$ Soluble in water, and alcohol. It undergoes partial decomposition when the solution is evaporated. Insoluble in ether and in concentrated bromhydric acid. (Hofmann, *J. Ch. Soc.*, 1. 166.)

Bromhydrate of Ethylamin.

Bromhydrate of *di*Ethylamin.

Bromhydrate of *tri*Ethylamin.

Bromhydrate of EthylAmylAnilin.

Bromhydrate of EthylAnilin. $C_{16} H_{11} N, H Br$ Extremely soluble in water. Also soluble in alcohol. (Hofmann.)

Bromhydrate of *di*EthylAnilin. $C_{20} H_{15} N, H Br$ Extremely soluble in water. (Hofmann.)

Bromhydrate of EthylConiin.

Bromhydrate of EthylNaphthylamin. $N \left\{\begin{matrix} C_{20} H_6'' \\ C_4 H_5 \end{matrix}\right. , H Br$ Very slightly soluble in cold water; rather soluble in hot water, alcohol, and ether. (Schiff.)

Bromhydrate of *tri*EthylPhosphin.

Bromhydrate of Glyceramin. $C_6 H_9 N O_4, H Br$ Soluble in alcohol. Almost entirely insoluble in ether. (Bethelot & De Luca.)

Bromhydrate of Guanin. $3 (C_{10} H_5 N_5 O_2, Br H) + 7 H O$ Soluble in bromhydric acid.

Bromhydrate of Harmalin.

Bromhydrate of Harmin.

Bromhydrate of IodAnilin. Slightly soluble in cold, somewhat more soluble in hot water. Soluble in alcohol. Insoluble in ether. (Hofmann, *J. Ch. Soc.*, 1. 276.)

Bromhydrate of MelAnilin. $C_{26} H_{13} N_3, H Br$ Very readily soluble in water, though less so than the chlorhydrate. Less easily soluble in strong bromhydric acid than in water. (Hofmann, *J. Ch. Soc.*, 1. 293.)

Bromhydrate of Menaphthalamin. Very soluble in alcohol.

Bromhydrate of Methylamin. $C_2 H_5 N, H Br$ Very deliquescent. Very soluble in water, and alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) 30. 459.)

Bromhydrate of Methyl Nitro Phenidin. $C_{14} H_8 (N O_4) N O_2, H Br$

Bromhydrate of Naphthylamin. $N \left\{\begin{matrix} C_{20} H_6'' \\ H \end{matrix}\right. , H Br$ Readily soluble in alcohol; less soluble in cold water. (Schiff.)

Bromhydrate of NitroHarmalin.

Bromhydrate of NitroHarmin.

Bromhydrate of Phosphuretted Hydrogen. $P H_3, H Br$ Decomposed by water.

Bromhydrate of Quinidin. Soluble in 200 pts. of cold water.

Bromhydrate of Strychnine. $C_{42} H_{22} N_2 O_4, H Br$ Soluble in water.

Bromhydrate of Terebene.

I.) *mono.* Permanent.
(*BiBromhydrate of Terebene* (of Deville).)
$C_{20} H_{16}, H Br$

II.) *basic.*
(*MonoBromhydrate of Terebene* (of Deville).)
$2 C_{20} H_{16}, H Br$

Bromhydrate of Turpentine-Oil. (*Bromhydrate of Camphene.*) $C_{20} H_{16}, H Br$ Soluble in alcohol. (Deville.)

***Mono*Bromhydrin.** $C_6 H_7 Br O_4 = \begin{matrix} C_6 H_5''' \\ H_2 \end{matrix} \left\}\begin{matrix} O_4 \\ Br \end{matrix}\right.$ Soluble in ether. (Berthelot & De Luca, *loc. cit.*)

***Bi*Bromhydrin.** $C_6 H_6 Br_2 O_2 = \begin{matrix} C_6 H_5''' \\ H \end{matrix} \left\}\begin{matrix} O_2 \\ Br_2 \end{matrix}\right.$ Insoluble in water. Soluble in absolute alcohol, and in ether. (B. & De L.)

***Ter*Bromhydrin.** (*Bromide of Glyceryl.*) $C_6 H_5''', Br_3 \& + 2 Aq$ (*Isomeric with Bromide of BromoPropylene.*) Slowly decomposed by water. (Berthelot & De Luca, *Ann. Ch. et Phys.*, (3.) 48. 304.)

***Iso-Ter*Bromhydrin.**
(*Isomeric with triBromhydrin and with Bromide of BromoProphylene.*)
$C_6 H_5 Br_3$

***Hemi*Bromhydrin.** $C_{12} H_9 Br O_4$ *Vid.* Propionate of BromAllyl.

***Epi*Bromhydrin.** (*Oxide of Bromo Glyceryl.*) $C_6 H_5 Br O_2 = C_6 H_5''' \left\{\begin{matrix} O_2 \\ Br \end{matrix}\right.$ Soluble in water, from which it is dissolved out by ether. (B. & L., *loc. cit.*)

Bromhydrinhexaglycerique. $C_{36} H_{37} Br O_{14}$ Insoluble in cold, sparingly soluble in boiling ether. (B. & L., *loc. cit.*)

Bromhydro *bi*Chlorhydrin.
$C_6 H_5 Cl_2 Br = C_6 H_5''' \left\{\begin{matrix} Cl_2 \\ Br \end{matrix}\right.$

***Quadri*BromHydrokinone.** (*Hydroquinone perbromée. BromHydranil.*) $C_{12} H_2 Br_4 O_4$ Almost insoluble in water. Readily soluble in alcohol, and ether. (Stenhouse, *Phil. Mag.*, (4.) 8. 39.)

Bromides. Almost all of the metallic bromides are soluble in water, excepting those of mercury, lead, silver, bismuth, and copper ($Cu_2 Br$). (Persoz, *Chim. Moléc.*, p. 463.)

Bromide of Acetyl. $C_4 H_3 O_2, Br$ Quickly decomposed by water.

Bromide of Aldehydin. *Vid.* BromEthylene.

Bromide of Allyl. $C_6 H_5, Br$ Soluble in alcohol, from which it separates on the addition of water.

***Bi*Bromide of Allyl.** $C_6 H_5 Br_2$ Insoluble in water. Readily soluble in ether. (Berthelot & De Luca.)

***Ter*Bromide of Allyl.** $C_6 H_5 Br_3$ Insoluble, or very sparingly soluble, in water. (Wurtz.)

Bromide of Aluminum.

I.) *normal.* $Al_2 Br_3$ Deliquescent. Very soluble in water, with evolution of heat. Very soluble in alcohol. (Berthemot, Lœwig.)

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II.) *basic.* Basic bromides of aluminum which contain six equivalents, and less, of base may be obtained soluble in water. Those containing more than six equivalents of base are insoluble. (Ordway, *Am. J. Sci.*, (2.) **26.** 203.)

Bromide of Ammonium. Readily soluble in water. Sparingly soluble in alcohol.
NH_4Br

Bromide of Ammonium & of Iron (Fe_2Br_3). Soluble in water. (Lœwig.)

Bromide of Ammonium & of Mercury. Soluble in an aqueous solution of bromide of ammonium. (Lœwig.)

Bromide of Ammonium (*basic*) **& of Vanadium.** Ppt.

Bromide of Ammonium with FerroCyanide of Ammonium. Permanent. Very soluble in water. The solution is decomposed on boiling. (Himly & Bunsen.)
(*BromoFerroCyanide of Ammonium.*)
$NH_4Br; 2NH_4Cy, FeCy$

Bromide of Amyl. Insoluble in water. Easily soluble in alcohol, and ether. (Cahours.)
$C_{10}H_{11}Br$

Bromide of Amylene.
$C_{10}H_{10}'', Br_2$

Bromide of Anisyl. Somewhat soluble in ether. Decomposed by boiling concentrated solutions of caustic potash. (Cahours, *Ann. Ch. et Phys.*, (3.) **14.** 486.)
(*BromAnisylous Acid. Brom Anisyl.*)
$C_{16}H_7O_4Br$

*Ter***Bromide of Antimony.** Deliquescent. Instantly decomposed by water. (Sérullas.)
$SbBr_3$

Bromide of Argentammonium. Soluble in a strong solution of ammonia; this solution becomes turbid, from deposition of bromide of silver, when water is added to it.
$N\left\{\begin{matrix}H_3\\Ag\end{matrix}\right. Br$

Bromide of Arsen*tri*Ethyl. Deliquescent. Easily soluble in water, and alcohol. Insoluble in ether.
$(C_4H_5)_3As, Br_2$

Bromide of ArsenEthylium. Very deliquescent. Very easily soluble in water, and alcohol.
$(C_4H_5)_4As, Br$

*Ter***Bromide of Arsenic.** Decomposed by water to a soluble, very acid, and an insoluble basic salt. (Sérullas.) Decomposed by a large quantity of water to arsenious acid and bromhydric acid.
$AsBr_3$

Bromide of Arsen*tri*Methyl.
$(C_2H_3)_3AsBr_2$

Bromide of ArsenMethylium. Very deliquescent.
$(C_2H_3)_4AsBr$

Bromide of ArsenMethylEthylium.

Bromide of Barium. Very easily soluble in water. (Balard.)
$BaBr + 2Aq$

1 pt of the anhydrous salt
is soluble in 1.02 pts. water at 0°
" 0.96 " 20°
" 0.88 " 40°
" 0.81 " 60°
" 0.74 " 80°
" 0.67 " 100°
(Kremers, *Pogg. Ann.*, **99.** 47.)

The saturated aqueous solution boils at 113°. (Kremers, *Pogg. Ann.*, **99.** 43.)

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of Ba Br dissolved in 100 pts. of water.	An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of Ba Br dissolved in 100 pts. of water.
1.1440	17.81	1.5816	81.97
1.3005	38.83	1.7115	104.68
1.4507	60.92		

(Kremers, *Pogg. Ann.*, **99.** 444.)

Easily soluble in absolute alcohol. (Huenefeld.) Soluble in absolute alcohol. (H. Rose.)

Bromide of Barium & of Mercury ($HgBr$). Deliquescent. Soluble in water. (v. Bonsdorff, *Pogg. Ann.*, 1830, **19.** pp. 340, 342.)

Bromide of Barium with Cyanide of Mercury. Soluble in water, and alcohol, especially when these are hot. (Caillot.)
$BaBr; 2HgCy + 6Aq$

Bromide of Benzamid. Slowly decomposed by water; quickly by ammonia-water.
$C_{14}H_7NO_2, Br_2$

*Ter***Bromide of Benzin.** *Vid.* Bromhydrate of *ter*BromoBenzin.

Bromide of Benzoyl. Very slowly decomposed when in contact with water. Easily soluble, without decomposition, in alcohol, and ether. (Liebig & Wœhler.)
(*Brombenzaldide. Benzolbiacibromide. OxyBromoBenzoyl.*)
$C_{14}H_5O_2, Br$

Bromide of Bismuth. Decomposed by water, with separation of an insoluble basic salt.
$BiBr_3$

Bromide of BismuthEthyl. Soluble in alcohol.

Bromide of Boron. Decomposed by water. (Poggiale.)
BBr_3

Bromide of BromAllyl.
C_6H_4Br, Br

Bromide of *bi*BromAllyl.
$C_6H_3Br_2, Br$

Bromide of BromAmylene.
$C_{10}H_9Br'', Br_2$

Bromide of BromEthylene. Insoluble in water. Freely soluble in alcohol, ether, and acetic acid. (M. Simpson, *Phil. Mag.*, **14.** 545.)
C_4H_3Br'', Br_2

*Bi***Bromide of BromoChloroNaphthalin.** Difficultly soluble in boiling, less soluble in cold ether. (Laurent.)
(*Bromide of Chlorobronaphtese.*)
$C_{20}H_6ClBr, 2Br_2$

Bromide of *bi*BromoMethyl. Very sparingly soluble in water. Soluble in alcohol, ether, and the essential oils. (Lœwig.)
(*Bromoform. Bromide of Carbon. Bromide of Methyl bibromé. Per Bromide of Formyl.*)
C_2HBr_2, Br

*Bi***Bromide of *bi*BromoNaphthalin.** Very slightly soluble in boiling ether. (Laurent.)
(*Bronaptesbromure.*)
$C_{20}H_6Br_6 = C_{20}H_6Br_2, 2Br_2$

Bromide of *ter*BromoNaphthalin. Soluble in boiling ether. (Laurent.)
(*Subbromide of Bronaphtise.*)
$C_{20}H_5Br_5 = C_{20}H_5Br_3, Br_2$

*Bi***Bromide of *ter*BromoNaphthalin.** Very sparingly soluble in ether. (Laurent.)
(*Bromide of Bronaphtise.*)
$C_{20}H_5Br_7 = C_{20}H_5Br_3, 2Br_2$

Bromide of *bi*BromoNitroMethyl. Very sparingly soluble in water. Readily soluble in alcohol, and ether. (Stenhouse, *Phil. Mag.*, (4.) **8.** 38.)
(*BromoPicrin. Bromide of NitroMethylperbromé.*)
$C_2Br_3NO_4 = C_2(NO_4)Br_2, Br$

Bromide of BromoPropylene. Insoluble, or very sparingly soluble, in water. (A. Wurtz.)
C_6H_5Br'', Br_2

Bromide of *bi*BromoPropylene.
$C_6H_4Br_2'', Br_2$

Bromide of *ter*BromoPropylene.
$C_6H_3Br_3'', Br_2$

Bromide of Butoyl. Soluble in spirit.
C_8H_7Br

Bromide of Butyl. Insoluble in water. (Kolbe's *Lehrb.*, **1.** 290.)
(*Bromide of Tetryl or of Valyl Butyl Bromhydric Ether.*)
C_8H_9Br

Bromide of Butylene.
(*Bromide of Tetrylene.*)
$C_8 H_8'', Br_2$

Bromide of Cacodyl.

I.) *normal.* Resembles the chloride. Is decomposed by water.
$(C_2 H_3)_2 As, Br$

II.) *basic.* Insoluble in water.
$3 C_4 H_6 As Br, C_4 H_6 As O$

Bromide of Cacoplatyl. Sparingly soluble in cold, tolerably soluble in warm water.
$\left.\begin{matrix} C_2 H_3 \\ C_2 H_2 Pt \end{matrix}\right\} As Br + 2 Aq$

Bromide of Cadmium. Deliquescent. Easily soluble in water. Readily soluble in alcohol, and ether. Also soluble in wood-spirit. Soluble, without decomposition, in chlorhydric, and acetic acids. Decomposed by nitric acid.
$a = Cd Br$

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of Cd Br dissolved in 100 pts. of water.
1.2337	29.8 pts.
1.4690	64.3
1.6496	94.1

(Kremers, *Pogg. Ann.*, **104.** 156.)

$b = Cd Br + 4 Aq$ Efflorescent.

Bromide of Cadmium & of Potassium. Much more readily soluble in water than the corresponding chloride (K Cl, Cd Cl). Slightly soluble in alcohol and in wood-spirit, though less so than bromide of cadmium. (Croft.)
$K Br, Cd Br$

Bromide of Cadmium & of Sodium.
$2 Cd Br, Na Br + 5 Aq$

Bromide of Cadmium*bi*amin. Decomposed by water. (Rammelsberg.)
(*Ammonio Bromide of Cadmium.*)
$N_2 \left\{ H_6 \right. . Cd, Br$

Bromide of Cadmiumammonium. Decomposed by water. (Rammelsberg.)
$N \left\{ \begin{matrix} H_3 \\ Cd \end{matrix} \right. Br$

Bromide of Cajputene. Soluble in boiling alcohol, and in ether. Is not altered by boiling with an aqueous solution of caustic potash. (Max. Schmidl.)
$C_{20} H_{16}, Br_4$

Bromide of Calcium.

I.) *mono.* Very deliquescent, and soluble in water. (Lœwig.)
$Ca Br$

1 pt. of the anhydrous salt is soluble in			
	0.80	pts. water at	0°
"	0.70	"	20°
"	0.47 @ 0.48	"	40°
"	0.36	"	60°
"	0 32	"	105°

(Kremers, *Pogg. Ann.*, **103.** 65.)

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of Ca Br dissolved in 100 pts. of water.
1.1386	17.65
1.2660	35.43
1.3983	55.91
1.5214	77.04
1.6517	102.56

(Kremers, *Pogg. Ann.*, **99.** 445.) Very soluble in alcohol. (O. Henry.)

II.) *basic.* *Vid.* OxyBromide of Calcium.

Bromide of Calcium & of Mercury.

a.) Permanent in dry air. Decomposed by a small quantity of water, but dissolves in warm water.

b.) "*Probably contains less Hg Br.*" Exceedingly deliquescent. Soluble in water. (v. Bonsdorff, *Pogg. Ann.*, **19.** 340, 342.)

Bromide of Calcium with Cyanide of Mercury. Readily soluble in water, and alcohol. (Custer.)
$Ca Br, 2 Hg Cy + 5 Aq$

Bromide of Calcium*ter*amin. Soluble in water. (Rammelsberg, *Pogg. Ann.*, **55.** 239 [Gm.].)
$N_3 \left\{ H_9 \right. . Ca Br$

Bromide of Camphor. Deliquescent, with decomposition. Soluble in water; but the solution soon decomposes. (Laurent.)
$C_{20} H_{16} O_2, Br_2$

Bromide of Capryl. *Vid.* Bromide of Octyl.

Bromide of Caprylene.
(*Bromhydrate of Bromo Caprylene. Bromide of Octylene.*)
$C_{16} H_{16}'', Br_2$

Bromide of Carbon. *Vid.* *per*BromEthylene.
(*Solid or protoBromide of Carbon.*)

Bromide of Carbon (liquid). *Vid.* Bromide of *bi*BromoMethyl.

Bromide of Carbon. *Vid.* Iodide of *bi*BromoMethyl.

Bromide of Cerium.

I.) *mono.* Very deliquescent. Soluble in water. (Beringer.)
$Ce Br$

II.) *basic.* Insoluble in water.

Bromide of Cetyl. Insoluble in water. More soluble in boiling, than in cold alcohol. Readily soluble in ether.
$C_{32} H_{33} Br$

Bromide of Chlorethose. *Vid.* Bromide of *per*ChlorEthylene.

Bromide of *per*ChlorEthylene. Soluble in alcohol. (Malaguti.)
(*Bromide of Chlorethose. Bromo Chloride of Carbon. Bromure d'Ethylène perchloré.*)
$C_4 Cl_4'', Br_2$

Bromide of ChlorOxethose. *Vid.* Oxide of *ter*Chloro*bi*BromEthyl.

***Bi*Bromide of *bi*ChloroNaphthalin.** Sparingly soluble in cold alcohol, or ether. Soluble in ether at 100° (in a sealed tube), from which it crystallizes on cooling, but if heated to 120° @ 130°, crystals can no longer be obtained. (Laurent.)
(*Bromide of Chlonaphtèse.*
$C_{20} H_6 Cl_2 Br_4 = C_{20} H_6 Cl_2, 2 Br_2$

Bromide of ChloroPropylene.
$C_6 H_5 Cl'', Br_2$

Bromide of *sexi*ChloroPropylene.
$C_6 Cl_6'', Br_2$

Bromide of ChloroStilbene. Sparingly soluble in ether, and alcohol. (Laurent.)
$C_{28} H_{11} Cl, Br_2$

***Proto*Bromide of Chromium.** Deliquesces, with decomposition.
$Cr Br$

***Sesqui*Bromide of Chromium.**
$Cr_2 Br_3$

a = *anhydrous.* When prepared in the dry way, and perfectly pure, it is completely insoluble in water, but if it contains any protobromide it dissolves in water. (Wœhler.)

b = *hydrated.* Deliquescent. Soluble in water, the solution being easily decomposed by evaporation. (Berthemot.)

Bromide of Cinnamene (or of Styrol). Insoluble in water. Readily soluble in alcohol, and ether. Miscible in all proportions with ether.
(*BromoCinnamene. BromoStyrol.*)
$C_{16} H_8, Br_2$

Bromide of Cobalt. Deliquescent. Easily soluble in water. Also soluble in alcohol, and ether.
$Co Br$

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Bromide of Cobalt*ter*amin.

$N_3 \left\{ H_9 . Co, Br \right.$

Bromide of Coniin. Permanent. Readily soluble in water, and alcohol; less soluble in ether.

***Di*Bromide of Copper.** Insoluble in water.
$Cu_2 Br$ Soluble in caustic ammonia. (Berthemot.) Soluble, without decomposition, in chlorhydric, and bromhydric acids. Soluble, with decomposition, in dilute nitric acid. (Lœwig.) Insoluble in acetic acid, and in sulphuric acid, even when concentrated and boiling. (Dumas, *Tr.*)

***Proto*Bromide of Copper.** Deliquescent.
$Cu Br + 5 Aq$ Readily soluble in water. (Lœwig.)

Bromide of Cyan*bi*amin. Permanent. Easily soluble in water, and in chlorhydric acid. (Bineau.)
(*Solid Ammonio Bromide of Cyanogen.*)
$C_2 H_6 N_3 Br = Cy Br ; 2 N H_3 = N_2 \left\{ \begin{matrix} C_2 N \\ H_6 \end{matrix} \right. , Br$

Bromide of Cyan*sex*amin.
(*Liquid Ammonio Bromide of Cyanogen.*)
$C_2 H_{18} N_7 Br = Cy Br ; 6 N H_3 = N_6 \left\{ \begin{matrix} C_2 N \\ H_{18} \end{matrix} \right. , Br$

Bromide of Cyanogen. Easily soluble in
$C_2 N Br = Cy Br$ water, and alcohol; more so than iodide of cyanogen. (Sérullas.)

Bromide of Cymene. Insoluble in water.
$C_{20} H_{14}'', Br_2$ (Sieveking.)

Bromide of Ethyl. Very sparingly soluble
$C_4 H_5 Br$ in water. (Lœwig.) Miscible in all proportions with alcohol, and ether. (Lœwig.) Water precipitates it from the alcoholic solution. (Sérullas.)

Bromide of Ethylene. Insoluble in water. Soluble in alcohol, ether, and strong aceticacid. (Hermann.) Unacted on by concentrated sulphuric acid. (Regnault.)
(*BromElayl. BromAcetyl. BromÆtherin. Bromhydrate of Bromide of Acetyl. Bromhydrate of Bromide of Aldehydin.*)
$C_4 H_4'', Br_2$

Bromide of Ethylene*bromé*. *Vid.* Bromide of BromEthylene.

Bromide of Ethylene*chloré*. *Vid.* Bromide of *per*ChlorEthylene.

Bromide of Ethylidene. Insoluble in wa-
$C_4 H_4'', Br_2$ ter; but is rapidly decomposed thereby. (Wurtz & Frappoli.)

Bromide of *tetr*Ethylammonium. Deliquescent.

Bromide of *tri*EthylPhosphin.

Bromide of EthylNicotin. Very deliquescent. Very soluble in water. Tolerably soluble in alcohol, even when this is absolute. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **87.** 5.)

***Per*Bromide of Formyl.** *Vid.* Bromide of *bi*BromoMethyl.

Bromide of Glucinum. Soluble in water,
$Gl_2 Br_3$ with great evolution of heat. (Wœhler.) The basic bromides of glucinum may be obtained dissolved in water so long as they contain less than three equivalents of the base, but those containing three, or more than three, equivalents are insoluble in water. (Ordway, *Am. J. Sci.*, (2.) **26.** 207.)

Bromide of Glyceryl. *Vid.* Bromhydrin.

***Ter*Bromide of Gold.** Hygroscopic. Readily soluble in water. (Lampadius.) Soluble in ether. (Wilson.)
(*Bromauric Acid.*)
$Au_2 Br_3$

***Proto*Bromide of Iodine.** Soluble in water.

***Quinqui*Bromide of Iodine.** Soluble in wa-
$I Br_5$ ter, with decomposition.

***Proto*Bromide of Iron.** Very deliquescent.
$Fe Br, \& + 6 Aq$ Soluble in water. (Lœwig.) (Soluble in alcohol?) (Gmelin.)

***Sesqui*Bromide of Iron.** Deliquescent. Sol-
$Fe_2 Br_3$ uble in water, alcohol, and ether. (Lœwig.)

Basic sesquibromides of iron containing six equivalents, and less, of base to one of acid may be obtained dissolved in water. (Ordway, *Am. J. Sci.*, (2.) **26.** 202.)

***Proto*Bromide of Iron & of Mercury.** Deliquescent. Soluble in water. (v. Bonsdorff, *Pogg. Ann.*, 1830, **19.** pp. 340, 343.)

Bromide of Lead.

I.) *normal.* Sparingly soluble in boiling water;
$Pb Br$ more readily soluble in water containing chlorhydric, nitric, or acetic acids. (Lœwig.) Slowly soluble in cold, quickly soluble in warm aqueous solutions of nitrate of ammonia and chloride of ammonium. (Wittstein.) It is not precipitated from solutions containing citrate of soda. (Spiller.)

II.) *basic.* *Vid.* OxyBromide of Lead.

Bromide of Lead & of Potassium. Solu-
$K Br, Pb Br$ ble in a small quantity of water, without decomposition, but is decomposed by much water. (Lœwig.)

Bromide of Lead & of Sodium. Decomposed by water. (Lœwig.)

Bromide of Lead with Carbonate of Lead.
$Pb Br ; Pb O, C O_2$ Insoluble in water.

Bromide of Lithium. Very deliquescent and soluble in water. (Troost.)

Soluble in	0.70 pts.	of water at	0°
"	0.51	"	34°
"	0.45	"	59°
"	0.41	"	82°
"	0.37	"	103°

(Kremers, *Pogg. Ann.*, **103.** 65.)

An aqueous solution of sp. gr. at 19.5° (sp. gr. of water at 19.5° = 1)	Contains pts. of Li Br dissolved in 100 pts. of water.
1.1173	18.3
1.1414	22.8
1.2267	37.8
1.2713	47.8
1.3366	60.2
1.4075	78.7
1.4405	84.1
1.5424	110.2
1.5358	112.7
1.6554	149.8

(Kremers, *Pogg. Ann.*, **104.** pp. 155, 158.)

Bromide of Lithium with Fluoride of Lithium. Deliquescent. Easily soluble in water.

Bromide of LuteoCobalt. Soluble in wa-
$6 N H_3 . Co_2 Br_3$ ter.

Bromide of Magnesium. Deliquescent.
$Mg Br + 6 Aq$ Very soluble in water, with great evolution of heat. (Lœwig.)

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of anhydrous Mg Br dissolved in 100 pts. of water.	An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of anhydrous Mg Br dissolved in 100 pts. of water.
1.0965	12.2	1.4386	64.2
1.1864	24.5	1.5693	88.6
1.2811	38.3		

(Kremers, *Pogg. Ann.*, **104.** 155.)

On evaporating the aqueous solution, some bromhydric acid is evolved. Soluble in alcohol.

Bromide of Magnesium & of Mercury.

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I.) $Mg Br ; Hg Br$ Deliquescent.

II.) $Mg Br ; 2\,Hg Br$ Permanent.

BROMIDE OF MAGNESIUM & OF POTASSIUM. $Mg Br ; K Br + 6\,Aq$ Permanent. Very soluble in water; when the solution is evaporated at the temperature of 75° @ 87° crystals of bromide of potassium are deposited while bromide of magnesium remains in solution. Decomposed by alcohol.

BROMIDE OF MANGANESE. Deliquescent. $Mn Br$ Soluble in water.

*Proto*BROMIDE OF MANGANESE & OF MERCURY. Deliquescent. Soluble in water. (v. Bonsdorff, *Pogg. Ann.*, 1830, **19.** pp. 340, 343.)

BROMIDE OF MERCUR(*ous*)*bi*AMIN.
$N_2\left\{H_6 \cdot Hg_2, Br\right.$

BROMIDE OF *di*MERCUR(*ous*)AMMONIUM. $N\left\{\begin{matrix}H_2\\2\,Hg_2\end{matrix}\right. Br$ Resembles the corresponding chloride.

BROMIDE OF *di*MERCUR(*ic*)AMMONIUM. $N\left\{\begin{matrix}H_2\\2\,Hg\end{matrix}\right. Br$ Insoluble in cold water, or in alcohol. Slightly soluble in ammonia-water. (Lœwig.)

BROMIDE OF MERCUR(*ic*)AMMONIUM & OF MERCURY. $N\left\{\begin{matrix}H_2\\Hg\end{matrix}\right. Br ; Hg Br$ Insoluble in water. (H. Rose.)

BROMIDE OF MERCUR(*ous*)ETHYL. $C_4 H_5 Hg_2, Br$ Resembles the chloride.

*Di*BROMIDE OF MERCURY. $Hg_2 Br$ Insoluble in water and in alcohol. (Parrish's *Pharm.*, p. 561.) Easily soluble in an aqueous solution of protonitrate of mercury. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 317.) Insoluble in cold aqueous solutions of carbonate and succinate of ammonia or chloride of ammonium, but they all dissolve it partially, with separation of mercury, when hot. Insoluble in boiling aqueous solutions of sulphate or nitrate of ammonia. (Wittstein.) Like the dichloride, it is partially decomposed by aqueous solutions of the alkaline chlorides; when out of contact with the air this decomposition is slight and protobromide is formed, while in the air protochloride of mercury ($Hg Cl$) is the result of the action. The decomposition is much more marked in hot solutions than in cold. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 177.).

*Proto*BROMIDE OF MERCURY.

I.) *normal.* $Hg Br$ Difficultly soluble in water. Soluble in 250 pts. of water at the ordinary temperature, and in 25 pts. of boiling water; in 12 pts. of cold, and in 3 pts. of hot spirit; still more readily soluble in ether. (Wittstein's *Handw.*) Soluble in 240 pts. of water at 18.75°. (Abl, from *Oesterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) Soluble in 94 pts. of water at 9°, and in 4 @ 5 pts. at boiling. Easily soluble in alcohol, and still more soluble in ether. (Balard.) Decomposed by warm nitric, and sulphuric acids.

II.) *basic.* *Vid.* OxyChloride of Mercury.

BROMIDE OF MERCURY & OF POTASSIUM.

I.) $K Br ; Hg Br$ (?) Permanent. Soluble in water. (v. Bonsdorff, *Pogg. Ann.*, 1830, **19.** pp. 340, 341.)

II.) $K Br ; 2\,Hg Br + 2\,Aq$ Permanent. Soluble in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1830, **19.** 340.)

BROMIDE OF MERCURY & OF SODIUM.

I.) $Na Br ; Hg Br$ (?) Deliquescent. (v. Bonsdorff.)

II.) $Na Br ; 2\,Hg Br + 3\,Aq$ Soluble in water, and alcohol. (Berthemot.)

*Di*BROMIDE OF MERCURY & OF STRONTIUM.

I.) $Sr Br, Hg_2 Br$ Soluble in all proportions in water.

II.) $Sr Br, 2\,Hg_2 Br$ Decomposed by much water, to the preceding compound and insoluble bromide of mercury. (Lœwig.)

*Proto*BROMIDE OF MERCURY & OF ZINC. Deliquescent. Soluble in water. (v. Bonsdorff, *Pogg. Ann.*, 1830, **19.** pp. 340, 343.)

*Proto*BROMIDE OF MERCURY with OXIDE OF CACODYL. $2\,Hg Br ; C_4 H_6 As O$ Somewhat soluble in water, the solution undergoing decomposition when boiled. (Bunsen.) About as soluble as the compound with chloride of mercury, *q. v.*

*Proto*BROMIDE OF MERCURY with SULPHIDE OF MERCURY. (*Sulphobromide of Mercury.*) $Hg Br ; 2\,Hg S$ Insoluble in hot nitric or sulphuric acids. (H. Rose.)

BROMIDE OF METHYL. (*Methylic Bromide. Hydrobromic Methyl Ether.*) $C_2 H_3 Br$ Insoluble, or but sparingly soluble in water at 0°. (Pierre.) Easily soluble in alcohol, wood-spirit, and ether.

BROMIDE OF METHYL*bibromé*. *Vid.* Bromide of *bi*BromoMethyl.

BROMIDE OF *tri*METHYLBROMETHYLAMMONIUM. $C_{10} H_{13} N Br_2 = N\left\{\begin{matrix}(C_2 H_3)_3\\C_4 H_4 Br\end{matrix}\right. Br$ Very easily soluble in water, and in boiling alcohol. Sparingly soluble in cold alcohol. Insoluble in ether.

BROMIDE OF METHYLSELENIOUS ACID.
$C_2 H_4 Br Se_2 O_5 = Se_2 (C_2 H_3) Br O_4 + Aq$

BROMIDE & *ter*CHLORIDE OF NAPHTHALIN. (*Ter Chloro Bromide of Naphthalin.*) $C_{20} H_6'' \left\{\begin{matrix}Cl_3\\Br\end{matrix}\right.$ More soluble than (α) bichloride of naphthalin in ether, but less soluble therein than (β) bichloride of naphthalin. (Laurent.)

BROMIDE OF NAPHTHALIN *bromé*, *chloré*, &c. *Vid.* Bromide of Bromo, Chloro, &c., Naphthalin.

BROMIDE OF NICKEL.

a = anhydrous. $Ni Br$ Like the chloride, it is only very slowly soluble in water.

b = hydrated. $Ni Br + 8\,Aq$ Deliquescent. Easily soluble in water. Soluble in alcohol, ether, chlorhydric acid, and ammonia-water. (Berthemot.)

BROMIDE OF NICKEL*ter*AMIN. (*Ammonio Bromide of Nickel.*) $N_2\left\{H_9 \cdot Ni, Br\right.$ Soluble in a small amount of water, but is decomposed when this solution is diluted with much water. (Rammelsberg.)

BROMIDE OF NITROGEN. $N Br_3$ Quickly decomposed by water, even more readily than chloride of nitrogen.

BROMIDE OF NITROMETHYL*perbrome*. *Vid.* Bromide of *per*BromoNitroMethyl.

BROMIDE OF OCTYL. (*Bromide of Capryl. BromoCapryl. CaprylBromhydricEther.*) $C_{16} H_{17} Br$ Insoluble in water. Soluble in alcohol. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 130.)

BROMIDE OF OCTYLENE. *Vid.* Bromide of Caprylene.

*Bi*BROMIDE OF PALLADIUM. $Pd Br_2$ (?) Insoluble in water. Soluble in water acidulated with bromhydric acid. (v. Bonsdorff, *Pogg. Ann.*, 1830, **19.** 347.) Insoluble in alcohol.

*Bi*BROMIDE OF PALLADIUM & OF *X*. *Vid.* BromoPalladiate of *X*.

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*Proto*BROMIDE OF PALLADIUM & OF POTASSIUM. $K\,Br, Pd\,Br$ Easily soluble in water, somewhat more difficultly soluble in alcohol.

*Proto*BROMIDE OF PALLADIUM & OF SODIUM.

*Ter*BROMIDE OF PHOSPHORUS. $P\,Br_3$ Decomposed, with solution, by water.

*Penta*BROMIDE OF PHOSPHORUS. $P\,Br_5$ Decomposed, with solution, by water.

BROMIDE OF PLATIN(*ous*)*bi*AMIN. (*Ammonioprotobromide of Platinum.*) $N_2 \left\{ H_6 . Pt', Br \right.$ Soluble in water. (Reiset, *Ann. Ch. et Phys.*, (3.) **11.** pp. 425, 426.)

*Bi*BROMIDE OF PLATINUM. (*BromoPlatinic Acid.*) $Pt\,Br_2$ Deliquescent. Soluble in water. (v. Bonsdorff, *Pogg. Ann.*, 1830, **19.** 343.)

*Bi*BROMIDE OF PLATINUM with BROMIDE OF *X*. *Vid.* BromoPlatinate of *X*.

BROMIDE OF $\frac{3}{2}$ PLUMBETHYL. $(C_4\,H_5)_3\,Pb_2, Br$ Easily soluble in alcohol, and ether.

BROMIDE OF POTASSIUM. $K\,Br$ Permanent.

Soluble in	1.87	pts. of water at	0°
"	1.55	"	20°
"	1.34	"	40°
"	1.18	"	60°
"	1.07	"	80°
"	0.98	"	100°

The saturated solution boils at 112°. (Kremers, *Pogg. Ann.*, **97.** pp. 15, 20.) Soluble in 4 pts. of water at 18.75° (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76); in 4 pts. of cold, and in 1 pt. of boiling water; in 200 pts. of cold alcohol of 80% and in 16 pts. at boiling.

An aqueous solution of sp. gr., at 19.5° (sp. gr. of water at 19.5°=1)	Contains per cent of K Br	Contains pts. of K Br dissolved in 100 pts. of water.
1.0755	10.088	11.22
1.1505	19.015	23.48
1.2222	26.670	36.37
1.2995	34.080	51.70
1.3618	39.500	65.29

(Kremers, *loc. cit.*, **95.** 119; the second column is from Gerlach's *Sp. Gew. der Salzlœsungen*, p. 33.)

From the observations of Kremers, Schiff calculates the following table by means of the formula:—

$$D = 1 + 0.00725\,p + 0.000022\,p^2 + 0.000000\,p^3;$$

in which D = the sp. gr. of the solution and p the percentage of substance in the solution.

An aqueous solution of sp. gr.	Contains per cent of K Br.	An aqueous solution of sp. gr.	Contains per cent of K Br.
1.037	5	1.201	25
1.075	10	1.248	30
1.115	15	1.298	35
1.157	20	1.351	40

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **107.** 306.)

BROMIDE OF POTASSIUM & OF THORIUM. Soluble in water.

BROMIDE OF POTASSIUM with CYANIDE OF MERCURY. $K\,Br; 2\,Hg\,Cy + 4\,Aq$ Soluble in 13.34 pts. of water at 18°, and in less than 1 pt. of boiling water. (Brett.) Soluble in alcohol, especially when this is hot. Soluble, without decomposition, even in hot dilute or monohydrated sulphuric, chlorhydric, or nitric acid. (Brett.)

BROMIDE OF PROPYLENE. (*Bromide of Tritylene.*) $C_6\,H_6'', Br_2$ Insoluble in water. Miscible with alcohol, and ether. (Reynolds.)

BROMIDE OF SALICYL. *Vid.* BromoSalicylous Acid.

BROMIDE OF SELENETHYL. $C_4\,H_5\,Se\,Br$ Readily soluble in ammonia-water, with formation of oxybromide. (Joy.)

BROMIDE OF SELENIUM. $Se\,Br$ Soluble in water, with decomposition.

BROMIDE OF SILICON. $Si\,Br_3$ Decomposed by water, like the chloride, with evolution of heat.

BROMIDE OF SILVER. $Ag\,Br$ Insoluble in water. It is precipitated before chloride of silver when a solution of a silver salt is added to a mixed solution of chlorhydric and bromhydric acids. (Berthier.) Slightly soluble in concentrated aqueous solutions of bromide of potassium, and bromide of sodium. (Lœwig.) Soluble in a hot aqueous solution of chloride of ammonium; very sparingly soluble in solutions of carbonate, sulphate, or succinate of ammonia, and still less soluble in a solution of nitrate of ammonia. (Wittstein.) Soluble in an aqueous solution of protonitrate of mercury. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 317.) Soluble in concentrated bromhydric, and chlorhydric acids. (Lœwig.) Boiling concentrated sulphuric acid decomposes it (Balard); hardly acts upon it (Dumas, *Tr.*); dissolves a small quantity of it, which is reprecipitated on the addition of water. (Berzelius, *Lehrb.*, **3.** 916.) Boiling concentrated nitric acid does not act upon it at all. (Balard.) Soluble in concentrated caustic ammonia; very sparingly in dilute ammonia-water. (Wackenroder.) Very slightly soluble in ammonia-water, from which it separates out unchanged on evaporating the solution. (Berzelius, *Lehrb.*) Only slowly soluble in concentrated ammonia-water. (Ot. Gr.) When prepared in the moist way, it is completely insoluble in water or nitric acid. Tolerably soluble in ammonia-water. Soluble in a hot aqueous solution of chloride of ammonium. Very sparingly soluble in a solution of nitrate of ammonia. (Fresenius, *Quant.*, p. 164.) Soluble in caustic-ammonia, though somewhat more difficultly than chloride of silver. Insoluble in dilute acids, sparingly soluble in concentrated sulphuric acid, from which it is precipitated on the addition of water. (Wittstein's *Handw.*)

BROMIDE OF SILVER with CHLORIDE OF SILVER. These salts appear to crystallize together in all proportions. Whether the solubilities of these mixtures vary from those of their components is a point not yet established.

BROMIDE OF SODIUM. $Na\,Br + 4\,Aq$ Readily soluble in water, and in weak alcohol. (O. Henry.) Very sparingly soluble in alcohol. (Gmelin.)

1 pt. of the anhydrous salt

is soluble in	1.29	pts. of water at	0°
	1.13		20°
	0.96		40°
	0.90*		60°
	0.89*		80°
	0.87*		100°

* In these three determinations the solutions remained supersaturated when cooled down, till at about 20° they solidified with development of considerable heat. (Kremers, *Pogg. Ann.*, **97.** pp. 14, 20.)

The saturated aqueous solution boils at 121°. (Kremers, *Ibid.*)

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An aqueous solution of sp. gr., at 19.5° (sp. gr. of water at 19.5° = 1)	Contains Per Cent of Na Br	Pts. of Na Br dissolved in 100 pts. of water.
1.1094	13.104	15.08
1.2175	24.093	31.74
1.3206	33.083	49.44
1.4342	41.643	71.36
1.5136	46.981	88.61

(Kremers, *Pogg. Ann.*, **95.** 120; the second column is from Gerlach's *Sp. Gew. der Salzlœsungen*, p. 33.)

From the observations of Kremers, Schiff calculates the following table, by means of the formula: $D = 1 + 0.00762\,p + 0.000059\,p^2 + 0.0000006\,p^3$; in which D = the sp. gr. of the solution and p the percentage of substance in the solution.

An aqueous solution of sp. gr.	Contains per cent of Na Br.	An aqueous solution of sp. gr.	Contains per cent of Na Br.
1.040	5	1.298	30
1.083	10	1.365	35
1.130	15	1.438	40
1.181	20	1.518	45
1.237	25		

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **107.** 305.)

Bromide of Sodium with **Cyanide of Mercury**. Readily soluble in water, and alcohol. Decomposed by acids. (Caillot.)
$Na\,Br;\ 2\,Hg\,Cy + 8\,Aq$

Bromide of Spiroyl. *Vid.* BromoSalicylous Acid.

Bromide of StannEthyl. Soluble in alcohol. Still more soluble in ether. Water precipitates it from both these solutions. (Lœwig.)
$C_4\,H_5\,Sn,\ Br$

Bromide of *bi*StannEthyl.
$C_4\,H_5\,Sn_2,\ Br$

Bromide of *bi*Stann(*ic*)*tri*Ethyl. Soluble in alcohol, and ether.
(*Bromide of MethyloStannEthyl.*)
$Sn_2\,(C_4\,H_5)_3,\ Br$

Bromide of StannMethyl.

Bromide of Stib*tri*Amyl. Soluble in alcohol, especially in absolute alcohol, and in ether.
$(C_{10}\,H_{11})_3\,Sb,\ Br_2$

Bromide of Stib*tri*Ethyl.

I.) $(C_4\,H_5)_3\,Sb,\ Br_2$ Entirely insoluble in water. Very easily soluble in alcohol, and ether. (Lœwig & Schweitzer.)

II.) *Merck's bromide.* Soluble in water. (Merck.)
$(C_4\,H_5)_3\,Sb,\ Br$

Bromide of StibEthylium. Permanent. Very readily soluble in water, and alcohol. (Lœwig.)
$(C_4\,H_5)_4\,Sb,\ Br + x\,Aq$

Bromide of StibMethylium. Very soluble in water, and alcohol. Insoluble in ether. (Landolt.)
$Sb\left\{(C_2\,H_3)_4\right.\ Br$

Bromide of Stilbene. Insoluble in alcohol or ether.
$C_{28}\,H_{12}'',\ Br_2$

Bromide of Strontium. Efflorescent. Easily soluble in water, being more readily soluble than bromate of strontia. Somewhat soluble in absolute alcohol. (Lœwig.) The crystallized salt is soluble in 1 pt., or less, of cold water. When heated, it melts in its water of crystallization. (Berzelius, *Lehrb.*, **3.** 385.)
$Sr\,Br\ \&\ + 6\,Aq$

1 pt. of the anhydrous salt
s soluble in 1.14 pts. of water at 0°
1.01 20°
0.89 38°
0.75 59°
0.55 83°
0.40 110°
(Kremers, *Pogg. Ann.*, **103.** 66.)

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.1327	16.15
1.2620	33.05
1.3784	49.51
1.5106	69.57
1.6809	98.13

(Kremers, *Pogg. Ann.*, **99.** 444.)

Bromide of Strontium with **Cyanide of Mercury**. Efflorescent. Soluble in water, and alcohol. Decomposed by acids.
$Sr\,Br;\ 2\,Hg\,Cy + 6\,Aq$

Bromide of Sulphur.

I.) $S_2\,Br$

II.) $S\,Br$ Slowly decomposed by cold, quickly decomposed by hot water. (Balard.)

Bromide of TellurEthyl. Soluble in a solution of ammonia.
$C_4\,H_5\,Te,\ Br$

***Proto*Bromide of Tellurium.**

I.) *normal.* Decomposed by water. (Berzelius.)
$Te\,Br$

II.) *basic.*

***Bi*Bromide of Tellurium.**
(*Bromotelluric Acid.*)

I.) *normal.* Slowly deliquescent. Soluble, without decomposition, in a very small quantity of water, but a larger quantity of water decomposes it.
$a = Te\,Br_2$

$b =$ *hydrated.* Deliquesces with extraordinary rapidity.
$Te\,Br_2 + Aq$

II.) *basic.* Permanent. Decomposed by much water.
(*Tellurite of biBromide of Tellurium.*)

***Bi*Bromide of Tellurium** with **Bromide of *X*.** *Vid.* BromoTellurate of *X*.

Bromide of TellurMethyl.
$C_2\,H_3\,Te,\ Br$

Bromide of Tetryl. *Vid.* Bromide of Butyl.

Bromide of Tetrylene. *Vid.* Bromide of Butylene.

Bromide of Thorium. Permanent. Soluble in water. (Berzelius.)
$Th\,Br$

***Proto*Bromide of Tin.** Soluble in water.
$Sn\,Br$

***Bi*Bromide of Tin.** Soluble in water, apparently without decomposition. (Balard.)
$Sn\,Br_2$

Bromide of Titanium. Deliquesces with decomposition. (Duppa.)
$Ti\,Br_2$

Bromide of Tritylene. *Vid.* Bromide of Propylene.

Bromide of Tungsten.

I.) $W\,Br_2$ Deliquesces, with decomposition, in the air. (Borck.)

II.) $W\,Br_2,\ W\,Br_3$

III.) $W\,Br_3$ Decomposed immediately by water. (Riche.)

***Proto*Bromide of Uranium.** Deliquescent. Soluble in water. (Rammelsberg.)
$Ur\,Br + 4\,Aq$

***Sesqui*Bromide of Uranium.** Deliquescent. Soluble in alcohol. (Berthemot.)
$Ur_2\,O_3,\ H\,Br$

Bromide of Valeryl.
$C_{10}\,H_9\,O_2,\ Br$

***Bi*Bromide of Vanadium.**
$V\,Br_2$

$a =$ *blue modif.* Soluble in water. When mixed with alcohol the solution gelatinizes, but on evaporating the alcohol it becomes fluid again.

$b =$ *brown modif.* Soluble in water.

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Bromide of Yttrium. Deliquescent. Very soluble in water, with evolution of heat. (Berlin.)
$Y\,Br$

Bromide of Zinc. Deliquescent. Soluble in water, with evolution of heat. Soluble in alcohol, ether, chlorhydric and acetic acids, and in ammonia. (Berthemot.)
$Zn\,Br$

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.1715	20.6
1.3270	42.6
1.3371	43.9
1.6101	91.4
1.7190	112.7
1.8797	150.3
2.1095	211.1
2.1441	224.7
2.3914	318.3

(Kremers, *Pogg. Ann.*, **104.** 155, & **106.** 587.)

Bromide of Zincammonium. Decomposed by water. Soluble in warm, less soluble in cold ammonia-water. (Rammelsberg.)
$N\left\{\begin{matrix}H_3\\ Zn\end{matrix}\right., Br + Aq$

Bromide of Zirconium. Easily soluble in water. (Berthemot.)
$Zr_2\,Br_3$

***Bi*Bromimasatin.** Soluble in a solution of potash. (Laurent.)
(*Imabromisatinèse. Imabibromisatin.*)
$C_{32}\,H_7\,Br_4\,N_3\,O_6$

BromIndatmit. *Vid. ter*BromAnilin.

***Bi*Bromindin.** Sparingly soluble in alcohol, and ether. (Laurent.)
$C_{32}\,H_6\,Br_4\,N_2\,O_4$

Bromindoptic Acid. *Vid. ter*BromoPhenic Acid.

Bromine. Soluble in 33.3 pts. of water at 15°. When exposed to sunlight the solution is gradually converted into bromhydric acid. (Lœwig.) Below + 4° it forms a crystalline hydrate with water. Soluble in 31.0 pts. of water. (Slessor.) No more soluble in hot than in cold water.
Br

An aqueous solution of sp. gr.	Contains in 1000 pts., pts. of Br.	An aqueous solution of sp. gr.	Contains in 1000 pts., pts. of Br.
1.0090 . .	10.7	1.0149 .	18.7 @ 19
1.0093	12.0	1.0158	19.5 @ 20.1
1.0099	13.0	1.0181	20.9 @ 21.5
1.0122 . .	15.0	1.0237*	31.0 @ 31.7

(Slessor.)

* Saturated solution.

Soluble in 34.29 pts. of water at 18.75°. (Abl, from *Oesterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.)

Easily soluble in strong alcohol, and in all proportions in ether, but these solutions soon undergo decomposition. Easily soluble in bisulphide of carbon. Tolerably soluble in glycerin, with combination. (Pelouze.) Soluble in benzin. (Mansfield.) Insoluble in benzin. (Moride, *Ann. Ch. et Phys.*, (3.) **39.** 452.) Soluble in oil of mandarin. (Luca.) Soluble in warm chloral (Liebig); also in bromal and iodal (Lœwig); soluble in chloride of sulphur (Solly); and in bromide of sulphur (Ot. Gr.). Readily soluble in strong acetic acid; decomposition ensuing after a time. (Balard.) Readily soluble in valerianic acid. (Trautwein.) Abundantly soluble, without decomposition, in aqueous solutions of the acetates of potash, soda, and lime. (Cahours.)

Soluble to an enormous extent in very concentrated bromhydric acid, from which solution much of it is precipitated on the addition of water, a solution remaining which contains three times as much bromine as there is acid. The bromine is easily expelled from these solutions on boiling or merely on exposure to the air. (Bineau, *Ann. Ch. et Phys.*, (3.) **7.** pp. 264, 274.) Soluble in concentrated chlorhydric acid. Less soluble in concentrated sulphuric acid than in water.

According to Balard, bromine is no more soluble in an aqueous solution of bromide of potassium than in pure water. Lœwig finds, however, that a solution of 1 pt. bromide of potassium in 6 pts. of water takes up as much bromine as it already contains; when this solution is gently heated the bromine which was dissolved is separated. A solution of 1 pt. of bromide of potassium in 1 pt. of water takes up twice as much bromine as it already contains, much heat being evolved. This solution loses its bromine when heated or exposed to the air. (Gmelin's *Handbook.*)

Most of the metallic bromides are soluble in water. Several of them are soluble in ether. (Gmelin.)

BromIodoform. *Vid.* Iodide of *bi*Bromo-Methyl.

***Mono*BromIsatic Acid.**
$C_{16}\,H_6\,Br\,N\,O_6$

***Mono*BromIsatate of Potash.**

***Bi*BromIsatic Acid.** Somewhat sparingly soluble in water. (Laurent.)
$C_{16}\,H_5\,Br_2\,N\,O_6$

***Bi*BromIsatate of Baryta.** Soluble in boiling water, separating out as the solution cools.

***Bi*BromIsatate of Copper.** Ppt.

***Bi*BromIsatate of Lead.** Soluble in water.

***Bi*BromIsatate of Lime.** Soluble in boiling water, separating out as the solution cools.

***Bi*BromIsatate of Potash.** Less soluble in water, and alcohol, than the bichlorisatate of potash.
$C_{16}\,H_4\,K\,Br_2\,N\,O_6 + 2\,Aq$

***Bi*BromIsatate of Silver.** Soluble in boiling, less soluble in cold water. (Laurent.)

BromIsatin. Soluble in boiling, less soluble in cold water. (Erdmann.) Soluble in boiling, less soluble in cold alcohol. (Hofmann.)
(*Bromisatinase.*)
$C_{16}\,H_4\,Br\,N\,O_4$

***Bi*BromIsatin.** More soluble in water than monobromisatin. Readily soluble in alcohol. (Erdmann.) Readily soluble in boiling, less soluble in cold alcohol. (Laurent.) Soluble in a cold aqueous solution of caustic potash; the solution subsequently undergoing decomposition, slowly in the cold, at once when heated. (Erdmann.)
(*Bromisatinèse.*)
$C_{16}\,H_3\,Br_2\,N\,O_4$

***Bi*BromIsatin with Potash.**
$C_{16}\,H_2\,K\,Br_2\,N\,O_4$

BromIsatinase. *Vid.* BromIsatin.

BromIsatinèse. *Vid. bi*BromIsatin.

***Bi*BromIsathyde.**
$C_{32}\,H_8\,Br_4\,N_2\,O_8$

***Bi*BromIsatoSulphite of Potash.** Very sparingly soluble in water. (Laurent.)
$C_{16}\,H_4\,Br_2\,K\,N\,O_6, 2\,S\,O_2$

BromItonic Acid. Tolerably soluble in cold, readily soluble in boiling water. Soluble in all proportions in alcohol, and ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **19.** 502.)
(*Bromo Propionic Acid. Bromometacetonic Acid.*)
$C_6\,H_4\,Br_2\,O_4$

BromoAnisic Acid. *Vid.* BromAnisic Acid.

BromoAnisatic Acid. *Vid.* BromAnisic Acid.

BromoAurate of *X*. *Vid.* BromAurate of *X*.

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BromoBenzene.
BromoBenzid.
BromoBenzine.
BromoBenzol.
Vid. Hydride of BromoPhenyl. Also, Bromhydrate of Benzin.

BromoBenzoic Acid. $C_{14}H_5BrO_4 = C_{14}H_4BrO_3, HO$ Sparingly soluble in water. Readily soluble in alcohol, ether, and wood-spirit.

Most of its salts are very readily soluble in water.

BromoBenzoate of Baryta. Sparingly soluble in water.

BromoBenzoate of Copper. Sparingly soluble in water.

BromoBenzoate of Lead. Readily soluble in water.

BromoBenzoate of Lime. Sparingly soluble in water.

BromoBenzoate *of dinoxide* of Mercury. Sparingly soluble in water.

BromoBenzoate of Silver. $C_{14}H_4BrAgO_4$ Sparingly soluble in cold, tolerably easily soluble in warm water. (Peligot.)

BromoBoracic Acid. Soluble, with decomposition, in water. (Poggiale.)

BromoBrucin. (*Brucine bromé.*) $C_{46}H_{25}BrN_2O_8$ Soluble in dilute alcohol; less soluble in water. (Laurent, *Ann. Ch. et Phys.*, (3.) **24.** 314.)

BromoButylene.
C_8H_7Br

*Bi*BromoButyric Acid. *Vid.* BromoTriconic Acid.

*Bi*BromoButyric Ether. *Vid.* BromoTriconate of Ethyl.

BromoCarbolic Acid. *Vid.* BromoPhenic Acid.

BromoCarbonate of *X*. *Vid.* Bromate of *X* with Carbonate of *X*.

*Bi*BromoCarmindin. $C_{64}H_{15}Br_8N_7O_{10}$ Insoluble in water, or in aqueous solutions of caustic potash or ammonia. Very freely soluble in ether; less soluble in alcohol. (Laurent.) Sparingly soluble in alcohol.

*Bi*BromoChlorAnilin. $C_{12}H_4ClBr_2N = N\left\{\begin{matrix} C_{12}H_2ClBr_2 \\ H_2 \end{matrix}\right.$ Entirely insoluble in water. Soluble in alcohol, and ether. Soluble, without alteration, in warm solutions of ammonia and of potash. Soluble in hot concentrated chlorhydric acid, from which it separates out on cooling; it is also precipitated by the addition of water. Soluble in concentrated sulphuric acid, from which it is precipitated by water. (Hofmann.)

*Bi*BromoChloride of Cacodyl.
$C_4H_6AsClBr_2$

BromoChloride of Carbon. *Vid.* Bromide of *per*ChlorEthylene.

Bromo*bi*ChloroNaphthalin. (*Naphthaline bromo-bichlorée. Chlorébronaphtise A.*) $C_{20}H_5BrCl_2$ Tolerably soluble in alcohol. Very soluble in ether.

*Bi*Bromo*bi*ChloroNaphthalin.
(*Naph. bibromo-bichlorée.*)
$C_{20}H_4Br_2Cl_2$

[There are two modifications.]

I.) *Modification α.* (*Chlorébronaptose b.*) Scarcely at all soluble, even in boiling alcohol or ether.

II.) *Modification β.* *Bromécklonaphtose b.*) Scarcely at all soluble in ether or in boiling alcohol.

Bromo*ter*ChloroNaphthalin.
(*Naph. bromo-trichlorée.*)
$C_{20}H_4BrCl_3$

[There are three isomeric modifications.]

I.) *Modification α.* (*Chloribronaphtose a.*) Soluble in ether, and in mixed alcohol and ether. (Laurent.)

II.) *Modification β.* (*Bromachlonaphtose a.*) Scarcely at all soluble in alcohol. Tolerably soluble in ether, though less so than in modification *α*. Soluble in a mixture of alcohol and ether. (Laurent.)

III.) *Modification γ.* (*Bromachlonaphtose b.*) Very sparingly soluble in boiling alcohol and in ether. (Laurent.)

*Bi*Bromo*ter*ChloroNaphthalin.
(*Naph. bibromo-trichlorée.*)
$C_{20}H_3Br_2Cl_3$

[There are two isomeric modifications.]

I.) *Modification α.* (*Bromécklonaphtuse b.*) Somewhat soluble in boiling ether, better in rock-oil.

II.) *Modification β.* (*Chloribronaphtuse.*) . Almost insoluble in ether.

BromoChloroPropylene.
C_6H_4ClBr

BromoCinchonin. $C_{40}H_{23}BrN_2O_2 = N_2\left\{C_{40}H_{22}BrO_2{}^{vi}\right.$ Tolerably easily soluble in boiling, less soluble in cold alcohol.

*Sesqui*BromoCinchonin. $C_{40}H_{22}Br_2N_2O_2 ; C_{40}H_{23}BrN_2O_2$ Insoluble in water. Somewhat soluble in boiling, less soluble in cold alcohol. (Laurent, *Ann. Ch. et Phys.*, (3.) **24.** 309.)

*Bi*BromoCinchonin. $C_{40}H_{22}Br_2N_2O_2$ Insoluble in water. Sparingly soluble in boiling alcohol.

BromoCinnamic Acid. $C_{18}H_7BrO_4$ Soluble in water; the aqueous solution being somewhat decomposed by evaporation. Soluble in alcohol, with partial decomposition. Its salts are easily soluble. (Herzog.)

BromoCinnamate of Silver. Soluble in water, and ether.

BromoCinnamate of Potash. Soluble in water.

BromoCinnamene. *Vid.* Bromide of Cinnamene.

BromoCodein. $C_{36}H_{20}BrNO_6 + 3\,Aq$ Scarcely at all soluble in cold, somewhat more soluble in boiling water. Easily soluble, especially in boiling alcohol. Scarcely at all soluble in ether. Soluble in cold concentrated sulphuric acid, also easily soluble in chlorhydric acid.

*Ter*BromoCodein. $C_{36}H_{18}Br_3NO_6$ Insoluble in water. Readily soluble in alcohol. Insoluble in ether. Sparingly soluble in cold, much more soluble in boiling chlorhydric acid; apparently with partial decomposition.

Its salts are very sparingly soluble in water. (Anderson.)

BromoComenic Acid. $C_{12}H_3BrO_{10} + 3\,Aq$ Sparingly soluble in cold, tolerably soluble in boiling water. Less easily soluble in water than chlorocomenic acid. Soluble in warm alcohol; but less so than chlorocomenic acid. (How.) The normal (*di*) salts of the alkaline earths are insoluble in water, the acid (*mono*) salts of the alkaline earths are, on the contrary, very readily soluble.

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BromoComenate of Silver.
I.) *normal* (*di*). Ppt.
II.) *acid* (*mono*). Sparingly soluble in cold, more readily soluble in boiling water. (How.)
$C_{12}H_2AgBrO_{10}$

***Ter*BromoCumidin.** Insoluble in water. Soluble in alcohol, and ether.
$C_{18}H_{10}NBr_3 = N\left\{\begin{matrix}C_{18}H_8Br_3\\H_2\end{matrix}\right.$

BromoCuminol. *Vid.* Hydrate of BromoCumoyl.

BromoDraconésic Acid.
BromoDraconic Acid. } *Vid.* BromAnisic Acid.

BromoEthylene. *Vid.* BromEthylene.

BromoEuxanthone. *Vid.* BromEuxanthone.

Bromoform. *Vid.* Bromide of *bi*BromoMethyl.

***Bi*BromoKinonamic Acid.** Soluble in caustic ammonia.
(*BiBromo Quinonamic Acid. BromAnilamic Acid.*)
$C_{12}H_3Br_2NO_6$

***Bi*BromoKinonamate of Ammonia.** Soluble in water, and alcohol. (Stenhouse, *Phil. Mag.*, (4.) **8.** 41.)

***Bi*BromoKinonamid.** Nearly insoluble in water, alcohol, and ether. (Stenhouse, *Phil. Mag.*, (4.) **8.** 41.)
(*BiBromo Quinonamid. BromAnilamid.*)
$C_{12}H_4Br_2N_2O_4 = N_2\left\{\begin{matrix}C_{12}Br_2O_4''\\H_4\end{matrix}\right.$

***Bi*BromoKinonic Acid.** Soluble in water, alcohol, and ether. (Stenhouse, *Phil. Mag.*, (4.) **8.** 40.)
(*BiBromo Quinonic Acid. BromAnilic Acid.*)
$C_{12}H_2Br_2O_8$

***Bi*BromoKinonate of Potash.** Readily soluble in water. Almost insoluble in alcohol and in an aqueous solution of caustic potash. (Stenhouse, *loc. cit.*)
$C_{12}K_2Br_2O_8 + 2\,Aq$

***Quadri*BromoKinone.** Nearly insoluble in water. Slightly soluble in cold, tolerably soluble in hot alcohol, and ether. (Stenhouse, *Phil. Mag.*, (4.) **8.** 39.)
(*Quinoneperbromé. Bromanil.*)
$C_{12}Br_4O_4$

BromOleic Acid.
$C_{36}H_{32}Br_2O_4$

BromoMeconin. Sparingly soluble in water. Abundantly soluble in alcohol, and ether. (Anderson, *J. Ch. Soc.*, **9.** 276.)
(*Brom Opianyl. Hydride of Brom Opianyl.*)
$C_{20}H_9BrO_8$

***Bi*BromoMelAnilin.** Almost insoluble in water. Easily soluble in boiling, less soluble in cold alcohol. Readily soluble in ether. (Hofmann, *J. Ch. Soc.*, **1.** 299.)
$C_{26}H_{11}Br_2N_3 = N_2\left\{\begin{matrix}C_{12}H_4(C_2N)\,.\,H\\C_{12}H_3Br_2\\H_3\end{matrix}\right.$

***Ter*BromoMesitylene** (or **Mesitilole**). Completely insoluble in water. Soluble in boiling alcohol. (Hofmann, *J. Ch. Soc.*, **2.** 108.)
$C_{18}H_9Br_3$

BromoMetAcetonic Acid. *Vid.* Bromitonic Acid.

BromoMethylSalicylic Acid. *Vid.* MethylBromoSalicylic Acid.

BromoMethylSelenious Acid.
$C_4H_6BrO, 2\,SeO_2$

BromoNaphthalin.
(*BromoNaphtalase. Bronaphtase. Bromide of Naphtyl* (of Kolbe). *Naphthaline bromée.*)
$C_{20}H_7Br$

***Bi*BromoNaphthalin.** Insoluble in water. Very soluble in alcohol, and ether. Scarcely, if at all, acted upon by concentrated sulphuric acid, even warm. Unacted upon by solution of potash. (Laurent.)
(*Bromnaphtalese. Bronaphtèse. Bromide of BromoNaphthyl* (of Kolbe).)
$C_{20}H_6Br_2$

***Ter*BromoNaphthalin.** Very slightly soluble in alcohol. Tolerably soluble in ether. (Laurent.)
(*Bromnaphtalise. Bronaphtise. Bromide of biBromoNaphtyl.*)
$C_{20}H_5Br_3$

***Quadri*BromoNaphthalin.**
(*Bronaphtase.*)
$C_{20}H_4Br_4$
[There are two modifications.]
I.) Difficultly soluble in alcohol, and ether. (Laurent.)
II.) Very sparingly soluble in ether. (Laurent.)

***Bi*BromoNitrAcetonitril.** Insoluble in water. Readily soluble in alcohol, and ether.
(*Cyanobibromopicrin.*)
$C_4Br_2N_2O_4 = N\left\}C_4Br_2(NO_4)'''\right.$

BromoNitroBenzin.
(*NitroBromoBenzin.*)
$C_{12}H_4(NO_4)Br$

BromoNitroHarmin. Soluble in alcohol. (Fritzsche.)
$C_{26}H_{10}BrN_3O_6 = N_2\left\}C_{26}H_{10}Br(NO_4)O_2\right.$

Bromo*bi*NitroNaphthalin. Insoluble in water. Very soluble in ether; less soluble in alcohol. (Laurent.)
(*Nitrobronaphtise.*)
$C_{20}H_5Br(NO_4)_2$

Bromo*bi*NitroPhenic Acid. Very sparingly soluble in boiling, and still less soluble in cold water. Tolerably soluble in boiling, less soluble in cold alcohol. Its best solvent is boiling ether. Soluble in warm, less soluble in cold concentrated sulphuric acid, but is decomposed when boiled with sulphuric acid. Its salts are generally soluble in water.
(*BiNitroBromoCarbolic Acid. NitroBromoPhenisic Acid.*)
$C_{12}H_3Br(NO_4)_2O_2$

Bromo*bi*NitroPhenate of Ammonia.
$C_{12}H_2(NH_4)Br(NO_4)_2O_2 + 4\,Aq$

Bromo*bi*NitroPhenate of Baryta. Very readily soluble in water. (Laurent.)
$C_{12}H_2BaBr(NO_4)_2O_2 + 4\,Aq$

Bromo*bi*NitroPhenate of Cadmium.
" " **Cobalt.**
" " **Copper.** } Ppts., scarcely at all soluble in ammonia-water.

Bromo*bi*NitroPhenate of Lead.
I.) *di.*
$C_{12}H_2Pb(NO_4)_2O_2, PbO + 8\,Aq$
II.) *polybasic.* Ppt.
$4\,PbO, 3\,C_{12}H_2Br(NO_4)_2O$

Bromo*bi*NitroPhenate of Lime.

Bromo*bi*NitroPhenate of Nickel. Ppt. Scarcely at all soluble in ammonia-water.

Bromo*bi*NitroPhenate of Potash. Sparingly soluble in water, and alcohol. (Laurent.)

Bromo*bi*NitroPhenate of Silver. Ppt.

BromoPalladic Acid. *Vid. bi*Bromide of Palladium.
$PdBr_2$

BromoPalladiate of Barium. Permanent. Easily soluble in water. (v. Bonsdorff, *Pogg. Ann.*, 1830, **19.** 347.)

BromoPalladiate of Manganese. Permanent. Easily soluble in water. (*Ibid.*)

BromoPalladiate of Potassium. Permanent. Easily soluble in water. (*Ibid.*)

BromoPalladiate of Zinc. Soluble in water. (*Ibid.*)

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BromoPapaverin. Insoluble in water. Readily soluble in alcohol, and ether.
$C_{40} H_{20} Br N O_8$

BromoPhenasic Acid. *Vid.* BromoPhenic Acid.

BromoPhenic Acid.
(*Bromo Carbolic Acid.*
Bromo Phenasic Acid.
Bromo Phenylic Acid.)
$C_{12} H_5 Br O_2 = C_{12} H_4 Br O, H O$

BromoPhenate of Ethyl. Soluble in boiling, less soluble in cold alcohol. (Baly, *J. Ch. Soc.*, **2.** 31.)
(*Phenate of Ethyl bromé.*)

BromoPhenate of Methyl.
(*Phenate of Bromo Methyl.*
Phenate of Methyl monobromé. BromAnisol.)
$C_{12} H_4 Br (C_2 H_3) O_2$

***Bi*BromoPhenic Acid.**
(*BiBromoPhenylic Acid.*
BiBromo Carbolic Acid.
Bromo Phenesic Acid.)
$C_{12} H_4 Br_2 O_2 = C_{12} H_3 Br_2 O, H O$

***Bi*BromoPhenate of Methyl.** Soluble in boiling, less soluble in cold alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **10.** 356.)
(*Phenate of biBromo Methyl.*
BiBromanisol. Anisol bibromé.
Phenate of Methyl bromé.)
$C_{12} H_3 Br_2 (C_2 H_3) O_2$

***Ter*BromoPhenic Acid.** Insoluble in water. Somewhat less soluble in alcohol than terchlorophenic acid. (Laurent.)
(*TerBromo Carbolic Acid.*
Bromo Phenisic Acid.
Brom Indoptic Acid.)
$C_{12} H_3 Br_3 O_2 = C_{12} H_2 Br_3 O, H O$

***Ter*BromoPhenate of Ammonia.**
$C_{12} H_2 (N H_4) Br_3 O_2$

BromoPhenesic Acid. *Vid. bi*BromoPhenic Acid.

BromoPhenisic Acid. *Vid. ter*BromoPhenic Acid.

BromoPhenylamin. *Vid.* BromAnilin.

BromoPhenylImesatin. Almost insoluble in water. Readily soluble in boiling, much less readily soluble in cold alcohol. (Engelhardt.)
$C_{28} H_9 Br N_2 O_2$

BromoPhenylSulphurous Acid. Deliquescent. Easily soluble in water.
(*SulphoBromoBenzolic Acid.*
SulphoBromoBenzinic Acid.)
$C_{12} H_5 Br S_2 O_6$

BromoPhenylSulphite of Ammonia. Almost insoluble in water.
$C_{12} H_4 Br (N H_4) S_2 O_6$

BromoPhillygenin.

***Bi*BromoPhloretic Acid.** Insoluble in water. Easily soluble in alcohol, and ether. Soluble in ammonia-water. (Hlasiwetz, *Ann. Ch. u. Pharm.*, **102.** 161.)
$C_{18} H_7 Br_2 O_5, H O$

***Bi*BromoPhloretate of Ammonia.** Sparingly soluble in cold water; partially decomposed when gently heated with water.

***Bi*BromoPhloretate of Baryta.**
$C_{18} H_7 Ba Br_2 O_6$

BromoPhloroglucin. Soluble in boiling, sparingly soluble in cold water. Readily soluble in alcohol and in alkaline liquors.
$C_{12} H_3 Br_3 O_6 + 6 Aq$

BromOpianyl. *Vid.* BromoMeconin.

BromoPicrin. *Vid.* Bromide of *per*BromoNitroMethyl.

BromoPlatinate of Barium. Permanent in warm dry air. (v. Bonsdorff, *Pogg. Ann.*, **19.** 345.) Easily soluble in water.

BromoPlatinate of Calcium. Permanent. Easily soluble in water.

BromoPlatinate of Magnesium. Tolerably permanent. Easily soluble in water.

BromoPlatinate of Manganese. Deliquesces in moist air. Easily soluble in water.

BromoPlatinate of Potassium. Difficultly soluble in water. Insoluble in alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1830, **19.** 344.)
$K Br, Pt Br_2$

BromoPlatinate of Sodium. Permanent. Easily soluble in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1830, **19.** 345; and **33.** 62.)
$Na Br, Pt Br_2 + 6 Aq$

BromoPlatinate of Zinc. Permanent. (v. Bonsdorff, *Pogg. Ann.*, **19.** 346.) Easily soluble in water.

BromoPropionic Acid. *Vid.* Bromitonic Acid.
$C_6 Br_2 H_4 O_4$

BromoPropylene.
$C_6 H_5 Br$

***Bi*BromoPropylene.**
$C_6 H_4 Br_2$

***Ter*BromoPropylene.**
$C_6 H_3 Br_3$

***Ter*BromoPropylic Aldide?** Completely insoluble in water, and in aqueous alkaline solutions. Miscible in all proportions with alcohol, and ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **19.** 504.)
$C_6 H_3 Br_3, O_2$

***Ter*BromoPyroGallic Acid.** Almost insoluble in cold, and only partially soluble in boiling water, while another portion is decomposed. Soluble in alcohol, and ether. Unacted upon by chlorhydric or sulphuric acids, decomposed by concentrated nitric acid. (Rosing.)
$C_{12} H_3 Br_3 O_6 = C_{12} H_2 Br_3 O_5, H O \& + 2 Aq$

BromoPyroMeconic Acid. Sparingly soluble in cold, somewhat more soluble in boiling water. Easily soluble in boiling, less soluble in cold alcohol. Soluble, without decomposition, in monohydrated sulphuric acid. Decomposed by nitric acid. (Brown.)
$C_{10} H_3 Br O_6$

BromoPyroMeconate of Lead. Insoluble in water or alcohol. (Brown.)
$C_{10} H_2 Pb Br O_6 + Aq$

BromoQuinonamid. *Vid.* BromoKinonamid.

BromoQuinonamic Acid. *Vid.* BromoKinonamic Acid.

BromoQuinonic Acid. *Vid.* BromoKinonic Acid.

BromOrceid. *Vid.* BromOrcin.

***Ter*BromOrcin.** Insoluble in water. Very easily soluble in alcohol, and ether. Soluble in alkaline solutions. (Stenhouse.)
(*Brom Orceid. Orcine tribromé.*)
$C_{14} H_5 Br_3 O_4$

BromoSalhydramid. *Vid.* Hydride of BromAzoSalicyl.

BromoSalicylic Acid. Very sparingly soluble even in boiling water. Tolerably soluble especially in warm alcohol, and ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **13.** 101.) Soluble in boiling, less soluble in cold water. Much less soluble in water than salicylic acid. Easily soluble in alcohol. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **7.** 227.)
$C_{14} H_5 Br O_6$

BromoSalicylate of Ammonia. Soluble in water, though less so than the salicylate.

BromoSalicylate of Ethyl. *Vid.* EthylBromoSalicylic Acid.

BromoSalicylate of Methyl. *Vid.* Methyl BromoSalicylic Acid.

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BromoSalicylate of Potash. } Soluble
" " **Soda.** } in water, though less so than the corresponding salicylates. (*Idem.*)

***Bi*BromoSalicylic Acid.** Scarcely at all soluble in water. Tolerably easily soluble in alcohol, and still more soluble in ether. Tolerably soluble in acetic acid. Soluble in gently heated concentrated sulphuric acid; from this solution it is precipitated by water. (Cahours, *Ann. Ch. et Phys.*, (3.) **13.** pp. 103, 112.)
$C_{14}H_4Br_2O_6$

***Bi*BromoSalicylate of Ammonia.** Less soluble in water than the monobromosalicylate.

***Bi*BromoSalicylate of Ethyl.** *Vid.* Ethyl*bi*BromoSalicylic Acid.

***Bi*BromoSalicylate of Methyl.** *Vid.* Methyl*bi*BromoSalicylic Acid.

***Bi*BromoSalicylate of Potash.** Less soluble in water than the monobromosalicylate. Soluble in alcohol.

***Bi*BromoSalicylate of Soda.** Less soluble in water than the monobromosalicylate.

With the oxides of the heavy metals bibromosalicylic acid forms insoluble salts. (Cahours.)

***Ter*BromoSalicylic Acid.** Insoluble in water. Tolerably soluble in alcohol. Very soluble in ether. Soluble in gently heated concentrated sulphuric acid. (Cahours, *Ann. Ch. et Phys.*, (3.) **13.** 105.)
$C_{14}H_3Br_3O_6$

***Ter*BromoSalicylate of Ammonia.** Very sparingly soluble in cold water.

***Ter*BromoSalicylate of Lead.** Ppt.

***Ter*BromoSalicylate of Potash.** Very sparingly soluble in cold water.

***Ter*BromoSalicylate of Soda.** Very sparingly soluble in cold water.

***Ter*BromoSalicylate of Silver.** Ppt. (Cahours.)

BromoSalicylimid. *Vid.* Hydride of BromAzoSalicyl.

BromoSalicylous Acid. Insoluble in water. Readily soluble in alcohol, and ether. Its alkaline salts are less soluble in water (than the chlorosalicylites ?). [Gmelin's Quere.]
(*Hydride of BromoSalicyl. Bromide of Salicyl* (Improperly). *Bromide of Spiroyl. BromoSpiroylous Acid.*)
$C_{14}H_5BrO_4$

***Bi*BromoSalicylous Acid.** Insoluble in water. Soluble in alcohol, and ether.
(*Hydride of biBromoSalicyl. BiBromoSpiroyl.*)
$C_{14}H_4Br_2O_4$

***Bi*BromoSalicylate of Potash.**

BromoSamid. *Vid.* Hydride of BromAzoSalicyl.

BromoSassafras-Oil. Soluble in boiling ether. (St. Evre.)
$C_{20}H_2Br_3O_4 = \left.\begin{matrix}C_{20}HBr_3O_2\\H\end{matrix}\right\}O_2$

BromoSpiroylous Acid. *Vid.* BromoSalicylous Acid.

BromoStearone. Insoluble, or sparingly soluble, in cold alcohol. Soluble in ether. (Rowney, *J. Ch. Soc.*, **6.** 100.)
$C_{70}H_{68}Br_2O_2$

BromoStrychnine. Soluble in alcohol. (Laurent, *Ann. Ch. et Phys.*, (3.) **24.** 312.)
$N_2\left\{C_{42}H_{21}BrO_4{}^{vi}\right.$

BromoStyrol. *Vid.* Bromide of Cinnamene.

BromoSulphoNaphthalic Acid. Soluble in boiling alcohol.
(*BromoNaphthyldithionic Acid. Sulphite of BromoNaphtoyl.*)
$C_{20}H_7BrS_2O_6$

BromoSulphoNaphthalate of Baryta. Difficultly soluble in cold water. (Laurent.)
$C_{20}H_6BrBaS_2O_6$

BromoSulphoNaphthalate of Cobalt. Appears to be soluble in water.

BromoSulphoNaphthalate of Lead. Ppt.

BromoSulphoNaphthalate of Lime. Ppt.

BromoSulphoNaphthalate of Magnesia.
" " **Manganese.**
" " **Nickel.**
Apparently soluble in water.

BromoSulphoNaphthalate of Potash. Difficultly soluble in cold water. Tolerably easily soluble in boiling water, and alcohol. (Laurent.)
$C_{20}H_6BrKS_2O_6$

BromoSulphoNaphthalate of Silver.
" " **Zinc.**
Apparently soluble in water.

***Bi*BromoSulphoNaphthalic Acid.** Easily soluble in water, and alcohol.
$C_{20}H_6Br_2S_2O_6$

***Bi*BromoSulphoNaphthalate of Baryta.** Soluble in hot water, from which it is deposited on cooling. (Laurent.)
$C_{20}H_5Br_2BaS_2O_6$

***Bi*BromoSulphoNaphthalate of Potash.** Soluble in boiling, less soluble in cold water, and alcohol. (Laurent.)
$C_{20}H_5Br_2KS_2O_6$

BromoTellurate of Potassium. Permanent. When treated with a large quantity of water, or with alcohol, it is decomposed. (Berzelius.)
(*BiBromide of Tellurium with Bromide of Potassium.*)

BromoTerebene.
$C_{20}H_4Br_{12}$

***Bi*BromoThionessal.** Insoluble in alcohol, ether, or naphtha.
$C_{56}H_{14}Br_4S_2 = \left.\begin{matrix}C_{28}H_7Br_2\\C_{28}H_7Br_2\end{matrix}\right\}S_2$

***Quinqui*BromoThymic Acid.** Soluble in ether. (Lallemand.)
(*Thymolquintibromé.*)
$C_{20}H_9Br_5O_2 = C_{20}H_8Br_5O, HO$

***Ter*BromoToluidin.** Insoluble in water. Soluble in alcohol, and ether.

BromoTriconic Acid. There are two modifications of this acid: one (α) oily, the other (β) crystalline.
(*BiBromoButyric Acid.*)
$C_8H_6Br_2O_4 = C_8H_5Br_2O_3, HO$

α The oily acid (BromoTriconic Acid, properly so called) is but sparingly soluble in water. It is miscible in all proportions with alcohol, and ether. It is soluble in monohydrated sulphuric acid at a gentle heat, from which solution water precipitates it.

β The crystalline acid (*bi*BromoButyric Acid) dissolves tolerably easily in water, especially at the temperature of boiling. It is readily soluble in alcohol, and ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **19.** 496.)

BromoTriconate of Ammonia.
α) *oily modif.* Very easily soluble in water, and alcohol.
$C_8H_5Br_2(NH_4)O_4, C_8H_6Br_2O_4$
β) *cryst. modif.* Soluble in water.

BromoTriconate of Ethyl. Sparingly soluble in water. Soluble in all proportions in alcohol. (Cahours, *loc. cit.*, p. 499.)
$C_8H_5Br_2(C_4H_5)O_4$

BromoTriconate of Lead.
I.) *cryst. modif.* Sparingly soluble in water.

BromoTriconate of Potash.
I.) *cryst. modif.* Soluble in water.

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BromoTriconate of Silver.
I.) *cryst. modif.* Sparingly soluble in water.
II.) *oily modif.* Slightly soluble in cold water.
$C_8\,H_5\,Br_2\,Ag\,O_4$

BromoTriconate of Soda.
I.) *cryst. modif.* Soluble in water.

*Quadri***BromoTurpentine-Oil.**
$C_{20}\,H_{12}\,Br_4$

*Bi***BromoVeratrol.** $C_{16}\,H_8\,Br\,O_4$ Insoluble in water. Easily soluble in alcohol, and ether. (W. Merck.)

BromOxaform. $C_6\,H\,Br_5\,O_4$ Insoluble either in hot or in cold water. Readily soluble in hot alcohol, especially if it be also concentrated; much less soluble in cold alcohol. Soluble in ether, and wood-spirit. Sparingly soluble in concentrated sulphuric acid when this is gently warmed, but at the temperature of ebullition decomposition ensues. Insoluble in cold moderately concentrated nitric acid, but is sparingly soluble without decomposition in the same acid when boiling. Soluble in a cold concentrated solution of potash, being decomposed when this is heated. (Cahours, *Ann. Ch. et Phys.*, (3.) **19.** 490.)

Brucin. (*Vomicin. Caniramin.*) $C_{46}\,H_{26}\,N_2\,O_8 + 8\,Aq = N_2 \left\{ C_{46}\,H_{26}\,O_8{}^{\text{vi}} \right. + 8\,Aq$ Somewhat efflorescent. Soluble in 850 pts. of cold, and in 500 pts. of boiling water (—— ?); in 320 pts. of cold, and in 150 pts. of boiling water (Duflos); in 768 pts. of water at 18.75° (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 75). Very soluble in alcohol. (Bouchardat, *Ann. Ch. et Phys.*, (3.) **9.** 231.) More soluble than strychnine in alcohol. Soluble in ammonia-water. (Parrish's *Pharm.*, p. 410.) Very soluble at ordinary temperatures in water saturated with carbonic acid. (Langlois.) 100 pts. of chloroform dissolve 14 pts. of it. (Schlimpert, *Kopp & Will's J. B. für* 1859, p. 405.) 100 pts. of chloroform dissolve 56.79 pts. of it. (Michael Pettenkofer, *Kopp & Will's J. B. für* 1858, p. 363.) 100 pts. of olive-oil dissolve 1.78 pts. of it. (M. Pettenkofer, *loc. cit.*) Sparingly soluble in the essential oils. Insoluble in ether and the fatty oils. (Gerhardt's *Tr.*) Most of the brucin salts are difficultly soluble in cold water, or alcohol. They are generally freely soluble in glycerin. (Parrish's *Pharm.*, p. 232.)

Brunolic Acid. Insoluble in water. Soluble in alcohol and in alkaline lyes. Its salts are mostly insoluble. (Runge.)

Brunolate of Lime. Insoluble in alcohol.

Brunolate of Soda. Soluble in water.

Bryonin (from *Bryonia alba*). $C_{96}\,H_{84}\,O_{42}$ Soluble in water, and alcohol. Insoluble in ether. Soluble, with decomposition, in concentrated sulphuric, nitric, and chlorhydric acids. Soluble, without decomposition, in alkaline solutions.

Bryonitin. Soluble in water, and ether. Insoluble in alcohol.
Soluble in alcohol, of 95%, and ether. (Parrish's *Pharm.*, p. 422.)

Bryoretin. Soluble in ether. (Walz.)
$C_{42}\,H_{35}\,O_{14}$

Butaldid. *Vid.* Hydride of Butyryl.

Butter. See **Fats.**

Butyl. (*Valyl. Tetryl* (of Gerhardt). *Butylium.*) $C_8\,H_9$, or $\left. \begin{matrix} C_8\,H_9 \\ C_8\,H_9 \end{matrix} \right\}$ Completely insoluble in water. Miscible in all proportions with alcohol, and ether. (Kolbe, *J. Ch. Soc.*, **2.** 161.)

Butyl Alcohol. *Vid.* Hydrate of Butyl.

Butylamin. (*Tetrylamin. Tetryl ammonia. Butyliaque. Butyriaque. Butyramin. Nitride of Tetryl.*) $C_8\,H_{11}\,N = N \left\{ \begin{matrix} C_8\,H_9 \\ H_2 \end{matrix} \right.$ Soluble in all proportions in water, alcohol, and ether. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **42.** 166.)

ButylAmyl.
(*Tetryl Amyl.*)
$C_{18}\,H_{20} = \begin{matrix} C_8\,H_9 \\ C_{10}\,H_{11} \end{matrix}$

Butylate of Ethyl. *Vid.* Oxide of Ethyl and of Butyl.

ButylCaproyl.
(*Tetryl Hexyl.*)
$C_{20}\,H_{22} = \left. \begin{matrix} C_{12}\,H_{13} \\ C_8\,H_9 \end{matrix} \right\}$

Butylene. (*Butyrene. Tetrylene. Di Tetryl.*) $C_8\,H_8$ Very sparingly soluble in cold water. Much more soluble in alcohol, and in oils, both fixed and volatile. Olive-oil absorbs about 6 times its own volume. (Faraday.) It is dissolved by a solution of dichloride of copper in chlorhydric acid, also, quickly, by monohydrated sulphuric acid and by bromine, with combination. Soluble in inflammable liquids generally. It is disengaged from its solutions by ebullition. (Berthelot, *Ann. Ch. et Phys.*, (3.) **51.** 70.)

Butylene *Chloré.* *Vid.* ChloroButylene.

ButylGlycol. *Vid.* Hydrate of Butylene.

Butyliaque. *Vid.* Butylamin.

Butylic Alcohol. *Vid.* Hydrate of Butyl.

Butylic Ether. *Vid.* Oxide of Butyl.

Butylic Mercaptan. *Vid.* Sulphydrate of Butyl.

Butylic Urethan. *Vid.* Carbamate of Butyl.

Butylium. *Vid.* Butyl.

ButylLactic Acid. Soluble in water.
(*Isomeric with Acetonic Acid.*)
$C_8\,H_8\,O_6 = C_8\,H_6\,O_4, 2\,H\,O$

ButylLactate of Baryta. $C_8\,H_7\,Ba\,O_6$ Easily soluble in water, and dilute alcohol. Insoluble in absolute alcohol.

ButylLactate of Lime. $C_8\,H_7\,Ca\,O_6$ Very easily soluble in water. Soluble in absolute alcohol. Insoluble in ether.

ButylLactate of Zinc. $C_8\,H_7\,Zn\,O_6 + 2\,Aq$ Permanent. Soluble in 160 pts. of water at 15°. Almost insoluble in absolute alcohol.

ButylLeucin. $C_{10}\,H_{11}\,N\,O_4 = N \left\{ \begin{matrix} C_2\,H\,O_2 \\ C_8\,H_9 \\ H \end{matrix} \right\} O_2$ Soluble in water; less soluble in alcohol. Insoluble in ether. Soluble, with combination, in chlorhydric acid.

ButylSulphuric Acid.
(*SulphoButylic Acid. TetrylSulphuric Acid.*)
$C_8\,H_{10}\,O_2, S_2\,O_6$

ButylSulphate of Baryta. $C_8\,H_9\,Ba\,O_2, 2\,S\,O_3 + 2\,Aq$ Very readily soluble in water.

ButylSulphate of Lime. $C_8\,H_9\,Ca\,O_2, 2\,S\,O_3$ Very soluble in water.

ButylSulphate of Potash. $C_8\,H_9\,K\,O_2, 2\,S\,O_3$ Very soluble in water. Tolerably readily soluble in boiling, but only sparingly soluble in cold alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **42.** 162.)

ButylSulphydric Acid. *Vid.* Sulphydrate of Butyl.

Butyral. *Vid.* Hydride of Butyryl.

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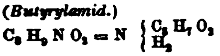
Butyral *chloré*. *Vid.* Hydride of ChloroButyryl.

ButyralAmmonia. *Vid.* Butyrylide of Ammonium.

Butyraldehyde. *Vid.* Hydride of Butyryl.

Butyramid. Permanent. Soluble in water, especially when this is warm. Also soluble in alcohol, and ether. (Chancel.)

(*Butyrylamid.*)



$C_8 H_9 N O_2 = N \left\{ \begin{matrix} C_8 H_7 O_2 \\ H_2 \end{matrix} \right.$

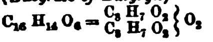
Butyramide mercurique. *Vid.* Mercur(*ic*)Butyramid.

Butyramin. *Vid.* Butylamin.

ButyrAnilid. *Vid.* PhenylButyramid.

Butyric Acid(Anhydrous). It is slowly acidified, by absorbing water, when exposed to the air. Slowly miscible with water. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 320.)

(*Butyrate of Butyryl.*)



$C_{16} H_{14} O_6 = \left. \begin{matrix} C_8 H_7 O_2 \\ C_8 H_7 O_2 \end{matrix} \right\} O_2$

Butyric Acid. Soluble in all proportions in water, alcohol, and wood-spirit. Unacted upon by cold concentrated sulphuric acid, but is partially decomposed when heated therewith. (Pelouze & Gélis, *Ann. Ch. et Phys.*, (3.) **10.** 445.) A mixture composed of 2 pts. of the acid with 1 pt. of water is of 1.00287 sp. gr. (Chevreul.) Soluble in all proportions in ether, and oils. Soluble, without decomposition, in cold concentrated sulphuric, and nitric acids, but decomposes when these solutions are boiled. All the butyrates are soluble in water.

$C_8 H_8 O_4 = C_8 H_7 O_3, H O$

Butyrate of Acetosamin.

Butyrate of Allyl. Soluble in ether. (Berthelot & De Luca.)

$C_{14} H_{12} O_4 = C_8 H_7 (C_6 H_5) O_4$

Butyrate of Ammonia. Deliquescent. Soluble in water. (Pelouze & Gélis, *loc. cit.*)

Butyrate of Amyl. Is not miscible with water.

$C_{18} H_{18} O_4 = C_8 H_7 (C_{10} H_{11}) O_4$

Butyrate of Anilin. Sparingly soluble in water. (Unverdorben.)

Butyrate of Baryta. Permanent. The salt with 4 Aq. is soluble in 2.77 pts. of water at 10°. 100 pts. of water at 10° dissolve 36.07 pts. of it. (Chevreul.) Alcohol dissolves it, apparently with partial decomposition. (Chevreul. [T.].) Soluble in 400 pts. of absolute alcohol at 5°.

$C_8 H_7 Ba O_4 + 2 Aq, \& 4 Aq$

Insoluble in cold absolute alcohol. (Berthelot.) Very soluble in absolute alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **11.** 254.)

Butyrate of Baryta & of Lime. Soluble in 3.8 pts. of water at 18°. (Chevreul.)

Butyrate of Cetyl. Somewhat soluble in alcohol. Miscible in all proportions with ether.

$C_8 H_7 (C_{32} H_{33}) O_4$

Butyrate of Cholesterin. Slightly soluble in cold, somewhat more easily soluble in boiling alcohol. Rather easily soluble in ether.

$C_{60} H_{50} O_4 = C_8 H_7 (C_{52} H_{43}) O_4$

Butyrate of Cinchonidin(of Pasteur). Easily soluble in water, and spirit. (Leers, *Ann. Ch. u. Pharm.*, **82.** 161.)

Butyrate of Copper. Very sparingly soluble in cold, somewhat more soluble in boiling water. (Pelouze & Gélis, *loc. cit.*)

$C_8 H_7 Cu O_4 + 2 Aq$

Butyrate of Ethyl. Sparingly soluble in water. Soluble in all proportions in alcohol, and wood-spirit. Very slowly decomposed even by boiling alkaline solutions. (Pelouze & Gélis, *loc. cit.*)

$C_{12} H_{12} O_4 = C_8 H_7 (C_4 H_5) O_4$

Butyrate of Ethylene. Perfectly insoluble in water. Soluble in all proportions in alcohol, and ether. (A. Wurtz.)

(*Butyrate of Glycol.*)

$C_{20} H_{18} O_8 = C_4 H_4'', 2 C_8 H_7 O_4$

Butyrate of Glyceryl.

I.) *bibasic.* Insoluble, or exceedingly sparingly soluble, in water. Soluble in all proportions in concentrated alcohol, and in ether, from which water readily separates it. (Pelouze & Gélis, *Ann. Ch. et Phys.*, (3.) **10.** 455.) It mixes with water and in certain proportions forms a stable emulsion therewith. When 1, 2, and 3 volumes of water are successively added to 8 vols. of monobutyrin the water dissolves and a limpid solution is formed; if 2 vols. more of water are now added, a slight opalescence is produced; 13 vols. more of water (18 vols. in all) produce a permanent homogeneous emulsion. This emulsion persists when more water, even so much as 220 pts., is added. 900 vols. of water render the liquid almost transparent, still one cannot affirm that a true solution has been produced. Monobutyrin is soluble in ether. (Berthelot, *Ann. Ch. et Phys.*, (3.) **41.** 262.)

(*MonoButyrin* (artificial).)

$C_{14} H_{14} O_8 = C_6 H_5 O_3, 2 H O, C_8 H_7 O_3$

II.) *monobasic.* Somewhat soluble in water. 1 volume of dibutyrin mixed with 1 vol. of water forms a limpid mixture; if another vol. of water be added, the dibutyrin will be precipitated, and this precipitation is hastened if 3 vols. more water are added; but with from 150 @ 200 vols. water a transparent emulsion or solution is formed.

$C_{22} H_{20} O_{10} = C_6 H_5 O_3, H O, 2 C_8 H_7 O_3$

(*DiButyrin.*)

Miscible with alcohol, and ether. The alcoholic solution decomposes after a time when it is exposed to the air. Soluble in an aqueous solution of carbonate of soda. (Berthelot, *loc. cit.*)

III.) *normal.* Insoluble in water. Very easily soluble in alcohol, and ether. Sparingly soluble in cold dilute alcohol. (Berthelot, *Ann. Ch. et. Phys.*, (3.) **41.** 267.)

$C_{30} H_{26} O_{12} = C_6 H_5 O_3, 3 C_8 H_7 O_3$

$= C_{24} H_{21} (C_6 H_5''') O_{12}$

(*TriButyrin.*)

Natural butyrin is extremely sparingly soluble in water; but is soluble in all proportions in boiling alcohol of 0.822 sp. gr., and in ether, from which water separates it. The warm alcoholic solution remains clear on cooling, if it contains 120 pts. of butyrin to 100 pts. of alcohol, but when the proportion of butyrin to alcohol is as 20 to 100 the solution becomes turbid on cooling. (Chevreul.)

Butyrate *of sesquioxide* **of Iron.** Soluble in much water.

Butyrate of Lead.

I.) *normal.* Soluble in alcohol, and in spirit; less soluble in water. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **11.** 253.)

$C_8 H_7 Pb O_4$

II.) *basic.* Difficultly soluble in water.

$C_8 H_7 Pb O_4, 2 Pb O$

Butyrate of Lime. Soluble in 5.69 pts. of water at 15°; much less soluble in hot water. (Chevreul.) 100 pts. of water at 15.5° dissolve 17.58 pts. of it;

$C_8 H_7 Ca O_4 + x Aq$

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when this solution is heated, the salt separates out so abundantly that the liquid becomes solid, but it again dissolves as the temperature falls to 15.5°. (Chevreul, [T.].)

Tolerably abundantly soluble in cold water: this solubility decreases gradually as the temperature of the solution is elevated, till at the point of ebullition almost all the salt separates out. (Pelouze & Gélis, *Ann. Ch. et Phys.*, (3.) **10.** 451.)

Butyrate of Magnesia. Very soluble in water. (Pelouze & Gélis, *loc. cit.*)
$C_8H_7MgO_4+5Aq$

Butyrate *of dinoxide* **of Mercury.** Ppt.

Butyrate of Methyl. Scarcely at all soluble in water. Soluble in all proportions in alcohol, ether, and wood-spirit. (Pelouze & Gélis, *loc. cit.*, p. 454.)
$C_{10}H_{10}O_4=C_8H_7(C_2H_3)O_4$

Butyrate of Picolin.

Butyrate of Potash. Very deliquescent. Soluble in 0.8 pt. of water at 15.5°. (Chevreul.) Much less deliquescent than acetate of potash. (Pelouze & Gélis, *loc. cit.*)
$C_8H_7KO_4$

Butyrate of Propyl. Decomposed by boiling potash lye.
$C_{14}H_{14}O_4=C_8H_7(C_6H_7)O_4$

Butyrate of Silver. Very sparingly soluble in water, though more soluble in hot than in cold water. (Pelouze & Gélis, *loc. cit.*) Very sparingly soluble in water; less soluble in alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **11.** 254.)
$C_8H_7AgO_4$

Butyrate of Soda. Less deliquescent than the potash salt. Soluble in water. (Chevreul.)
$C_8H_7NaO_4$

Butyrate of StibMethylEthylium. Permanent. Soluble in water. (Friedlænder.)
$C_8H_7\left(Sb\left\{\begin{matrix}C_2H_3\\(C_4H_5)_3\end{matrix}\right.\right)O_4$

Butyrate of Strontia. Soluble in 3 pts. of water at 4°. (Chevreul.)
$C_8H_7SrO_4$

Butyrate of Trehalose. Difficultly soluble in water. Soluble in alcohol, and ether.
$C_{16}H_{14}(C_{12}H_8O_6'')O_8$

Butyrate of Zinc.

I.) *normal.* Sparingly soluble in cold, decomposed by boiling water. Sparingly soluble in alcohol. (Larocque & Hurault.)
$C_8H_7ZnO_4$

II.) *basic.* Insoluble in water. (Larocque.)

Butyrene. *Vid.* Butylene.

Butyrene *chloré.* *Vid.* ChloroButylene.

Butyriaque. *Vid.* Butylamin.

Butyric Aldehyde. *Vid.* Hydride of Butyryl.

Butyric Ether. *Vid.* Butyrate of Ethyl.

Butyrin. *Vid.* Butyrate of Glyceryl.

Butyridin. *Vid.* Butyrate of Glyceryl, II.)

ButyroAcetic Acid. (*PseudoAcetic Acid.*) Was at one time thought to be identical with propionic acid, but the experiments of Limpricht & v. Uslar (*Ann. Ch. u. Pharm.*, **94.** 321) appear to disprove this and to establish its individuality.
$C_6H_6O_4=C_6H_5O_3,HO$

It is soluble in all proportions in water.

ButyroAcetate of Baryta. Easily soluble, especially in hot water. Very sparingly soluble in absolute alcohol. Tolerably soluble in hot, less soluble in cold spirit. (Nicklès.)
$C_6H_5BaO_4+Aq$

ButyroAcetate of Copper. Very sparingly soluble in water, more soluble in water acidulated with acetic acid. Very soluble in alcohol. (Nicklès.)

ButyroAcetate of Ethylene. (*ButyroAcetate of Glycol. Glycolic AcetoButyrin, or ButyroAcetin.*) Insoluble in water. Soluble in alcohol. (Simpson.)
$C_{16}H_{14}O_8=C_{12}H_{10}(C_4H_4'')O_8$

ButyroAcetate of Lead.

I.) *normal.* Deliquescent in moist air. Soluble in water.

II.) *basic.* Efflorescent. Melts at 19° in its water of crystallization. Easily soluble in spirit.

ButyroAcetate of Lime. Efflorescent. Easily soluble in hot water.
$C_6H_5CaO_4$

ButyroAcetate of Potash. Very deliquescent. Exceedingly soluble in water. Easily soluble in absolute alcohol, and in a mixture of alcohol and ether.

ButyroAcetate of Silver. Somewhat soluble, with partial decomposition, in hot water.
$C_6H_5AgO_4$

ButyroAcetate of Soda. Deliquescent. Very soluble in water, and alcohol; less soluble in a mixture of alcohol and ether. (Limpricht & v. Uslar, *Ann. Ch. u. Pharm.*, **94.** 330.)

ButyroAcetate of Zinc. Soluble in water, the solution undergoing decomposition when boiled.

ButyroChlorhydrin. Insoluble in water. (Berthelot, *Ann. Ch. et Phys.*, (3.) **41.** 303.)
$C_{14}H_{13}ClO_6$

Butyro*bi***Chlorhydrin.** Insoluble in water. (Berthelot, *Ann. Ch. et Phys.*, (3.) **41.** 303.)
$C_{14}H_{12}Cl_2O_4$

"**Butyroleic Acid.**" Was a mixture.

Butyrone. Almost entirely insoluble in water. Soluble in all proportions in alcohol. (Chancel, *Ann. Ch. et Phys.*, (3.) **12.** 148.)
$C_{14}H_{14}O_2=\left.\begin{matrix}C_8H_7\\C_6H_7\end{matrix}\right\}O_2$

"**ButyroNitric Acid.**" *Vid.* NitroPropionic Acid.

Butyronitril. *Vid.* Cyanide of Propyl.

ButyroSulphuric Acid. *Vid.* SulphoButyric Acid.

Butyryl. Not isolated.
$C_8H_7O_2$

Butyrilide of Ammonium. (*Butyralammonia.*) Almost insoluble in water, or ammonia-water. Easily soluble in alcohol, and ether. (Guckelberger.)
$\left.\begin{matrix}C_8H_7O_2\\NH_4\end{matrix}\right\}+10Aq$

ButyrylUrea. (*CarbonylButyrylbiamid.*) Soluble in water, and spirit. (Moldenhauer, *Ann. Ch. u. Pharm.*, **94.** 101.)
$C_{10}H_{10}N_2O_4=N_2\left\{\begin{matrix}C_2O_2''\\C_8H_7O_2\\H_3\end{matrix}\right.$

Buxin (from *Buxus sempervirens*). Difficultly soluble in cold water; more easily soluble in hot water, and in alcohol. Sparingly soluble in ether. Insoluble in alkaline solutions.

C.

CachouTannic Acid. *Vid.* MimoTannic Acid.

Cacodyl. (*Kakodyl. ArsenbiMethyl.*) Sparingly soluble in water. Very soluble in alcohol, and ether. Miscible with chloride of ethyl.
$(C_2H_3)_2As$

Cacodylic Acid. (*Alkargen.*) Permanent in dry air; deliquesces in moist air. Miscible with water. Easily sol-
$C_4H_7AsO_4=(C_2H_3)_2AsO_3,HO$

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able in dilute, less readily soluble in cold concentrated alcohol. Insoluble in anhydrous, but is sparingly soluble in ordinary aqueous ether. (Bunsen.)

Its metallic salts are soluble in water, and alcohol.

Cacodylate of *per*Bromide of Cacodyl. (*Basic Perbromide of Cacodyl. Bromhydrate of Cacodylic Acid.*) $C_4 H_6 As Br_3, 3 C_4 H_6 As O_3 + 12 Aq$ Deliquescent. Decomposed by water.

Cacodylate of *bi*Chloride of Cacodyl. $3 C_4 H_6 As Cl_2, 2 C_4 H_6 As O_3$ Insoluble in water. Soluble in alcohol. (Bunsen.)

According to Bæyer (*Ann. Ch. u. Pharm.*, **107.** 279) this body consists of a mixture of bichloride of arsenmethyl and oxide of cacodyl.

Cacodylate of *per*Chloride of Cacodyl. (*Basic Perchloride of Cacodyl. Clorhydrate of Cacodylic Acid.*) $C_4 H_6 As Cl_3, 2 C_4 H_6 As O_3 + 6 Aq$ Deliquescent. Decomposed by water.

Cacodylate of Cacodyl. (*Hydrarsin. Binoxide of Cacodyl.*) $C_8 H_{12} As_2 O_4 = (C_2 H_3)_2 As O, (C_2 H_3)_2 As O_3$ Easily soluble in water; but is decomposed by much water.

Cacodylate of Copper. Soluble in water, and alcohol.

Cacodylate of Copper with *proto*Chloride of Copper. $7 Cu Cl ; 2 (Cu O, 2 C_4 H_6 As O_3)$ Easily soluble in water. Insoluble in absolute alcohol. (Bunsen.)

Cacodylate of Chloride of Mercury. $2 Hg Cl, C_4 H_6 As O_3 + Aq$ Abundantly soluble in water. Difficultly soluble in alcohol. (Bunsen.)

Cacodylate of *per*Fluoride of Cacodyl. (*Basic Perfluoride of Cacodyl. Fluorhydrate of Cacodylic Acid.*) $2 C_4 H_6 As Fl_3, C_4 H_6 As O_3 + 3 Aq$ Deliquescent. Readily soluble in water, and alcohol. (Bunsen.)

Cacodylate *of sesquioxide* of Iron. Soluble in water, and alcohol.

Cacodylate *of protoxide* of Mercury. Partially soluble in water, and alcohol, a basic salt separating out.

Cacodylate of Potash. Deliquescent. Soluble in water, and alcohol.

Cacodylate of Silver.

I.) *normal.* $C_4 H_6 Ag As O_4$ Permanent. Very readily soluble in water. Easily soluble in hot alcohol.

II.) *acid.* Soluble in water.
$C_4 H_6 Ag As O_4 ; 2 C_4 H_7 As O_4$

Cacodylate of Silver with Nitrate of Silver. $C_4 H_6 Ag As O_4 ; Ag O, N O_5$ Easily soluble in water. Sparingly soluble in absolute alcohol.

Cacodylate of Soda. Less deliquescent than the potash salt. Soluble in water and alcohol.

Cacothelin. $C_{40} H_{22} (N O_4)_2 N_2 O_{10}$ Insoluble in water. Sparingly soluble in alcohol. Easily soluble in ammonia-water, but is decomposed when the solution is boiled. Easily soluble in chlorhydric acid. (Laurent, *Ann. Ch. et Phys.*, (3.) **22.** 465.) Very sparingly soluble in boiling water, and still less soluble in boiling alcohol. Insoluble in ether. Soluble in water strongly acidulated with nitric acid, and in acids generally, with combination. Easily soluble in aqueous solutions of caustic potash, ammonia, or baryta. (Strecker, *Ann. Ch. u. Pharm.*, **91.** 89.)

Cacothelin with Baryta. $C_{40} H_{22} (N O_4)_2 N_2 O_{10}, Ba O$ Soluble in water. Insoluble in alcohol. (Strecker.)

Cacothelin with Lead. Ppt.

Cacothelin with Silver. Ppt.

Cadmium. Cd Permanent in dry air, but becomes slightly tarnished in a moist atmosphere.

Decomposes water at 100°. (Regnault.) Soluble in chlorhydric acid, when this is not too dilute, especially on heating. Dilute sulphuric and other acids, even acetic acid, dissolve it slowly. Very easily soluble in nitric acid.

CadmiumEthyl. $C_4 H_5 Cd$ Decomposed by water. (Wanklyn.) Insoluble in water. Soluble in iodide of ethyl. (Sonnenschein.)

Caffein. (*Cafein. Thein. Guaranin.*) $C_{16} H_{10} N_4 O_4, \& + 2 Aq$ Sparingly soluble in cold, easily soluble in hot water. Soluble in 35 @ 40 pts. of cold water (Oudry); in 48 pts. of water at 21° (Zenneck); in 50 pts. of water (Pfaff); in 100 pts. at 15°. (Günther.)

1 pt. of crystallized caffein is soluble in 93 pts. of water at 12.5°; when dried at 120°, 1 pt. of it is soluble in 98 pts. of water at 12.5°; quickly soluble in boiling water. (Mulder, *Pogg. Ann.*, 1838, **43.** 174.) Soluble in 20 pts. of alcohol at 21° (Zenneck); in 25 pts. of alcohol, of 85%, at 20°. (Günther.) Crystallized caffein dissolves in 158 pts. of anhydrous alcohol at 12.5°; when it has been dried at 120° it dissolves in 97 pts. of the same alcohol; quickly soluble in boiling alcohol. (Mulder, *Pogg. Ann.*, **43.** 174.) Insoluble in absolute alcohol. (Pfaff.) Easily soluble in hot alcohol.

Very sparingly soluble in ether. (Robiquet, Martius, Herzog.) Insoluble in ether. (Pfaff.) Readily soluble in hot ether. (Jobst.) Soluble in 300 pts. of ether; being very sparingly soluble therein, and much less soluble than it is in alcohol, and water. (Péligot, *Ann. Ch. et Phys.*, (3.) **11.** pp. 137, 138.) 1 pt. of crystallized caffein is soluble in 298 pts. of ether at 12.5°; after having been dried at 120°, 1 pt. of caffein dissolves in 194 pts. of ether at 12.5°; it is quickly soluble in hot ether. (Mulder, *Pogg. Ann.*, **43.** 174.)

100 pts. of chloroform dissolve 11 pts. of it. (Schlimpert, *Kopp & Will's J. B. für* 1859, p. 405.) Soluble in volatile oils, but insoluble in fatty oils. (Herzog.) Very easily soluble in oil of rosemary. (Günther.) Soluble in oil of almonds.

Insoluble in oil of turpentine. (Pfaff.) Readily soluble in benzin. (Vogel.) Soluble in acids, with combination.

Easily soluble in nitric acid, without decomposition, even by the concentrated acid. Easily soluble in chlorhydric acid, from which a portion of it is precipitated, unchanged, by water and by alcohol. Rapidly soluble in dilute sulphuric acid, without decomposition. (Pfaff.) Easily soluble in acetic acid; slowly soluble in oxalic and in tartaric acid, crystallizing unchanged from these last. (Mulder.) It crystallizes unchanged from its solution in dilute perchloric acid. (Bœdecker.) More easily soluble in aqueous solutions of potash, and ammonia, than in water. (Pfaff.)

Caffein with Chloride of Mercury. $C_{16} H_{10} N_4 O_4 ; 2 Hg Cl$ Easily soluble in water, alcohol, chlorhydric acid, and oxalic acid. Almost insoluble in ether. (Nicholson.)

Caffein with Cyanide of Mercury. Diffi-

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$C_{16}H_{10}N_4O_4 ; 2HgCy$ cultly soluble in cold water, and in alcohol. (Kohl & Swoboda.)

Caffein with Nitrate of Silver. $C_{16}H_{10}N_4O_4 ; AgO, NO_5$ Sparingly soluble in cold water. More soluble in boiling water and in alcohol. (Nicholson.)

Caffein with Oxide of Lead.
I.) *basic.* Insoluble in boiling water. (Peligot, *loc. cit.*)

CaffeoTannic Acid. (*Caffeic Acid. Chloroginic Acid.*) $C_{70}H_{38}O_{34}$ Readily soluble in water; less soluble in alcohol. Soluble in concentrated sulphuric acid. Soluble in aqueous solutions of potash and soda, with subsequent decomposition.

Very soluble in water. Soluble in absolute alcohol; still more soluble in spirit. (Payen, *Ann. Ch. et Phys.*, (3.) **26.** 114.)

CaffeoTannate of Baryta.

CaffeoTannate of Caffein.
I.) *acid.* Soluble in alcohol.

CaffeoTannate of Caffein & of Potash. Easily soluble in water. Scarcely soluble even in hot absolute alcohol. Tolerably soluble in dilute alcohol; its solubility increasing in proportion to the amount of water present. (Payen, *Ann. Ch. et Phys.*, (3.) **26.** 112.)

CaffeoTannate of Lead. Insoluble in water. Soluble in a solution of caustic potash. (Payen, *loc. cit.*)

CaffeoTannate of Lime.

CaffeoTannate of **Potash.** Soluble in water. Insoluble in alcohol.

Cahincic Acid. *Vid.* Caincic Acid.

Caincic Acid. (*Cainca bitter.*) $C_{32}H_{26}O_{14} = C_{32}H_{24}O_{12}, 2HO$ Permanent. More than 600 pts. of water are required in order to dissolve one pt. of it. Abundantly soluble in alcohol, especially when this is warm. Ether dissolves about as much as water. Soluble, with decomposition, in concentrated sulphuric, chlorhydric, and nitric acids. Scarcely at all soluble in dilute nitric or chlorhydric acids. Soluble without alteration in cold glacial acetic acid, but the solution undergoes decomposition when boiled or when left to itself. (François, Caventou, & Pelletier, *Ann. Ch. et Phys.*, 1830, (2.) **44.** 292.) Readily soluble, with combination, in aqueous solutions of ammonia, potash, and baryta, but the compounds thus obtained do not crystallize. All of its salts are soluble in alcohol, and most of them in water also. (F., C., & P., *loc. cit.*, pp. 293, 294.)

Caincate of Lead.
I.) *normal.* Ppt., in spirit.
$C_{32}H_{24}Pb_2O_{14} + 2 Aq$
II.) *basic.* Insoluble in boiling water. (F., C., & P., *loc. cit.*, p. 295.)

Caincate of Lime.
I.) *normal?* Soluble in water. (F., C., & P., *loc. cit.*, p. 293.)
II.) *basic.* Ppt., in water. Readily soluble in alcohol. (*Ibid.*)
III.) *acid.* Soluble in water, and spirit, less soluble in strong alcohol.

Cajputene. $C_{20}H_{16}$ Permanent. Insoluble in alcohol. Soluble in ether, and oil of turpentine. (Max. Schmidl.)

Calcium. Ca Slowly oxidized in dry, quickly oxidized in moist air. Decomposes water with violence and evolution of much heat, and dilute acids still more violently.

Most of the compounds of calcium are soluble in chlorhydric, and nitric acids.

Calcium Amalgam. Decomposed by water.

Calendulin (from *Calendula officinalis*). Almost insoluble in cold, sparingly soluble in boiling water. Easily soluble in alcohol, acetic acid, and aqueous solutions of the caustic alkalies. Insoluble in ether, the fatty or essential oils, and most dilute acids.

CalluTannic Acid (from *Calluna vulgaris*). $C_{28}H_{14}O_{18} = C_{28}H_{12}O_{16}, 2HO$ Hygroscopic. Soluble in water, and alcohol. Decomposed by the mineral acids. (Rochleder.)

CalluTannate of Lead. Ppt.

CalluXanthin. $C_{28}H_{10}O_{14}$ Soluble in hot, but almost entirely insoluble in cold water. Easily soluble in alcohol. (Rochleder.)

Calomel. *Vid. di*Chloride of Mercury.

Camphic Acid. $C_{20}H_{16}O_4$ More or less soluble in water. (Berthelot.) Readily soluble in alcohol.

Camphate of Copper(CuO).
" **Iron**(FeO).
" **Iron**(Fe_2O_3).
" **Lead.**
} Sparingly soluble in water. Soluble in acetic acid. (Berthelot.)

Camphate of Potash. Deliquescent. Easily soluble in pure water, and alcohol. Sparingly soluble in a concentrated aqueous solution of caustic potash. (Berthelot.)

Camphate of Silver. Sparingly soluble in water. Soluble in acetic acid.

Camphate of Soda. Deliquescent. Easily soluble in pure water, and in alcohol. Sparingly soluble in a concentrated aqueous solution of caustic soda.

Camphate of Zinc. Sparingly soluble in water. Soluble in acetic acid.

"**Camphene**"(of Deville). *Vid.* Oil [essential] of Turpentine.

"**Camphene**"(of Dumas). *Vid.* Camphilene.

Camphene(of Berthelot).
$C_{20}H_{16}$

Camphilene(of Deville). (*Dadyl of Blanchet & Sell*). *Camphene*(*of Dumas*). *Terebene*(*of Soubeiran*). *Isomeric with Oil of Turpentine.*) $C_{20}H_{16}$ Soluble in alcohol, ether, and bisulphide of carbon. Insoluble in acetic acid. (Oppermann.) It is not dissolved or altered by fuming nitric acid. (Oppermann.) Alcoholic nitric acid converts it into a crystalline hydrate. (Gerhardt's *Tr.*) Fuming chlorhydric acid combines with it. With iodhydric acid it forms a liquid compound. (Deville.) Decomposed by concentrated sulphuric acid.

Camphin. (*Isomeric with Campholene.*) $C_{18}H_{16}$ Insoluble in water, dilute spirit, potash-lye, or dilute acids. Soluble in strong alcohol, in ether, oil of turpentine, and rock-oil. Insoluble in strong chlorhydric acid. (Claus.)

CamphoCreosote. *Vid.* Carvacrol.

Camphogene. *Vid.* Cymene.

Camphol. *Vid.* Borneol.

Campholic Acid. Insoluble in water. Very

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(Borneenic Acid.)
$C_{20} H_{16} O_4 = C_{20} H_{17} O_3, HO$
abundantly soluble in alcohol, and ether. (Delalande, *Ann. Ch. et Phys.*, 1841, (3.) **1.** 121.)

Campholate of Ammonia. Soluble in water. (Delalande, *loc. cit.*)

Campholate of Lime. Soluble in water;
$C_{20} H_{17} Ca O_4$
much more soluble in *cold* than in hot water. (Delalande, *loc. cit.*, p. 123.)

Campholate of Potash. Soluble in water. (Delalande, *loc. cit.*)

Campholate of Silver. Ppt. Insoluble in
$C_{20} H_{17} Ag O_4$
water. (Delalande, *loc. cit.*)

Campholene.
(Isomeric with Camphin.)
$C_{18} H_{16}$

Campholone.
$C_{20} H_{24} O_2$

CamphoMethylic Acid. *Vid.* MethylCamphoric Acid.

Camphor (from *Laurus Camphora*). Soluble
(Oxide of Camphene. Campholic Aldehyde. Isomeric with Caryophyllin and Ursone.)
$C_{20} H_{16} O_2 = \left.\begin{matrix} C_{20} H_{15} \\ H \end{matrix}\right\} O_2$
in 1000 pts. of water. (Giese.) Heated with water in a Papin's digester, it dissolves more abundantly, apparently without decomposition, without separating out again on cooling. (Pfaff.) Its solubility in water is increased by the presence of the stronger acids, but not by carbonic acid. (Giese, Brandes.) By the aid of magnesia it dissolves in 150 pts. of cold water. (M., R., & P.) From an intimate mixture of camphor with carbonate of lime or carbonate of magnesia, water is said to take up three times as much camphor as it dissolves when shaken with camphor alone. (Gm., **14.** 346.) But camphor is insoluble in aqueous solutions of the caustic alkalies, and does not combine with the other metallic oxides.

Soluble in 0.8333 pt. of alcohol, of 0.806 sp. gr., at 12° (Saussure); or 100 pts. of this alcohol dissolve 120 pts. of it. Much more soluble in hot than in cold alcohol. Water precipitates it from the alcoholic solution. Soluble in much less than its own weight of wood-spirit. (Gmelin.) Abundantly soluble in acetone. (Trommsdorff.) Soluble in 0.3333 pt. of chloroform. (Smith.) Abundantly soluble in ether, and the compound ethers. Soluble in fusel-oil (hydrate of amyl). Readily soluble in lignone. Largely soluble in benzin. (Mansfield, *J. Ch. Soc.*, **1.** 261.) Soluble in bisulphide of carbon, and the solution thus obtained is miscible with alcohol, but not with water, although it is not precipitated by water. (Lampadius.) Soluble in oil of ocotea (Hancock); in creosote (Reichenbach); in anilin, and in leucol (quinolein). (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** pp. 143, 169.) Readily soluble in the volatile oils, crystallizing out from hot solutions as they cool. Also soluble in the fixed oils, and fats, and in some resins.

Only sparingly soluble in vinegar, but dissolves in 0.0833 pt. of concentrated acetic acid. (Pfaff.) When camphor dissolves in moderately strong acetic acid, the solution is effected only by the more concentrated portion of the acid, and a watery liquid separates containing a little acetic acid and a trace of camphor. (Vauquelin.) Slowly, but abundantly, soluble in cold valerianic acid; this solution may be distilled without decomposition, but deposits camphor when mixed with 30 pts. of water. (Trommsdorff.) Soluble in 2.6 pts. of concentrated chlorhydric acid, and is precipitated therefrom on the addition of water. (Wenzel.) Soluble in 0.1667 pt. of cold fuming nitric acid. (Wenzel.) Soluble in cold concentrated nitric acid, from which a portion of it is precipitated on the addition of water. Decomposed by prolonged boiling with nitric acid. Abundantly soluble, without decomposition, in bromine. (Claus.) Soluble in 0.36 pt. of cold, and in a smaller quantity of warm concentrated sulphuric acid. (Wenzel.) Soluble in 4 pts. of concentrated sulphuric acid at 100°; from this solution, when recently prepared, water precipitates camphor, but on continuing to heat it, at 100°, during 12 @ 13 hours, the camphor is decomposed. (Chautard.)

For the solubility of the indefinite compounds of camphor with sulphurous, hyponitric, and chlorhydric acids, see Bineau's paper in *Ann. Ch. et Phys.*, (3.) **24.** 326.

Camphors. Most "Camphors" are sparingly
(Stearoptenes. Solid essential oils.)
soluble, or insoluble, in water. Soluble in alcohol, and ether. Many of them are soluble in acetone and in concentrated acetic acid.

Altyxia-Camphor (from *Alyxia Reinwardii*). Very sparingly soluble in cold, more easily soluble in warm water, and does not separate out again as the solution cools. Readily soluble in alcohol, of 0.85 sp. gr., ether, oil of turpentine, and acetic acid. Also readily soluble in aqueous solutions of caustic and carbonated potash, in ammonia-water, &c., without neutralizing them. Insoluble in nitric acid of 1.2 sp. gr. (Nees v. Esenbeck.)

Amber-Camphor.
$C_{20} H_{18} O_2$

Camphor of *Buphthalmum maritimum*. Soluble in alcohol; the solution becomes turbid when mixed with water. (Landerer.)

Cassia Camphor. Soluble in absolute alcohol.
(Stearoptene of Oil of Cassia. Improperly Benzhydrol.)
$C_{36} H_{20} O_{10}$
Soluble in concentrated sulphuric acid, from which it is precipitated on the addition of water. (Rochleder & Schwarz.)

Camphor of Cubebs. Insoluble in water.
$C_{30} H_{26} O_2 = \left.\begin{matrix} C_{30} H_{25} \\ H \end{matrix}\right\} O_2$
Easily soluble in alcohol, ether, and the essential oils. (Blanchet & Sell.)

Camphor of *Iris florentia*. Insoluble in water.
$C_{16} H_{16} O_4$ (Dumas.) Readily soluble in alcohol.

Jasmine Camphor. Sparingly soluble in water. Tolerably readily soluble in alcohol, ether, and the fixed and volatile oils. Insoluble in acetic acid, and but partially soluble in concentrated chlorhydric or sulphuric acids. (Herberger.)

Juniper Camphor. With 200 pts. of cold water it forms an incomplete solution, which becomes clear when heated, and remains clear on cooling. From the solution in hot alcohol, of 0.83 sp. gr., it crystallizes on cooling. More readily soluble in ether than in alcohol. More readily soluble in acetic acid than in water. Only slightly soluble in ammonia-water. (Zaubzer.)

Ledum Camphor (from *Ledum palustre*). Near-
$C_{50} H_{42} O_2$
ly insoluble in water. (Grassmann, Buchner.) Readily soluble in alcohol, and ether. Sparingly soluble in chlorhydric acid, still less soluble in acetic acid. Insoluble in ammonia-water. (Buchner.)

Lemon-Camphor. Insoluble in cold, abundantly soluble in boiling water. The solution solidifies on cooling. (Boissenot.) Soluble in chlorhydric acid, the solution becoming turbid when heated above 100°, but clear again on cooling. (Boissenot.) Soluble in alcohol, ether, and acetic acid. Insoluble in pure oil of lemon, but soluble in this oil when it contains acetic acid. (Boissenot.)

Marjoram-Camphor (from *Origanum marjorana*). Soluble in boiling water. (Guenther, Mulder.) Soluble in alcohol, and ether (Mulder); in 10 pts. of alcohol forming a solution which is not rendered turbid by water; in 10 pts. of oil of turpentine; in 10 pts. of boiling oil of almonds, from which it crystallizes out on cooling, after a while. (Guenther.) Soluble in 10 pts. of concentrated nitric acid. (Guenther.)

Massoy-Camphor. Soluble in hot alcohol and in ether. (Bonastre.)

Neroli-Camphor (from the flowers of *Citrus aurantium*). Insoluble in water. (Plisson, Boullay.) Sparingly soluble in cold, readily soluble in hot alcohol (Boullay, Landerer); in 60 pts. of alcohol of 0.9 sp. gr., separating out on cooling. Abundantly soluble in ether, from which it is precipitated on the addition of water or alcohol. (Boullay, Plisson.) Very easily soluble in hot oil of turpentine, from which it separates completely as the solution cools. (Plisson.) Soluble in hot acetic acid. (Landerer.)

Nutmeg-Camphor. Soluble in 19 pts. of boiling, sparingly soluble in cold water. (John.) Easily soluble in alcohol, and ether (John, Mulder), and in warm fixed and volatile oils. (Bley.) Soluble in cold nitric acid, and in an aqueous solution of caustic potash. (Mulder.)

(*Myristicin. Muscat-Camphor.*)
$C_{16}H_{16}O_5$, or $C_{20}H_{20}O_6$

Peppermint-Camphor (from *Mentha piperita*). Sparingly soluble in water, the solution in boiling water becoming turbid on cooling. (Gmelin.) Readily soluble in alcohol, and ether (Dumas, Walter), and in volatile oils (Dumas); less easily in oil of turpentine (Walter), in wood-spirit, and bisulphide of carbon. (Walter.)

(*Menthene Camphor. Hydrated Oxide of Menthene.*)
$C_{20}H_{20}O_2$

Raspberry-Camphor. Soluble in water, alcohol, ether, and aqueous solutions of caustic potash and ammonia. (Bley.)

Rose-Camphor. Very sparingly soluble in water. (Herberger.) Sparingly soluble in alcohol. Readily soluble in ether. (Blanchet.) Soluble in 500 pts. of alcohol, of 0.85 sp. gr., at 14° (Saussure); in 490 pts. of alcohol, of 0.85 sp. gr., at 15°, more easily in absolute alcohol, the alcoholic solution becomes cloudy when mixed with water. (Herberger.) Soluble in volatile oils, and acetic acid. (Herberger.) Very sparingly soluble in chlorhydric acid; with difficulty in an aqueous solution of caustic potash; more easily in ammonia-water. Also soluble in aqueous solutions of the alkaline carbonates. (Herberger.)

(*Solid Rose-oil.*)
$C_{16}H_{16}$

Sage-Camphor. Soluble in 450 pts. of cold, and in 300 pts. of hot water. Soluble in 5 pts. of alcohol of 0.82 sp. gr.; in all proportions in ether; easily in oil of turpentine; less easily in rock-oil; easily in fixed oils; without alteration in dilute sulphuric acid. (Herberger.)

Camphoramic Acid. Tolerably soluble in warm, much less soluble in cold water. More soluble in alcohol than in water. Its salts are all soluble in water. (Laurent.)

(*Camphorylaminic Acid.*)
$C_{20}H_{17}NO_6 = N\left\{\begin{matrix}C_{20}H_{14}O_4'' \\ H_2\end{matrix}\right. . O, HO$

Camphoramate of Ammonia. Soluble in water. Somewhat soluble in alcohol, but not readily in absolute alcohol. (Laurent.)

$C_{20}H_{16}(NH_4)NO_6 + 2Aq$

Camphoramate of Baryta. Soluble in water. (Laurent, in his *Chemical Method*, p. 250.)

Camphoramate of Lead. Soluble in water. (Laurent, in his *Chemical Method*, p. 250.) Moderately easily soluble in alcohol, though less so than in water.

$C_{20}H_{16}PbNO_6$

Camphoramate of Silver. Soluble in water. (Laurent, in his *Chemical Method*, p. 250.) Soluble in hot alcohol. May be washed with cold absolute alcohol.

$C_{20}H_{16}AgNO_6$

Camphoramid. Insoluble in water. Soluble in alcohol. (Laurent.)

(*Camphorylbiamid.*)
$C_{20}H_{18}N_2O_4 = N_2\left\{\begin{matrix}C_{20}H_{14}O_4'' \\ H_4\end{matrix}\right.$

Camphoranil. *Vid.* PhenylCamphorimid.

CamphorAnilic Acid. *Vid.* PhenylCamphoric Acid.

Camphoric Acid (Anhydrous). Very sparingly soluble in cold, somewhat more soluble in boiling water. Readily soluble in boiling alcohol; still more soluble in ether. Very slowly acidified by boiling with water. (Malaguti.) Less easily soluble in alcohol than camphoric acid. (Laurent.) Very sparingly soluble in water. Soluble in cold concentrated sulphuric acid, from which water precipitates it. It combines with hot sulphuric acid. (Walter, *Ann. Ch. et Phys.*, (3.) **9**. 179.)

(*Oxide of Camphèse. Camphoric Anhydride.*)
$C_{20}H_{14}O_6$

Camphoric Acid. Sparingly soluble in cold, more soluble in boiling water. Readily soluble in alcohol, ether, and the essential and fatty oils.

$C_{20}H_{16}O_8 = C_{20}H_{14}O_6, 2HO$

Soluble in		pts. of water at
Soluble in	88.87	12.5°
“	70.03	25°
“	61.50	37.5°
“	40.66	50°
“	23.40	62.5°
“	17.18	82.5°
“	8.90	90°
“	8.61	96.25°*

Or, 100 pts. of water at °C	Dissolve pts. of it.
12.5°	1.130
25°	1.457
37.5°	1.626
50°	2.459
62.5°	4.290
82.5°	5.290
90°	10.130
96.25°*	12.000

Or, the aqueous solution saturated at °C	Contains per cent of it.
12.5°	0.88
25°	1.4346
37.5°	1.60
50°	2.40
62.5°	4.10
82.5°	5.50
90°	10.09
96.25°*	10.41

(R. Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1823, **38**. 276.)

Soluble in 200 pts. of cold water. (Kosegarten.) In 400 pts. (Dœrffurt.) In 80 pts. (Bouillon-

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* Boiling-point of the saturated aqueous solution. (Brandes.)

Lagrange.) In 12 pts. of boiling water (Kosegarten); in 24 pts. (Dœrffurt); in 10 pts. (Bouillon-Lagrange).

100 pts of water at 15.5° dissolve 1.04 pts. of it, and at 100°, 8.30 pts. (Ure's *Dict.*) Soluble in [somewhat less than] 100 pts. of water at 18.75°, and in 10 @ 11 pts. of boiling water; in 1.94 pts. of absolute alcohol at 18.75°, and in 0.63 pt. or less at the temperature of boiling. (Bucholz, *Gehlen's Journ. für Ch. Phys. u. Min.*, 1810, **9.** pp. 340 – 344, 355.)

Soluble in	pts. of [absol.] alcohol at
0.94* – 1.36†	8.75°
0.89	12.5°
0.79	25°
0.59	37.5°
0.68	62.5°

Or, 100 pts. of [absolute] alcohol at °C	Dissolve pts. of it.
8.75°	106* – 73†
12.5°	111
25°	115
37.5°	161
62.5°	121

Or, the alcoholic solution saturated at °C	Contains per cent of it.
8.75°	51 42* – 42.28†
12.5°	52.68
25°	55.70
37.5°	62.77
62.5°	59.40

(R. Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1823, **38.** 278.)

Soluble in 1.52 pts. of ether at 8.75°; or, 100 pts. of ether at 8.75° dissolve 65 pts. of it; or, the ethereal solution saturated at 8.75° contains 39.66% of it. (Brandes, *loc. cit.*, p. 279.) Soluble in 3 pts. of ether at 8.3°.

Only sparingly soluble in cold oil of turpentine, but dissolves in the hot oil; on cooling the hot solution a considerable quantity of the acid crystallizes out, while a smaller quantity remains dissolved. (Brandes, *loc. cit.*, p. 279.) Soluble, without alteration, in concentrated sulphuric, and nitric acids.

The camphorates of the alkalies and alkaline earths are readily soluble in water, but most of the others are difficultly soluble therein.

Camphorate of Alumina. Permanent. Soluble in 200 pts. of cold, and in a smaller quantity of hot water. Sparingly soluble in cold, easily soluble in hot alcohol. (Bouillon.) 100 pts. of water at 15.5° dissolve 5 pts. of it. (Ure's *Dict.*)

Camphorate of Ammonia.

I.) *normal.* Deliquescent. Readily soluble in water. (Malaguti.) According to Brandes (*Schweigger's Journ. für Ch. u. Phys.*, 1823, **38.** 288), the statement of Bouillon-Lagrange, that this salt is soluble in 100 pts. of cold, and 3 pts. of boiling water, is unquestionably erroneous, the salt being really very much more readily soluble than this. When heated, it first begins to melt in its water of crystallization, and then gives off ammonia. Soluble in absolute alcohol. (Brandes, *loc. cit.*) Easily soluble in alcohol. (Bouillon.)

$C_{20}H_{14}(NH_4)_2O_8$

II.) *acid.* Easily soluble in cold water. (Malaguti.)

(“*Four thirds basic.*”)
$C_{20}H_{15}(NH_4)O_8 + 6\,Aq$

Camphorate of Ammonia & of Copper. (Brandes, *loc. cit.*, p. 298.)

Camphorate of Baryta. Soluble in 1.79 pts. of water at 18.75°; or, 100 pts. of water at 18.75° dissolve 55.77 pts. of it; or the aqueous solution saturated at 18.75° contains 35.82% of it. (Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1823, **38.** 294.) 100 pts. of water at 15.5° dissolve 0.16 pt. of it. (Ure's *Dict.*) Soluble in 600 pts. of boiling water. (Bouillon.)

$C_{20}H_{14}Ba_2O_8 + 7\,Aq$

Camphorate of *bi*ChlorEthyl. Soluble in 8 pts. of alcohol and in an equal quantity of ether. (Malaguti.)

$C_{28}H_{20}Cl_4O_8 = C_{20}H_{14}(C_4H_3Cl_2)_2O_8$

Camphorate of Cobalt. Appears to be soluble in water. (Kemper.)

Camphorate of Copper(CuO). Almost insoluble in water. (Brandes, *Schweigger's Journ.*, **38.** 297.)

$C_{20}H_{14}Cu_2O_8$

Camphorate of Ethyl.

I.) *normal.* Insoluble in water. Easily soluble in alcohol, and ether. Soluble, without decomposition, in cold concentrated sulphuric acid. Unacted upon by chlorhydric or nitric acids even when these are boiling. (Malaguti.)

$C_{28}H_{24}O_8 = C_{20}H_{24}(C_4H_5)_2O_8$

II.) *mono.* *Vid.* EthylCamphoric Acid.

Camphorate of Iron(Fe_2O_3). Insoluble in water. (Brandes, *Schweigger's Journ.*, **38.** 300.)

Camphorate of Lead.

I.) *normal.* Insoluble in water. (Brandes, *Schweigger's Journ.*, **38.** 295.)

$C_{20}H_{14}Pb_2O_8$

Camphorate of Lime.

I.) *normal.* Efflorescent. Scarcely soluble in cold water. Soluble in 200 pts. of boiling water. Insoluble in alcohol. (Bouillon.) 100 pts. of water at 15.5° dissolve 0.5 pt. of it, and at 100°, 0.8 pt. (Ure's *Dict.*)

$C_{20}H_{14}Ca_2O_8 + 2\,Aq$

II.) *acid.* Soluble in 4.61 pts. of water at 18.75°; or, 100 pts. of water at 18.75° dissolve 21.67 pts. of it; or the aqueous solution saturated at 18.75° contains 17.8% of it. (Bucholz, *Gehlen's Journ. für Ch. Phys. u. Min.*, 1810, **9.** pp. 352, 357.) Soluble in 5 pts. of cold, and very soluble in hot water. (R. Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1823, **38.** 290.)

$C_{20}H_{15}CaO_8 + 15\,Aq$

Camphorate of Magnesia.

I.) *normal.* Hygroscopic. Soluble in 6.5 pts. of water at 2.5°. Soluble in 54.19 pts. of absolute alcohol at 3.75°; or, 100 pts. of absolute alcohol at 3.75° dissolve 1.841 pts. of it; or the alcoholic solution saturated at 3.75° contains 1.812% of it. (R. Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1823, **38.** 292.)

$a = C_{20}H_{14}Mg_2O_8$

$b = C_{20}H_{14}Mg_2O_8 + 15\,Aq$ Efflorescent. Soluble in 2.5 pts. of water at 20°. (Kemper.) Camphorate of magnesia is insoluble in cold, but dissolves, with decomposition, in hot alcohol. (Bouillon.)

Camphorate of Manganese. Very soluble in water. (Brandes, *Schweigger's Journ.*, **38.** 299.)

Camphorate of Mercur(*ic*)Amin.

I.) *basic.* Insoluble in water or alcohol. Soluble in 1000 pts. of ether. (Harff.)

Camphorate of Mercur(*ous*)amin.

I.) *basic.* Insoluble in water, alcohol, or ether. (Harff.)

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* This solution was obtained by cooling down a hotter solution, as were all the others, excepting only that marked with a †, which was prepared by digestion, at the temperature indicated (8.75°).

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CAMPHORATE *of dinoxide* **OF MERCURY.** Insoluble in cold water. (Harff); nearly insoluble in water. (Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1823, **38.** 299.) Partially decomposed by boiling water, or cold alcohol. Soluble in 1666 pts. of ether. (Harff.)
$C_{20}H_{14}Hg_4O_8$

CAMPHORATE *of protoxide* **OF MERCURY.** Nearly insoluble in cold, more soluble in boiling water. Insoluble in alcohol. Soluble in 1666 pts. of ether. Soluble in nitric, and chlorhydric acids. (Harff.)
$C_{20}H_{14}Hg_2O_8$

CAMPHORATE OF METHYL.

I.) *mono.* *Vid.* MethylCamphoric Acid.

CAMPHORATE OF NICKEL. Rather sparingly soluble in water. (Brandes, *Schweigger's Journ.*, **38.** 300.)

CAMPHORATE *of binoxide* **OF PLATINUM.** Not very difficultly soluble in water. (Brandes, *loc. cit.*, p. 299.) A solution of camphorate of magnesia produces no precipitate in a solution of bichloride of platinum. (Kemper.)

CAMPHORATE OF POTASH.

I.) *normal.* Very deliquescent. Extremely easily soluble in water. (Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1823, **38.** 282.) Very soluble in water. (Bucholz, *Gehlen's Journ. für Ch. Phys. u. Min.*, 1810, **9.** 353.)
$C_{20}H_{14}K_2O_8$

II.) *acid?* Soluble in 100 pts. of cold, and in 4 pts. of boiling water. Also soluble in alcohol. (Bouillon-Lagrange.) [Brandes regards Bouillon's salt as nothing but camphoric acid.]

CAMPHORATE OF SILVER. Ppt.
$C_{20}H_{14}Ag_2O_8$

CAMPHORATE OF SODA.

I.) *normal.* Deliquescent. (Brandes, Kemper.) Very soluble in water. Somewhat soluble in absolute alcohol; 100 pts. of [this] alcohol at 7.5° dissolve 1.25 pts. of it. (Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1823, **38.** 286.)
$C_{20}H_{14}Na_2O_8$

II.) *acid?* Soluble in 100 pts. of cold, and in 8 pts. of boiling water. (Bouillon-Lagrange.) [Brandes thinks that Bouillon's salt is nothing but camphoric acid.]

CAMPHORATE OF STRONTIA. Much more soluble than the baryta salt. (Brandes, *Schweigger's Journ.*, **38.** 295.)

CAMPHORATE *of protoxide* **OF TIN.** Ppt.

CAMPHORATE *of sesquioxide* **OF URANIUM.** Ppt.

CAMPHORATE OF ZINC. Ppt.

CAMPHORESIN. Insoluble in water or spirit. Soluble in strong alcohol, ether, oil of turpentine, and naphtha. (Claus.)
$C_{20}H_{12}$

CAMPHORIMID. Easily soluble in boiling, less soluble in cold alcohol. Soluble in gently heated concentrated sulphuric acid, in which solution water produces a precipitate. (Laurent.)
(*Camphorylamid.*)

$C_{20}H_{15}NO_4 = N\left\{\begin{matrix}C_{20}H_{14}O_4''\\H\end{matrix}\right.$

CAMPHORIN. Soluble in ether. (Berthelot, *Ann. Ch. et Phys.*, (3.) **41.** 294.)
(*Camphorate of Glyceryl.*)

"**CAMPHORYL.**" *Vid.* Phorone.

CAMPHORYL. Hypothetical radical of Camphoric Acid, &c.
$C_{20}H_{14}O_4''$

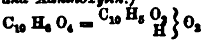
CAMPHRENE. Insoluble, or but sparingly soluble in water. (Chautard.)
$C_{16}H_{12}O_2$

CAMPHRONE.
$C_{20}H_{22}O$

CANELLIN (from *Canella alba*). Appears to be identical with Mannit.

CANIRAMIN. *Vid.* Brucin.

CANNABIN. Insoluble in water, or in aqueous solutions of potash or ammonia, and but sparingly soluble in acids. Easily soluble in alcohol, and ether. Soluble in cold essential oils, and warm fatty oils. (Smith.)

CANTHARIDIN. Insoluble in water, whether cold or boiling. It is, however, rendered soluble by the yellow matter in cantharides, so that hot water can extract from these the whole of the cantharidin. (Robiquet, and others.) Slightly soluble in cold, more soluble in hot alcohol, and acetate of ethyl, less soluble in wood-spirit, more soluble in ether (in 34 pts. of cold ether according to Warner); its best solvents are acetone and chloroform, the latter abstracting it from the aqueous solution. (W. Procter.) Soluble in hot oil of turpentine, in the oils of cinnamon, cloves, and sassafras, also in almond-oil, olive-oil, and lard, crystallizing out on cooling. (Thierry, and others.) According to Procter, cantharidin is extracted from cantharides by glacial acetic acid, oil of turpentine, and olive-oil, but only the last-mentioned retains any considerable quantity of it in solution after cooling.
(*Isomeric with Picrotoxin and Xanthoxylin.*)

$C_{10}H_6O_4 = \left.\begin{matrix}C_{10}H_5O_2\\H\end{matrix}\right\}O_2$

Easily soluble in benzin. Soluble in 70 pts. (Procter), in 63 pts. (Warner), of boiling oil of turpentine. Soluble in 20 pts. of olive-oil at 121°. Slightly soluble in cold, more easily soluble in hot acetic acid of 1.041 sp. gr.; completely soluble in 40 pts. of hot glacial acetic acid. According to Robiquet it is insoluble in acetic acid. Scarcely at all soluble in hot formic acid. Abundantly soluble in boiling nitric acid. Soluble without color in hot concentrated sulphuric acid, from which it is precipitated on the addition of water. Nearly insoluble in cold chlorhydric acid of 1.18 sp. gr., and in cold phosphoric acid; a little more soluble in these acids when hot. From all these acid solutions cantharidin crystallizes on cooling. (Procter, and others.) Insoluble in ammonia-water. (Thierry.) Slightly soluble in hot ammonia-water. (Procter.) Soluble in aqueous solutions of caustic potash and soda, from which it is precipitated on neutralizing with acetic acid. (Thierry.)

CAOUTCHENE. Insoluble in water. Very readily soluble in alcohol, and ether. Insoluble in alkaline solutions. (Bouchardat.)
C_8H_8''

CAOUTCHICENE. *Vid.* Caoutchin.

CAOUTCHIN. Soluble in 2000 pts. of water. It takes up a small quantity of water in the cold, and at higher temperatures a larger quantity, which separates on cooling. Soluble in all proportions in absolute alcohol, ether, and acetate of ethyl. It is partially precipitated from the alcoholic solution on the addition of weak alcohol, and totally on mixing with water. Water does not precipitate it from the ethereal solution unless alcohol is likewise added. Soluble in the fixed and volatile oils. Slightly soluble in concentrated formic, and acetic acids. Insoluble in chloride of ethyl. Miscible in all proportions with xanthic acid. Soluble in benzin, bisulphide of carbon, and colza-oil.
(*Caoutchicene.*)
$C_{20}H_{16}$

CAOUTCHOUC. Insoluble in water or alcohol. One portion of it is soluble in ether, benzin, bisulphide of carbon, oil of turpentine, and the other essential oils; another portion of it is insoluble in these liquids. Anhydrous ether dissolves 66% of translucid caoutchouc; anhydrous
C_8H_7

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oil of turpentine dissolves 49% of it. The best solvent of caoutchouc is a mixture of 6 @ 8 pts. of absolute alcohol and 100 pts. of bisulphide of carbon. Concentrated sulphuric, and nitric acids slowly attack caoutchouc, but most acids have no action upon it at ordinary temperatures. It is not acted upon by alkalies. (Payen.)

Insoluble in water or alcohol. Soluble in coal-naphtha, caoutchin, and ether. (Page, *Am. J. Sci.*, (2.) **4.** 342.)

No portion of caoutchouc is dissolved by water or by cold alcohol; but hot alcohol dissolves out 4.712% of a soft resinous matter. Pure caoutchouc may be easily obtained by dissolving the ordinary gum in chloroform and precipitating this solution with alcohol. (Adriani.) Soluble in benzin. (Mansfield.) Chloroform is a powerful solvent of caoutchouc (Parrish's *Pharm.*, p. 318); but vulcanized rubber is insoluble in chloroform. (Wittstein's *Handw.*) Sparingly soluble in hot fusel-oil (hydrate of amyl). (Pelletan.) Largely soluble in hot oil of amber ("ambereupion"). (Dœpping.) Soluble in rosin-oil-naphtha. Soluble in oil of turpentine, especially if this has been several times redistilled, in oil of sassafras, and oil of lavender. In oil of ocotea. (Hancock.) Abundantly soluble in oil of rosemary. Swells up in naphtha, but does not dissolve [?] therein. (Laurent.) Swells up in heated styrol, but dissolves in it only to a very slight extent. (Blyth & Hofmann.) Soluble in mercuric methyl.

Very slightly acted upon by anilin, or by leukol (quinolein), even when these liquids are boiling. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** pp. 143, 169.) Readily soluble at a gentle heat in melted hog's-lard, but in whale-oil it dissolves only at very high temperatures. After having been swollen in oil of turpentine or in naphtha it is soluble in hot linseed-oil, and the solution thus obtained is miscible with oil of turpentine. (E. Merck, *Ann. der Pharm.*, 1837, **21.** 342.) Soluble in the oil obtained by the destructive distillation of caoutchouc, but no more readily than in oil of turpentine, naphtha, &c. (Trommsdorff.)

Capnomor. $C_{40}H_{22}O_4$ Insoluble in water. Easily soluble in alcohol, ether, and oils. When pure, it is insoluble in potash-lye, but when contaminated with creosote it dissolves in potash. Soluble in concentrated sulphuric acid. (Vœlckel.)

Capral. *Vid.* Hydride of Capronyl.

Capramid. *Vid.* Rutylamid.

Capric Acid. *Vid.* Rutylic Acid.

Capric Aldehyde. *Vid.* Hydride of Rutyl.

Caprinamid. *Vid.* Rutylamid.

Caprinic Acid. *Vid.* Rutylic acid.

Caproic Acid (Anhydrous). (*Caproic Anhydride. Caproic Caproate.*) $C_{24}H_{22}O_6 = \left.\begin{matrix} C_{12}H_{11}O_2 \\ C_{12}H_{11}O_2 \end{matrix}\right\} O_2$ Readily acidified by water and by alkaline solutions. Soluble in ether. (Chiozza, *Ann. Ch. et Phys.*, (3.) **39.** 207.)

Caproic Acid. (*Capronic Acid.*) $C_{12}H_{12}O_4 = C_{12}H_{11}O_3, HO$ Soluble in 96 pts. of water at 7°. Soluble in all proportions in absolute alcohol. Easily soluble in ether. Soluble in cold concentrated sulphuric acid, from which it is precipitated by water. Slowly soluble, without alteration, in cold nitric acid. (Chevreul.)

Caproate of Ammonia.

Caproate of Amyl. $C_{22}H_{22}O_4 = C_{12}H_{11}(C_{10}H_{11})O_4$ Insoluble in water. Soluble in all proportions in alcohol, and ether. Partially soluble in alkaline solutions. Insoluble in acid liquors. (Brazier & Gossleth, *J. Ch. Soc.*, **3.** 214.)

Caproate of Baryta. $C_{12}H_{11}BaO_4$ Soluble in 12.46 pts. of water at 10.5°, and in 12.50 pts. at 20°. (Chevreul.) 100 pts. of water at 10° dissolve 8.02 pts. of it. (Chevreul [T.].) Very soluble in water; the aqueous solution undergoing partial decomposition when boiled. (Brazier & Gossleth, *J. Ch. Soc.*, **3.** 215.) More soluble than the caprylate in cold water. Easily soluble in alcohol. (Chiozza, *Ann. Ch. et Phys.*, (3.) **39.** 206.)

Caproate of Ethyl. $C_{16}H_{16}O_4 = C_{12}H_{11}(C_4H_5)O_4$ Insoluble, or very sparingly soluble, in water.

Caproate of Lead.

Caproate of Lime. Soluble in 49.4 pts. of water at 14°. (Chevreul.)

Caproate of Magnesia. $C_{12}H_{11}MgO_4 + Aq$ Soluble in water.

Caproate of Methyl. $C_{14}H_{14}O_4 = C_{12}H_{11}(C_2H_3)O_4$ Insoluble, or sparingly soluble, in water.

Caproate of Potash. $C_{12}H_{11}KO_4$ Soluble in water. (Chevreul.)

Caproate of Silver. $C_{12}H_{11}AgO_4$ Sparingly soluble in boiling water. Less soluble in water than the butyrate. (Frankland & Kolbe.)

Caproate of Soda. $C_{12}H_{11}NaO_4$ Soluble in water. (Chevreul.)

Caproate of Strontia. $C_{12}H_{11}SrO_4$ Efflorescent. Soluble in 11.05 pts. of water at 10°. (Chevreul.)

Caproene. *Vid.* Caproylene.

Caproic Alcohol. *Vid.* Hydrate of Caproyl.

Caproile. *Vid.* Caproyl.

Caproilene. *Vid.* Caproylene.

Caprone. (*Caproylide of Amyl.*) $C_{22}H_{22}O_2 = \left.\begin{matrix} C_{10}H_{11} \\ C_{12}H_{11}O_2 \end{matrix}\right\}$ Insoluble in water. Readily soluble in alcohol, and ether. (Brazier & Gossleth, *J. Ch. Soc.*, **3.** 217.)

Capronic Acid. *Vid.* Caproic Acid.

Capronoyl. $C_{12}H_{11}$ Not isolated.

Capronyl. (*Caproyl of Gerhardt.*) $C_{12}H_{11}O_2$ Not isolated.

"**Caproyl**" (of Gerhardt). *Vid.* Capronyl.

Caproyl. (*Caproil. Hexyl.*) $C_{12}H_{13}$, or $\left.\begin{matrix} C_{12}H_{13} \\ C_{12}H_{13} \end{matrix}\right\}$ Insoluble in water. Miscible in all proportions with alcohol, and ether. (Brazier & Gossleth, *J. Ch. Soc.*, **3.** 226.)

***Tri*Caproylamin.** (*TriCapronylamin. TriHexylamin.*) $N\left\{(C_{12}H_{13})_3\right.$ Almost insoluble in water. Easily soluble in alcohol, and ether. Soluble in acids, forming deliquescent salts. (Petersen & Gœssmann, *Ann. Ch. u. Pharm.*, **101.** 311.)

Caproylene. (*Caproilene. Oléène. Hexylene. Caproene.*) $C_{12}H_{12}$ Scarcely at all soluble in water. Readily soluble in alcohol, and ether. (Fremy.)

"**Capryl.**" $C_{16}H_{17}$ *Vid.* Octyl.

Capryl (of Gerhardt). $C_{16}H_{15}O_2$ Not isolated.

CaprylAldehyde. *Vid.* Hydrate of Capricyl.

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CAPRYLAMID. Unknown.
$N\left\{\begin{matrix}C_{16}H_{15}O_2\\H_2\end{matrix}\right.$

"**CAPRYLAMIN.**" *Vid.* Octylamin.

CAPRYLIC ACID(Anhydrous). Unacted upon by boiling water. It becomes partially hydrated, however, by prolonged contact with moist air. Decomposed by alcohol. Soluble in ether. (Chiozza, *Ann. Ch. et Phys.*, (3.) **39.** 204.)
(*Caprylic Anhydride. Caprylic Caprylate.*)
$C_{32}H_{30}O_6 = \left.\begin{matrix}C_{16}H_{15}O_2\\C_{16}H_{15}O_2\end{matrix}\right\}O_2$

CAPRYLIC ACID. Very sparingly soluble in water. (Lerch.) Soluble in 400 pts. of water at 100°, but at 110° it separates out again almost completely, in crystals.
(*Capranic Acid.*)
$C_{16}H_{16}O_4 = C_{16}H_{15}O_3, HO$

Soluble in all proportions in alcohol, and ether. (Fehling.) Its alkaline salts are very soluble in water; the other salts are sparingly soluble or insoluble.

CAPRYLATE OF BARYTA. Permanent. Difficultly soluble in water. (Lerch.) Soluble in 1066 pts. of water at 10°, and in 50 pts. at 100°; or, 100 pts. of water at 10° dissolve 0.79 pt. of the salt, and at 100°, 2 pts. Perfectly insoluble in alcohol, and ether. (Fehling.) Less soluble in cold water than the caproate. Almost completely insoluble in alcohol. (Chiozza, *Ann. Ch. et Phys.*, (3.) **39.** 206.)
$C_{16}H_{15}BaO_4$

CAPRYLATE OF ETHYL. Nearly insoluble in water. Readily soluble in alcohol, and ether. (Fehling.)
$C_{20}H_{20}O_4 = C_{16}H_{15}(C_4H_5)O_4$

CAPRYLATE OF LEAD. Permanent. Sparingly soluble in water. (Lerch.)
$C_{16}H_{15}PbO_4$

CAPRYLATE OF METHYL. Scarcely at all soluble in water. Easily miscible with alcohol, and ether. (Fehling.)
$C_{18}H_{18}O_4 = C_{16}H_{15}(C_2H_3)O_4$

CAPRYLATE OF PHENYL.
$C_{28}H_{20}O_4 = C_{16}H_{15}(C_{12}H_5)O_4$

CAPRYLATE OF POTASH.

CAPRYLATE OF SILVER. Almost insoluble in water. (Schneider.) Slightly soluble in water. (Redtenbacher.) Soluble in hot alcohol. (Schneider.) Soluble in acids and in ammonia.
$C_{16}H_{15}AgO_4$

CAPRYLATE OF SODA.

CAPRYLENE. Insoluble in water. Soluble in alcohol, and ether. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 114.)
(*Octylene.*)
$C_{16}H_{16}''$

CAPRYLIAQUE. *Vid.* Octylamin.

CAPRYLIC ALCOHOL. *Vid.* Hydrate of Octyl.

CAPRYLIC ALDEHYDE. *Vid.* Hydrate of Capricyl.

CAPRYLIC ETHER. *Vid.* Oxide of Octyl.

CAPRYLONE. Insoluble in water. Readily soluble in cold alcohol, ether, and the fatty and volatile oils. Very abundantly soluble in hot alcohol, and wood-spirit. This solution becomes pasty upon cooling, as does that in 80% alcohol.
(*Caprylide of Heptyl.*)
$C_{30}H_{30}O_2$

CAPRYLPHOSPHORIC ACID. *Vid.* OctylPhosphoric Acid.

CAPRYLSULPHURIC ACID. *Vid.* OctylSulphuric Acid.

CAPSICIN(from *Capsicum annuum*). Sparingly soluble in water. Easily soluble in alcohol, ether, oil of turpentine, and an aqueous solution of caustic potash. (Bucholz, Braconnot.) Witting describes it as a crystalline resin, insoluble in cold water, or in ether, and but sparingly soluble in hot water or alcohol.

Soluble in alcohol, and ether. (H. B. Taylor, *Parrish's Pharm.*, pp. 423, 427.)

CARAMEL. Soluble in water. Insoluble in alcohol. (Péligot.)
(*Caramelic Acid. Normal Caramel.*)
$C_{12}H_9O_9$, or rather $C_{24}H_{18}O_{18}$

The *Caramel* of commerce is a mixture, according to Gélis, of *caramelan*, *caramelene*, and *caramelin*. It is very deliquescent, and mostly soluble in water if the sugar has not been very strongly heated in preparing it, but those samples which have been exposed to a high heat contain much that is insoluble in water. Sometimes it is almost entirely insoluble in alcohol. A portion of it is, nevertheless, always soluble in alcohol. (Gélis, *Ann. Ch. et Phys.*, (3.) **52.** 352.)

CARAMEL(from *Glucose*). Is a mixture of 3 substances analogous to those in cane-sugar-caramel. Their solubility in water is, however, greater and that in alcohol less than that of the compounds in cane-sugar-caramel. Hence glucose-caramel is almost entirely insoluble in strong alcohol, while it is nearly all soluble in water. (Gélis, *Ann. Ch. et Phys.*, (3.) **52.** 387.)

CARAMELATE OF BARYTA. Insoluble in water. (Péligot.)
$C_{24}H_{17}BaO_{18}$

CARAMELAN(of Vœlckel). Insoluble in water or alcohol. Sparingly soluble in an aqueous solution of caustic potash. (Vœlckel.)
$C_{24}H_{18}O_{18}$

CARAMELAN(of Gélis). Very deliquescent. Exceedingly soluble in water. Readily soluble in alcohol of 84%. Sparingly soluble in absolute alcohol. Insoluble in ether.
$C_{12}H_9O_9 = C_{12}H_8O_8, HO$

Its compounds with metallic oxides are more soluble in water than those of caramelene. (Gélis, *Ann. Ch. et Phys.*, (3.) **52.** 360.)

CARAMELAN with **BARYTA.**
$C_{12}H_8O_8, 2BaO$

CARAMELAN with **LEAD.** Insoluble in alcohol.
$a = C_{12}H_8PbO_9$ Somewhat soluble in acetic acid.
$b = C_{12}H_8O_8, 2PbO$ Ppt. (Gélis, *loc. cit.*)

CARAMELENE. Permanent. Soluble in water, and dilute alcohol. Very sparingly soluble in strong alcohol. Insoluble in ether.
$C_{36}H_{25}O_{25} = C_{36}H_{24}O_{24}, HO$

Its compounds with metallic oxides are less soluble in water than those of caramelan. (Gélis, *loc. cit.*)

CARAMELENE with **BARYTA.** Sparingly soluble in water. Insoluble in spirit.
$C_{36}H_{24}BaO_{25}$

CARAMELENE with **LEAD.** Sparingly soluble
$a = C_{36}H_{24}PbO_{25}$ in water. Insoluble in spirit.
$b = C_{36}H_{24}O_{24}, 4PbO$
$c = C_{36}H_{24}O_{24}, 6PbO$ (Gélis, *loc. cit.*)

CARAMELIN. Occurs in different modifications:
$C_{96}H_{50}O_{50}, HO$

Modif. A. Soluble in water.

Modif. B. Insoluble in cold, but soluble in boiling water, being thereby transformed into *A*. Insoluble in alcohol of 90%, but very soluble in alcohol of 60%. Soluble in alkaline liquors. Insoluble in chlorhydric, sulphuric, or tartaric acids.

Modif. C. Insoluble in all ordinary solvents.

CARAMELIN (*B*) with **BARYTA.** Ppt.
$a = C_{96}H_{50}BaO_{51}$
$b = C_{96}H_{50}O_{50}, 2BaO$ Ppt.

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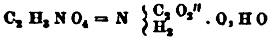
Caramelin with Lead. Ppt. (Gélis, *loc. cit.*)
$C_{96}H_{50}PbO_{51}$

Under the name *caramelin* Maumené has described a substance, of composition $C_{12}H_4O_4$, which is insoluble in water, acids, or alkaline solutions.

Carapin(from *Carapa guianensis*). Easily soluble in water, and alcohol. Insoluble in ether. (Petroz & Robinet.)

Carbamic Acid. Not isolated.


$C_2H_2NO_4 = N\left\{\begin{matrix}C_2O_2''\\ H_2\end{matrix}\right. . O, HO$

Carbamate of Ammonia. In the air a part of it evaporates, while the rest absorbs moisture and is converted into carbonate of ammonia. Easily soluble in water, but the solution soon undergoes decomposition to carbonate of ammonia. (H. Rose.) Also soluble in alcohol. (J. Davy.)
(*Anhydrous Carbonate of Ammonia.*)
$C_2H_2(NH_4)NO_4$

Carbamate of Ammonia with Carbonate of Ammonia. Decomposed by water.
$C_2H_2(NH_4)NO_4;\ 2(NH_4O, CO_2)$

Carbamate of Amyl. Soluble in boiling, less soluble in cold water. Soluble in alcohol, and ether. Soluble, without decomposition, in cold concentrated sulphuric acid, from which solution it is precipitated by water. The sulphuric acid solution is decomposed on heating. (Medlock, *J. Ch. Soc.*, **2**. 213.)
(*Amyl (or Amylo) Urethan.*)
$C_2H_2(C_{10}H_{11})NO_4$

Carbamate of Butyl. Insoluble in water. Soluble in alcohol, and ether. (Humann, *Ann. Ch. et Phys.*, (3.) **44**. 341.)
(*Carbamate of Tetryl. Butylic (or Tetrylic) Urethan.*)
$C_{10}H_{11}NO_4 = C_2H_2(C_8H_9)NO_4$

Carbamate of Ethyl. Very soluble both in warm and in cold water. Very soluble in alcohol, spirit, and ether. (Dumas, Liebig & Wœhler.)
(*Ethyl Urethan. Urethan.*)
$C_6H_7NO_4 = C_2H_2(C_4H_5)NO_4$

Carbamate of Methyl. Permanent. Soluble in 0.46 pt. of water at 11°; or 100 pts. of water at 11° dissolve 217 pts. of it. Soluble in 1.37 pts. of alcohol at 15°; or, 100 pts. of alcohol at 15° dissolve 73 pts. of it. In ether it is less soluble. (Echevarria.) Decomposed by a solution of caustic potash, and by warm sulphuric acid.
(*Urethylan. Methyl Uretane.*)
$C_4H_5NO_4 = C_2H_2(C_2H_3)NO_4$

Carbamate of Tetryl. *Vid.* Carbamate of Butyl.

Carbamic Ether. *Vid.* Carbamate of Ethyl.

Carbamid. Identical with Urea, *q. v.*

Carbamid(or ido)Carbanilid. *Vid.* PhenylCarbamid.

CarbamidNitroCarbanilid. *Vid.* NitroPhenylCarbamid.

CarbAnil. *Vid.* Cyanate of Phenyl.

CarbAnilamid. *Vid.* PhenylUrea; and PhenylCarbamid.

Carbanilethan. *Vid.* Benzamate of Ethyl; and also, PhenylCarbamate of Ethyl.

CarbAnilic Acid. *Vid.* Benzamic Acid; and PhenylCarbamic Acid.

CarbAnilic Ether. *Vid.* PhenylCarbamate of Ethyl.

CarbAnilid. *Vid.* *di*PhenylCarbamid.

CarbanilMethylan. *Vid.* Benzamate of Methyl; and also PhenylCarbamate of Methyl.

CarbAzotic Acid. *Vid.* Picric Acid.

Carbide of Iridium.
IrC_4

Carbide of Iron.

Carbide of Iron of Platinum. Much more soluble in dilute sulphuric acid than pure steel. Soluble in aqua-regia, forming a solution containing much platinum with but little iron. (Faraday & Stodart.)

Carbide of Palladium.

Carbide of Platinum. Most of the platinum may be dissolved out by hot aqua-regia. (Zeise, *Ann. Ch. u. Pharm.*, 1840, **33**. 53.)
PtC_2

Carbide of Silver. Soluble in nitric acid, with separation of carbon.
Ag_2C

CarboBenzid. *Vid.* BenzoPhenone.

CarboBenzoic Acid(of Plantamour). "Probably impure benzoic acid." (Gmelin, Gerhardt.) Soluble in hot, less soluble in cold water. It is more soluble than benzoic acid, in water. Readily soluble in alcohol, and ether.
(*Myroxylic Acid.*)
$C_{15}H_6O_4$

CarboBenzoate of Baryta. Soluble in water.
$C_{15}H_5BaO_4$

CarboBenzoate of Lead.
$C_{15}H_5PbO_4$

CarboBenzoate of Lime. Soluble in water.
$C_{15}H_5CaO_4$

CarboBenzoate of Silver. Ppt.
$C_{15}H_5AgO_6$

Carbolate of *X*. *Vid.* Phenate of *X*.

Carbolic Acid. *Vid.* Phenic Acid.

CarboMethylic Acid. *Vid.* MethylCarbonic Acid.
$C_4H_4O_6$

Carbon. Insoluble in water, alcohol, ether, or in dilute acids or alkaline solutions.
Modif. α (Diamond.)

Modif. β (Graphite.) Insoluble in water, alcohol, ether, or in dilute acids or alkaline solutions.

Modif. γ (Lampblack.) Insoluble in water, alcohol, ether, or in dilute acids or alkaline solutions.

CarboNaphthalid. *Vid.* *di*NaphthylCarbamid.

Carbonic Acid(Gas). Water dissolves about its own volume of the gas at the ordinary temperature (the solution obtained being of 1.0018 sp. gr.) and pressure; and an additional volume for the pressure of each additional atmosphere to which it is subjected. According to Soubeiran the power of water to absorb carbonic acid does not increase in precisely the same ratio as the pressure. Courbe (*Journ. de Pharm.*, **26**. 121) also finds that a volume of water under a pressure of 7 atmospheres contains only 5 volumes of carbonic acid, and that a much greater pressure is necessary in order to increase the amount of the gas dissolved; but up to 4 or 5 volumes the amount of gas dissolved by water is very nearly proportional to the pressure. On removing the pressure from these solutions the excess of carbonic acid gas escapes, leaving only a single volume in solution; but under the same circumstances Champagne wine loses of 4 vols. only ½ a vol. (In *Berzelius's J. B.*, **21**. 77.)
CO_2

100 volumes of water, at

12.78°	absorb	116 ["107" T.]	vols. CO_2	(Cavendish.)
29.44°	"	84	"	(Henry.)
15.56°	"	106	"	(Saussure.)
15.56°	"	108	"	(Henry.)
15.56°	"	100	"	(Dalton.)

(Cited by Rogers, *Am. J. Sci.*, (2.) **6.** 108.)

100 vols. of water at °C	Absorb of dry CO_2, vols. reduced to 30 inches Bar. and 15.56° (= 60° F.).
0°	175.72
4.4°	147.94
10°	122.27
15.6°	100.50
21.1°	83.86
26.7°	68.60
32.2°	57.50
37.8°	50.39
65.6°	11.40
100.0°	still a perceptible quantity.

(W. B. & R. E. Rogers, *Am. J. Sci.*, (2.) **6.** 107.)

1 vol. of water under a pressure of $0^{m}.76$ of mercury at °C	Dissolves of carbonic acid gas: — vols. reduced to 0°C. and $0^{m}.76$ pressure of mercury.
0°	1.7967
1°	1.7207
2°	1.6481
3°	1.5787
4°	1.5126
5°	1.4497
6°	1.3901
7°	1.3339
8°	1.2809
9°	1.2311
10°	1.1847
11°	1.1416
12°	1.1018
13°	1.0653
14°	1.0321
15°	1.0020
16°	0.9753
17°	0.9519
18°	0.9318
19°	0.9150
20°	0.9014

(Bunsen's *Gasometry*, pp. 287, 128, 152.)

At about 5° one vol. of water absorbs somewhat more than 1 vol. of CO_2; at 10° scarcely 1 vol., and still less at higher temperatures. The solution saturated at 2° is of 1.0015 sp. gr. A great part of the carbonic acid escapes when the solution is exposed to the air, and the quicker in proportion as the solution is hotter. But as the amount of CO_2 diminishes the remainder is retained more obstinately, so that boiling for half an hour is necessary to discharge the whole of it. On freezing the water, however, the carbonic acid is all evolved. (Bergman, *Essays*, 1. pp. 12, 75.)

1 vol. alcohol under a pressure of $0^{m}.76$ of mercury at °C	Dissolves of carbonic acid gas: — vols. reduced to °C. and $0^{m}.76$ pressure of mercury.
0°	4.3295
1°	4.2368
2°	4.1466
3°	4.0589
4°	3.9736
5°	3.8908
6°	3.8105
7°	3.7327
8°	3.6573
9°	3.5844
10°	3.5140
11°	3.4461
12°	3.3807
13°	3.3178
14°	3.2573
15°	3.1993
16°	3.1438
17°	3.0908
18°	3.0402
19°	2.9921
20°	2.9465
21°	2.9034
22°	2.8628
23°	2.8247
24°	2.7890

(Bunsen's *Gasometry*, pp. 287, 128, 153.)

At 18°C. and the ordinary pressure,

100 vols. of			absorb vols. of CO_2
Water			106
Alcohol of 0.803 sp. gr.			260
" 0.840 "			186 @ 187
Ether 0.727 "			217
Rect. Naphtha (Rock-oil) of 0.784 sp. gr.			169
Oil of Turpentine of 0.860 "			166
" Lavender (freshly distilled) of 0.880 sp. gr.			191
" Thyme of 0.890 "			188
Linseed-oil of 0.940 "			156
Olive-oil of 0.915 "			151
An aqueous solution of Gum Arabic (containing 25% of the gum) of	1.092	sp.gr.	75
An aqueous solution of Cane-Sugar (cont. 25% of Sugar) of	1.104	"	72
A saturated aqueous solution of Chloride of Sodium (cont. 29% of Na Cl) of	1.212	"	32.9
A saturated aqueous solution of Chloride of Ammonium (cont. 27.53% of the salt) of	1.078	"	75
A saturated aqueous solution of Chloride of Potassium (cont. 26% of K Cl) of	1.168	"	61
A saturated aqueous solution of Chloride of Calcium (cont. 40.2% of Ca Cl) of	1.402	"	26.1
A saturated aqueous solution of Sulphate of Potash (cont. 9.42% KO, SO_3) of	1.077	"	62
A saturated aqueous solution of Sulphate of Soda (cont. 11.14% of NaO, SO_3) of	1.105	"	58
A saturated aqueous solution of Alum (cont. 9.14% of $Al_2O_3, 3SO_3; KO, SO_3 + 24 Aq$) of	1.047	"	70
A saturated aqueous solution of Nitrate of Potash (cont. 20.6% of KO, NO_5) of	1.139	"	57
A saturated aqueous solution of Nitrate of Soda (cont. 26.4% of NaO, NO_5) of	1.206	"	45
A saturated aqueous solution of Tartaric Acid (cont. 53.37% of the crystallized acid) of	1.285	"	41
Sulphuric Acid of	1.840	"	45

(Th. de Saussure, *Gilbert's Ann. Phys.*, 1814, **47.** pp. 167 – 172.

From these experiments, it appears that the fatty oils can absorb a much larger quantity of carbonic acid gas than the much more mobile water; that the solubility of this gas in gum or sugar-water is greater than in the far more fluid solutions of sulphate of soda and chloride of potassium; while in solutions of the chlorides of potassium, and of ammonium, and of nitrate of potash, which are as fluid as pure water, it is much less soluble than in the latter: hence, although there are some liquids, like ether and alcohol, more fluid than water, which absorb more of the gas than this is capable of doing, De Saussure argues that, as a general rule, viscosity has but little influence upon the amount of any gas which is absorbed by a liquid, although he admits that a much longer time is required in order that a viscid liquid shall become saturated with the gas, — viscous liquids, like the fatty oils, gum-arabic water, or a solution of chloride of calcium, requiring a considerably longer time to become saturated with a gas than the more mobile liquids, like water, naphtha, alcohol, ether, and the essential oils, which are capable of absorbing similar quantities.* In general, liquids of low specific gravity can absorb more of any gas than those which are heavier. Solutions of the metallic salts, which are of high specific gravity, must consequently have still less power of absorbing gases than those employed in the foregoing experiments. It follows, that in pneumatic operations, as in collecting carbonic acid or any other somewhat soluble gas, it is better to fill the trough with some saline solution instead of water. A solution of common salt is peculiarly well fitted to serve this purpose, and ordinary impure commercial salt is better than purified chloride of sodium, a saturated solution of the former having absorbed at the ordinary temperature not quite $\frac{1}{3}$ of its volume of carbonic acid gas, and having required a much longer time to do this than is required by pure water in absorbing its own volume of the gas. (Th. de Saussure, *Gilbert's Ann. Phys.*, 1814, **47.** pp. 172–175.) 1 vol. of oil of turpentine absorbs from 1.7 @ 1.9 vols. of it. (Saussure, in *Gm.*, **14.** 270.) 1 vol. of spirit at 10° absorbs 2 vols. of CO_2; 1 vol. of olive-oil at 10° absorbs 1 (or more) of CO_2; 1 vol. of oil of turpentine at 10° absorbs nearly 2 vols. of CO_2 (with great rapidity at first). (Bergman, *Essays*, **1.** 56.) 1 vol. of caoutchin absorbs 11 vols. of it. Slightly soluble in chlorhydric acid.

Sulphuric acid of ordinary density, at 15.56° and the common pressure, absorbs about 94% of its volume of CO_2; and Nordhausen acid 125% of its volume. The absorption by pure water under the same temperature and pressure being 98%. (W. B. & R. E. Rogers, *Am. J. Sci.*, (2.) **5.** 115.) Monohydrated sulphuric acid absorbs from 7 @ 10% of CO_2. (Hlasiwetz, *Wien. Akad. Bericht*, **20.** 193.) Tolerably soluble in water and in concentrated sulphuric acid. (Berthelot, *Ann. Ch. et Phys.*, (3.) **51.** 72.) About half as soluble in an aqueous solution of chloride of sodium (containing about 15% of NaCl) as in pure water. Much more soluble in an aqueous solution of ordinary diphosphate of soda than in pure water, the quantity dissolved being larger in proportion to the amount of phosphate of soda in the solution. A similar remark is true for solutions of carbonate of soda. The solubility of carbonic acid gas in solutions of these two salts seems to depend upon its coefficient of solubility in pure water plus the product of a constant coefficient (0.069 for $2NaO, HO, PO_5$, and 0.088 for NaO, CO_2) by the amount of salt in solution. (Fernet, *Ann. Ch. et Phys.*, (3.) **47.** 367.)

Carbonic acid is not disengaged at ordinary temperatures from water in which $\frac{1}{1000}$ of carbonate of lime is held in solution by it. Carbonate of magnesia also acts in an analogous manner. Not only does the presence of carbonate of lime or of magnesia in water tend to *retain* carbonic acid very forcibly, even at the temperature of boiling, and when the solution is placed in an exhausted receiver, — a phenomenon which is most strongly marked in dilute solutions, — but such solutions are also capable of absorbing the gas from the atmosphere and of dissolving it in much larger quantity than can be done by pure water. (Bineau.) [The above observation of Bineau is in accordance with facts observed, but incorrectly explained, by myself. (Storer, *Am. J. Sci.*, 1858, (2.) **25.** 41.) From my own observations it appears that carbonate of baryta, as well as carbonate of lime, can most forcibly retain carbonic acid in solution even after long-continued ebullition.] Carbonic acid is also absorbed from the air by aqueous solutions of carbonate of soda and carbonate of potash, especially when these are dilute. (Bineau.) Carbonic acid gas seems to be more soluble than sulphuretted hydrogen in water at high temperatures, as when heated under pressure in sealed tubes. (De Senarmont, *Ann. Ch. et Phys.*, (3.) **32.** 169.)

II.) *Liquid Carbonic Acid.* Not miscible with water, though slightly soluble therein, or with the fatty oils; but miscible in all proportions with alcohol, ether, bisulphide of carbon, and the essential oils. (Thilorier, Mitchell.) Unacted upon by water. Soluble in alcohol, ether, rock-oil, oil of turpentine, and bisulphide of carbon. (Mareska & Donny, *Mem. Brussels Acad.* (Savants étrangers), 1845, vol. **18.** p. 26 of the memoir.)

III.) *Solid Carbonic Acid.* When immersed in water it rapidly assumes the gaseous state and dissolves. With alcohol or ether it forms a semi-fluid mixture, with apparent chemical combination. (Channing, *Am. J. Sci.*, (2.) **5.** 186.) Only slightly soluble in anhydrous ether, but may be mixed therewith to a paste. (Thilorier.)

All basic and normal carbonates of the metallic oxides are insoluble in water, excepting those of the alkalies and ammonia, but they all dissolve in carbonic acid water, hence it may be said that all acid carbonates are soluble in water.

Carbonates of the metallic oxides are insoluble, or very sparingly soluble, in alcohol. (Saussure.)

CARBONATE OF ALLYL. Insoluble in water. Soluble in alcohol.
$C_6H_5O, HO, 2CO_2$

CARBONATE OF ALUMINA. Insoluble in water.
$3Al_2O_3, 2CO_2 + 16Aq$ (Muspratt.)

CARBONATE OF AMMONIA.

I.) "*Anhydrous.*" *Vid.* Carbamate of Ammonia.
NH_3CO_2 or $N_2H_6C_2O_4$

II.) *mono.* Known only in solution in water, and alcohol. (See Berzelius's *Lehrb.*, **3.** 310.)
NH_4O, CO_2

III.) *sesqui.* Loses water when exposed to the air. Soluble in water; less soluble in alcohol. (H. Deville, *Ann. Ch. et Phys.*, (3.) **40.** 90.) Soluble in 1.667 pts. of cold, and in 0.833 pt. of hot water. (Fourcroy.)
(*Common Commercial Carbonate of Ammonia.*)
$2NH_4O, 3CO_2 + 3Aq$

100 pts. of water	dissolve	25 pts.	of it at	13°
"	"	" 30		17°
"	"	" 37		32°
"	"	" 40		41°
"	"	" 50		49°

(Berzelius, *Lehrb.*, **3.** 313.)

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* Compare, in this connection, the experiments of Prof. Joseph Henry (*Proc. Amer. Phil. Soc.*, 1844, **4.** pp. 56, 84), who finds that viscous liquids, like soap-water, have less cohesion than pure water.

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When the aqueous solution is heated to 49° carbonic acid escapes with effervescence. (*Ibid.*) It evaporates in the air.

100 pts. of water at 15.5° dissolve 33 pts. of it. 100 pts. of water at 100° dissolve 100 pts. of it. (Ure's *Dict.*) Soluble in 2 pts. of water at 15.5°, and in less than 1 pt. of boiling water; the solution saturated at 15.5° containing 33.33% of it and the saturated boiling solution 50%. Insoluble in spirit. Soluble in 2.4 @ 3 pts. of water at 18.75°. (Abl, from *Oesterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.)

The aqueous solution saturated
at 10° contains 15.7% of it. (Eller.)
?° " 6.1% " (Mussembrock.)
in the cold, " 37.5% " (Fourcroy.)
(All cited by Hassenfratz, *Ann. de Chim.*, **28.** 291.)

Decomposed by water and by alcohol. A small quantity of water dissolves out the compound ($NH_4O, CO_2; NH_3CO_2$), while the bicarbonate ($NH_4O, HO, 2CO_2$) remains undissolved. (H. Rose.) Ordinary commercial carbonate of ammonia does not dissolve as such in water. The first portions of water added to it dissolve principally neutral [mono] carbonate of ammonia, while bicarbonate of ammonia remains undissolved. (Scanlan, *Rep. Br. Assoc.*, 1838, p. 63.) When a solution of carbonate of ammonia is heated, it seems to boil at 82.22°, and if the temperature be increased, the salt evaporates so that by the time the water reaches the boiling-point it is perfectly free from all traces of the substance. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 91.) When alcohol is added to the concentrated aqueous solution, bicarbonate of ammonia (No. 4) is precipitated while the mono salt (No. 2) remains dissolved. (Berzelius, *Lehrb.*, **3.** 311.)

IV.) *bi.* $a = NH_4O, HO, 2CO_2$ Permanent, except that it very slowly evaporates when exposed to the air. Soluble in 8 pts. of cold water. (Wittstein's *Handw.*) In about 6 pts. of water at the ordinary temperature. (Berzelius's *Lehrb.*) When the aqueous solution is slightly heated the salt loses a portion of its acid. (Berthollet, *Gehlen's N. All. J.*, **3.** 255 [T.].) When the solution is heated above 36°, carbonic acid escapes with effervescence and the salt ultimately becomes neutral. Very slightly soluble in alcohol. (Berzelius, *Lehrb.*, **3.** 311.)

$b = 2(NH_4O, HO, 2CO_2) + Aq$

$c = NH_4O, HO, 2CO_2 + Aq$

CARBONATE OF AMMONIA & OF COBALT.
I.) $NH_4O, CO_2; CoO, CO_2 + 4Aq$ Permanent. Ppt. (Deville). Soluble in water. (Berzelius, *Lehrb.*, **3.** 648.)

II.) $NH_4O, 2CO_2; CoO, CO_2 + 9Aq$ & $+ 2Aq$ Quickly decomposes in the air. (H. Deville, *Ann. Ch. et Phys.*, (3.) **35.** 450.)

CARBONATE OF AMMONIA & OF COPPER.
I.) Soluble in water.

II.) Insoluble in water.

CARBONATE OF AMMONIA & OF GLUCINA.
$NH_4O, 3CO_2; Gl_2O_3, 3CO_2 + Aq$ Very soluble in cold, readily decomposed by hot water; much less soluble in spirit, and almost insoluble in absolute alcohol. (Debray, *Ann. Ch. et Phys.*, (3.) **44.** 30.)

CARBONATE OF AMMONIA & OF MAGNESIA.
I.) $MgO, CO_2; NH_4O, CO_2 + 4Aq$ Soluble in water, without decomposition. Insoluble in an aqueous solution of carbonate of ammonia. (Guibourt.) Slowly decomposed by cold, more readily decomposed by boiling water.

"Insoluble in pure water. Contrary to the statement of Guibourt it is decomposed by water, as Bucholz has already said." (Favre, *loc. cit.*, p. 478.) Very sparingly soluble in a solution of carbonate of ammonia. (Favre, *Ann. Ch. et Phys.*, (3.) **10.** pp. 475 – 478.) Scarcely soluble in a solution of carbonate of ammonia. (Bucholz.) Soluble in a solution of sesquicarbonate of ammonia. (H. Deville, *Ann. Ch. et Phys.*, (3.) **35.** 464.)

II.) $NH_4O, 2CO_2; 2(MgO, CO_2) + 9Aq$ & $+ 12Aq$ Very rapidly altered when exposed to the air. (Deville.)

CARBONATE OF AMMONIA & OF NICKEL.
I.) $NH_4O, 2CO_2; 2(NiO, CO_2) + 9Aq$

II.) ? Soluble in water. (Berzelius, *Lehrb.*)

CARBONATE OF AMMONIA & *of protoxide* OF TIN. $NH_4O, 2CO_2; 2SnO, CO_2 + 8Aq$ Decomposed by cold water. (H. Deville, *Ann. Ch. et Phys.*, (3.) **35.** 457.)

CARBONATE OF AMMONIA & *of protoxide* OF URANIUM. Soluble in a solution of carbonate of ammonia. (Rammelsberg.)

CARBONATE OF AMMONIA & *of sesquioxide* OF URANIUM. $2(NH_4O, CO_2); Ur_2O_3, CO_2 + 2Aq$ Slowly decomposes in the air. Sparingly soluble in water, 1 pt. of it being soluble in 20 pts. of water at 15°; or, 100 pts. of water at 15° dissolve 5 pts. of it. More soluble in water containing carbonate of ammonia. The aqueous solution is decomposed by boiling. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** 207.)

Permanent. Soluble in water, at least in that containing carbonate of ammonia, the solution undergoing decomposition when boiled. (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** 45.) Insoluble in pure water. Soluble in an aqueous solution of carbonate of ammonia, but this solution is decomposed when boiled. (Berzelius.) Easily soluble in sulphurous acid; on boiling the solution subsulphite of uranium separates out. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 76.)

CARBONATE OF AMMONIA & OF YTTRIA. Insoluble in an aqueous solution of carbonate of ammonia, but is decomposed when boiled. (Berzelius, *Lehrb.*, **2.** 176; **3.** 501.)

CARBONATE OF AMMONIA & OF ZINC. $NH_4O, CO_2; ZnO, CO_2$ Insoluble in water. (Deville.) Tolerably permanent in the air. Slowly decomposed by cold, rapidly by boiling water. Somewhat soluble in cold water, being much more soluble than the corresponding magnesia salt. Very soluble in water containing carbonate of ammonia. Unacted upon by alcohol. (Favre, *Ann. Ch. et Phys.*, (3.) **10.** 481.)

CARBONATE OF AMMONIA & OF ZIRCONIA. Soluble in water, or at least in an aqueous solution of carbonate of ammonia, the solution undergoing decomposition when boiled. [T.]

CARBONATE OF AMMONIOCHLORIDE OF SULPHUR. Soluble in water, with decomposition.

CARBONATE OF AMMONIUMCHLOROPLATIN(*ous*)AMMONIUM. (*Gros's Carbonate.*) Insoluble in water. Soluble in acids, with decomposition. (Gros, *Ann. der Pharm.*, 1838, **27.** 256.)

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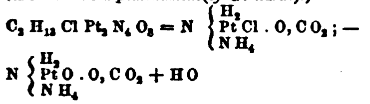
Carbonate of AmmoniumChloroPlatin(ous)ammonium & of AmmoniumOxyPlatin(ous)ammonium. Sparingly soluble in water. (Raewsky.)
(Raewsky's Carbonate. Sesquichlorhydrocarbonate de diplatinamine(of Gerhardt).)



$$C_2H_{13}ClPt_2N_4O_8 = N\left\{\begin{matrix}H_2\\ PtCl\\ NH_4\end{matrix}\right. .O, CO_2; - N\left\{\begin{matrix}H_2\\ PtO\\ NH_4\end{matrix}\right. .O, CO_2 + HO$$

Carbonate of AmmonioIridium. $5NH_3 . Ir_2O_3, 3CO_2 + 3Aq$ Soluble in water. (Claus, *Beiträge*, p. 91.)

Carbonate of AmmonioRhodium. $5NH_3 . Rh_2O_3, 3CO_2 + 8Aq$ Permanent. Very easily soluble in water. Insoluble in alcohol. (Claus, *Beiträge*, **2.** 88.)

"**Carbonate of Amyl.**" *Vid.* Carbamate of Amyl.

Carbonate of Amyl. Insoluble in water.
$C_{10}H_{11}O, CO_2$, or $(C_{10}H_{11}O)_2 \big\} 2CO_2$

Carbonate of Amylamin.

Carbonate of Baryta. BaO, CO_2 Permanent. Soluble in 12027 pts. of water at 15° (Kremers, *Pogg. Ann.*, **85.** 247); in 14137 pts. of water at 16° @ 20°, and in 15421 pts. at the temperature of boiling. (Fresenius, *Ann. Ch. u. Pharm.*, 1846, **59.** 119.) Soluble in about 25000 pts. of water. (Bineau, *C. R.*, **41.** 511.) Subsequently Bineau states that the numbers resulting from his earlier experiments upon the solubility of carbonate of baryta are too high, as he was ignorant of the necessity of taking special precautions to avoid the influence of the carbonic acid of the air, and that in his recent experiments he found 0.021 grm. of carbonate of baryta to the litre of water at the ordinary temperature, i. e. 1 pt. of it is soluble in 47620 pts. of water. (*Ann. Ch. et Phys.*, 1857, (3.) **51.** 299.) Malaguti appears to be in error in citing the solubility of carbonate of baryta as $\frac{1}{400000}$ after Bineau. (*Ibid.*, p. 346.) Soluble in 4304 pts. of cold, and in 2304 pts. of boiling water. (Fourcroy.) Soluble in 588 pts. of water saturated with carbonic acid, at 10°. (Lassaigne, *J. Ch. Méd.*, **4.** 312; in *Berzelius's Jahresbericht*, **29.** 132.) Soluble in 833 pts. of water saturated with carbonic acid (Dumas); in 380 [830 [T.]] pts. (Fourcroy.)

Insoluble in water. Soluble in 1550 pts. of water saturated with carbonic acid; when reduced to a fine powder it is much more readily soluble than this in carbonic acid water. (Bergman, *Essays*, **1.** 30.) [Carbonic acid gas produces no precipitate at ordinary temperatures in baryta-water which has been largely diluted with water; nor is any precipitate produced when such dilute solution is boiled.] (Compare Bineau, *Art.* Carbonic Acid.) Almost absolutely insoluble in water containing free ammonia and carbonate of ammonia; thus, when digested in a solution of ammonia and carbonate of ammonia, in excess, the mixture being gently heated and allowed to stand during 12 hours, 1 pt. of the carbonate dissolves in 141000 pts. of the liquid: the addition of chloride of ammonium in this experiment does not increase the solubility of the carbonate. (Fresenius, *Ann. Ch. u. Pharm.*, 1846, **59.** 119.) When caustic ammonia, which has been partially neutralized with carbonic acid, is mixed with baryta-water, or when a mixture of caustic ammonia and of baryta-water is treated with a small amount of carbonic acid gas, no precipitate is produced except on boiling. Yet it does not appear that caustic ammonia can redissolve carbonate of baryta which has once been precipitated. (Vogel, *Ann. de Chim.*, 1814, **89.** 131; also *Schweigger's Journ. für Ch. u. Phys.*, 1821, **33.** 208.)

Soluble in a boiling aqueous solution of chloride of ammonium, with evolution of ammonia. (Fuchs; Demarçay, *Ann. der Pharm.*, 1834, **11.** 251.) When recently precipitated it is soluble in a cold aqueous solution of chloride of ammonium, and even the compact native carbonate (*Witherite*), when finely powdered, is also soluble. (Vogel, *J. pr. Ch.*, 1836, **7.** 455.) Soluble in a cold saturated aqueous solution of chloride of ammonium, and in the solution thus obtained ammonia in excess causes no precipitate. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 96, 334.) Much more soluble in solutions of chloride of ammonium or of nitrate of ammonia than in pure water. From solutions in these salts it is partially reprecipitated by caustic ammonia. (Fresenius, *Quant.*, p. 126.) Soluble in aqueous solutions of various salts: as, chloride of ammonium, nitrate of ammonia, and succinate of ammonia (Wittstein); also soluble in solutions of ammonia, and carbonate of ammonia (Vogel), and of carbonate of potash (Wackenroder). When a solution of ammonia incompletely saturated with carbonic acid is mixed with a solution of chloride of barium no precipitate ensues immediately at the ordinary temperature of the air, but after standing for some time exposed to the air a portion of the carbonate of baryta separates out. On boiling the mixture a precipitate is produced at once. Solutions of ammonia saturated or nearly saturated with carbonic acid generally produce precipitates when mixed with chloride of barium, but the precipitation is incomplete unless the mixture is heated. (Vogel, *Ann. de Chim.*, 1814, **89.** 130; also *Schweigger's J. für Ch. u. Phys.*, 1821, **33.** pp. 205, 206.) When a mixture of a solution of chloride of barium and of caustic ammonia is exposed to an atmosphere of pure carbonic acid no precipitate is produced until a great deal of the acid has been absorbed, and the baryta is completely precipitated only after the lapse of several days. (Vogel, *Schweigger's J.*, **33.** pp. 205, 206.) Aqueous solutions of several of the soluble salts of ammonia, potash, and soda dissolve a portion of recently precipitated carbonate of baryta when digested in great excess therewith; this solvent action is more distinctly observed, however, in the tendency to prevent the precipitation of carbonate of baryta from solutions of baryta salts when these are mixed with other saline solutions. Chloride of ammonium retards in a marked manner the precipitation of carbonate of baryta from dilute baryta-water, a portion of baryta remaining in solution even after boiling with carbonate of soda The chlorides of sodium and potassium also retard in a measure the precipitation of carbonate of baryta, but their action is not well marked. A solution of chloride of barium produces no precipitate, except on boiling, when added to a mixed solution of carbonate of soda and chloride of ammonium, and if the latter be present in considerable quantity there will be no precipitate even on boiling. When the chloride of ammonium is present in smaller quantity there is a point where the addition of a drop of carbonate of soda produces a cloudiness which clears up on heating. If in the last experiment chloride of sodium be substituted for chloride of ammonium, a similar action may be observed, although it is much less in degree. In one experiment, in which an excess of carbonate of soda was used and a partial precipitate produced in the cold, the liquid was left in repose during twenty-four hours, but on being filtered and the clear filtrate boiled, an additional amount of carbonate of baryta separated. When a mixed solution of carbonate of soda and nitrate of potash is quickly added, in large excess, to a small quantity of a solution of chloride of barium or of hydrate of baryta, no immediate precipitate is produced except on boiling. But in general, carbonate of baryta appears to be affected in much less degree than carbonate of lime by the solvent action of the alkaline salts, and seems to be capable of separating entirely, even in the cold, from such solution after a time. Even solutions of the alkaline carbonates fail to precipitate baryta when they are suddenly added in great excess to dilute solutions of the latter; on boiling the mixture, however, a precipitate is produced, unless the solutions employed were exceedingly dilute. (Storer, *Am. J. Sci.*, 1858, (2.) **25.** 43.) Insoluble in aqueous solutions of potash or soda salts. (In Gmelin.) Soluble in a solution of normal citrate of soda. (Spiller.) In presence of much water carbonate of baryta is no longer precipitated when solutions of carbonate of soda and chloride of barium are mixed together. If the solutions contain 1 pt. of salt to every 1000 pts. of water a very slight precipitate will separate after the lapse of some time, but if the dilution be increased to 2000 pts. of water for every pt. of salt no precipitation will occur. (R. Brandes, *Schweigger's J. für Ch. u. Phys.*, 1825, **43.** 159.) Baryta-water is rendered slightly turbid by a solution of carbonate of soda containing 1 pt. of carbonic acid in between 40000 to 80000 pts. of water. (Lassaigne.) Carbonate of baryta is insoluble in, and is unacted upon by, concentrated nitric acid (Braconnot); but is easily soluble in dilute nitric, and other acids. It is not decomposed by a mixture of 1 pt. oil of vitriol and 6 pts. absolute alcohol, but is slowly decomposed by a mixture of nitric acid and absolute alcohol. It is also acted upon by a solution of oxalic acid in absolute alcohol, although the resulting oxalate is insoluble in the alcoholic mixture. But is not decomposed by alcoholic solutions of racemic, tartaric, citric, or glacial acetic acids. It is partially decomposed when boiled with an aqueous solution of sulphate of potash. (Babington & Richard Phillips, *Journ. of Royal Inst. of Gt Br.*, 1816, **1.** 81.) [See under Sulphate of Baryta.] 1 pt. of carbonate of baryta is decomposed, even in the cold, by an aqueous solution of 1 pt. sulphate of potash or 2 pts. sulphate of soda, but if these solutions be boiled down to a syrup, carbonate of baryta and sulphate of potash or of soda will again be formed. (Kœlreuter, cited by H. Rose, *Pogg. Ann.*, **94.** 484.) When carbonate of baryta is treated, at ordinary temperatures, with a solution of sulphate of potash, or of soda, partial decomposition soon ensues, the carbonate of baryta being converted into sulphate of baryta; and this decomposition may be complete even at the ordinary temperature. (H. Rose, *Ibid.*, p. 491.) When one equivalent of $Ba O, C O_2$ is boiled with one equivalent of $K O, S O_3$, in aqueous solution, 0.60 of it may be decomposed; when boiled with an equivalent of $Na O, S O_3$, 0.7182 of it may be decomposed; when boiled with an equivalent of $K O, Cr O_3$, 0.79 of it may be decomposed; when boiled with an equivalent of $Na O, Cr O_3$, 0.76 of it may be decomposed; and when boiled with an equivalent of $2 Na O, H O, P O_5$, 0.50 of it may be decomposed. (p. 335.) On the other hand, when an equivalent of $Ba O, S O_3$ is boiled with one of $K O, C O_2$, 0.2217 of it may be decomposed; with an equivalent of $Na O, C O_2$, 0.1873 of it may be decomposed; and when an equivalent of $Ba O, Cr O_3$ is boiled with one of $K O, C O_2$, 0.2072 of it may be decomposed, or with an equivalent of $Na O, C O_2$, 0.24 of it may be decomposed. For a discussion of the influences which tend to interfere with these reactions, see Malaguti's original memoir, also under sulphate of baryta; in a set of experiments, made under identical conditions, with the exception of the length of time during which the mixture was boiled, the following results were obtained: —

Number of hours during which the mixture of $Ba O, C O_2$ and $Na O, S O_3$ was boiled. h m	Per cent of the equivalent of $Ba O, C O_2$ decomposed.
0 30 . . .	56.57
1	60.57
2	67.71
4	71.88
6	71.37
8	73.80
10	73.80
12	75.88
14	73.80
16 . . .	75.54

(Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** pp. 344, 348, *et seq.* Compare Sulphate of Baryta.)

It is not decomposed by a solution of carbonate of ammonia at the ordinary temperature, but on boiling the decomposition rapidly ensues. (H. Rose, *Pogg. Ann.*, **95.** 105.) Carbonate of baryta is partially decomposed when boiled with aqueous solutions of the sulphates of potash, soda, lime, ammonia, or magnesia; the phosphates of soda and ammonia; the sulphites of potash, soda, and ammonia; the phosphites of potash, soda, and ammonia; borate of soda; the arseniates of potash and soda; the oxalates of potash and ammonia; fluoride of sodium; and chromate of potash. With the ammonia salts the decomposition is complete. (Dulong, *Ann. de Chim.*, **82.** 286.) Rapidly decomposed, with evolution of carbonate of ammonia, when boiled with solutions of ammoniacal salts. (Denham Smith, *Phil. Mag.*, **9.** 542.)

Soluble in aqueous solutions of the chlorhydrate or nitrate [or any other salt (Demarçay)] of the sesquioxide of iron, with evolution of carbonic acid and precipitation of sesquioxide of iron [as a basic salt (Demarçay, p. 245)]. (Fuchs, *Schweigger's Journ. für Ch. u. Phys.*, 1831, **62.** 193; compare Demarçay, *Ann. der Pharm.*, 1834, **11.** 242, *et seq.*) Solutions of the salts of sesquioxide of chromium, of bismuth, of both the oxides of mercury, and of the perchlorides of tin and antimony, behave like those of the sesquisalts of iron; but, in the cold, carbonate of baryta does not precipitate solutions of alumina, magnesia, manganous oxide, lead, copper, cobalt, nickel, protoxide of tin, protoxide of iron, &c., though at higher temperatures some of these salts decompose it; thus, when boiled with solutions of the chlorides or nitrates of cobalt, nickel, zinc, manganese, or copper, it dissolves, while the oxides of these salts are precipitated. (Demarçay, *loc. cit.*, pp. 246 – 251.)

At the ordinary temperature carbonate of baryta dissolves in aqueous solutions of salts of the sesquioxides of alumina, manganese, chromium, iron, uranium, and bismuth, of the protoxides of cad-

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mium, copper, mercury, palladium, and tin, of dinoxide of mercury, of the oxides of rhodium, iridium, and gold, of binoxide of tin, and of titanic, arsenic, antimonic, phosphoric, selenic, and sulphuric acids; the oxides in question being meanwhile completely precipitated if an excess of the carbonate be present. The five acids last mentioned are precipitated only when their solutions are slightly acidulated with chlorhydric, or nitric, acid. From the above general rule several *chlorides* must be excepted; thus, carbonate of baryta occasions no precipitate in solutions of sesquichloride of gold, or of the protochlorides of mercury, even on heating, or of palladium; or in those of the bichlorides of iridium or rhodium, unless these be boiled; with bichloride of platinum it gives no precipitate, even on boiling. Solutions of the other salts of platinum, and gold, are, however, only partially precipitated by carbonate of baryta, except on heating. Oxide of tin is completely precipitated even in the cold from both the, α and β, bichlorides. But carbonate of baryta does not precipitate, at the ordinary temperature, the oxides of potassium, sodium, lithium, ammonium, barium, strontium, calcium, magnesium, glucinum, yttrium, or zirconium, or the protoxides of manganese, iron, lead, or silver. Magnesia is completely precipitated by it from a solution of the sulphate after long-continued boiling; but under the same conditions it is only incompletely precipitated from the chloride or nitrate. Lime is partially precipitated from solutions of its salts after long-continued boiling. Glucina is not precipitated by carbonate of baryta except on boiling; nor does this completely precipitate zirconia either in the cold or on boiling. It does not precipitate yttria either in the cold or on heating; nor does it immediately precipitate protoxide of cerium, though at the end of 24 hours the precipitation is complete; after some hours it precipitates completely sesquioxide of cerium. Oxide of lanthanum is completely precipitated, after some time, at the ordinary temperature, the reaction being more rapid at the temperature of boiling. When left in contact, at the ordinary temperature, with a solution of nitrate of didymium during an hour or so, scarcely a trace of the oxide of didymium is precipitated, but on allowing the mixture to stand for a longer time, the oxide gradually separates out, but the precipitation is not completed even after several days, nor can it be completely precipitated on boiling. In any event, oxide of didymium is precipitated by carbonate of baryta more slowly than the protoxides of cerium or lanthanum. The protoxides of manganese and iron are precipitated only on boiling, but the precipitation is then complete. Oxide of zinc is not immediately precipitated in the cold, but by long-continued ebullition with an excess of carbonate of baryta the oxide of zinc may all be thrown down. As a rule it does not precipitate the protoxides of cobalt or nickel from their solutions at the ordinary temperature, though after a very long time the greater part of these oxides may be precipitated from solutions of their sulphates; this does not occur with the chlorides, however, though by long-continued boiling the oxides may be almost completely precipitated from them. Sesquioxide of nickel is not precipitated by it from dilute solutions at the ordinary temperature; but sesquioxide of cobalt may be precipitated from the acetate both in the cold and on boiling. Oxide of lead is not precipitated in the cold, but is precipitated completely by long-continued ebullition. (H. Rose, *Tr.*, *passim*, & p. 943.)

*Sesqui*CARBONATE OF BARYTA. Much more soluble than the mono-carbonate in water. (Boussin.)
$2\,Ba\,O, 3\,C\,O_2$

CARBONATE OF BISMUTH. Insoluble in water, or in carbonic acid water. (Lefort; Bergman, *Essays*, **1.** 55.)
$Bi\,O_3, C\,O_2 + Aq$

As good as insoluble in water. Easily soluble in chlorhydric, and nitric acids. (Fresenius, *Quant.*, p. 150.) Completely soluble in an aqueous solution of carbonate of ammonia; slightly soluble in a solution of carbonate of potash; insoluble in a solution of carbonate of soda. (Laugier.) Perfectly insoluble in a solution of carbonate of ammonia unless phosphoric or arsenic acid be also present. (Berzelius.) Somewhat soluble in solutions of the alkaline carbonates, but is precipitated by caustic alkali. (Stromeyer.) Insoluble in aqueous solutions of the carbonates of potash, soda, or ammonia. (H. Rose, *Tr.*) Soluble, when recently precipitated, in an aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 315; Brett, *Phil. Mag.*, 1837, (3.) **10.** 98.) But insoluble in a solution of nitrate of ammonia. (Brett, *Ibid.*) Soluble in a solution of chloride of calcium. (Pearson.)

CARBONATE OF BUTYL. Insoluble, or but sparingly soluble in water. Decomposed by ammonia-water.
(*Carbonate of Tetryl.*)
$C_8\,H_9\,O, C\,O_2$

CARBONATE OF CADMIUM. Insoluble in water. (Stromeyer.) Insoluble in solutions of the alkaline carbonates.
$Cd\,O, C\,O_2$

Exceedingly sparingly soluble in a solution of carbonate of ammonia. (Fresenius, *Quant.*, p. 151.) Readily soluble in aqueous solutions of sulphate, nitrate, and succinate of ammonia and of chloride of ammonium. (Wittstein.) Soluble in a solution of cyanide of potassium. Soluble in a cold aqueous solution of chloride of ammonium, and less perfectly in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 99, 334.) Readily soluble in a warm aqueous solution of chloride of ammonium, yet carbonate of ammonia precipitates cadmium from solutions which contain much chloride of ammonium. (H. Rose, *Tr.*) The presence of non-volatile organic substances does not prevent the alkaline carbonates from precipitating cadmium from its solutions. (H. Rose, *Tr.*) It is not precipitated from solutions which contain citrate of soda. (Spiller.) Easily soluble in acids.

CARBONATE *of protoxide* OF CERIUM. Insoluble in water, or in carbonic acid water. (Vauquelin.)
I.) $Ce\,O, C\,O_2 + 3\,Aq$

Slightly soluble in aqueous solutions of the alkaline carbonates, and bicarbonates.

Easily soluble in sulphurous acid. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 77.)

II.) $2\,Ce\,O, C\,O_2 + 2\,Aq$ Easily soluble, with decomposition, in acids.

CARBONATE *of sesquioxide* OF CERIUM. Insoluble in water. (Hisinger, in *Berzelius's Lehrb.*) A solution of carbonate of soda only dissolves a trace of it; somewhat more soluble in bicarbonate of soda and in carbonate of ammonia, the solutions thus obtained being precipitated on boiling. (H. Rose, *Tr.*)

CARBONATE OF *bi*CHLORETHYL. Insoluble in water. Soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **9.** 203.)
(*Bichlorocarbonic ether.*
Carbonate of Ethyl bichloré.)
$C_5\,H_3\,Cl_2\,O_3 = C_4\,H_3\,Cl_2\,O, C\,O_2$

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Carbonate of *per***ChlorEthyl.** Soluble in alcohol and in ether, with partial decomposition. (Cahours, *Ann. Ch. et Phys.*, (3.) **9.** 204.) Soluble in alcohol, with slight elevation of temperature, and partial decomposition; from this solution it is precipitated on the addition of water. (Malaguti.)

(*PerChloro Carbonic Ether. Carbonate d'ethyle perchloré.*)
$C_5 Cl_5 O_3 = C_4 Cl_5 O, C O_2$

Carbonate of Chloride of Sulphur. *Vid.* Sulphite of Chloride of ChloroMethyl.

Carbonate *of protoxide* **of Chromium.** Somewhat soluble in an aqueous solution of bicarbonate of potash. (Moberg.)

Carbonate *of sesquioxide* **of Chromium.** Insoluble in water. Soluble in acids. (T. Thomson, *Phil. Trans.*, 1827, Part I. p. 208.) Insoluble in water. When recently precipitated it is soluble in aqueous solutions of the carbonates of potash and ammonia, and still more soluble in a solution of caustic potash. (Meissner.) According to Lefort it is only the salts of the violet modification of chromeoxide which afford a carbonate when treated with a solution of an alkaline carbonate.

$Cr_2 O_3, C O_2 + 4 Aq$

Carbonate of Cinchonin. Cinchonin is more soluble in carbonic acid water than in pure water. (Langlois.)

Carbonate of Cobalt.

I.) *normal.* Unacted upon by cold chlorhydric or nitric acids, even when these are concentrated. (De Senarmont, *Ann. Ch. et Phys.*, (3.) **30.** 138.)

a = anhydrous. $Co O, C O_2$

b = $Co O, C O_2 + 6 Aq$ Permanent. (H. Deville.) Normal carbonate of cobalt is decomposed by water, a basic insoluble salt being formed. (Berzelius, *Lehrb.*, **3.** 647.)

II.) $3 (Co O, C O_2) + 2 Aq$

III.) $4 Co O, 2 C O_2 + 7 Aq$ Ppt. Converted into No. 5 by washing or boiling with water. (Beetz.)

IV.) $4 Co O, C O_2 + 4 Aq$ Ppt.

V.) $5 Co O, 2 C O_2 + 4 Aq$ Insoluble in water. Soluble in aqueous solutions of carbonate, sulphate, nitrate, and succinate of ammonia, and of chloride of ammonium.

Soluble, even in the cold, in aqueous solutions of chloride of ammonium, and nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 98, 99, 334.) Soluble in carbonic acid water, and in aqueous solutions of the alkaline bicarbonates, from which it is again precipitated on boiling. (Berzelius, *Lehrb.*, **3.** 648.) Very sparingly soluble in strong aqueous solutions of carbonate of soda and carbonate of potash; from the last-named solution it is precipitated when much water is added. (Proust, Gmelin.) Largely soluble, with combination, in an aqueous solution of carbonate of ammonia, also soluble in part in ammonia-water. (Berzelius, *Lehrb.*, **3.** 648.) It is not precipitated from solutions which contain citrate of soda. (Spiller.)

Carbonate of Cobalt & of Potash.

I.) $Co O, C O_2 ; K O, C O_2 + 4 Aq$

II.) $2 Co O, 3 C O_2 ; K O, 2 C O_2 + 9 Aq$ Permanent. Very rapidly decomposed by water. (Deville, *Ann. Ch. et Phys.*, (3.) **33.** 90.)

Carbonate of Cobalt & of Soda. Decomposed by water.

I.) $Co O, C O_2 ; Na O, C O_2 + 4 Aq$

II.) $Co O, C O_2 ; Na O, C O_2 + 10 Aq$ Very easily decomposed by water. (H. Deville, *Ann. Ch. et Phys.*, (3.) **33.** 94.)

Carbonate *of dinoxide* **of Copper.** Ppt.

$Cu_2 O, C O_2$

Carbonate *of protoxide* **of Copper.**

I.) $2 Cu O, C O_2$ Decomposed by boiling with water. (Gay-Lussac.)

II.) $2 Cu O, C O_2 + Aq$ (*Malachite.*) Insoluble in water. Sparingly soluble in carbonic acid water; 30720 pts. of this solution contain 1 pt. of oxide of copper. (Fr. Jahn.) Soluble in 3833 pts. of a saturated aqueous solution of carbonic acid. (Lassaigne, *J. Ch. Méd.*, **4.** 312; in *Berzelius's Jahresbericht*, **29.** 132.) Carbonate of copper is insoluble in carbonic acid water unless it be precipitated in presence of an excess of this, in which event a small portion of it is taken up. (Bergman, *Essays*, **1.** 55.) Soluble in aqueous solutions of ammoniacal salts. Partially soluble in solutions of the fixed alkaline carbonates and still more soluble in solutions of the alkaline bicarbonates. Soluble in a solution of sesquicarbonate of ammonia. (Favre, *Ann. Ch. et Phys.*, (3.) **10.** 118.) Less soluble in a solution of carbonate of ammonia than oxide of copper is in caustic ammonia. (Thomson's *System of Chem.*, London, 1831, **2.** 777.) Soluble in aqueous solutions of the alkaline cyanides. (Berzelius, *Lehrb.*, **3.** 795.) Soluble in aqueous solutions of chloride of ammonium, and nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 98, 335.) Slowly but completely soluble in a hot aqueous solution of chloride of ammonium. (H. Rose, *Tr.*) It is not precipitated from solutions which contain citrate of soda. (Spiller.) Soluble in an aqueous solution of carbonate of ethylamin. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 483.) Soluble in aqueous solutions of the salts of sesquioxide of iron with evolution of carbonic acid and precipitation of hydrated sesquioxide of iron. [Compare Carbonate of Lime.] (Fuchs, *Schweigger's Journ. für Ch. u. Phys.*, 1831, **62.** 193.) Carbonate of copper, either natural or artificial, is soluble, with effervescence, in sulphurous acid (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 80); and easily in the acids generally.

III.) *sesqui.*

$3 Cu O, 2 C O_2 + Aq$

Carbonate of Copper & of Potash.

$5 Cu O, 4 C O_2 ; K O, C O_2 + 10 Aq$

Carbonate of Copper & of Soda.

$Cu O, C O_2 ; Na O, C O_2 + 3 Aq$

Carbonate of Copper & of Zinc. Readily soluble in chlorhydric acid. (Bœttger.)

$5 (Zn O, Cu O), 2 C O_2 + 8 Aq$

Carbonate of Cuprammonium. Decomposed by water. Insoluble in alcohol or ether. Soluble in an aqueous solution of sesquicarbonate of ammonia. (Favre, *Ann. Ch. et Phys.*, (3.) **10.** 116.)

$N \left\{ \begin{matrix} H_3 \\ Cu \end{matrix} \right. O, C O_2$

Carbonate of Didymium. Insoluble in water, or in aqueous solutions of the alkaline carbonates or bicarbonates. (Marignac, *Ann. Ch. et Phys.*, (3.) **38.** 166.) Not completely insoluble in a concentrated solution of chloride of ammonium. (H. Rose, *Tr.*)

$Di O, C O_2 + 2 Aq$

Carbonate of Ethyl.

I. *normal.* Insoluble in water. Very readily soluble in alcohol, and ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **9.** 202.)

$C_4 H_5 O, C O_2$ or $(C_4 H_5 O)_2 \left. \right\} 2 C O_2$
(*Carbonic ether.*)

II.) *bi.* Not isolated.

$C_6 H_6 O_6 = C_4 H_5 O, H O, 2 C O_2$
(*Ethyl Carbonic Acid.*)

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Carbonate of Ethyl & of Methyl. $C_8 H_8 O_6 = C_4 H_5 O, C_2 H_3 O, 2 C O_2$ Its properties are for the most part similar to those of carbonate of ethyl. (Chancel, *Ann. Ch. et Phys.*, (3.) **35.** 467.)

Carbonate of Ethyl & of Potash. (*Ethyl Carbonate of Potash.*) $C_6 H_5 K O_6 = C_4 H_5 O, K O, 2 C O_2$ Decomposed by water. Soluble in absolute alcohol. Insoluble in anhydrous ether. (Dumas & Peligot.)

Carbonate of Ethylamin.

a = *anhydrous.* $C_4 H_7 N, C O_2$ Soluble in water. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 483.)

b = *hydrated.* Very deliquescent.

Carbonate of *tetra***EthylAmmonium.** Not deliquescent. Very soluble in water. Soluble in water, and alcohol. (Bruening.)

Carbonate of Ethyl *chloré.* *Vid.* Carbonate of ChlorEthyl.

Carbonate of EthylMethylConiin. Deliquescent. Readily soluble in water. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **89.** 139.)

Carbonate of EthylStrychnine. Partially soluble, and partially insoluble in water.

*Bi***Carbonate of EthylStrychnine.** $C_{42} H_{21} (C_4 H_5) N_2 O_4, 2 H O, 2 C O_2$ Permanent. Readily soluble in water. Easily soluble in absolute alcohol; less soluble in ether.

Carbonate of Glucina. $Gl_2 O_3, C O_2 + 5 Aq$ Not perceptibly soluble in water, or in carbonic acid water. Soluble in aqueous solutions of ammoniacal salts and of the caustic alkalies. Readily soluble in aqueous solutions of the alkaline carbonates, and especially of carbonate of ammonia. (Vauquelin.) Sparingly soluble in an aqueous solution of carbonate of potash; if the latter be concentrated, but little glucina will be precipitated from it on boiling; a larger portion will be thrown down if the solution is diluted with water, and then boiled. A solution of bicarbonate of potash behaves in a similar manner, as does also a solution of carbonate of ammonia, excepting that the latter dissolves the carbonate of glucina more readily than the others. On boiling the solution in carbonate of ammonia a basic carbonate of glucina is precipitated. Easily soluble in acids. (H. Rose, *Tr.*)

Carbonate of Glucina & of Potash. $Gl_2 O_3, C O_2; K O, C O_2$ Hygroscopic. Very soluble in cold water. Less easily soluble in spirit. The aqueous solution is decomposed by boiling. (Debray, *Ann. Ch. et Phys.*, (3.) **44.** 32.)

*Bi***Carbonate of Harmalin.**

Carbonate *of protoxide* **of Iron.**

a = *anhydrous.* $Fe O, C O_2$ As it occurs in nature it is but slowly soluble in chlorhydric acid. It appears to be insoluble in aqueous solutions of chloride of ammonium and nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.)

b = *hydrated.* $Fe O, C O_2 + Aq$ Slightly soluble in water. (Berzelius, *Lehrb.*) Easily soluble, with decomposition, in acids. Soluble in carbonic acid water. Also soluble in an aqueous solution of cane-sugar.

Readily soluble in an aqueous solution of chloride of ammonium. (H. Rose, *Tr.*) From a weak solution in carbonic acid water it is precipitated by caustic, but not by carbonated, alkalies. (Bergman, *Essays*, **1.** 49.) Soluble in aqueous solutions of the salts of sesquioxide of iron, with evolution of carbonic acid and precipitation of sesquioxide of iron. [Compare Carbonate of Lime.] (Fuchs, *Schweigger's Journ. für Ch. u. Phys.*, 1831, **62.** 194.)

Carbonate *of sesquioxide* **of Iron.** $Fe_2 O_3, 3 C O_2$ Has but a momentary existence as a precipitate, which falls, and then decomposes, when solutions of the salts of sesquioxide of iron are mixed with those of the alkaline carbonates. (Berzelius, *Lehrb.*)

On adding a solution of carbonate of potash or of soda to a solution of a salt of sesquioxide of iron a mixture of hydrate and carbonate of the sesquioxide is precipitated, but a portion of iron always remains in solution, and tends to separate out from the clear filtrate when this is left to itself. In some cases, especially when the solution of the iron salt contains much free acid, the whole of it may remain dissolved in an excess of the alkaline carbonate. With the alkaline bicarbonates the action is much the same though the iron is more easily retained in solution by them than by the former; and after having once been precipitated the sesquioxide of iron may be redissolved in a very large excess of a solution of the alkaline bicarbonate. The best way of obtaining such a solution is to add, drop by drop, a dilute solution of the iron salt to the solution of the alkaline bicarbonate which is kept constantly agitated. After some time the solution thus obtained deposits almost all of its iron as hydrated sesquioxide. A solution of carbonate of ammonia behaves like that of carbonate of potash; in proportion as it contains more carbonic acid so much the more iron remains dissolved in it. (H. Rose, *Tr.*)

Carbonate *of protoxide* **of Iron & of Magnesia.** $Fe O, C O_2; Mg O, C O_2$

Carbonate of Lanthanum. Insoluble in in water.

Carbonate of Lead.

I.) *mono.* $Pb O, C O_2$ Very sparingly soluble in water. When recently precipitated, 1 pt. of it is soluble in 50551 pts. of water at ordinary temperatures, and in 23450 pts. of water containing a small quantity of acetate of ammonia plus carbonate of ammonia and caustic ammonia; and in a smaller quantity of water containing much nitrate of ammonia plus carbonate of ammonia and caustic ammonia. (Fresenius, *Ann. Ch. u. Pharm.*, 1846, **59.** 125.) Soluble in 7144 pts. of a saturated aqueous solution of carbonic acid. (Lassaigne, *J. Ch. Méd.*, **4.** 312; in *Berzelius's Jahresbericht*, **29.** 132.) Carbonic acid water can dissolve $\frac{1}{60000}$ @ $\frac{1}{50000}$ of oxide of lead. (Yorke.) Insoluble in carbonic acid water. (Bergman, *Essays*, **1.** 55; Fr. Jahn, *Ann. Pharm.*, **28.** 117.) Very slightly soluble in carbonic acid water, but the presence of traces of various salts prevents this solution. (Tünnermann.) Soluble in carbonic acid water. (Wetzlar.) Easily soluble in acetic acid.

Soluble in aqueous solutions of acetate of ammonia at 18.8° @ 25°; and chloride of ammonium at 12.5° @ 25°. (Weppen, *Arch. d. Pharm.*, (2.) **9.** 236; in *J. pr. Ch.*, 1837, **11.** pp. 181, 183.) Soluble in an aqueous solution of caustic potash. Not absolutely insoluble at the ordinary temperature in an excess of a solution of carbonate of potash or of soda, and at the temperature of ebullition still more of it is dissolved; but an excess of carbonate of ammonia or of the alkaline bicarbonates does not dissolve the least trace of it.

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(H. Rose, *Tr.*) It is not decomposed by ammonia-water, but dissolves in aqueous solutions of caustic potash, and soda. Decomposed by a boiling aqueous solution of nitrate of lime. (Berzelius's *Lehrb.*) Soluble in aqueous solutions of the acetates. (Mercer, *Rep. Br. Assoc.*, 1844, p. 32.) It is not precipitated from solutions which contain citrate of soda. (Spiller.) About equally soluble with sulphate of lead in water; but is much less soluble in alkaline solutions than the sulphate. (Dulong, *Ann. de Chim.*, **82.** 290.) Normal carbonate of lead, as thrown down by an alkaline bicarbonate, is not decomposed by an aqueous solution of sulphate of potash. (H. Rose, *Tr.*) Only slightly decomposed by aqueous solutions of the sulphates of potash and soda. (Persoz, *Chim. Moléc.*, p. 385.) Not at all decomposed by aqueous solutions of the alkaline sulphates. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 347.) Carbonate of lead is partially decomposed when boiled with aqueous solutions of the sulphates of potash, soda, lime, ammonia, and magnesia; the phosphates of soda and ammonia; the sulphites of potash, soda, and ammonia; the phosphites of potash, soda, and ammonia; borate of soda; the arseniates of potash and soda; the oxalates of potash and ammonia; fluoride of sodium; and chromate of potash (even at a temperature of 10° @ 15°). With the ammonia salts the decomposition is complete. (Dulong, *loc. cit.*, p. 286.) Soluble in an aqueous solution of chloride of ammonium, especially when this is heated (Brett, *Phil. Mag.*, 1837, (3.) **10.** 96), a free evolution of ammonia occurring when the mixture is boiled. (L. Thompson, *Ibid.*, p. 179.) An excess of caustic ammonia precipitates all the lead from this solution. (Brett, *Ibid.*, p. 99.) Slowly soluble in a boiling aqueous solution of chloride of ammonium; on diluting with water the solution thus obtained, it becomes cloudy, but clears up again when reheated. (H. Rose, *Tr.*) When an equivalent of carbonate of lead is boiled with an equivalent of oxalate of potash, in aqueous solution, 0.15 of it may be decomposed. While, on the other hand, when an equivalent of oxalate of lead is boiled with one of carbonate of potash, 0.9328 of it may be decomposed. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** pp. 348–353.) Carbonate of lead is not decomposed by concentrated nitric acid, most probably because nitrate of lead is insoluble in nitric acid; nor by a mixture of 1 pt. of oil of vitriol and 6 pts. of absolute alcohol, nor by alcoholic solutions of racemic or tartaric acids.

II.) *sesquicarbonate.* Soluble in carbonic acid-water, and in alkaline solutions. (Schubarth's *Tech. Chem.*) Soluble in dilute, insoluble in concentrated, potash-lye. Insoluble in solutions of the alkaline carbonates, and bicarbonates. (Bœttger.) Soluble in a cold dilute solution of chloride of ammonium. (Brett.)

(*White Lead.*)
$3PbO, 2CO_2, + HO$

III.) *dicarbonate.* Water dissolves only a trace of it. (Yorke.)

$2PbO, CO_2 + Aq$

CARBONATE OF LEAD & OF LIME.

CARBONATE OF LEAD & OF SODA. Insoluble in water. (Svanberg.)

$NaO, CO_2; 4(PbO, CO_2)$

CARBONATE OF LEAD with CHLORIDE OF LEAD. Insoluble in water.

$PbO, CO_2; PbCl$

CARBONATE OF LEAD with IODIDE OF LEAD. **Insoluble in water. (Poggiale.)**

$PbO, CO_2; PbI$

CARBONATE OF LEAD with SULPHATE OF LEAD.

I.) (*Leadhillite.*)
$3(PbO, CO_2); PbO, SO_3$

II.) (*Lanarkite.*)
$PbO, CO_2; PbO, SO_3$

CARBONATE OF LIME. Permanent. More readily soluble in cold than in hot water. (In *Gm.*) When recently precipitated it is soluble in 8834 pts. of boiling, and in 10601 pts. of cold water; it is much less soluble in water containing ammonia and carbonate of ammonia, 65246 pts. of such a solution having been required to dissolve 1 pt. of carbonate of lime. (Fresenius, *Ann. Ch. u. Pharm.*, 1846, **59.** 122.) Soluble in 16000 pts. of pure water. (Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1825, **43.** 156; Margueritte, *C. R.*, **38.** 308); in 12858 pts. of water at 15° (Kremers, *Pogg. Ann.*, **85.** 247); in 16000 @ 24000 pts. of water. (Bucholz, cited by Cousté.)

$a = CaO, CO_2$

A litre of pure water may contain about 0.016 grm. of carbonate of lime, i. e. 1 pt. of it is soluble in 62500 pts. of water. This result Bineau esteems as being most trustworthy, though admitting that the results of his experiments have afforded extremely discordant numbers, owing to the action of the glass of his vessels and to the carbonic acid of the air (the latter having vitiated his earlier published results, as "carbonate of lime is soluble in from 35000 to 50000 pts. of water, the solubility not differing much whether the water be hot or cold"). (Bineau, *C. R.*, **41.** 510.) According to Bineau, Péligot's determinations give 0.02 grm. of carbonate of lime to the litre of water, i. e. 1 pt. of it is soluble in 50000 pts. of water. The solubility of carbonate of lime experiences no marked increase when the temperature is elevated to 100°. (Bineau, *Ann. Ch. et Phys.*, (3.) **51.** pp. 291, 292.) Malaguti appears to be in error in citing "the solubility of carbonate of lime as $\frac{1}{3000000}$, after Bineau." (*Ibid.*, p. 346.)

Alcohol dissolves a trace of it. (Grischow.)

Like sulphate of lime, the carbonate is less soluble in hot than in cold water: it is, however, much less soluble than the sulphate at temperatures but little above 100°, and its solubility decreases less rapidly than that of the sulphate as the temperature increases, a point being finally reached at which the sulphate is less soluble than the carbonate. But, like the sulphate, it becomes less and less soluble as the temperature is elevated, and at 150° may be regarded as completely insoluble, or at least as insoluble as the oxalate. The precipitate thus formed at 150° does not redissolve in the water after it has become cold (when protected from carbonic acid), or only dissolves very slowly. On mixing recently precipitated carbonate of lime with an aqueous solution of sulphate of ammonia, or of the sulphates of soda, potash, or magnesia, and heating the mixture to 130° @ 140° in a sealed tube, crystals of sulphate of lime separate out, and the liquid becomes alkaline. (Cousté, *Ann. des Mines*, 1854, (5.) **5.** pp. 144, 140, 81, 139.)

Carbonate of lime, especially when recently precipitated, is soluble in a cold aqueous solution of chloride of ammonium; the clear solution obtained by thus dissolving precipitated carbonate of lime soon becomes cloudy on exposure to the air, a portion of the carbonate of lime being reprecipitated, but a portion of the carbonate still remains dissolved, and cannot be separated from the filtrate even on boiling. If precipitated carbonate of lime be thoroughly washed, and then left to itself for 24 hours, it is no longer so easily soluble in the chloride of ammonium as was the case at the first moment of its production, and even when the precipitate is not washed, but merely allowed to

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stand beneath the liquid in which it was produced, its solubility in chloride of ammonium, though not destroyed, is still much less than at first. Even the compact carbonate of lime which occurs in nature is not entirely insoluble in an aqueous solution of chloride of ammonium; it is much less soluble, however, than carbonate of magnesia. This solubility appears to depend upon a partial decomposition of the carbonate of lime by the ammonia-salt [i. e. it is a case of reciprocal affinity]. (Vogel, *J. pr. Ch.*, 1836, **7.** 453.) Soluble in a boiling aqueous solution of chloride of ammonium, ammonia being evolved meanwhile. (Fuchs; Demarçay, *Ann. der Pharm.*, 1834, **11.** 251.)

When a solution of ammonia incompletely saturated with carbonic acid is mixed with a solution of chloride of calcium no precipitate ensues even after the lapse of several days when the mixture is kept in a closed vessel and frequently agitated, and only a slight precipitate occurs during this time when the mixture is exposed to the air, but as soon as the mixture is boiled a considerable precipitate of carbonate of lime separates out. Solutions of ammonia saturated or nearly saturated with carbonic acid generally produce precipitates when mixed with the chloride of calcium, but the precipitation is never complete unless the solutions are heated. Moreover, when an excess of the solution of chloride of calcium is added to a solution of crystallized carbonate of ammonia only a portion of the carbonate of lime is precipitated unless the mixture is boiled. (Vogel, *Ann. de Chim.*, 1814, **89.** pp. 122, 128 – 130; also *Schweigger's Journ. für Ch. u. Phys.*, 1821, **33.** 205.) When a mixed solution of chloride of calcium and of caustic ammonia is exposed to an atmosphere of pure carbonic acid, no precipitate appears until after the lapse of several hours and the absorption of much carbonic acid; and the lime is completely precipitated only after the lapse of several days. (Vogel, *Schweigger's Journ. für Ch. u. Phys.*, **33.** 206.) When recently precipitated it is readily soluble in cold aqueous solutions of chloride of ammonium and nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 95.) Soluble, when recently precipitated, in an aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 315.) When recently precipitated it is readily soluble in aqueous solutions of carbonate, sulphate, nitrate, or succinate of ammonia and of chloride of ammonium. (Wittstein, *Rept.*, **57.** 18 [Gm.].) Soluble in an aqueous solution of acetate of ammonia. (T. Thomson, in his *System of Chem.*, London, 1831, **2.** 395.) Rapidly decomposed and dissolved when boiled with solutions of ammoniacal salts. (Denham Smith, *Phil. Mag.*, **9.** 542.) An aqueous solution of sulphate of potash, or of chloride of potassium, etc., on being poured into lime-water which has been rendered milky by the addition of carbonic acid water, causes the immediate disappearance of the precipitate. In like manner there will be no precipitate produced when carbonic acid water is poured into a mixture of lime-water and a solution of these neutral salts. (Guyton de Morveau, *Mém. de Scheele*, part II., p. 18 (note), cited by Berthollet, *Ann. de Chim.*, **37.** 178 (note).) More soluble in solutions of chloride of ammonium or nitrate of ammonia than in water, but is reprecipitated, even more completely than carbonate of baryta, when ammonia and carbonate of ammonia are added. It is also more readily soluble in solutions of neutral potash and soda salts than in water. (Fresenius, *Quant.*, p. 128.) When caustic ammonia which has been partially neutralized with carbonic acid is mixed with lime-water, no cloudiness appears unless the mixture is boiled; with ammonia which has been more nearly neutralized with carbonic acid, a precipitate is formed at first, but disappears again immediately, and a great deal of lime-water must be added before a persistent precipitate is obtained. Yet it does not appear that caustic ammonia can itself dissolve carbonate of lime which has once been precipitated, at least no such action could be perceived on making the experiment. Again, no precipitate was formed when a current of carbonic acid gas was passed into caustic ammonia which had been mixed with three times its volume of lime-water, until the mixture was heated. Potash cannot be substituted for ammonia in these experiments. (Vogel, *Ann. de Chim.*, 1814, **89.** pp. 130 – 132; also *Schweigger's Journ. für Ch. u. Phys.*, 1821, **33.** pp. 208, 209.) It is not precipitated when solutions of carbonate of soda and of chloride of calcium containing no more than 1 pt. of either of these salts in 6000 @ 7000 pts. of water are mixed, not even when these solutions are boiled. (R. Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1825, **43.** 156.)

"Lime-water has the property of dissolving a little carbonate of lime, of which one can assure himself by blowing into it with a tube; the air expired produces a cloud which redissolves entirely, until the lime-water is saturated with the carbonate of lime which has been formed." (Welter & Berthollet, *Ann. de Chim.*, 1789, **3.** 68.) Lime-water from which a portion of the lime has been precipitated by carbonic acid, but which still exhibits an alkaline reaction, is capable of retaining a certain amount of carbonate of lime in solution at the ordinary temperature; this is precipitated on boiling. (Vogel, *Schweigger's Journ. für Ch. u. Phys.*, **33.** 207, (1821); also *Ann. de Chim.*, 1814, **89.** 132.) When diluted with several times its volume of water, lime-water ceases to afford an immediate precipitate when carbonic acid gas is passed through it. A precipitate generally forms on boiling, but if the lime-water be much diluted no precipitate will occur, even on actual ebullition, although solutions of the alkaline carbonates produce at once precipitates. If to the lime-water in which carbonic acid gas produced no precipitate even after boiling, a dilute solution of caustic soda, ammonia, or lime be added, and the mixture heated, a precipitate of carbonate of lime will be formed. Even saturated lime-water is capable of retaining a portion of carbonic acid in solution for a considerable time if the solution is not heated, as is easily proved by passing carbonic acid into lime-water until it is partially saturated, when on filtering and boiling the clear filtrate an abundant precipitate of carbonate of lime is formed. I have noticed that lime-water which has been exposed to the air, as when kept in bottles with loosely fitting stoppers, affords an abundant precipitate of carbonate of lime on boiling, but if that which has been thus exposed be afterwards placed in a securely closed bottle it will deposit after a few days all the carbonate of lime which it had previously retained in solution, and will no longer afford any precipitate of it on boiling. (Storer, *Am. J. Sci.*, (2.) **25.** 42; Eliot & Storer, *Proc. Amer. Acad.*, 1860, **5.** 63.) Lime-water mixed with a *dilute* solution of caustic soda, potash, or ammonia gives no immediate precipitate when carbonic acid gas is passed into it, unless the solution is boiled. [Compare Bineau's observations on the stability of dilute solutions of

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the carbonates of the alkaline earths in carbonic acid-water, *Art.* Carbonic Acid.]

Besides solutions of ammonia and potash salts, solutions of soda salts are capable of dissolving carbonate of lime. (Berthollet, *Ann. de Chim.*, **37.** pp. 178, 179.) They appear to stand midway in this respect between those of ammonia and of potash. Even a solution of chloride of calcium exerts a certain solvent power upon recently precipitated carbonate of lime. This solvent action may be seen by treating the recently precipitated carbonate with a great excess of a solution of almost any alkaline salt, but is observed more distinctly in the great tendency of the alkaline salts to prevent the precipitation of the carbonate. Thus, if lime-water be mixed with an aqueous solution of chloride of ammonium, chloride of sodium or chloride of potassium, and a current of carbonic acid gas be passed into the mixture no precipitate is produced, even on boiling, if the alkaline chloride be present in sufficient quantity. If less of the alkaline chloride has been used, there will be a precipitate formed on boiling, although none has occurred in the cold. Chloride of calcium exerts an action entirely analogous to that of the alkaline chlorides, though, so far as I have observed, a precipitate always forms on boiling. A solution of sulphate of ammonia or of sulphate of soda, when mixed with lime-water, exerts an influence almost precisely like that of the alkaline chlorides, carbonate of lime not being precipitated, even on boiling, if they are present in sufficient quantity. A solution of sulphate or nitrate of potash behaves much like that of sulphate of soda, but its influence is less strongly marked. The solvent influence of the alkaline salts can be observed with equal facility by mixing their solution with that of an alkaline carbonate and adding a solution of a lime salt to the mixture. Thus, a solution of chloride of calcium produces no precipitate, except on boiling, when added to a mixed solution of carbonate of soda and sulphate of soda, excepting when the carbonate is in excess. In this experiment the sulphate of soda may be replaced by any of the alkaline sulphates or chlorides. The most remarkable solvent action which I have noticed is seen in the inability of the alkaline carbonates to precipitate lime from its solutions, when they are added in great excess. That such solvent power exists may be proved by precipitating a small quantity of a salt of lime with carbonate of ammonia and then redissolving the precipitate in a very great excess of the precipitant. But a much more satisfactory proof may be obtained by adding quickly a large excess of the solution of the alkaline carbonate to a small portion of a dilute solution of a lime or baryta salt; so quickly that the precipitate may not have sufficient time to form. This is readily accomplished by swinging rapidly the vessel containing the solution of the lime or baryta salt and suddenly turning into it the solution of the alkaline carbonate. If the solutions have been used in proper proportion, no trace of a precipitate will appear, owing to the complete mixture obtained by this method of experimenting, although a fractional amount of the lime salt used would have produced a persistent precipitate had it been slowly added. By using the same portion of the solution of the alkaline carbonate upon successive small portions of that of the lime salt no inconsiderable amount of the latter may be finally obtained in solution. As a rule, this solution is precipitated at once on boiling, but if it be diluted with a large quantity of water, ebullition no longer produces any precipitate. In one instance, such a solution left in repose during twenty-four hours afforded no precipitate, although oxalate of ammonia when added to it produced a copious precipitate of oxalate of lime. As would follow from the facts given above, carbonic acid gas frequently affords no immediate precipitate in the cold in solutions of lime salts which have been neutralized by ammonia, as has been repeatedly observed. I find that a weak solution of caustic soda, potash, or even lime, may be substituted for caustic ammonia in the above mixture with like result, no precipitate appearing until after the lapse of considerable time unless the solution be heated. The action of the fixed alkali being, to all appearance, entirely analogous, in kind, to that of ammonia, although less in degree.*

To demonstrate this it is only necessary to employ sufficiently dilute solutions of the caustic alkalies and to pass through the mixture a stream of carbonic acid gas diluted with air, — air expired from the lungs, for example, — when no immediate precipitate will be produced unless the solution be heated. Even if the solution of caustic alkali be used in so concentrated a form (not sufficiently so, however, to precipitate a hydrate of the alkaline earth) that a precipitate of carbonate of lime is produced, in the cold, by a current of carbonic acid, it can readily be proved that a portion of the carbonic acid has not been precipitated, by filtering and boiling the clear filtrate, when a copious precipitate of carbonate of lime will be produced at once. This behavior is more marked with lime salts than with those of baryta, and soda evidently exerts a greater influence than potash. If a solution of chloride of sodium, of chloride of potassium, or of chloride of ammonium be added to the mixed solution before passing carbonic acid gas, the precipitation of the carbonate of lime or baryta is attended with still greater difficulty. As a rule, carbonate of lime appears to be more easily dissolved by solutions of the alkaline salts than carbonate of baryta. (Storer, *Am. J. Sci.*, 1858, (2.) **25.** 41.) Soluble in a boiling aqueous solution of chloride of magnesium, even when this is very dilute, much carbonic acid being meanwhile evolved, and some flocks of magnesia separating out. (Cousté, *Ann. des Mines*, 1854, (5.) **5.** 137.) In sea-water, near limestone coasts, it is found dissolved in about 10000 pts. water. (J. Davy.) Soluble in a solution of normal citrate of soda. (Spiller.) Soluble in a solution of sucrate of lime. (Barreswil.) Soluble in carbonic acid water. (Bergman, *Essays*, **1.** 34.) Soluble at 0° in 1428 pts. of water saturated with carbonic acid; at 10° in 1136 pts. (Lassaigne, *J. Ch. Méd.*, **4.** 312; in *Berzelius's J. B.*, **29.** 132.) The intensity of the power by which CO_2 dissolves carbonate of lime is far from being in

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* Kolbe (*Handwœrterbuch der Chem.*, I., Supplem., p. 157) explains this behavior of the solution of chloride of calcium or barium neutralised with ammonia, by supposing that carbamate of ammonia, $NH_4O, C\left\{\begin{array}{l}O\\NH_2\,CO_2\end{array}\right.$, is formed, capable of existing for some time in cold aqueous solution, but not of supporting heat, on application of which it is transformed into ordinary carbonate of ammonia, which reacts at once on the lime or baryta salt present. The insufficiency of this view to explain all the facts in the case is evident: (1.) In presence of an excess of chloride of ammonium, carbonic acid produces no precipitate in the mixed solution of chloride of calcium and ammonia, *even when the mixture is boiled.* (2.) When a large excess of any alkaline carbonate is added to a small amount of a solution of a salt of lime or of baryta, no immediate precipitate is produced unless the solution be heated. (3.) A current of carbonic acid gas produces no immediate precipitate in a solution of chloride of calcium or chloride of barium which has been neutralized with a dilute solution of caustic soda or potash instead of ammonia.

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direct proportion with the quantity of gas dissolved, and if the amount of the latter is progressively elevated the increased solubility of the salt will become less and less manifest until at last it may be no longer perceived. Carbonic acid waters containing $\frac{1}{1000}$ of carbonate of lime will not deposit any of it at ordinary temperatures when exposed to the air. (Bineau, *Ann. Ch. et Phys.*, (3.) **51.** 290.) Bineau, by operating in presence of large quantities of water, was not able to retain dissolved by carbonic acid more than $\frac{1}{8}$ the quantity of carbonate of lime necessary to make a bicarbonate.

In order that a solution of carbonate of soda shall produce a sensible precipitate in lime-water, the proportion of lime-water must not exceed 20000 pts. to 1 pt. of carbonic acid. (Lassaigne.) Carbonate of lime is not decomposed when boiled with aqueous solutions of the sulphates of potash, soda, lime, or magnesia, or of borate of soda; but it is partially decomposed when boiled with solutions of sulphate of ammonia; the phosphates of soda and ammonia; the sulphites of potash, soda, and ammonia; the phosphites of potash, soda, and ammonia; arseniate of potash, and of soda; oxalate of potash, and of ammonia; fluoride of sodium, and chromate of potash. With the ammonia salts the decomposition is complete. (Dulong, *Ann. de Chim.*, **82.** 286.) Not at all decomposed by aqueous solutions of the alkaline sulphates. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 348.) When one equivalent of carbonate of lime is boiled with an equivalent of oxalate of potash, in aqueous solution, 0.23 of it may be decomposed; when boiled with an equivalent of oxalate of soda 0.18 of it may be decomposed. While, on the other hand, when an equivalent of oxalate of lime is boiled with one of carbonate of potash, 0.7944 may be decomposed, and with an equivalent of carbonate of soda 0.85 of it may be decomposed. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 348.) One equivalent of CaO, CO_2 boiled with an equivalent of $2 NaO, HO, PO_5$ may be decomposed to the extent of 0 3921. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 335.) Soluble in an aqueous solution of the chlorhydrate or nitrate [or any salt (Demarçay)] of sesquioxide of iron, slowly at the ordinary temperature, more rapidly when the solution is heated, with evolution of carbonic acid, and, after a considerable amount of the carbonate has been dissolved, precipitation of sesquioxide of iron [as a basic salt (Demarçay)]. (Fuchs, *Schweigger's Journ. für Ch. u. Phys.*, 1831, **62.** pp. 184, 187, 188, 191; compare Demarçay, *Ann. der Pharm.*, 1834, **11.** 242.) Also soluble in the chlorhydrates and nitrates of the sesquioxides of alumina, manganese, chromium, and uranium, with separation of the several oxides. [As basic salts.] (Fuchs, *Ibid.*, pp. 190, 191.) A solution of protochloride of iron, on the other hand, is not thus precipitated by carbonate of lime, except at a boiling heat, and even then only slowly (Fuchs, *Ibid.*, pp. 185, 188); and in general the protoxides, as MgO, NiO, MnO, ZnO, &c., are not precipitated by it. (Fuchs, *Ibid.*, pp. 190 - 192.) But much depends upon the temperature at which one operates and upon the acid with which the metallic oxide is combined. Thus at a boiling heat carbonate of lime is dissolved by aqueous solutions of the chlorides and nitrates of cobalt, nickel, zinc, manganese, and copper, these salts being completely decomposed with precipitation of their oxides. The precipitation of the oxides of nickel, cobalt, manganese, and copper, may even be effected at any temperature above 60°. (Demarçay, *loc. cit.*, pp. 249 - 251.) It is soluble to a certain extent in the salts of those bases which tend to form insoluble basic salts: thus chloride of copper is decomposed by it with separation of a basic salt. (Fuchs, *loc. cit.*, p. 191.) Soluble even in the cold in a solution of bichloride of tin, with effervescence and precipitation of binoxide of tin. (H. Rose, *Tr.*)

Carbonate of lime, even the native mineral, is easily soluble in sulphurous acid. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 75.) Soluble in acids generally. When treated with an acid in a closed vessel, effervescence soon ceases as the pressure increases, but the action of the acid is at once renewed on opening the vessel. (Bergman, *Essays*, **1.** 9; Link, *Gilbert's Ann. der Phys.*, 1814, **47.** 34.) Unacted upon by concentrated nitric acid, even when this is boiling, most probably because nitrate of lime is insoluble in strong nitric acid; nor is it decomposed by a mixture of 1 pt. oil of vitriol and 6 pts. of absolute alcohol, but is immediately decomposed by a mixture of nitric acid and absolute alcohol. It is not decomposed by absolute alcoholic solutions of oxalic, racemic, tartaric, citric, or glacial acetic acids. Unacted upon by glacial acetic acid, even when this is boiling.

$b = CaO, CO_2 + 5 Aq$ Permanent at temperatures below 20°, both in the air and under water. Insoluble in water. When heated to 30° either in the air, in water, or in ether, it loses its water completely, but in alcohol it behaves quite differently. In boiling anhydrous alcohol the salt becomes cloudy and parts with 2 equivalents of its water, and the milk-white crystals ($CaO, CO_2 + 3 Aq$) on being removed from the alcohol and exposed to the air lose their water more readily than the original 5 hydrated salt, so that they cannot be heated with safety above 10°. (Pelouze, in *Berzelius's Lehrb.*)

When one equivalent of $CaO, 2 CO_2$ is boiled with an equivalent of $2 KO, HO, PO_5$, in aqueous solution, 0.41 of it may be decomposed; when boiled with an equivalent of $2 NaO, HO, PO_5$, 0.39 of it may be decomposed. While, on the other hand, when an equivalent of $2 CaO, HO, PO_5$ is boiled with an equivalent of $KO, 2 CO_2$, 0.3323 of it may be decomposed, or with an equivalent of $NaO, 2 CO_2$, 0.2536 of it may be decomposed. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** pp. 348 - 354.)

CARBONATE OF LIME & OF MAGNESIA. Not so readily soluble in carbonic acid water as carbonate of lime. Unacted upon by cold, decomposed by boiling acetic acid.
(*Bitter spar. Dolomite.*)

CARBONATE OF LIME & OF SODA.

I.) *anhydrous.* Decomposed by water.
$CaO, CO_2; NaO, CO_2$

II.) $CaO, CO_2; NaO, CO_2 + 5 Aq$ Sparingly soluble, without decomposition, in water.

CARBONATE OF LIME & *of sesquioxide* OF URANIUM. Soluble, with decomposition, in chlorhydric acid. (J. L. Smith.)
$CaO, CO_2; Ur_2O_3, CO_2 + 2 Aq$

CARBONATE OF LIME with CHLORIDE OF CALCIUM. Decomposed by water. (*Ann. der Pharm.*, **12.** 221, note.)
$CaO, CO_2; CaCl$

CARBONATE OF LIME with HYDRATE OF LIME.
$CaO, CO_2; CaO, HO$

CARBONATE OF LITHIA. Very difficultly soluble in water; but more readily in hot than in cold.
LiO, CO_2

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Soluble in about 100 pts. of cold, more soluble in hot water. (Mitscherlich.) Soluble in 120 pts. of cold water. (Wittstein's *Handw.*) 1 pt. of the anhydrous salt is soluble in 150.24 pts. of water at 100°. The saturated aqueous solution boils at 100°. (Kremers, *Pogg. Ann.*, **92.** 499.) 1 pt. of the anhydrous salt is soluble in 130 pts. of water at 13°, and in 128.5 pts. of water at 102°. The saturated solution boils at 102°. "This statement is preferable to the previous one." (Kremers, *Pogg. Ann.*, **99.** pp. 43, 48.) 100 pts. of water dissolve 1.2 pts. of carbonate of lithia. This solubility is nearly the same at all temperatures. It is much more soluble in a solution of carbonic acid water: 100 pts. of water saturated with carbonic acid dissolve 5.25 pts. of carbonate of lithia. It is also soluble in solutions of ammoniacal salts. (Troost, *Ann. Ch. et Phys.*, (3.) **51.** 129.)

Insoluble in alcohol. (C. Gmelin.)

CARBONATE OF LUTEOCOBALT.

I.) *normal.* Easily soluble in hot water. Also soluble in cold water.
$6\,NH_3 . Co_2O_3, 3\,CO_2 + 7\,Aq$

II.) *acid.* Less soluble than the normal salt in water. (Gibbs & Genth, *Smithson. Contrib.*, vol. **9.**)
$6\,NH_3 . Co_2O_3, 3\,CO_2 ; HO, CO_2 + 5\,Aq$

CARBONATE OF MAGNESIA.

I.) *normal.*

$a = MgO, CO_2$ (*anhydrous.*) (*Magnesite.*) When in the crystalline state it is but feebly acted upon by weak acids. (Senarmont.) Powdered magnesite may even be treated with warm concentrated chlorhydric acid without any noticeable evolution of carbonic acid. In order to dissolve the powder it must be boiled for a long time with chlorhydric acid or with dilute sulphuric acid. (Berzelius, *Lehrb.*, **3.** 444.) Soluble in 5071 pts. of water at 15°. (Kremers, *Pogg. Ann.*, **85.** 247.) "Carbonate of magnesia" is soluble in 2504 pts. of cold water. (Fourcroy, cited in *Ann. de Chim.*, **28.** 290.)

$b = MgO, CO_2 + 3\,Aq$ Permanent. Soluble in 48 pts. of water, but is decomposed by a larger quantity of water. (Fourcroy.) 100 pts. of water at 15.5° dissolve 2 pts. of carbonate of magnesia. (Ure's *Dict.*) In another place Ure speaks of it as being "very slightly soluble" in water, and of the native carbonate as "insoluble." When treated with cold water it is decomposed to an insoluble basic and a soluble acid salt. (Berzelius.) Water does not decompose it. (Fritzsche.) It is not decomposed by water, even when this is boiling. (Deville, *Ann. Ch. et Phys.*, (3.) **33.** 89.) Cold water has a tendency to decompose it into an insoluble subsalt and a soluble acid salt. It is only when a large amount of liquid, in proportion to the carbonate of magnesia, is present that the salt can dissolve integrally. It is no longer precipitated from mixed solutions of carbonate of soda and sulphate of magnesia when the liquid contains 0.4 @ 0.5 pt. of the elements of carbonate of magnesia in every thousand parts. (Bineau, *Ann. Ch. et Phys.*, 1857, (3.) **51.** 301.)

More stable in sea-water than in pure water, but when the solution is heated to boiling, carbonic acid is evolved and a basic carbonate precipitated. (Cousté, *Ann. des Mines*, 1854, (5.) **5.** 137.) A Swedish *Kanne* of water dissolves 47 grains of it at a moderate heat. Water saturated with carbonic acid dissolves a far greater quantity, even so much as an ounce and a quarter, provided it be precipitated in presence of the solvent. (Bergman, *Essays*, **1.** 434.) Carbonate of magnesia is not precipitated when dilute solutions of carbonate of soda and sulphate of magnesia are mixed. Precipitation in the cold first occurs, and then only after the lapse of nearly an hour, in solutions containing 7 @ 8 grains of either salt per ounce. When the solutions are heated precipitation takes place more readily. (R. Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1825, **43.** 153, *et seq.*; compare Bergman, *Essays*, **1.** 45.) If a solution containing 1% of carbonate of soda be mixed with another containing 1% of sulphate of magnesia no precipitate will be formed. A precipitate occurs, however, when solutions containing 1.5 @ 2% of the above-mentioned salts are mixed. (Brandes, cited by Mulder, in his *Die Silberprobirmethode*, p. 14.)

More soluble than carbonate of lime in a cold aqueous solution of chloride of ammonium. When recently precipitated, it is readily soluble in an aqueous solution of chloride of ammonium, but if the carbonate has been dried at the temperature of 100° it dissolves much more difficultly and slowly. A concentrated solution of carbonate of magnesia in chloride of ammonium becomes cloudy when exposed to the air, but deposits no carbonate of magnesia on boiling. (Vogel, *J. pr. Ch.*, 1836, **7.** 455.) Soluble in an aqueous solution of nitrate of ammonia and somewhat more readily in a solution of chloride of ammonium. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 96.) Carbonate of magnesia is not precipitated from solutions which contain citrate of soda. (Spiller.)

The carbonates of magnesia are soluble in carbonic acid water; an amount of magnesia very nearly equal to 1 equivalent existing in solution for every 2 equivalents of carbonic acid. (Bineau, *loc. cit.*)

Dry carbonate of magnesia is not decomposed by a mixture of 1 pt. oil of vitriol and 6 pts. of absolute alcohol, nor by alcoholic solutions of racemic, tartaric, or glacial acetic acids; but is slowly decomposed by an alcoholic solution of citric acid and by a mixture of nitric acid and absolute alcohol. Carbonate of magnesia is more soluble in cold than in hot water impregnated with carbonic acid. (Butini, *Sur le Magnesie*; cited by Graham, *Phil. Mag.*, 1827, (2.) **2.** 26.) Unlike the anhydrous salt, this compound, as well as the other hydrates of carbonate of magnesia, is readily soluble in acids, even dilute. (Berzelius, *Lehrb.*, **3.** 444.)

$c = MgO, CO_2 + 5\,Aq$ Slowly efflorescent. Partially dissolved by cold water, with decomposition to soluble bicarbonate and insoluble basic carbonate. Boiling water converts it into the latter, with evolution of carbonic acid, without dissolving anything. (Fritzsche, *Berzelius's Lehrb.*, **3.** 446.)

II. $\frac{4}{3}$ *basic.* (*Hydromagnesite. Magnesia alba. Subcarbonate of Magnesia.*) $4\,MgO, 3\,CO_2 + 4\,Aq$ After thorough washing it becomes very difficultly soluble in water: — 1 pt. of it then requiring 10000 pts. of water, either hot or cold, for its solution. The more ready solubility ordinarily attributed to it is unquestionably due to the presence of carbonic acid. (Bineau, *C. R.*, **41.** 510.)

After long washing it only dissolves in the proportion of 1 pt. in 10000 pts. of water. Ordinarily, 1000 pts. dissolve 0.08 pt., either when cold or at the temperature of boiling. In solutions from which it had been precipitated by an excess of sulphate of magnesia, 1000 pts. of the liquor contained 0.06 pt. of $\frac{4}{3}$carbonate of magnesia = 1 pt. in

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17000 pts. of water. (Bineau, *Ann. Ch. et Phys.*, 1857, (3.) **51.** 300.) Commercial "magnesia" (of composition about $2\,MgO, CO_2 + 3\,Aq$) is soluble in 850 pts. of water at a moderate heat. Water saturated with carbonic acid dissolves $\frac{1}{300}$ of its own weight of common "magnesia" at a moderate heat, and double that quantity if it be in as fine powder as a precipitate. (Bergman, *Essays*, **1.** pp. 43, 45.) Soluble in carbonic acid water. Soluble in 2493 pts. of cold, and in 9000 of boiling water. (Fyfe, *Edin. Journ.*, **5.** 305 [T.].) [Compare Bineau, above.] Soluble in aqueous solutions of carbonate of potash or soda, and of sulphate and nitrate of potash.

Easily soluble in aqueous solutions of chloride of ammonium and of sulphate, nitrate, and succinate of ammonia. (Wittstein.) Soluble in cold aqueous solutions of carbonate of potash, carbonate of soda, sulphate of potash, chloride of potassium, nitrate of potash, and probably of other salts. On heating these solutions it separates out in part, but dissolves again as the solution cools. (Longchamps.) Soluble in an aqueous solution of sulphate of magnesia. (Dulong, *Ann. de Chim.*, **82.** 289 (note).) Very easily soluble in acids. Soluble in aqueous solutions of the salts of sesquioxide of iron, with evolution of carbonic acid and separation of hydrate of sesquioxide of iron. (Fuchs, *Schweigger's Journ. für Ch. u. Phys.*, 1831, **62.** 193; compare Demarçay, *Ann. der Pharm.*, 1834, **11.** 242.) In the cold it does not precipitate solutions of most of the R O oxides, but at higher temperatures such precipitation may occur in some cases; thus carbonate of magnesia is completely dissolved when boiled with solutions of the chlorides or nitrates of cobalt, nickel, zinc, manganese, or copper. (Demarçay, *loc. cit.*, pp. 250, 251.)

III.) $3\,MgO, CO_2 + 3\,Aq$

IV.) $5\,MgO, 4\,CO_2 + 5\,Aq$ Insoluble, or very sparingly soluble, in water. (Fritzsche.)

V.) *bi.* $MgO, 2\,CO_2$ Soluble in water. When the aqueous solution is heated, either in the open air or in a closed vessel, it deposits a precipitate; in the closed vessel this redissolves as the liquid cools, but from the open vessel no such resolution occurs on cooling, since carbonic acid has been expelled. (Osann, *Kastner's Archiv.*, 1824, **3.** 213.)

CARBONATE OF MAGNESIA & OF POTASH.

I.) $KO, CO_2; MgO, CO_2 + 4\,Aq$ Very easily decomposed by cold water. (Deville, *Ann. Ch. et Phys.*, (3.) **33.** 87.)

II.) $KO, 2CO_2; 2\,(MgO, CO_2) + 9Aq$ Insoluble, as such, in water; but is decomposed by water to bicarbonate of magnesia and bicarbonate of potash, which dissolve, and insoluble subcarbonate of magnesia. (Berzelius, *Lehrb.*, **3.** 448.)

III.) ? Very sparingly soluble in cold water; decomposed by boiling water. (Bonsdorff.)

CARBONATE OF MAGNESIA & OF SODA. $MgO, CO_2; NaO, CO_2$ Very rapidly decomposed by water. (Deville, *Ann. Ch. et Phys.*, (3.) **33.** 89.) The existence of the compound mentioned by Berzelius has been doubted. According to B., this was less easily decomposed by water than the potash salt.

CARBONATE *of protoxide* OF MANGANESE.

I.) MnO, CO_2 Permanent. As good as insoluble in water. (Fresenius, *Quant.*, p. 134.) Soluble in 2500 pts. of a saturated aqueous solution of carbonic acid. (Lassaigne, *J. Ch. Méd.*, **4.** 312; in *Berzelius's J. B.*, **29.** 132.) Soluble in 3840 pts. of an aqueous solution of carbonic acid, and in 7680 pts. of water. (John.)

When recently precipitated it is tolerably easily soluble in a solution of chloride of ammonium. It is also soluble in other ammoniacal salts, as carbonate of ammonia, when recently precipitated, but is very sparingly soluble after having stood for some time after precipitation. (Wittstein.) Insoluble in an aqueous solution of chloride of ammonium or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 98.) H. Rose (*Tr.*, **1.** pp. 68, 69) speaks of ordinary precipitated carbonate of manganese as a *basic* salt. According to him, it is only slightly soluble at the ordinary temperature in a solution of chloride of ammonium, though in presence of the latter it is not immediately precipitated by bicarbonate of potash.

No more soluble in a solution of carbonate of potash, or soda, than in pure water. (Compare Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** 220.) Is not precipitated from solutions containing a soluble citrate. (Spiller.) Soluble in aqueous solutions of the salts of sesquioxide of iron with evolution of carbonic acid and separation of sesquioxide of iron. [Compare Carbonate of Lime.] (Fuchs, *Schweigger's Journ. für Ch. u. Phys.*, 1831, **62.** 193.) Easily soluble in acids, even in acetic, and sulphurous acids.

II.) $(2\,MnO, CO_2) + Aq$ Permanent. Insoluble in water.

CARBONATE OF MERCUR(*ous*)ETHYL. (*Carbonate of Hydrargethyl.*) Readily soluble in water, and alcohol.

CARBONATE *of dinoxide* OF MERCURY. Hg_2O, CO_2 Insoluble in cold, immediately decomposed by boiling water.

Soluble in a hot or warm aqueous solution of chloride of ammonium, though less completely than the protocarbonate; less readily soluble in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.) Slightly soluble in an aqueous solution of carbonate of potash. Partially soluble, with separation of metallic mercury, in ammonia-water. (Wittstein.)

CARBONATE *of protoxide* OF MERCURY.

I.) HgO, CO_2 Permanent. Insoluble in water. Slightly soluble in carbonic acid water, and in an aqueous solution of carbonate of potash. (Berzelius.) Soluble in an aqueous solution of chloride of ammonium. (Wittstein.) Soluble in hot aqueous solutions of chloride of ammonium, and nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.)

II.) $3\,HgO, CO_2$ Insoluble in cold water.

III.) $4\,HgO, CO_2$ Insoluble in cold water. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 368.)

CARBONATE OF METHYLAMIN. $C_2H_5N, CO_2 + Aq$ Very deliquescent. Soluble in water. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 461.)

CARBONATE OF MORPHINE.

I.) *acid.* Soluble in 4 pts. of water. (Choulant.)

CARBONATE OF NICKEL.

I.) NiO, CO_2

a = anhydrous(crystalline). Unacted upon by cold chlorhydric or nitric acids, even when these are concentrated. (De Senarmont, *Ann. Ch. et Phys.*, (3.) **30.** 138.)

b = hydrated (precipitated). Permanent. Insoluble in water. Soluble in an aqueous solution of carbonate of ammonia. Very sparingly soluble even in a concentrated solution of carbonate of soda.

$NiO, CO_2 + 6 Aq$

Insoluble in carbonic acid water. (Bergman, *Essays*, **1.** 55.) Easily soluble in an aqueous solution of chloride of ammonium when this is gently heated. (H. Rose, *Tr.*) Soluble in a solution of cyanide of potassium. It is not precipitated from solutions containing citrate of soda. (Spiller.)

II.) *basic.* Readily soluble in chlorhydric acid.
$2(NiO, 3HO); NiO, CO_2$ (Silliman.)

Carbonate of Nickel & of Potash.

I.) $KO, CO_2; NiO, CO_2 + 4 Aq$

II.) $KO, 2CO_2; 2NiO, CO_2 + 9 Aq$ Decomposed by water, but may be washed with a solution of bicarbonate of potash.

Carbonate of Nickel & of Soda.
$NaO, CO_2; NiO, CO_2 + 10 Aq$

Carbonate of NitroHarmalin.

Carbonate of Palladium.

I.) *basic.* Insoluble in water. Partially soluble in ammonia-water. Slightly soluble in an aqueous solution of carbonate of soda. Soluble in acids. (Kane, *Phil. Trans.*, 1842, p. 279.)

$10 PdO, CO_2 + 10 Aq$

Carbonate of Picolin. Decomposed by boiling with water. (Unverdorben.)

Carbonate of Platin(*ous*)*bi*amin.
(Ammonio Carbonate of protoxide of Platinum. Carbonate of diPlatosamin.)

I.) *mono.*
$N_2\left\{H_6 . Pt'O, CO_2 + HO\right.$

II.) *sesqui.* More soluble in water than the bicarbonate. (Reiset, *Ann. Ch. et Phys.*, (3.) **11.** 425.)
$2(N_2\left\{H_6 . Pt'O\right.), HO, 3CO_2$

III.) *bi.* Somewhat soluble in water. (Reiset, *loc. cit.*)
$N_2\left\{H_6 . Pt'O, HO, 2CO_2\right.$

Carbonate of $\frac{3}{2}$ PlumbEthyl. Nearly insoluble in water. Sparingly soluble in alcohol, and ether.
$(C_4H_5)_3 Pb_2 O, CO_2$

Carbonate of Potash.

I.) *anhydrous.* Deliquescent. Very easily soluble in water, with evolution of heat.
KO, CO_2

Soluble in 1.05 pts. of water at 3°
" 0.962 " " 6°
" 0.900 " " 12.6°
" 0.747 " " 26°
" 0.490 " " 70°
(Osann.)

Soluble in 0.92 pt. of cold water, the saturated solution containing 52% of it (M. R. & P); in 0.922 pt. of water at 15° (Gerlach's determination, see his table of sp. grs., below); in 1 pt. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.)

II.) *hydrated, ordinary.*
$KO, CO_2 + 2 Aq$

At °C	100 pts. of water dissolve pts. of the anhydrous salt KO, CO_2.	of the cryst. salt $KO, CO_2 + 2 Aq$ (calculated).
0°	83.12	131.15
10°	88.72	142.50
20°	94.06	153.70
30°	100.09	166.85
40°	106.20	180.07
50°	112.90	196.60
60°	119.24	212.35
70°	127.10	232.84
80°	134.25	252.57
90°	143.18	278.72
100°	153.66	311.85
135°	205.11	526.10

(Poggiale, *Ann. Ch. et Phys.*, (3.) **8.** 468.)

[In Berzelius's *Jahresbericht*, **24.** 152, 9° is printed at the top of the temperature column instead of 0°; an error which has found its way into other works.]

Mono-carbonate of potash is more soluble in water than either the sesqui- or the bicarbonate. (Poggiale, *loc. cit.*, p. 474.) The saturated aqueous solution boils at 135°. [Poggiale, *vid. supra*, & Legrand.] (Kremers, *Pogg. Ann.*, **99.** 43.) 100 pts. of water at 15.5° dissolve 100 pts. of it. (Ure's *Dict.*)

The aqueous solutions of several salts, when evaporated, may become supersaturated, as it were, at the boiling-point, nothing being deposited, in spite of the movements of the liquid, while the temperature becomes more and more elevated. But at the moment the salt begins to be deposited the temperature falls to a point where it remains constant. The "boiling-point" of saturated solutions must consequently be taken *while* the salt is separating, and not at the moment when this separation has just commenced. Carbonate of potash exhibits this phenomenon in a very striking manner. In one instance the temperature of a solution rose to 140° without depositing any of the salt, when suddenly a lively effervescence occurred, a large quantity of the salt was deposited, and the temperature fell to the normal 135°, where it remained fixed for an indefinite length of time. (Legrand, *Ann. Ch. et Phys.*, 1835, (2.) **59.** 428.)

Amount of Anhydrous KO, CO_2 contained in the aqueous solution at 15°.

Sp. Gr.	Per Cent.	Sp. Gr.	Per Cent.
1.00914	1	1.27893	28
1.01829	2	1.28999	29
1.02743	3	1.30105	30
1.03658	4	1.31261	31
1.04572	5	1.32417	32
1.05513	6	1.33573	33
1.06454	7	1.34729	34
1.07396	8	1.35885	35
1.08337	9	1.37082	36
1.09278	10	1.38279	37
1.10258	11	1.39476	38
1.11238	12	1.40673	39
1.12219	13	1.41870	40
1.13199	14	1.43104	41
1.14179	15	1.44338	42
1.15200	16	1.45573	43
1.16222	17	1.46807	44
1.17243	18	1.48041	45
1.18265	19	1.49314	46
1.19286	20	1.50588	47
1.20344	21	1.51861	48
1.21402	22	1.53135	49
1.22459	23	1.54408	50
1.23517	24	1.55728	51
1.24575	25	1.57048	52
1.25681	26	1.57079*	52.024
1.26787	27		

* Saturated solution.

(Th. Gerlach, *Sp. Gew. der Salzlœsungen*, 1859, p. 18.)

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Sp. Gr. (at 15°).	Per Cent of KO, CO_2.	Sp. Gr. (at 15°).	Per Cent of KO, CO_2.
1.4812	40.504	1.2282	19.580
1.4750	40.139	1.2150	18.601
1.4626	39.160	1.2020	17.622
1.4504	38.181	1.1892	16.643
1.4384	37.202	1.1766	15.664
1.4265	36.223	1.1642	14.685
1.4147	35.244	1.1520	13.706
1.4030	34.265	1.1400	12.727
1.3915	33.286	1.1282	11.748
1.3803	32.307	1.1166	10.769
1.3692	31.328	1.1052	9.790
1.3585	30.349	1.0940	8.811
1.3480	29.360	1.0829	7.832
1.3378	28.391	1.0719	6.853
1.3277	27.412	1.0611	5.874
1.3177	26.432	1.0505	4.895
1.3078	25.454	1.0401	3.916
1.2980	24.475	1.0299	2.934
1.2836	23.496	1.0108	1.958
1.2694	22.517	1.0098	0.979
1.2554	21.538	1.0048	0.489
1.2417	20.539		

(Tuennermann, *Trommsdorff's N. Journ. der Pharm.*, **18.** 2. 20, in Gmelin's *Handbook*, **3.** 22.)

Sp. Gr.	Per Cent of KO, CO_2.	Boils at °C.	Sp. Gr.	Per Cent of KO, CO_2.	Boils at °C.
2.60	100	137.78°	1.41	39.0	107.22°
2.40	88.4	129.44°	1.38	36.2	105.56°
2.15	79.2	125.56°	1.34	33.6	104.44°
1.95	71.8	122.22°	1.31	30.5	103.33°
1.80	65.6	119.44°	1.28	27.3	102.78°
1.70	60.4	117.78°	1.25	24.0	102.22°
1.63	56.0	116.11°	1.22	20.5	101.66°
1.58	52.1	114.44°	1.19	16.8	101.11°
1.54	48.8	112.78°	1.15	13.2	101.11°
1.50	45.8	111.11°	1.11	9.0	100.56°
1.46	43.3	109.44°	1.06	4.7	100.56°
1.44	41.7	108.33°			

(Dalton, in his *New System*, **2.** 481.)

In a solution containing for 100 pts. of water, pts. of anhydrous KO, CO_2	The boiling point is elevated.	Difference.	In a solution containing for 100 pts. of water, pts. of anhydrous KO, CO_2	The boiling point is elevated.	Difference.
0.0	0°		117.1	18°	4.9
13.0	1°	13.0	122.0	19°	5.0
22.5	2°	9.5	127.0	20°	5.0
31.0	3°	8.5	132.0	21°	5.0
38.8	4°	7.8	137.0	22°	5.0
46.1	5°	7.3	142.0	23°	5.0
53.1	6°	7.0	147.1	24°	5.1
59.6	7°	6.5	152.2	25°	5.1
65.9	8°	6.3	157.3	26°	5.1
71.9	9°	6.0	162.5	27°	5.2
77.6	10°	5.7	167.7	28°	5.2
83.0	11°	5.4	172.9	29°	5.2
88.2	12°	5.2	178.1	30°	5.2
93.2	13°	5.0	183.4	31°	5.3
98.0	14°	4.8	188.8	32°	5.4
102.8	15°	4.7	194.2	33°	5.4
107.5	16°	4.8	199.6	34°	5.4
112.3	17°	4.8	205.0*	35°	5.4

The point of ebullition of pure water, observed in a glass tube containing bits of metallic zinc, having been 100.3°. (Legrand, *Ann. Ch. et Phys.*, 1835, (2.) **59.** 438.) An aqueous solution containing 10% of KO, CO_2 boils at 100.8°; one of 20% boils at 102.2°; one of 30% at 104.5°; one of 40% at 108.6°; and one of 50% at 115.2°. (Gerlach's *Sp. Gew. der Salzlœsungen*, p. 110.) Insoluble in absolute alcohol; it absorbs water from ordinary spirit and deliquesces.

Somewhat soluble in spirit. (Schubarth, *Tech. Chem.*) Soluble in 9 pts. of alcohol of 17° B.; if a larger quantity of dry carbonate of potash is added to this solution it absorbs water and precipitates, as an oily liquor, the carbonate of potash which was originally dissolved. (Guibourt.)

Dry carbonate of potash is not decomposed by an alcoholic solution of sulphuric acid prepared by mixing 1 pt. of oil of vitriol and 6 pts. of absolute alcohol, nor by a mixture of absolute alcohol and nitric acid, or an alcoholic solution of chlorhydric acid gas, oxalic, racemic, tartaric, or glacial acetic acids, but is decomposed by an alcoholic solution of citric acid.

Soluble in phenic acid, without decomposition.

As a general rule all insoluble salts are partially decomposed when boiled with an aqueous solution of carbonate of potash. (Dulong, *Ann. de Chim.*, **82.** pp. 278, 293, 300.)

When treated with an acid in a closed vessel effervescence ceases as the pressure increases, but the action of the acid is at once renewed on opening the vessel. (Bergman, *Essays*, **1.** 9.)

*Sesqui*CARBONATE OF POTASH. $2KO, 3CO_2$ Permanent. Soluble in water. Insoluble in spirit. (Schubarth, *Tech. Chem.*) More soluble in water than the bicarbonate, but less soluble than the normal salt. (Poggiale, *loc. cit.*, p. 474.)

The experiments of Poggiale recorded in the table below were made with a salt which was prepared by *boiling* a solution of bicarbonate of potash. P. observes, however, that another set of experiments made upon a salt prepared by dissolving in boiling water 100 pts. of normal carbonate and 131 pts. of bicarbonate, afforded different results.

At °C.	100 pts. of water dissolve pts. of the anhydrous salt.	of the cryst. salt.
0°	38.25	85.86
10°	43.40	102.17
20°	48.02	118.22
30°	52.60	133.57
40°	57.13	154.54
50°	62.08	177.48
60°	66.90	202.46
70°	71.40	228.54
80°	76.19	259.93
90°	80.86	294.63
100°	85.50	334 22

(Poggiale, *Ann. Ch. et Phys.*, (3.) **8.** 468.)

[In Berzelius's *Jahresbericht* there is a typographical error in this table, similar to that mentioned under monocarbonate of potash.]

*Bi*CARBONATE OF POTASH. $KO, HO, 2CO_2$ Permanent. Soluble in 3.5 pts. of water at 15°. When the solution is heated to 80° carbonic acid is evolved, and after long-continued boiling a salt nearly of the composition of the normal carbonate remains. (Redwood, in *Ot. Gr.*)

Permanent, even in moist and dry air. Soluble in 4 pts. of water at a moderate temperature. (Bergman, *Essays*, **1.** 18.) Soluble in 0.8333 pt. of boiling water (Pelletier); in 4 pts. of cold, and in 1.2 pts. of boiling water; the saturated cold solution containing 20% of it, and the saturated hot solution 41.6% (M. R. & P.'s *Pharmacy*). Soluble in 4 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.)

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* Saturated.

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At °C.	100 pts. of water dissolve pts. of the anhydrous salt $KO, 2CO_2$ [theoretical].	100 pts. of water dissolve pts. of the cryst. salt $KO, HO, 2CO_2$.
0°	17.56	19.61
10°	20.73	23.23
20°	23.95	26.91
30°	27.05	30.57
40°	30.12	34.15
50°	33.36	37.92
60°	36.25	41.35
70°	39.57	45.24

The salt is decomposed when its solution is heated above 70°. It is less soluble in water than either the mono- or sesquicarbonate. (Poggiale, *Ann. Ch. et Phys.*, (3.) **8.** pp. 468, 474.) [In Berzelius's *Jahresbericht*, **24.** 152, the above table is incorrectly printed, all the figures being misplaced, and the error has been copied by Otto, in his *Lehrbuch*. That the misprint alluded to is really an error is proved by the context of Poggiale's memoir, as well as by his own table. In his *Lehrbuch*, edit. of 1845, vol. **3.** p. 157, Berzelius has printed the table correctly.] 100 pts. of water at 15.5° dissolve 30 pts. of it, and at 100°, 83 pts. (Ure's *Dict.*) Soluble in 1200 pts. of boiling alcohol. (Berthollet.) Insoluble in alcohol. (Dumas, *Tr.*) Sparingly soluble in boiling alcohol. (Gmelin.)

Carbonate of Potash & of Soda. $2(NaO, CO_2); KO, CO_2 + 18 Aq$ Permanent, or but slightly efflorescent. Extremely soluble in water, with decomposition. It crystallizes from a saturated solution of carbonate of potash. (Marignac.)

Carbonate of Potash & *of protoxide* of Tin. $KO, 2CO_2; 2SnO, CO_2 + 2Aq$

Carbonate of Potash & *of sesquioxide* of Uranium. $2(KO, CO_2); Ur_2O_3, CO_2$ Soluble in 13.51 pts. of water at 15°; or, 100 pts. of water dissolve 7.4 pts. of it. It is a little more soluble in warm water. Partially decomposed by boiling water, at least when not in presence of a slight excess of carbonate of potash. When the aqueous solution is diluted with a large quantity of water it becomes cloudy, and deposits some uranate of potash; but this decomposition does not occur in presence of a small quantity of free alkaline carbonate, no matter how much the solution may be diluted. Completely insoluble in alcohol. When a small quantity of acid is added to the aqueous solution, a basic salt is precipitated. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** 204.) More soluble in an aqueous solution of carbonate or bicarbonate of potash than in water; after standing during some time a precipitate is formed in the solution in the carbonate, but none in the solution in the bicarbonate. (H. Rose, *Tr.*)

Carbonate of Potash & of Zinc.

I.) $KO, CO_2; ZnO, CO_2 + 2Aq$ Insoluble in water. (Kane.)

II.) $4(KO, 2CO_2); 3(2ZnO, CO_2) + 8Aq$ Less readily decomposed than most of the double carbonates. It can be washed with cold water. (Deville, *Ann. Ch. et Phys.*, (3.) **33.** 101.)

Carbonate of Potash with Chloride of Potassium. $KO, CO_2; KCl$ (Dœbereiner.)

***Bi*Carbonate of Quinine.** $C_{40}H_{24}N_2O_4, C_2O_4, 2HO + 2Aq$ Efflorescent. Somewhat soluble in water. Soluble in carbonic acid water. Soluble in alcohol. Insoluble in ether. (Langlois, *Ann. Ch. et Phys.*, (3.) **41.** 90.)

Carbonate of Silver. AgO, CO_2 Somewhat soluble in water.

Soluble in 31978 pts. of water at 15°. (Kremers, *Pogg. Ann.*, **85.** 248.) Insoluble in carbonic acid water. (Bergman, *Essays*, **1.** 55.) Soluble in 961 pts. of carbonic acid water. (Lassaigne, *J. Ch. Méd.*, **4.** 312; in *Berzelius's Jahresbericht*, **29.** 132.) Insoluble in alcohol. Soluble in an aqueous solution of carbonate of ammonia. Also readily soluble in ammonia-water.

Slightly soluble in a cold saturated solution of carbonate of potash. (Wittstein.) Readily soluble, with decomposition, in aqueous solutions of the soluble hyposulphites. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 397.) Soluble in a hot aqueous solution of chloride of ammonium; also very imperfectly soluble in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 97, 98, 335.) Soluble in an aqueous solution of nitrate of ammonia when this is gently heated. (H. Rose, *Tr.*) It is not precipitated from solutions containing citrate of soda. (Spiller.) Readily decomposed by chlorhydric acid and by solutions of the metallic chlorides.

Carbonate of Sinkalin. Deliquescent. Soluble in water. (v. Babo & Hirschbrunn.)

Carbonate of Soda.

I.) *mono*, or normal.

a = *anhydrous.*

NaO, CO_2 Permanent.

It absorbs water from the air, though very slowly. (Fresenius, *Quant.*, p. 122.) Soluble in 5.967 pts. of water at 15°. (Gerlach's determination. See his table of sp. grs., below.) [See also under *b*.] Easily soluble in water, much less soluble in dilute ammonia-water. Insoluble in alcohol. (Margueritte; Fresenius, *Quant.*, p. 122.) Slightly soluble in absolute alcohol. Apparently quite insoluble in an alcoholic solution of soap. (Duffy, *J. Ch. Soc.*, **5.** 305.) Carbonate of soda possesses at least 4 different degrees of solubility according to different states of molecular constitution and degrees of hydration in which it occurs. (Lœwel, *Ann. Ch. et Phys.*, (3.) **44.** 330.) It is a little more soluble at temperatures about 34° @ 38° than at 104°, but the maximum of solubility is at a point still lower, probably at about 15°. (Lœwel, *loc. cit.*, (3.) **44.** 329.)

It would appear from the researches of Lœwel that carbonate of soda presents two maxima of solubility; the one occurring as warm solutions are cooled, which appears to be at about 15°, or even at a lower point; the other when cold solutions are warmed [at 34° @ 38°], the salt being probably of different composition, as regards its proportion of water of crystallization, in the two cases. (Payen, *Ann. Ch. et Phys.*, (3.) **44.** 330.)

An aqueous solution containing 5% of NaO, CO_2 boils at 100.5°, one of 10% boils at 101.1°; and one of 15% at 101.8°. (Gerlach's *Sp. Gew. der Salzlœsungen*, p. 108.)

In a solution containing for 100 parts of water, pts. of anhydrous NaO, CO_2	The boiling point was elevated.	Difference.
0.0	0.0°	
7.5	0.5°	7.5
14.4	1.0°	6.9
20.8	1.5°	6.4
26.7	2.0°	5.9
32.0	2.5°	5.3
36.8	3.0°	4.8
41.0	3.5°	4.2
44.7	4.0°	3.7
47.9	4.5°	3.2
48.5	4.63°	

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The point of ebullition of pure water, observed in a glass tube containing bits of metallic zinc, having been 100°. (Legrand, *Ann. Ch. et Phys.*, 1835, (2.) **59.** 433.) The saturated aqueous solution boils at 104.4° (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90); at 106° (Kremers, *Pogg. Ann.*, **99.** 43); at 104°. (Payen, *Ann. Ch. et Phys.*, (3.) **43.** 233.) A hot aqueous solution of carbonate of soda is liable to become supersaturated on cooling. (Gay-Lussac.) A supersaturated solution of carbonate of soda (2 pts. of $NaO, CO_2 + 10$ Aq in 1 pt. of water) may be preserved for a long time in a flask loosely stopped with cotton-wool, and only crystallizes after some time when opened to the air, even when shaken. (Schrœder, *Ann. Ch. u. Pharm.*, 1859, **109.** 47.) As is the case with sulphate of soda, a clear hot solution of carbonate of soda does not crystallize when cooled out of contact with the air, but may be kept for a long time as a supersaturated solution: when exposed to low temperatures, the salt with 10 Aq. crystallizes out, but under other circumstances two other salts are formed, each containing 7 Aq.; the one (7 Aq. *a*) being nearly four times as soluble at 10° as the ordinary 10 Aq. salt, and the other (7 Aq. *b*) 2 times as soluble as the 10 Aq. salt. The salt 7 Aq. *b* is identical with the "8 Aq." salt of Thomson. (Lœwel, *Ann. Ch. et Phys.*, (3.) **33.** 337; compare Schrœder, *Ann. Ch. u. Pharm.*, **109.** 50.)

Dry carbonate of soda is not decomposed by a mixture of 1 pt. oil of vitriol and 6 pts. of absolute alcohol, nor by alcoholic solutions of racemic, tartaric, or glacial acetic acids; it is slowly decomposed, however, by a mixture of nitric acid and absolute alcohol.

As a general rule, all insoluble salts are partially decomposed when boiled with an aqueous solution of carbonate of soda. (Dulong, *Ann. de Chim.*, **82.** pp. 278, 293, 300.)

$b = NaO, CO_2 + 10$ Aq (*Ordinary crystallized Carbonate of Soda. Sal Soda.*) Efflorescent. Soluble in 1.05 pts. of water at 23°; or, 100 pts. of water at 23° dissolve 95.3 pts. of it; or, the aqueous solution saturated at 23° contains 48.8% of it, or, 18.1% of the anhydrous salt, and is of 1.1995 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.)

At °C.	100 pts. of water dissolve pts. of the anhydrous salt NaO, CO_2.	of the cryst. salt $NaO, CO_2 + 10$ Aq.
0°	7.08	21.52
10°	16.66	61.98
20°	25.93	123.12
25°	30.83	171.33
30°	35.90	241.57
104.6°	48.50	420.68

(Poggiale, *Ann. Ch. et Phys.*, (3.) **8.** 468.)

"Crystallized carbonate of soda melts in its water of crystallization at about 32°. Its point of congelation appears to be at 33°. It is then soluble in all proportions in water above this temperature. Legrand has observed, however, that water saturated with NaO, CO_2 boils at 104.6°, and contains 48.5 pts. of this salt." (Poggiale, *loc. cit.*, p. 474.) The correctness of Poggiale's results is called in question by Lœwel. (*Ann. Ch. et Phys.*, (3.) **33.** 377.)

	A saturated solution of $NaO, CO_2 + 10$ Aq contains		A saturated solution of $NaO, CO_2 + 7$ Aq *b* contains			A saturated solution of $NaO, CO_2 + 7$ Aq *a* contains		
At °C.	Anhydrous salt dissolved by 100 pts. of water.	10 Aq salt dissolved by 100 pts. of water.	Anhydrous salt dissolved by 100 pts. of water.	7 Aq *b* salt dissolved by 100 pts. of water.	10 Aq salt dissolved by 100 pts. of water.	Anhydrous salt dissolved by 100 pts. of water.	7 Aq *a* salt dissolved by 100 pts. of water.	10 Aq salt dissolved by 100 pts. of water.
0°	6.97	21.33	20.39	58.93	84.28	31.93	112.94	188.37
10°	12.06	40.94	26.33	83.94	128.57	37.85	150.77	286.13
15°	16.20	63.20	29.58	100.00	160.51	41.55	179.90	381.29
20°	21.71	92.82	38.55	122.25	210.58	45.79	220.20	556.71
25°	28.50	149.13	38.07	152.36	290.91			
30°	37.24	273.64	43.45	196.93	447.93			
38°	51.67	1142.17						
104°	45.47	539.63						

(Lœwel, *Ann. Ch. et Phys.*, (3.) **33.** 382.)

100 pts. of
water at 14° dissolve 60.4 pts. of the 10 Aq. salt.
" 36° " 833.0 " "
" 104° " 445.0 " "

The solubility increases up to 36°, and then diminishes: if a solution saturated at 36° be boiled, a portion of the carbonate of soda will be precipitated, but as the solution cools again to 36° the precipitate redissolves. A solution saturated at 36° may be cooled to 20° and maintained at that temperature during 8 @ 10 days, even when agitated, without depositing anything. (Payen, *Ann. Ch. et Phys.*, (3.) **43.** 233.) 100 pts. of water at 14.6° dissolve 7.74 pts. of the anhydrous, or 20.64 pts. of the crystallized salt, the solution, which is of 1.0752 sp. gr., containing 7.19% of the anhydrous salt. Soluble in rather less than 1 pt. of boiling water. When heated, crystallized carbonate of soda dissolves in its water of crystallization, and it sometimes happens that when once melted in this way it remains permanently liquid. (T. Thomson, in his *System of Chem.*, London, 1831, **2.** 451.) Soluble in about 2 pts. of water. (Bergman, *Essays*, **1.** 28.) Soluble in 2 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) The aqueous solution saturated at 15° is of 1.166987 sp. gr., and contains dissolved in every 100 pts. of water at least 18.088 pts. of the anhydrous, or 66.059 pts. of the 10 Aq. salt. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.) More soluble in water than the sesqui- or bi-salt. (Poggiale.) It melts completely in its water of crystallization at about 65.56°, but on boiling this liquid for a while a quantity of the 5 Aq. salt (*d*) crystallizes out, and the supernatant liquid is of 1.35 sp. gr. (i. e. it contains 28.8% of NaO, CO_2). Mother liquor, from which ordinary 10 Aq. salt has crystallized, i. e. the saturated aqueous solution at ordinary temperatures, is of sp. gr. 1.18, and contains 16.4% of NaO, CO_2. (Dalton, in his *New System*, **2.** 498.)

An aqueous solution of sp. gr. (at 23°)	Contains (by experiment) per cent of $NaO, CO_2 + 10$ Aq.
1.1995	48.81
1.1307	32.54
1.0859	21.70
1.0638	16.27
1.0430	10.85
1.0219	5.425

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 334.)

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From these results Schiff calculates the following table, by means of the formula, $D = 1 + 0.0038\,p + 0.00000811\,p^2 - 0.0000000464\,p^3$; in which D = the sp. gr. of the solution and p the percentage of substance in the solution.

An aqueous solution of sp. gr.	Contains Per Cent of $NaO, CO_2 + 10Aq.$	Contains Per Cent of anhydrous NaO, CO_2.
1.0038	1	0.370
1.0076	2	0.741
1.0114	3	1.112
1.0153	4	1.482
1.0192	5	1.853
1.0231	6	2.223
1.0270	7	2.594
1.0309	8	2.965
1.0348	9	3.335
1.0388	10	3.706
1.0428	11	4.076
1.0468	12	4.447
1.0508	13	4.817
1.0548	14	5.188
1.0588	15	5.558
1.0628	16	5.929
1.0668	17	6.299
1.0708	18	6.670
1.0748	19	7.041
1.0789	20	7.412
1.0830	21	7.782
1.0871	22	8.153
1.0912	23	8.523
1.0953	24	8.894
1.0994	25	9.264
1.1035	26	9.635
1.1076	27	10.005
1.1117	28	10.376
1.1158	29	10.746
1.1200	30	11.118
1.1242	31	11.488
1.1284	32	11.859
1.1326	33	12.230
1.1368	34	12.600
1.1410	35	12.971
1.1452	36	13.341
1.1494	37	13.712
1.1536	38	14.082
1.1578	39	14.453
1.1620	40	14.824
1.1662	41	15.195
1.1704	42	15.566
1.1746	43	15.936
1.1788	44	16.307
1.1830	45	16.677
1.1873	46	17.048
1.1916	47	17.418
1.1959	48	17.789
1.2002	49	18.159
1.2045	50	18.530

(H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 186.)

Amount of Anhydrous NaO, CO_2 in the aqueous solution at 15°.

Sp. Gr.	Per Cent.	Sp. Gr.	Per Cent.
1.01050	1	1.09500	9
1.02101	2	1.10571	10
1.03151	3	1.11655	11
1.04201	4	1.12740	12
1.05255	5	1.13845	13
1.06309	6	1.14950	14
1.07369	7	1.15350	14.354*
1.08430	8		

(Th. Gerlach, *Sp. Gew. der Salzlœsungen*, 1859, p. 17.)

See also a table of sp. grs. and percentages for each degree of temperature between 0° and 30° on p. 123 of Gerlach's book, and another, on p. 124, of the sp. gr. of a 10% solution at each degree of temperature from 0° to 100°.

Sp. Gr. (at 15°).	Per Cent of NaO, CO_2.	Sp. Gr. (at 15°).	Per Cent of NaO, CO_2.
1.0040	0.372	1.0892	7.812
1.0081	0.744	1.0937	8.184
1.0121	1.116	1.0982	8.556
1.0163	1.488	1.1028	8.928
1.0204	1.850	1.1074	9.300
1.0245	2.232	1.1120	9.672
1.0286	2.504	1.1167	10.044
1.0327	2.976	1.1214	10.416
1.0368	3.348	1.1261	10.788
1.0410	3.720	1.1308	11.160
1.0452	4.090	1.1356	11.532
1.0494	4.464	1.1404	11.904
1.0537	4.836	1.1452	12.276
1.0578	5.208	1.1500	12.648
1.0625	5.580	1.1549	13.020
1.0669	5.972	1.1598	13.392
1.0713	6.324	1.1648	13.764
1.0757	6.396	1.1698	14.136
1.0802	6.768	1.1748	14.508
1.0847	7.440	1.1816	14.880

(Tuennermann, *Trommsdorff's N. Journ. der Pharm.*, **18. 2.** 23, in *Gmelin's Handbook*, **3. 82.**)

From Tuennermann's table Schiff calculates the following table for the 10 Aq. salt, by means of the formula, $D = 1 + 0.00393\,p + 0.0000145\,p^2 - 0.0000001\,p^3$; in which D = the sp. gr. of the solution and p the percentage of substance in the solution.

An aqueous solution of sp. gr.	Contains per cent of $NaO, CO_2 + 10Aq.$	An aqueous solution of sp. gr.	Contains per cent of $NaO, CO_2 + 10Aq.$
1.020	5	1.128	30
1.041	10	1.151	35
1.062	15	1.174	40
1.084	20	1.197	45
1.106	25	1.220	50

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **107.** 302.)

An aqueous solution of sp. gr.	Contains per cent of NaO, CO_2.	Boils at °C.
1.90 ?	85.5	
1.64	54.0	
1.42	37.0	
1.35	28.8	104.44°
1.26	22.7	102.78°
1.18	16.4	101.11°

(Dalton, in his *New System*, Pt. **2.** p. 501.)

At 8° the sp. gr. of a saturated solution = 1.107. (Anthon, *Ann. der Pharm.*, 1837, **24.** 211.)

$c = NaO, CO_2 + Aq$ Crystallizes out when a saturated aqueous solution of carbonate of soda is evaporated at temperatures between 75° and 87°. (Schindler.) Crystallizes from a saturated solution of common carbonate of soda kept for a long time at 49°. (Harvey, in *Thomson's System of Chem.*, London, 1831, **2.** 452.) Crystallizes on evaporating a saturated aqueous solution of carbonate of soda at temperatures between 25° and 37°. (Haidinger.) Is deposited from boiling saturated solutions of carbonate of soda. When left in contact with the mother liquor, out of contact with the air, it gradually redissolves as the liquor cools, being less soluble in water at 104° than at lower temperatures. It is not easy to determine the point of its greatest solubility, for when the solution is cooled to 15° a molecular change ordinarily occurs, a salt containing 7 equivalents of water being formed. The

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* Saturated solution.

solubility of the monohydrated salt increases, however, as the temperature is lowered, until this change takes place. At 15° @ 20° its solution contains, for 100 pts. of water, 52.41 pts. of anhydrous $Na O, C O_2$, or 1290 pts. of the 10 hydrated salt ($Na O, C O_2 + 10 Aq$). When a solution of carbonate of soda is heated above 34° the monohydrated salt appears to be formed and the solubility decreases as the temperature is elevated. Insoluble in spirit. (Lœwel, *Ann. Ch. et Phys.*, (3.) **44.** 328; also **33.** 337.)

d = $Na O, C O_2 + 5 Aq$ Not efflorescent. (Berzelius, *Tr.*, **3.** 466.) Soluble in water. (Persoz.)

e = $Na O, C O_2 + 6 Aq$

f = $Na O, C O_2 + 7 Aq$ See above. Both of the 7 Aq. salts are insoluble in alcohol. (Lœwel.)

g = $Na O, C O_2 + 8 Aq$ 100 pts. of water at 17.2° dissolve 63.87 pts. of it, or 1 pt. of the salt is soluble in 1.566 pts. of water at 17.2°. (Thomson, *Ann. Phil.*, (2.) **10.** 442 [T.].) Less soluble in water than the 10 hydrated salt. "This salt is identical with my *b* $Na O, C O_2 + 7 H O$." [See above, under *b.*] (Lœwel, *Ann. Ch. et Phys.*, (3.) **33.** 383.)

II.) *Sesqui*CARBONATE OF SODA. Permanent. $2 Na O, 3 C O_2$ Less soluble in water than the monocarbonate, but more soluble than the bicarbonate. (H. Rose.)

At °C.	100 pts. of water dissolve pts. of the theoretical anhydrous salt $2 Na O, 3 C O_2$.	of the cryst. salt $2 Na O, 3 C O_2 + 3 Aq$.
0°	12.68	16.60
10°	15.50	20.53
20°	18.30	24.55
30°	21.15	28.48
40°	23.95	32.51
50°	26.78	36.66
60°	29.68	40.97
70°	32.55	45.30
80°	35.80	50.32
90°	38.63	54.77
100°	41.59	59.48

(Poggiale, *Ann. Ch. et Phys.*, (3.) **8.** 468.)

III.) *Bi*CARBONATE OF SODA. Permanent. $Na O, 2 C O_2$ Soluble in 13 pts. of cold water, decomposed by boiling water. (V. Rose.) Soluble in 8 pts. of cold water (Berthollet); in 10 pts. of water at ordinary temperature (Dumas, *Tr.*); in 13.33 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) 100 pts. of water at 17.7° dissolve 9.33 pts. of it. [T.]

At °C.	100 pts. of water dissolve pts. of the theoretical anhydrous salt $Na O, 2 C O_2$.	of the cryst. salt $Na O, H O, 2 C O_2$
0°	7.92	8.95
10°	8.88	10.04
20°	9.84	11.15
30°	10.80	12.24
40°	11.76	13.35
56°	12.72	14.45
60°	13.68	15.57
70°	14.64	16.69

Since it is decomposed at about 70°, the solubility above that temperature cannot be studied. (Poggiale, *Ann. Ch. et Phys.*, (3.) **8.** pp. 468, 475.)

CARBONATE OF SODA & *of sesquioxide* OF URANIUM. Soluble in water. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** 206.) Soluble in aqueous solutions of carbonate and bicarbonate of soda; after standing for some time a precipitate forms in the solution in the carbonate, but not in that of the bicarbonate. (H. Rose, *Tr.*)

CARBONATE OF SODA & OF YTTRIA.

CARBONATE OF SODA & OF ZINC. Insoluble $3 (Na O, C O_2) ; 8 (Zn O, C O_2) + 8 Aq$ in water, but is decomposed by water. (Wœhler.) Less readily decomposed by water than most of the double carbonates. (H. Deville, *Ann. Ch. et Phys.*, (3.) **33.** 101.)

CARBONATE OF SODA with PHOSPHATE OF SODA. $Na O, C O_2 ; 3 (2 Na O, H O, P O_5) + 40 Aq$ Permanent. Tolerably easily soluble in water. (T. Thomson, in his *First Principles*, **2.** 451; and in his *System of Chem.*, London, 1831, **2.** 804.)

CARBONATE OF SODA with TARTRATE OF ALUMINA. $Na O, C O_2$; 1 "tartrate of alumina" + 9 Aq When solutions of carbonate of soda and tartrate of alumina are mixed in equivalent proportions, and the solution evaporated, the double salt crystallizes out in long transparent four-sided prisms. (T. Thomson, in his *First Principles*, **2.** 451; and in his *System of Chem.*, London, 1831, **2.** 804.)

CARBONATE OF STANNETHYL. Insoluble in water.

CARBONATE OF STIB*di*AMYL. Soluble in $Sb (C_{10} H_{11})_2 O, C O_2$ ether, and alcohol.

CARBONATE OF STIB*tri*ETHYL. Soluble in $(C_4 H_5)_3 Sb O, C O_2$ water. (Merck.)

CARBONATE OF STIBETHYLIUM. Exceedingly deliquescent.

CARBONATE of STIBMETHYLETHYLIUM. Soluble in water. $Sb (C_2 H_3) (C_4 H_5)_3 O, C O_2$ (Friedlænder.)

CARBONATE OF STIBMETHYLIUM.

I.) *normal.* Deliquescent. Very soluble in water, and alcohol. Very sparingly soluble in ether.

II.) *bi.* Deliquescent. Very soluble in water, and alcohol. Insoluble in ether.

CARBONATE OF STRONTIA. Soluble in 18045 $Sr O, C O_2$ pts. of water at ordinary temperatures, and in 56545 pts. of water containing ammonia and carbonate of ammonia. (Fresenius, *Ann. Ch. u. Pharm.*, 1846, **59.** 121.) Soluble in 12522 pts. of water at 15° (Kremers, *Pogg. Ann.*, **85.** 247); in about 33000 pts. of water. (Bineau, *C. R.*, **41.** 511.) 1000 pts. of water dissolve 0.01 pt. of carbonate of strontia. (Bineau, *Ann. Ch. et Phys.*, 1857, (3.) **51.** 299.) Sensibly less soluble in water than sulphate of strontia. (Dulong, *Ann. de Chim.*, **82.** 290.) Soluble in 1536 pts. of boiling water. (Hope, *Edinburgh Trans.*, **4.** 5. [T.].) Soluble in 850 [in 833 pts. at 10° (in *Gmelin*)] pts. of a saturated aqueous solution of carbonic acid (= $1 Sr O : 6 C O_2$). (Lassaigne, *J. Ch. Méd.*, **4.** 312; in *Berzelius's Jahresbericht*, **29.** 132.) Soluble in a boiling aqueous solution of chloride of ammonium, with evolution of ammonia. (Fuchs; Demarçay, *Ann. der Pharm.*, 1834, **11.** 251.) Soluble in a cold aqueous solution of chloride of ammonium. (Vogel, *J. pr. Chem.*, 1836, **7.** 455.) Easily soluble in a cold aqueous solution of chloride of ammonium, and an excess of ammonia produces no precipitate in this solution. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 96, 334.) Readily soluble in cold aqueous solutions of nitrate and succinate of ammonia, and of chloride of ammonium. Decomposed when boiled with solutions of ammoniacal salts.

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Tolerably readily soluble in solutions of chloride of ammonium and of nitrate of ammonia, but is reprecipitated on the addition of ammonia and carbonate of ammonia more completely than carbonate of baryta. (Fresenius, *Quant.*, p. 127.) Soluble in an aqueous solution of normal citrate of soda. (Spiller.) Soluble in aqueous solutions of the salts of sesquioxide of iron, with precipitation of a basic iron salt; but few, if any, of the salts of R O oxides are thus decomposed by it in the cold, although on boiling it is dissolved by some of them. [Compare Carbonate of Lime, and of Baryta.] (Demarçay, *Ann. der Pharm.*, 1834, **11.** pp. 242, 244, 251.) It is partially decomposed when boiled with aqueous solutions of the sulphates of potash, soda, lime, ammonia, and magnesia; the phosphates of soda and ammonia; the sulphites of potash, soda, and ammonia; the phosphites of potash, soda, and ammonia; borate of soda; the arseniates of potash and soda; the oxalates of potash and ammonia; fluoride of sodium; and chromate of potash. With the ammonia salts the decomposition is complete. (Dulong, *Ann. de Chim.*, **82.** 286.) Only slightly decomposed by aqueous solutions of the sulphates of potash and soda. (Persoz, *Chim. Moléc.*, p. 385.)

When an equivalent of $Sr O, C O_2$ is boiled with an equivalent of $2 Na O, HO, P O_5$, 0.4412 of it may be decomposed. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 335.) It is not decomposed by a mixture of 1 pt. oil of vitriol and 6 pts. of absolute alcohol, nor by alcoholic solutions of racemic, tartaric, citric, or glacial acetic acids; but is immediately decomposed by a mixture of nitric acid and absolute alcohol, and is also acted upon by a solution of oxalic acid in absolute alcohol, although the oxalate which is formed is insoluble in the alcoholic mixture.

Carbonate of Strychnine. Soluble in carbonic acid water.

Carbonate of SulphEthyl. *Vid.* EthylSulphoCarbonate of Ethyl.

***Bi*Carbonate of *bi*Sulphide of Ethyl.** (*Persulfure Ethyl sulphocarbonique* (of Gerhardt).) $C_{12} H_{10} O_8 S_4 = \begin{matrix} C_2 O_4 \\ C_2 O_4 \end{matrix} \left\{ \begin{matrix} C_4 H_5 S_2 \\ C_4 H_5 S_2 \end{matrix} \right.$ Insoluble in water. Readily soluble in alcohol, and ether. Miscible in all proportions with absolute alcohol, but its solubility decreases in proportion as water is added; spirit of 40% taking up but little of it. (Debus.)

***Bi*Carbonate of *bi*Sulphide of Ethyl & of *mono*Sulphide of Ethyl.** $C_{12} H_{10} O_8 S_3 = \begin{matrix} C_2 O_4 \\ C_2 O_4 \end{matrix} \left\{ \begin{matrix} C_4 H_5 S_2 \\ C_4 H_5 S \end{matrix} \right.$ Insoluble in water. Soluble in alcohol, and ether. Insoluble in chlorhydric acid. Unacted upon by cold, decomposed by hot nitric acid. (Debus.)

Carbonate of Sulphide of Ethyl & of *X*. *Vid.* EthylSulphoCarbonate of *X*.

Carbonate of Tetryl. *Vid.* Carbonate of Butyl.

Carbonate of Thoria.

I.) *basic.* Insoluble in water, or carbonic acid water. Soluble in aqueous solutions of the alkaline carbonates, tolerably easily if these solutions are concentrated, but difficultly when they are very dilute. [Compare Oxide of Thorium (II.) hydrated).]

Carbonate of Tin. $2 Sn O, C O_2$ Decomposes when exposed to the air. Insoluble in water. (H. Deville.) Insoluble in carbonic acid water. (Bergman, *Essays*, **1.** 55.)

Carbonate *of sesquioxide* of Uranium. Insoluble in water. Soluble in carbonic acid water. (Brande.)

Carbonate of Urea. (*Allophanic Acid.*) $C_4 H_4 N_2 O_6 = C_2 O_4 \left\{ \begin{matrix} N H_2 Cy O \\ H O \end{matrix} \right.$ Not isolated.

Carbonate of Veratrin. Insoluble in water. Soluble in alcohol, and ether. (Langlois, *Ann. Ch. et Phys.*, (3.) **48.** 504.)

Carbonate of Yttria. $Y O, C O_2 + 3 Aq$ Insoluble in water. Slightly soluble in carbonic acid water. (Gadolin.) Soluble in aqueous solutions of the alkaline carbonates; more soluble in a solution of carbonate of ammonia than in carbonate of potash. (Berlin.) More soluble than carbonate of ceria, but five or six times less soluble than carbonate of glucina, in a solution of carbonate of ammonia. (Vauquelin.) Slightly soluble in a large excess of a solution of carbonate of potash; completely soluble in a very large excess of bicarbonate of potash; carbonate of ammonia behaves in a similar manner, but in a saturated solution of carbonate of yttria in carbonate of ammonia a double salt precipitates itself after a time, and might easily lead one to believe that carbonate of yttria were insoluble in carbonate of ammonia. (H. Rose, *Tr.*) Gradually soluble in aqueous solutions of ammoniacal salts. (Berzelius, *Lehrb.*) Soluble in sulphurous acid. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 75); and easily in the acids generally.

Carbonate of Zinc.

I.) *normal.* $Zn O, C O_2 + Aq$ Calculated as anhydrous, 1 pt. is soluble in 20895 pts. of water at 15°. (Kremers, *Pogg. Ann.*, **85.** 248.) Soluble in an aqueous solution of carbonate of ethylamin. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 483.) Easily soluble in acids. (De Senarmont.) Easily soluble in a warm aqueous solution of chloride of ammonium. (H. Rose, *Tr.*) Carbonate of zinc is not precipitated from solutions containing a soluble citrate. (Spiller.) Soluble in a solution of caustic potash.

All the carbonates of zinc are soluble in carbonic acid water. (Jahn.)

II.) *di.*
$2 Zn O, C O_2 + 2 Aq$

III.) $5 Zn O, 2 C O_2 + 3 Aq$ Dissolves in from 2000 to 3000 pts. of water, but separates out when the solution is heated, and does not redissolve on cooling. (Schindler.) Soluble in 44642 pts. of water at ordinary temperatures. (Fresenius, *Ann. Ch. u. Pharm.*, **59.** 126.) Easily soluble in solutions of potash, soda, ammonia, and carbonate of ammonia, also in acids. When the solution in potash or soda is boiled it is not altered if it be concentrated, but if it is dilute almost all the oxide of zinc will separate out. The ammoniacal solution also, and that in carbonate of ammonia, deposits oxide of zinc when boiled, especially when dilute. Somewhat soluble in solutions of the alkaline bicarbonates, also soluble in solutions of ammoniacal salts. (Fresenius, *Quant.*, pp. 133, 759.) Soluble in a boiling aqueous solution of chloride of ammonium, with evolution of ammonia. (Fuchs; Demarçay, *Ann. der Pharm.*, 1834, **11.** 251.) Soluble even in a cold aqueous solution of chloride of ammonium, and also, though somewhat less perfectly, in a solution of nitrate of ammonia (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97; Wittstein); a free evolution occurring when the mixture is boiled. (L. Thompson, *Phil. Mag.*, (3.) **10.** 179.) Soluble in aqueous

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solutions of the salts of sesquioxide of iron with evolution of carbonic acid and precipitation of sesquioxide of iron. [Compare Carbonate of Lime.] (Fuchs, *Schweigger's Journ. für Ch. u. Phys.*, 1831, **62.** 193.) Insoluble in aqueous solutions of the monocarbonates of potash or soda. (Compare Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** 220.) A solution of carbonate of potash produces a precipitate in solutions of sulphate of zinc in presence of 10000 pts. of water, and even in presence of 20000 pts. of water after a time. (Lassaigne.) Soluble in 1428 pts. of a saturated aqueous solution of carbonic acid. (Lassaigne, *J. Ch. Méd.*, **4.** 312; in *Berzelius's J. B.*, **29.** 135.)

IV.) *tetra.*
$4 Zn O, C O_2 + 2 Aq$

V.) $8 Zn O, C O_2 + 2 Aq$

CARBONATE OF ZINC & OF ZINCAMMONIUM. $Zn O, C O_2 ; N \left\{ \begin{matrix} H_3 \\ Zn \end{matrix} \right. O, C O_2$ Decomposed by water, especially when this is boiling. (Deville.)

CARBONATE OF ZIRCONIA. Insoluble in water. $2 Zr_2 O_3, C O_2 + 6 Aq$ Soluble in aqueous solutions of the alkaline carbonates, better in the bicarbonates, and of carbonate of ammonia, especially if the zirconium salt be added by degrees, and with agitation, to an excess of the carbonate. On boiling the saturated solution, hydrate of zirconia is precipitated, while carbonic acid is expelled. This precipitation by boiling is incomplete, however, unless ammonia be present, in which case carbonate of ammonia is expelled. (Berzelius, *Lehrb.*, **2.** 188.) Slightly soluble in a large excess of a solution of carbonate of potash; somewhat more readily soluble in bicarbonate of potash, the saturated solution becoming cloudy on boiling; also more readily soluble in carbonate of ammonia than in monocarbonate of potash, a gelatinous precipitate falling when the solution is boiled. (H. Rose, *Tr.*)

CARBONIC ETHER. *Vid.* Carbonate of Ethyl.

CARBONIC OXIDE. (*Carbonyl.*) $C O$, or $C_2 O_2$ Soluble in 50 volumes of recently boiled water (Davy, Thomson); in 16 vols. (De Saussure); in 27 vols. of water. (Dalton, in his *New System*, **2.** 375; D. refers to his memoir in *Manchester Memoirs*, [N. S.] **1.** pp. 272, 436.)

1 vol. of water under a pressure of 0m.76 of mercury, at °C	Dissolves of carbonic oxide gas; vols. reduced to 0°C, and 0m.76 pressure of mercury.
0°	0.03287
1°	0.03207
2°	0.03131
3°	0.03057
4°	0.02987
5°	0.02920
6°	0.02857
7°	0.02796
8°	0.02739
9°	0.02686
10°	0.02635
11°	0.02588
12°	0.02544
13°	0.02504
14°	0.02466
15°	0.02432
16°	0.02402
17°	0.02374
18°	0.02350
19°	0.02329
20°	0.02312

(Bunsen's *Gasometry*, pp 287, 128, 146.)

1 vol. of alcohol under a pressure of 0m.76 of mercury at °C.	Dissolves of carbonic oxide gas; vols. reduced to 0°C. and 0m.76 pressure of mercury.
At all temperatures from 0° to 25° . . .	0.20443

(Bunsen's *Gasometry*, pp. 147, 287, 128.)

At 18° and the ordinary pressure, 100 vols. of	Dissolve vols. of C O.
Water	6.2
Alcohol of 0.84 sp. gr.	14.5
Rectified naphtha of 0.784 sp. gr.	20.0
Oil of lavender (freshly distilled) of 0.88 sp. gr.	15.6
Olive oil of 0.915 sp. gr.	14.2
A saturated aqueous solution of chloride of potassium (containing 26% of K Cl) of 1.168 sp. gr.	5.2

(Th. de Saussure, *Gilbert's Ann. Phys.*, 1814, **47.** pp. 167, 169.)

1 vol. of oil of turpentine absorbs from 0.16 @ 0.2 vol. of it. (Saussure, in *Gm.*, **14.** 270.) Soluble in ether. (Regnault, *Phil. Mag.*, (4.) **9.** 16.) Insoluble in caoutchin. Carbonic oxide is almost insoluble in all known solvents, excepting solutions of the compounds of dinoxide of copper. 1 volume of a solution of dichloride of copper in chlorhydric acid can absorb even 15 @ 20 vols. of carbonic oxide. At boiling the solution retains only a trace of this gas. (Berthelot, *Ann. Ch. et Phys.*, (3.) **51.** 65.)

CARBONIC OXIDE with *di*CHLORIDE OF COPPER. *Vid.* Chloride of Carbonyl & of Copper.

CARBONIDSULFOSAURES ETHYL. *Vid.* *bi*Carbonate of *bi*Sulphide of Ethyl.

CARBONYL. *Vid.* Carbonic Oxide.

CARBONYLSULFOSÆURE. *Vid.* OxySulphoCarbonic Acid.

CARBOSTYRYL. $C_{18} H_7 N O_2 = N (C_{16} H_7) (C O)_2$, or $N \left\{ \begin{matrix} C_{18} H_5 O_2 \\ H_2 \end{matrix} \right.$ Nearly insoluble in cold, tolerably readily soluble in boiling water; somewhat more soluble in chlorhydric acid. Easily soluble in alcohol, and ether. Soluble, without alteration, in warm concentrated sulphuric acid. Easily soluble in a solution of caustic potash. Insoluble in ammonia-water. (Chiozza.)

CARBOSULPHAMID. *Vid.* *bi*Sulphide of SulphoCarb(onyl) ammonium.

CARBOTHIACETONIN. Not isolated.
$C_{20} H_{18} N_2 S_4$

CARBOTHIACETONIN with *bi*CHLORIDE OF PLATINUM. Ppt.
$C_{20} H_{18} N_2 S_4 Pt S_2, Pt Cl_2$

CARBOTHIALDIN. $C_{10} H_{10} N_2 S_4$ Insoluble in water. Sparingly soluble in cold, very soluble in boiling alcohol. Insoluble in cold ether.

Readily soluble in dilute chlorhydric acid; the solution undergoing decomposition when boiled, also when kept for some time. (Redtenbacher.)

CARBOVINIC ACID. *Vid.* EthylCarbonic Acid.

CARBOXIDE OF POTASSIUM. Soluble in water.

Bi(*or heavy*)CARBURETTED HYDROGEN. *Vid.* Ethylene.

"*Bi*CARBURET OF HYDROGEN" (of Faraday). *Vid.* Hydride of Phenyl.

*Light*CARBURETTED HYDROGEN. }
*Proto*CARBURETTED HYDROGEN. } *Vid.* Hydride of Methyl.

CARBYL. *Vid.* Ethylene.
$C_4 H_4''$

Cardol. $C_{42}H_{20}O_4$ Insoluble in water. Readily soluble in alcohol, and ether. Soluble in concentrated sulphuric acid. (Stædeler.)

Carminic Acid. (*Carmin.*) $C_{28}H_{14}O_{16}$ Soluble in all proportions in water, alcohol, and a mixture of alcohol and ether; but only sparingly soluble in pure ether.

Very much less soluble in a solution of chloride of sodium than in pure water. (Robinet, cited in *Schweigger's Journ. für Ch. u. Phys.*, 1825, **45.** 241.) Soluble, without alteration, in chlorhydric and sulphuric acids. Decomposed by nitric acid. (W. De la Rue.)

Carminate of Copper. Ppt.
$C_{28}H_{13}CuO_{16} + Aq$

Carmin(coloring matter of Cochineal). *Vid.* Carminic Acid.

"**Carmin**(blue)". *Vid.* SulphIndigotate of Potash.

Carmufellic Acid. $C_{24}H_{20}O_{32} = C_{24}H_{19}O_{31}, HO$ Insoluble in cold, sparingly soluble in boiling water. Insoluble in alcohol or ether. Is not attacked by cold concentrated sulphuric acid. Soluble in aqueous solutions of caustic potash and ammonia. (Muspratt & Danson.)

Carmufellate of Baryta. $C_{24}H_{19}BaO_{32} + Aq$ Barely soluble in water. Abundantly soluble in chlorhydric and nitric acids. (M. & D.)

Carmufellate of Copper (CuO). Ppt.

Carmufellate of Iron (FeO,& Fe_2O_3). Ppts.

Carmufellate of Lead. $C_{24}H_{19}PbO_{32} + Aq$ Almost insoluble in water, but dissolves in nitric acid.

Carmufellate of Lime. Ppt.

Carmufellate of Silver. Ppt.

Carmufellate of Strontia. Ppt.

Carotin. $C_{36}H_{24}O_2$ Permanent. Insoluble in water. Soluble in alcohol or ether only when contaminated with an oil which occurs with it. Insoluble in acetic acid or in alkaline solutions. Easily soluble in fatty and essential oils. (Wackenroder.) Completely insoluble in water. After having been purified from an oil which occurs with it in the carrot-root it is almost insoluble in alcohol, and wood-spirit. When pure it is very sparingly soluble in ether, and acetone; but more readily soluble in ether when the oil is present. Abundantly soluble in bisulphide of carbon, from which it may be precipitated by adding absolute alcohol. After having been fused, carotin dissolves with tolerable facility in alcohol, and ether, but it no longer crystallizes from these solutions. (Zeise, *Ann. Ch. et Phys.*, (3.) **20.** 125.)

Insoluble in water. When pure it is not completely insoluble in absolute alcohol. Much more soluble in alcohol when contaminated with hydrocarotin or amorphous carotin. Besides bisulphide of carbon, it is easily soluble in benzin, and essential oils. Also slowly soluble in cold fatty oils. But is difficultly soluble in ether, chloroform, and alcohol. When exposed to daylight, carotin gradually loses its color, and after having been thus bleached is only very difficultly soluble in bisulphide of carbon, and benzin, but is easily soluble in alcohol, and ether. A similar change is produced by heat. (Husemann, *Ann. Ch. u. Pharm.*, 1861, **117.** 216.)

Carotine *chlorée.* *Vid.* ChloroCarotin.

Carthagin. Insoluble in water. Soluble in alcohol. (Parrish's *Pharm.*, p. 408.)

Carthamin (from *Carthamus tinctorius*).

a.) *Yellow principle.* Soluble in water and in weak acids.

ditto with **Oxide of Lead.**
$C_{16}H_{10}O_{10}, 3PbO$

b.) *Red principle* (*the true Carthamin*). (*Carthamic Acid.*) $C_{28}H_{16}O_{14}$ Insoluble in water, dilute acids, or oils. Sparingly soluble in alcohol, and less so in ether. Readily soluble in dilute alkaline solutions, even in baryta-water.

Little soluble in water. Soluble in alcohol. Insoluble in ether.

Carvacrol. (*Camphocreosote.*) $C_{20}H_{14}O_2$ Slightly soluble in water. Easily soluble in alcohol, ether, and an aqueous solution of caustic potash. Concentrated sulphuric acid precipitates it from the aqueous solution. (Schweitzer.)

Carvene. $C_{20}H_{16}$ Difficultly soluble in water. Easily soluble in alcohol, and ether. (Schweitzer.)

Carvol. $C_{20}H_{14}O_2$ Insoluble, or but sparingly soluble, in water.

Caryophyllin. $C_{20}H_{16}O_2$ Insoluble in water, even when this is boiling. Sparingly soluble in cold, easily soluble in boiling alcohol, and ether. (Bonastre.) Soluble in oil of turpentine; less easily in rock-oil. (Jahn.) Sparingly soluble in strong acetic acid. Insoluble in dilute mineral acids or in aqueous solutions of caustic or carbonated potash or ammonia. (Mylius.) Sparingly soluble in an aqueous solution of caustic soda, and somewhat more readily in caustic potash. (Bonastre.) Soluble in cold concentrated sulphuric acid. (Bonastre.)

Caryophillite of Potash. Soluble in absolute alcohol. The metallic caryophillites are insoluble. (Playfair, *Rep. Br. Assoc.*, 1842, p. 36.)

Cascarillin (from the bark of *Croton Eleuteria*). Very sparingly soluble in water. More readily soluble in alcohol, and ether. Soluble in chlorhydric acid; and in concentrated sulphuric acid, from which it is precipitated by water.

Caseic Oxide. *Vid.* Leucin.

Casein. Some chemists admit two modifications; one soluble, the other insoluble, in water. But soluble casein has never been obtained free from alkali.

a.) *Insoluble casein.* Insoluble in water, alcohol, or ether. Easily soluble in a solution of caustic potash; the solution undergoing decomposition when boiled. Soluble in solutions of carbonate of soda and of diphosphate of soda; also easily soluble in solutions of chloride of sodium, chloride of ammonium, nitrate of potash, &c.

Soluble in cold concentrated chlorhydric acid. (Caventou, *Ann. Ch. et Phys.*, (3.) **8.** 326.)

β.) *Soluble casein.* Soluble in water, the solution not coagulating when heated. After having been dried, casein does not redissolve entirely in water. But when heated with water under pressure it dissolves entirely, with decomposition. (Hlaziwetz.) Insoluble in absolute alcohol; partially soluble in weak alcohol, especially on boiling. (Compare Dumas & Cahours, *Ann. Ch. et Phys.*, (3.) **6.** pp. 417, 390.) Moist casein dissolves completely in water containing $\frac{1}{2000}$ of chlorhydric acid. All the acids, even acetic and lactic, precipitate casein from its aqueous solution, but these precipitates redissolve in an excess of acid. All the soluble

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earthy and metallic salts precipitate casein solutions, but chloride of calcium, sulphate of lime, acetate of lime, and sulphate of magnesia produce precipitates only when the mixed solutions are heated.

Casein with **Lime.** Insoluble in water.

Casein with *protoxide of* **Mercury.** Soluble in alcohol and in acetic acid.

Cassin (from *Cassia fistula*).

Castin (from the seeds of *Vitex Agnus castus*). Sparingly soluble in water. Partially soluble in acetic acid. Soluble in alcohol, and ether. (Landerer.)

Castorin. Insoluble in cold water. Sparingly soluble in cold, more soluble in hot alcohol. Readily soluble in ether. Soluble in warm volatile oils.

Soluble in 100 pts. of boiling alcohol. Insoluble in cold alcohol. Soluble in volatile oils. (Parrish's *Pharm.*, p. 425.)

Catechin. (*Catechuic Acid. Catechucic Acid. Tanningenic Acid.*) $C_{34}H_{15}O_{14} + 6\,Aq$ Soluble in boiling, nearly insoluble in cold water. Soluble in 1133 pts. of water at 17°, and in 2 @ 3 pts. at the temperature of boiling. Dry catechin mixed with 2 pts. of cold water swells up to a thick pulp, which at 80° forms a clear solution. (Wackenroder.) Soluble in 16000 pts. of water at 5°, and in 3 @ 4 pts. at boiling. (Buechner.) Soluble in 5 @ 6 pts. of cold, and in 2 @ 3 pts. of boiling alcohol (Wackenroder); in 120 pts. of cold, and in 2 @ 3 pts. of boiling alcohol; and in 7 @ 8 pts. of boiling ether (Buechner); in 120 pts. of cold, and in 7 @ 8 pts. of boiling ether. (Wackenroder.) Insoluble in oil of turpentine. Soluble, without alteration, in acetic acid. Decomposed by concentrated acids, but is soluble, without decomposition, in dilute sulphuric, and hot dilute chlorhydric acid. Soluble, without immediate decomposition, in aqueous solutions of the caustic alkalies and of ammonia.

Catechin with **Barium.** Insoluble in water. (Svanberg.)

Catechin with *bi*Chromate of Potash. Insoluble in water and in chlorhydric acid. (Wackenroder.) Soluble in chlorhydric acid. (Delffs.)

Catechin with **Copper** (Cu O). Ppt.

Catechin with *ter*Oxide of Gold. Sparingly soluble in water.

Catechin with *prot*Oxide of Iron. Ppt. Soluble in acetic acid.

Catechin with *per*Oxide of Iron. Ppt.

Catechin with **Lead.**

I.) "$C_{14}H_6O_6, PbO$" Sparingly soluble in water. (Svanberg.)

II.) "$C_{14}H_6O_6, 2\,PbO + Aq$" Insoluble in water. (Hagen.)

Catechin with *din*Oxide of Mercury. Ppt.

Catechin with *prot*Oxide of Mercury. Ppt. Soluble in acetic acid, and in an aqueous solution of chloride of sodium. (Wackenroder.)

Catechin with *bin*Oxide of Platinum.

Catechu. (The dried aqueous extract of several tropical trees.) Partially soluble in cold water. Almost entirely soluble in boiling water and in alcohol.

Catechucic Acid. } *Vid.* Catechin.
Catechuic Acid. }

CatechuTannic Acid. *Vid.* MimoTannic Acid.

Cathartin. Hygroscopic. Soluble in water, and alcohol. Insoluble in ether. Decomposed by alkaline solutions. The cathartin of Winckler is now thought to have been impure chrysophanic acid.

Caulophyllin. (From the root of *Caulophyllum thalictroides.*) Partially soluble in water; more soluble in alcohol. Completely soluble in an aqueous or alcoholic solution of ammonia. Insoluble in ether. (Parrish's *Pharm.*, p. 194.)

Cautschin, &c. *Vid.* Caoutchin.

Cedrene. $C_{30}H_{24}$ More soluble in alcohol than the solid body ($C_{30}H_{26}O_2$), which occurs with it in oil of juniper.

Cedrin (from the seeds of *Simaba cedron*). Soluble in alcohol. Insoluble in ether. (Lewy.)

Cedriret. Insoluble in water, alcohol, or ether. Soluble in creosote, in concentrated sulphuric acid, and in an aqueous solution of caustic potash. Also somewhat soluble in an aqueous solution of acetate of potash. (Reichenbach.)

Cellulose. $C_{12}H_{10}O_{10}$ Insoluble in cold water, in alcohol, ether, or the oils. Many samples of it may be disaggregated, with formation of dextrin, by boiling with water; but the more compact varieties are capable of resisting for a long time the action of boiling water and of many other more energetic agents.

Soluble at ordinary temperatures in an aqueous solution of ammoniacal oxide of copper (prepared by dissolving basic hyposulphate or basic sulphate of copper in a concentrated solution of ammonia). Paper and linen dissolve more slowly than cotton. (Schweizer.) The solution of ammoniacal oxide of copper is a more effective solvent of cellulose when recently prepared; after having been repeatedly exposed to the air it is less efficacious. (C. Cramer.) The solvent power of the solution is also often lost when it is preserved in carefully closed vessels. (Schweizer.) In presence of salts the power of ammoniacal oxide of copper to dissolve cellulose (or to cause it to swell up to a thin emulsion) is very much diminished; a clear solution of cellulose being immediately precipitated on the addition of a strong solution of an alkaline salt. A solution of honey, of gum arabic, or of dextrin also produces immediate and complete precipitation. When a clear concentrated solution of cellulose is largely diluted with water it becomes cloudy and deposits flocks. Cellulose is not precipitated from its solution by chloroform or ether (neither of which are miscible therewith) nor by a concentrated solution of urea; but it is precipitated by alcohol. In order that the solvent should be effective it should contain a large quantity of oxide of copper. (Schlossberger.) Schlossberger prepares the solvent by dissolving recently precipitated and well-washed hydrate of copper in strong ammonia-water. Peligot prepares it by causing ammonia-water to trickle over copper turnings exposed to the air; the solution obtained dissolves a weight of cellulose about equal to that of the copper which it contains; when treated with this solution, cotton is first converted into a thick jelly, which disappears on agitation. On the addition of an acid the cellulose is reprecipitated as an amorphous mass.

Cellulose is insoluble in an aqueous solution of ammonio-oxide of nickel. (Schlossberger.)

Concentrated acids, like sulphuric or chlorhydric, dissolve cotton after having first reduced it to a pulpy condition; from the recent solution it

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can be separated as a matter insoluble in hot or cold water. After longer action of sulphuric acid the cellulose may be separated as a gelatinous mass soluble in cold water ("soluble lignin"); and by still longer continued action of the acid the cellulose is changed to a variety of dextrin, and finally to sugar. (Bèchamp, *Ann. Ch. et Phys.*, (3.) **48.** 458.) Very concentrated sulphuric acid is an excellent solvent of cellulose; dissolving it quickly and with the greatest facility. In this solution, when recently prepared, water occasions a precipitate, but after the solution has been allowed to stand for a day or two no precipitate is produced on the addition of water, the cellulose having been entirely converted into glucose. When cellulose is boiled for a long time in water acidulated with a few hundredths of chlorhydric or sulphuric acids, it is transformed into sugar. When a mixture of cellulose and caustic potash is heated to 160° and then treated with an acid, a substance, having the composition and general properties of cellulose, is precipitated. It is, however, soluble both in cold and in warm alkaline solutions. (Pelouze.) Concentrated phosphoric acid slowly disaggregates it in the cold.

Centaurin. *Vid.* Cnicin.

Cerain. Difficultly soluble in ether or oil of turpentine; and still more difficultly soluble in alcohol. (Boudet & Boissenot, Ettling.)
(Unsaponifiable portion of Beeswax.)

Cerainic Acid (of Hess). Soluble in alcohol, and still more readily in ether. Easily soluble, with combination, in aqueous solutions of the caustic alkalies.
$C_{20}H_{20}O_8$

Cerasin. *Vid.* Bassorin, under Gum Bassora.

Cerealin. Easily soluble in water. Insoluble in alcohol, ether, or oils. The aqueous solution coagulates when heated to 75°. (Mège-Mouriès.)

Ceric Acid. Insoluble in water. Soluble in alcohol. Easily soluble in aqueous solutions of caustic potash and ammonia. (Dœpping.)
(From action of NO_5 on Cork wax.)
$C_{42}H_{33}O_{13}, HO$

Cerate of Lead. Ppt.

Cerebric Acid. Insoluble in water, but swells up to an emulsion in hot water. Readily soluble in boiling, less soluble in cold alcohol. Almost insoluble in cold, more soluble in boiling ether. Soluble in cold concentrated sulphuric acid, the solution being precipitated on the addition of water.
(Cerebrin.)
$C_{34}H_{33}NO_6$

Cerebrate of Ammonia. Almost insoluble in alcohol.

Cerebrate of Baryta. } Form emulsions
Cerebrate of Lime. } with water.

Cerebrate of Potash. } Almost insoluble
Cerebrate of Soda. } in alcohol.

Cerebrate of Strontia. Forms an emulsion with water.

Cerinic Acid (from Beeswax). Very sparingly soluble in ordinary alcohol, and in ether; more readily soluble in absolute alcohol. (Lewy, *Ann. Ch. et Phys.*, (3.) **13.** 444.)

Cerin. *Vid.* Cerotic Acid; also Wax of Cork.

Cerium. Slowly oxidized by water at the ordinary temperature, more rapidly on boiling. Easily soluble in dilute acids. (Mosander.)
Ce

Cerolein. Very soluble in cold alcohol, and ether. (Lewy, *Ann. Ch. et Phys.*, (3.) **13.** 444.)

Cerosic Acid. Insoluble in water. Very sparingly soluble in boiling alcohol or ether. Soluble in naphtha. (Lewy, *Ann. Ch. et Phys.*, (3.) **13.** 556.)
$C_{48}H_{48}O_2$

Cerosate of Baryta. Insoluble in boiling alcohol. (Lewy.)

Cerosin. Insoluble in water, or in cold alcohol. Easily soluble in boiling alcohol, the solution solidifying to a stiff emulsion on cooling. Insoluble in cold, difficultly soluble in boiling ether. (Avequin.) Insoluble in cold, very soluble in boiling alcohol. Insoluble in cold, difficultly soluble in hot ether. Soluble, with combination, in concentrated sulphuric acid, forming sulphocerosic acid, the baryta salt of which is very soluble in water. (Lewy, *Ann. Ch. et Phys.*, (3.) **13.** 448.)
(Cerosie. Wax of the Sugarcane. Aldehyde of Cerosic Acid.)
$C_{48}H_{48}O_2$

Cerotic Acid. Soluble in boiling, less soluble in cold alcohol. Soluble in ether. (Lewy, *Ann. Ch. et Phys.*, (3.) **13.** 444.) Insoluble in water.
(Cerin (of Beeswax).)
$C_{54}H_{54}O_4 = C_{54}H_{53}O_3, HO$

Soluble in 16 pts. of boiling alcohol, from which it separates out again, almost entirely, as the solution cools. Soluble in 42 pts. of cold absolute ether. (John. ?) Soluble in creosote. (Reichenbach.)

Cerotate of Ceryl. Very sparingly soluble in boiling alcohol, and ether. Easily soluble in naphtha. (Lewy, *Ann. Ch. et Phys.*, (3.) **13.** 445.) Soluble in a mixture of alcohol and naphtha.
(Wax of China.)
$C_{108}H_{108}O_4 = C_{54}H_{53}(C_{54}H_{55})O_4$

Cerotate of Ethyl.
$C_{58}H_{58}O_4 = C_{54}H_{53}(C_4H_5)O_4$

Cerotate of Lead. Insoluble in boiling alcohol.
$C_{54}H_{53}PbO_4$

Cerotate of Potash. Soluble in boiling water.

Cerotate of Silver. Insoluble in water.
$C_{54}H_{53}AgO_4$

Cerotene. Soluble in ether, and benzin.
(Paraffin.)
$C_{54}H_{54}$

Cerotyl. Not isolated.
$C_{54}H_{53}O_2$

Ceroxylin. Easily soluble in alcohol, ether, and the essential oils. More soluble than palm wax in alcohol. (Boussingault.)
(Resin from the wax of the palm-tree (Ceroxylon andicola).)
$C_{20}H_{16}O$

Ceryl. Not isolated.

Cetene. Insoluble in water. Readily soluble in alcohol, and ether. (Dumas & Peligot.) Soluble in ether. (Lawrence Smith, *Ann. Ch. et Phys.*, (3.) **6.** 52.)
$C_{32}H_{32}''$

Cetin. *Vid.* Palmitate of Cetyl.

Cetraric Acid. Permanent. 100 pts. of absolute alcohol dissolve 0.28 pt. of it at 14°, and 1.70 pts. at the temperature of boiling. Alcohol of 0.83 dissolves 0.04 pt. of it at 14°, 0.28 pt. at 25°, and 0.44 pt. at the temperature of boiling. It is still less soluble in boiling or cold water, bisulphide of carbon, etherol, creosote, etc., but more soluble in acetate of ethyl, and especially in ether, 100 pts. of which dissolve 0.57 pt. of it at 14°, and 0.93 pt. at the temperature of boiling; these proportions refer to anhydrous ether, for ordinary ether dissolves only 0.5 pt. of it at 14°, and 0.87 pt. at boiling. Insoluble in fatty oils. Exceedingly
(Cetrarin.)
$C_{36}H_{16}O_{16}$

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easily soluble in aqueous alkaline solutions. Dilute acids precipitate it from its solutions, though not completely. Decomposed by concentrated acids. (Herberger, *Ann. der Pharm.*, 1837, **21.** pp. 139 – 141.) Insoluble in essential oils or in naphtha. Almost insoluble in cold water. Decomposed by boiling with water. Difficultly soluble in cold alcohol. Easily soluble in strong boiling alcohol. Sparingly soluble in ether. (Knop & Schnedermann.)

Cetrarate of Ammonia. Soluble in water, and alcohol. (Herberger, *loc. cit.*, p. 141.)

Cetrarate of Cadmium. Ppt., in alcohol. (Herberger.)

Cetrarate of Cobalt. Ppt., in alcohol. (Herberger.)

Cetrarate of Copper. Ppt. (Herberger.)

Cetrarate of Iron. Ppt. (Herberger.)

Cetrarate of Lead. Insoluble in water. $C_{36}H_{14}Pb_2O_{16}$ (Knop & Schnedermann.)

Cetrarate of Manganese. Ppt., in alcohol. (Herberger.)

Cetrarate of Mercury (Hg O). Appears to be soluble in alcohol. (Herberger.)

Cetrarate of Mercury (Hg_2O). Ppt., in alcohol. (Herberger.)

Cetrarate of Nickel. Ppt., in alcohol. (Herberger.)

Cetrarate of Silver. Ppt. (Herberger.)

Cetrarate of Zinc. Ppt., in alcohol. (Herberger.)

Cetrarin-Blue. Slightly soluble in water, alcohol, or the like. Decomposed by alkalies. Soluble in concentrated sulphuric and nitric acids, from which it may be reprecipitated almost unchanged by water, if this be added immediately. (Herberger, *Ann. der Pharm.*, 1837, **21.** 140.)

Cetyl. Not isolated.
$C_{32}H_{33}$

CetylAldehyde. *Vid.* Hydride of Palmityl.

Tri**Cetylamin.** Insoluble in water. Soluble
(*Nitride of Cetyl.*) in boiling alcohol. Soluble in ether.
$C_{96}H_{99}N = N \left\{ (C_{32}H_{33})_3 \right.$
Its salts are insoluble in water, but soluble in warm ether, and alcohol.

CetylAnilin. Insoluble in water. Readily
(*Cetyl Phenylamin.*) soluble in alcohol, and ether.
$$C_{44}H_{39}N = N \left\{ \begin{matrix} C_{12}H_5 \\ C_{32}H_{33} \\ H \end{matrix} \right.$$

Di**CetylAnilin.** Sparingly soluble in boiling, less soluble in cold alcohol.
$$C_{76}H_{71}N = N \left\{ \begin{matrix} C_{12}H_5 \\ (C_{32}H_{33})_2 \end{matrix} \right.$$

Cetylate of *X*. *Vid.* Oxide of Cetyl & of *X*.

CetylPhenylamin. *Vid.* CetylAnilin.

Cetyl*di*SulphoCarbonic Acid. *Vid.* OxySulphoCarbonate of Cetyl.

Cetyl*di*SulphoCarbonate of *X*. *Vid.* OxySulphoCarbonate of Cetyl & of *X*.

CetylSulphuric Acid. Soluble in alcohol.
(*Sulphacetic Acid.*)
$C_{32}H_{34}S_2O_8 = C_{32}H_{33}O, HO, S_2O_6$

CetylSulphate of Potash. Soluble in absolute alcohol.
$C_{32}H_{33}KS_2O_8 + 2\,Aq$
Tolerably soluble in hot alcohol; less easily soluble in hot water. Insoluble in ether. (Kœhler.)

Cevadic Acid. Soluble in water, alcohol, and ether.

Chærophyllin(from the seeds of *Chærophyllum bulbosum*).

Chelerythrin. Identical with Sanguinarin, *q. v.* (Schiel, *Am. J. Sci.*, (2.) **20.** 220.)

Chelidonic Acid. Efflorescent. After having been dried at 100°, 1 pt. of the acid is soluble in 166 pts. of water at 8°, and in about 26 pts. at the temperature of boiling; the hot solution solidifying on cooling. (Probst, *Ann. der Pharm.*, 1839, **29.** 116.) Sparingly soluble in cold, but very much more soluble in hot water; the hot aqueous solution solidifying on cooling. More abundantly soluble in chlorhydric and sulphuric acids than in water. (Lerch.) Soluble in 709 pts. of alcohol, of 75° Richter, at 22°. (Probst, *Ann. der Pharm.*, **29.** 116.) Soluble, without alteration, in concentrated sulphuric acid; the solution undergoing decomposition when boiled. Scarcely at all attacked by concentrated nitric acid. Chelidonic acid forms three series of salts: those with one equivalent of metal (acid) are the least stable; most of those with two equivalents of metal are soluble in water; those of three equivalents of metal are difficultly soluble or insoluble in water, excepting the alkaline salts, which are very soluble. They are decomposed by long-continued contact with water.
$C_{14}H_4O_{12} + 2\,Aq \,\&\, 8\,Aq =$
$C_{14}HO_9, 3HO + 2\,Aq \,\&\, 8\,Aq$

Chelidonate of Ammonia.

I.) *di.* Efflorescent. Soluble in water; but is decomposed by repeated evaporation and solution. (Lerch.) Easily soluble in water. (Probst, *Ann. der Pharm.*, **29.** 119.)
$C_{14}H_2(NH_4)_2O_{12} + 4\,Aq$

Chelidonate of Baryta.

I.) *peracid.*
$C_{14}H_3BaO_{12}; C_{14}H_4O_{12} + 4\,Aq$

II.) *di.* Very sparingly soluble in water.
$C_{14}H_2Ba_2O_{12} + 2\,Aq$ (Lerch.)

III.) *tri*, or *normal*. Sparingly soluble in water. Insoluble in alcohol. (Lerch.)
$C_{14}HBa_3O_{12} + 6\,Aq$

Chelidonate of Copper. Difficultly soluble in water. (Probst, *Ann. der Pharm.*, **29.** 120.)

Chelidonate *of protoxide* of Iron. Soluble in water, but is quickly oxidized when exposed to the air.

Chelidonate *of sesquioxide* of Iron. Insoluble in water. Somewhat soluble in acetic acid, and in an aqueous solution of sesquichloride of iron. (Lerch.)
$C_{14}HFe_2'''O_{12} + Aq$

Chelidonate of Lead.

I.) *di.* Insoluble, or very sparingly soluble, in water. Very sparingly soluble in dilute nitric acid. Easily soluble in strong nitric acid, and in solutions of the other lead salts. (Lerch.)
$C_{14}H_2Pb_2O_{12} + 2\,Aq$

II.) *tri*, or *normal*. Insoluble in water or alcohol. Soluble in solutions of the other lead salts. (Lerch.)
$C_{14}HPb_3O_{12}$

III.) *basic.* Ppt.
$C_{14}HPb_3O_{12}; 3\,PbO$

Chelidonate of Lime.

I.) *peracid.* Soluble in chlorhydric acid.
$C_{14}H_3CaO_{12}. C_{14}H_4O_{12} + 4\,Aq$

II.) *di.* Permanent. Rather difficultly soluble in water, more easily soluble in hot than in cold. Also soluble in spirit, especially when this is dilute. (Probst, *Ann. der Pharm.*, **29.** 119; Lerch.) Insoluble in absolute alcohol. (Lerch.)
$C_{14}H_2Ca_2O_{12} + 6\,Aq$

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III.) *tri*, or *normal*. Very sparingly soluble in water. Insoluble in alcohol. (Lerch.)
$C_{14}HCa_3O_{12} + 6Aq$

Chelidonate of Lime & of Potash.

Chelidonate of Lime & of Silver. Decomposed when boiled for a long time with water.
$C_{14}HCaAg_2O_{12} + Aq$

Chelidonate of Magnesia. Efflorescent. After having been dried at 100° it is soluble in 79 pts. of water at 16°, and more readily in hot water. (Probst, *Ann. der Pharm.*, **29.** 120.)

Chelidonate of Potash.

I.) *di*. Very readily soluble in water. (Probst, *Ann. der Pharm.*, **29.** 119.)

II.) *tri*. Efflorescent. Soluble in water. Insoluble, or nearly insoluble, in alcohol.

Chelidonate of Sanguinarin. Soluble in water, and alcohol. (Probst, *Ann. der Pharm.*, **29.** 122.)

Chelidonate of Silver.

I.) *di*. Permanent. Soluble in water, ammonia-water, and strong nitric acid, the last decomposes it when boiling. Insoluble in alcohol. (Lerch.)
$C_{14}H_2Ag_2O_{12}$

II.) *tri*, or *normal*. Ppt.
$C_{14}HAg_3O_{12}$

Chelidonate of Soda.

I.) *mono*.
$C_{14}H_3NaO_{12} + 4Aq$

II.) *di*. Efflorescent. Readily soluble in cold or in hot water. 1 pt. of the salt dried at 100° is soluble in 15.5 pts. of water at 15°, and in far less hot water. (Probst, *Ann. der Pharm.*, **29.** 119.)
$C_{14}H_2Na_2O_{12} + \left\{\begin{matrix}Aq \\ 8Aq \\ 5Aq\end{matrix}\right.$

III.) *tri*. Resembles the potash-salt.

IV.) *peracid*.
$C_{14}H_3NaO_{12}, C_{14}H_4O_{12} + 6Aq$

Chelidonate of Strontia. 1 pt. of the salt dried at 100° is soluble in 224 pts. of water at 16°, and in far less hot water. (Probst, *Ann. der Pharm.*, 1839, **29.** 119.)

Chelidonate of Zinc. 1 pt. of the salt dried at 100° is soluble in 146 pts. of water at 16°, and in far less hot water. (Probst, *Ann. der Pharm.*, **29.** 120.)

Chelidonin. Insoluble in water. Soluble in spirit, absolute alcohol, and ether. (Probst, *Ann. der Pharm.*, 1839, **29.** 123.) Since it requires much alcohol to dissolve it, it is better to employ acetic acid, from which solution it crystallizes out uncombined. (Probst., *loc. cit.*, p. 124.) Rather difficultly soluble in water; more easily soluble in ether, and very easily in spirit, and essential oils; also soluble in fatty oils. (Reuling, *Ann. der Pharm.*, 1839, **29.** 133.) The salts of Chelidonin are easily soluble in water; more difficultly soluble in absolute alcohol; and insoluble in anhydrous ether. (Reuling, *loc. cit.*, p. 134.)
$C_{40}H_{19}N_3O_6 + 2Aq = N_3\left\{C_{40}H_{19}O_6^{x} + 2Aq\right.$

ChelidoXanthin. Very difficultly soluble in cold water, requiring several hundred pts. of cold water for its solution, more easily soluble in hot water. Also difficultly soluble in alcohol; but more easily soluble in very dilute, than in concentrated alcohol. Insoluble in ether. Indifferent towards acids and alkalies. Soluble in concentrated sulphuric acid. (Probst, *Ann. der Pharm.*, 1839, **29.** 128.)

Chenocholic Acid.

Chenocholate of Soda. Deliquescent. Soluble in alcohol, and ether.

Chicoccic Acid. *Vid.* Quinovatic Acid.

Chinagerbsæure. *Vid.* KinoTannic Acid.

Chinasæure. *Vid.* Kinic Acid.

Chinese Green. The coloring matter proper is almost insoluble in water, but may easily be suspended therein. It is insoluble in alcohol, ether, acetone, bisulphide of carbon, or the essential oils. Somewhat soluble in acetic acid, and dilute sulphuric, chlorhydric, and tartaric acids. Soluble in alkaline solutions.
(*Vegetable Green. Vert de Chine. Lo-KaO.*)

Chinhydrone. *Vid.* Kinhydrone.

Chinic Acid. *Vid.* Kinic Acid.

Chinicin. *Vid.* Quinicin.

Chinidin. *Vid.* Quinidin.

Chinin. *Vid.* Quinine.

Chinoidin. *Vid.* Quinidin.

Chinolein.
Chinolin. } Same as Quinolein, *q. v.*
Chinoilin.

Chinonamid. *Vid.* Kinonamid.

Chinone. *Vid.* Kinone.

Chinoyl. *Vid.* Kinone.

Chitin. Insoluble in water, alcohol, and ether. Weak acids and alkalies exert no action upon it. Slowly disaggregated and dissolved, with combination, by boiling concentrated acids. (Fremy, *Ann. Ch. et Phys.*, (3.) **43.** 94.)

ChloCarbethamid. *Vid. ter*ChlorAcetamid.

ChlorAcetal. Insoluble in water. Soluble in alcohol. Unacted upon by a solution of potash. (Lieben, *Ann. Ch. et Phys.*, (3.) **52.** 319.)
$C_{12}H_{13}ClO_4 = \left.\begin{matrix}C_4H_3Cl'' \\ (C_4H_5)_2\end{matrix}\right\}O_4$

***Bi*ChlorAcetal.** Insoluble in water. Soluble in alcohol. Unacted upon by a solution of potash. (Lieben, *loc. cit.*)
$C_{12}H_{12}Cl_2O_4 = \left.\begin{matrix}C_4H_2Cl_2'' \\ (C_4H_5)_2\end{matrix}\right\}O_4$

***Ter*ChlorAcetal.** Insoluble in water. Soluble in alcohol.
$C_{12}H_{11}Cl_3O_4 = \left.\begin{matrix}C_4HCl_3'' \\ (C_4H_5)_2\end{matrix}\right\}O_4$

ChlorAcetamic Acid. *Vid. quadri*ChlorAcetamid.

ChlorAcetamid. Soluble in 10 pts. of water at 24°; and in 10.5 pts. of alcohol at 24°. Very sparingly soluble in ether. (William, *Ann. Ch. et Phys.*, (3.) **49.** 99.)
$C_4H_4ClNO_2 = N\left\{\begin{matrix}C_4H_2ClO_2 \\ H_2\end{matrix}\right.$

***Ter*ChlorAcetamid.** Permanent. Very sparingly soluble in cold, more readily soluble in boiling water. Very soluble in alcohol and in ether. Soluble, with decomposition, in ammonia. (Malaguti, *Ann. Ch. et Phys.*, (3.) **16.** pp. 13, 58, 63, & 37, 73, 80.) Insoluble in water; tolerably soluble in alcohol; very easily soluble in ether. Soluble, with decomposition, in dilute nitric acid. Soluble, with decomposition, in ammonia, especially if this be hot. (Cloez, *Ann. Ch. et Phys.*, (3.) **17.** pp. 300, 305.)
(*Cloro Carbethamid. Chlor-Acetamid. Chlo Carbethamid.*)
$C_4H_2Cl_3NO_2 = N\left\{\begin{matrix}C_4Cl_3O_2 \\ H_2\end{matrix}\right.$

***Quadri*ChlorAcetamid.** Permanent. Insoluble in water. Tolerably readily soluble in alcohol, and wood-
(*ChlorAcetamic Acid.*)
$C_4HCl_4NO_2 = N\left\{\begin{matrix}C_4Cl_3O_2 \\ Cl \\ H\end{matrix}\right.$

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spirit. Very soluble in ether. Soluble in cold ammonia-water, and in solutions of the mineral alkalies, with combination. (Cloez, *Ann. Ch. et Phys.*, (3.) **17.** 306.)

*Quadri*ChlorAcetamid with Ammonia. Soluble in water. (Cloez.)
(ChlorAcetamate of Ammonia (hydrated).)

*Quadri*ChlorAcetamid with Potash. Soluble in water; the solution undergoing decomposition when boiled. (Cloez.)
(ChlorAcetamate of Potash.)

ChlorAcetic Acid. Deliquescent. Very easily soluble in water, with reduction of temperature. Its salts are mostly easily soluble in water.
$C_4 H_3 Cl O_4 = C_4 H_2 Cl O_3, H O$

ChlorAcetate of Ammonia. Deliquescent. More soluble in water than the potash salt.

ChlorAcetate of Baryta. Soluble in hot, very much less soluble in cold water.
$C_4 H_2 Cl Ba O_4 + 2 Aq$

ChlorAcetate of *per*ChlorEthyl ?.
(Acetate d'éthyle sexchloré. Sextichlorovinic Acetate.)
$C_8 H_2 Cl_6 O_4 = C_4 H_2 Cl (C_4 Cl_5) O_4$

ChlorAcetate of Chloromethylase. *Vid.* Acetate of *ter*ChloroMethyl.

ChlorAcetate of Ethyl. Insoluble in water. (R. Hoffmann, *Ann. Ch. u. Pharm.*, **102.** 1.)
$C_8 H_7 Cl O_4 = C_4 H_2 Cl (C_4 H_5) O_4$

ChlorAcetate of Potash.

I.) *normal.* Permanent. Very easily soluble in water. Soluble in absolute alcohol.
$C_4 H_2 Cl K O_4 + 3 Aq$

II.) *acid.* Sparingly soluble in water.
$C_4 H_2 Cl K O_4 ; C_4 H_3 Cl O_4$

ChlorAcetate of Silver. Sparingly soluble in cold, more readily in hot water. (Hoffmann.) Somewhat more soluble in water than the simple acetate. (Leblanc.)
$C_4 H_2 Cl Ag O_4$

*Bi*ChlorAcetate of Amyl. *Vid.* Acetate of *bi*ChlorAmyl.

*Bi*ChlorAcetate of *per*ChlorEthyl. Insoluble in water. Sparingly soluble in cold spirit. Very soluble in ether. (Leblanc, *Ann. Ch. et Phys.*, (3.) **10.** 209.)
(Acetate d'éthyle septichloré. Septichlorovinic Acetate.)
$C_8 H Cl_7 O_4 = C_4 H Cl_2 (C_4 Cl_5) O_4$

*Ter*ChlorAcetic Acid. Very deliquescent. Very soluble in water. (Dumas.) Most of its metallic salts are soluble in water.
$C_4 H Cl_3 O_4 = C_4 Cl_3 O_3, H O$

*Ter*ChlorAcetate of Ammonia. Very soluble in water. (Malaguti.)
$C_4 Cl_3 (N H_4) O_4 + 4 Aq$

*Ter*ChlorAcetate of Baryta. Very soluble in water. (Dumas.)

*Ter*ChlorAcetate of *per*ChlorEthyl. Insoluble in water. Decomposed by absolute alcohol. (Malaguti.) Gradually decomposed by moist air and by water. Insoluble in concentrated sulphuric acid. Decomposed by strong alkaline solutions. (Leblanc, *Ann. Ch. et Phys.*, (3.) **10.** 201.)
(PerChlorAcetic Ether. Acetate d'éthyle perchloré. PerChlorovinic Acetate.)
$C_8 Cl_8 O_4 = C_4 Cl_3 (C_4 Cl_5) O_4$

*Ter*ChlorAcetate of *ter*ChloroMethyl. Decomposed by water and by moist air; also decomposed by alcohol, wood-spirit, acids, and alkaline solutions. Appears to be identical with ChloroFormiate of perChloride of Ethyl. (Cloez, *Ann. Ch. et Phys.*, (3.) **17.** 312.)
(Perchloroformic Ether. PerchloroMethylic Acetate. Perchlorovinic Formiate. Acetate de "Methylène" perchloré. Acetate de Methyl perchloré.)
$C_6 Cl_6 O_4 = C_4 Cl_3 (C_2 Cl_3) O_4$

*Ter*ChlorAcetate of Ethyl. Insoluble, or very sparingly soluble, in water.
$C_8 H_5 Cl_3 O_4 = C_4 Cl_3 (C_4 H_5) O_4$

*Ter*ChlorAcetate of Lime. Very soluble in water.

*Ter*ChlorAcetate of Methyl. Insoluble in water. Soluble in alcohol, and ether. (Dumas.)
$C_6 H_3 Cl_3 O_4 = C_4 Cl_3 (C_2 H_3) O_4$

*Ter*ChlorAcetate of Potash. Permanent. Slightly hygroscopic in moist air. Soluble in water. (Dumas.)
$C_4 Cl_3 K O_4 + Aq$

*Ter*ChlorAcetate of Silver. Sparingly soluble in water. (Dumas.)
$C_4 Cl_3 Ag O_4$

ChlorAcetene. Slowly soluble, with decomposition, in water. (Harnitz-Harnitzky.)
$C_4 H_3 Cl$

*Ter*ChlorAcetic Ether. *Vid. ter*ChlorAcetate of Ethyl.

*Per*ChlorAcetic Ether. *Vid. ter*ChlorAcetate of *per*ChlorEthyl.

ChlorAcetone. It does not mix immediately with water, but appears to dissolve in it slowly. It is more rapidly soluble, but with slight decomposition, in boiling water. (Riche.)
$C_6 H_5 Cl O_2$

*Bi*ChlorAcetone. Insoluble in water. Miscible in all proportions with alcohol, and ether. (Fittig.)
(Mesitic Chloral. Xylitic Chloral is also probably identical with it.)
$C_6 H_4 Cl_2 O_2$

*Ter*ChlorAcetone.
$C_6 H_3 Cl_3 O_2$

*Quadri*ChlorAcetone. Very soluble in water, alcohol, and ether. (Bouis, *Ann. Ch. et Phys.*, (3.) **21.** 116.) Melts at 35°.
$C_6 H_2 Cl_4 O_2 + 8 H O$

*Quinqui*ChlorAcetone.

$a = C_6 H Cl_5 O_2$ Soluble in 10 vols. of water at 0°. When the aqueous solution, saturated at 0°, is gently heated, the quinquichloracetone separates out at 50°. This separation may also be brought about by the addition of chloride of sodium, or chloride of ammonium and other soluble salts. Soluble in all proportions in alcohol, and ether. (Stædeler.)

$b = C_6 H Cl_5 O_2 + 8 Aq$ Melts at 16°.

*Per*ChlorAcetone.

$a = C_6 Cl_6 O_2$ Resembles the preceding compounds.

$b = C_6 Cl_6 O_2 + 2 Aq$ Melts at 15° @ 16°.

ChlorAcetonitril. *Vid.* Cyanide of *ter*ChloroMethyl.

ChlorAcetyl. *Vid.* Chloride of Acetyl.

*Ter*ChlorAcetyl. Not isolated.
$C_4 Cl_3 O_2$

ChlorAcetylamid. *Vid.* ChlorAcetamid.

*Ter*ChlorAcetylphosphin. Permanent. Insoluble in water. Sparingly soluble in alcohol, ether, and wood-spirit. (Cloez, *Ann. Ch. et Phys.*, (3.) **17.** 311.)
(Phosphide of terCh'orAcetyl. ChlorAcethyphide. Ter Chlor Acet Phosphamide.)
$C_4 H_2 Cl_3 P O_2 = P \begin{cases} C_4 Cl_3 O_2 \\ H_2 \end{cases}$

ChlorAcetylSulphurous Acid. Slowly soluble in water.
(Chloro Sulphate of Acetyl.)
$C_4 H_3 Cl S_2 O_8 = C_4 H_3 Cl O_2, O_2 ; S_2 O_4$

ChlorAcetylSulphite of Baryta. Soluble in water. (Williamson.)

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ChlorAcetyphid. *Vid.* Phosphide of *ter*ChlorAcetyl.

Chloral. *Vid.* Hydride of *ter*ChlorAcetyl.

ChlorAlbin. Insoluble in water, and in hot concentrated sulphuric acid. Sparingly soluble in boiling alcohol. Soluble in boiling ether. Unacted on by boiling nitric acid, or an alcoholic solution of potash. (Laurent.)
$C_{12}H_6'', Cl_6$

Chloralid. Insoluble in water and in concentrated sulphuric acid. Sparingly soluble in cold absolute alcohol. Easily soluble in boiling alcohol and in ether. (Stædeler.)
$C_{10}H_2Cl_6O_6$

ChlorAldehyde. *Vid.* Chloride of *ter*ChlorAcetyl.

Chloralise. Sparingly soluble in cold, very easily soluble in boiling water. Easily soluble in alcohol. Very sparingly soluble in ether. Soluble, with decomposition, in alkaline solutions. Soluble in mineral acids, the solutions undergoing decomposition after a time. (E. Robiquet, in *J. de Pharm.*)
$C_{10}H_4ClO$ (?)

ChlorAloil. Almost entirely insoluble in water and in cold alcohol. Very soluble in boiling alcohol and in ether. Soluble, with decomposition, in sulphuric, nitric, and acetic acids. (Robiquet, *Ann. Ch. et Phys.*, (3.) **20.** 491.)
$C_{12}Cl_6O_5$?

ChlorAmidide of Mercury. *Vid.* Chloride of Mercurammonium.

"ChlorAmyl." *Vid.* Chloride of Amyl.

ChlorAmyl. Insoluble in water.
$C_{10}H_{10}Cl$

*Bi*ChlorAmyl. Insoluble in water. Soluble in alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **44.** 285.)
$C_{10}H_9Cl_2$

*Octi*ChlorAmyl.
$C_{10}H_3Cl_8$

ChlorAmylal. Insoluble in water or alkaline liquors. Easily soluble in alcohol, and ether. (Cahours.)
$C_{20}H_{17}Cl_3O_4$

*Ter*ChlorAnethol.
(*ChlorAnisol. ChlorAnisal.*)
$C_{20}H_9Cl_3O_2$

ChlorAnil. *Vid.* *per*ChloroKinone.

ChlorAnilam. } *Vid.* *bi*ChloroKinonamic Acid.
ChlorAnilamic Acid. }

ChlorAnilamid. *Vid.* *bi*ChloroKinonamid.

ChlorAnilic Acid. *Vid.* *bi*ChloroKinonic Acid.

ChlorAnilin. Permanent. Extremely sparingly soluble in water. Readily soluble in boiling, but only sparingly soluble in cold alcohol. Easily soluble in ether, wood-spirit, acetone, bisulphide of carbon and the fatty and essential oils. Most of its salts are but sparingly soluble in water or alcohol. (Hofmann.)
(*Amachlophenase.*)
$C_{12}H_6ClN = N\left\{\begin{matrix}C_{12}H_4Cl\\H_2\end{matrix}\right.$

*Bi*ChlorAnilin.
(*Amachlophenese.*)
$C_{12}H_5Cl_2N = N\left\{\begin{matrix}C_{12}H_3Cl_2\\H_2\end{matrix}\right.$

*Ter*ChlorAnilin. Very sparingly soluble in cold, more readily soluble in boiling water. Easily soluble in alcohol, and ether. It does not combine with acids or alkalies. (Hofmann.) Soluble in boiling water, and in cold alcohol. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 159.)
(*Chlorindatmit. Amachlophenise.*)
$C_{12}H_4Cl_3N = N\left\{\begin{matrix}C_{12}H_2Cl_3\\H_2\end{matrix}\right.$

ChlorAnisatic Acid. *Vid.* ChlorAnisic Acid.

ChlorAnisic Acid. Insoluble in water. Tolerably easily soluble in alcohol and in ether, especially when these are warm. Soluble in gently heated concentrated sulphuric acid, from which it is deposited as the liquid cools; water precipitates it from this solution. (Cahours, *Ann. Ch. et Phys.*, (3.) **14.** 498.)
(*Chloranisylic Acid. ChlorAnisatic Acid. ChloroDracasic Acid. ChloroDraconesic Acid.*)
$C_{16}H_7ClO_6 = C_{16}H_6ClO_5, HO$

ChlorAnisate of Ammonia. Soluble in water. (Cahours.)

ChlorAnisate of Baryta. Difficultly soluble in water.

ChlorAnisate of Ethyl. Insoluble in water. Easily soluble in alcohol, and ether, especially when these are boiling.
$C_{16}H_6(C_4H_5)ClO_6$

ChlorAnisate of Lead. Insoluble in water.

ChlorAnisate of Lime. Difficultly soluble in water.

ChlorAnisate of Methyl. Resembles the ethyl salt.
$C_{16}H_6(C_2H_3)ClO_6$

ChlorAnisate of Potash. Soluble in water. (Cahours, *loc. cit.*)

ChlorAnisate of Silver. Insoluble in water.

ChlorAnisate of Soda. Soluble in water. (Cahours, *loc. cit.*)

ChlorAnisate of Strontia. Difficultly soluble in water.

ChlorAnisol. *Vid.* ChlorAnethol.

ChlorAnisoNitrAnisic Acid. Insoluble in water. Soluble in hot alcohol, and ether. (Laurent.)
(*Nitro Chloro Draconesic Acid.*)
$C_{32}H_{14}ClNO_{16}$

ChlorAnisoNitrAnisate of Ammonia. Soluble in water.

ChlorAnisoNitrAnisate of Baryta.
" " Cobalt.
" " Copper.
" " Lead.
" " Lime.
" " Manganese.
" " Mercury.
" " Silver.
" " Strontia.

Ppts.

ChlorAnthracenese. Soluble in hot, less soluble in cold ether.
(*BiChloroparanaphthalin.*)
$C_{30}H_{10}Cl_2$

ChlorAntimonic Acid. *Vid.* Chloride of Antimony.

ChlorAntimoniate of Picolin.

ChlorAntimoniate of Quinolein ("leucol"). Soluble in boiling, less soluble in cold chlorhydric acid. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 174.)

ChlorAntimoniate of *X*. *Vid.* Chloride of Antimony & of *X*.

ChlorArsenide of Mercury. *Vid.* Arsenide of Mercury with Chloride of Mercury.

Chlorasile. Sparingly soluble in cold water, soluble in all proportions in boiling water. Soluble in all proportions in alcohol. Sparingly soluble in boiling ether. (Robiquet, *Ann. Ch. et Phys.*, (3.) **20.** 493.)
$C_{10}H_4ClO$?

Chloric Acid. Soluble in all proportions in water. (Pelouze & Fremy.)
(*Hyperoxymuriatic Acid.*)
ClO_5

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The solution is not decomposed when exposed to the light (Gay-Lussac), but is decomposed when heated to 40°. (Sérullas.) Rapidly decomposed by alcohol, and ether. All of its salts, excepting the chlorate of dinoxide of mercury, are soluble in water; most of them are deliquescent, and many are soluble in alcohol.

Chlorate of Alumina. $Al_2O_3, 3ClO_5$ Deliquescent. Soluble in alcohol. (Chenevix, from *Phil. Trans.*, 1802, in *Nicholson's Journ. of Nat. Phil.*, 3. 232.)

Chlorate of Ammonia. NH_4O, ClO_5 Is liable to explode after having been kept for a time. Very soluble in water, and alcohol. (Chenevix, from *Phil. Trans.*, 1802, in *Nicholson's Journ. of Nat. Phil.*, 3. 231.) Much less soluble in water at 0° than the soda salt. (Storer.) Easily soluble in water, but only to an insignificant extent in absolute alcohol. (Wæchter, *J. pr. Ch.*, 1843, 30. 323.)

Chlorate of Argent*bi*amin. $N_2\left\{H_6 . AgO, ClO_5\right.$ Easily soluble in water, and alcohol. (Wæchter, *J. pr. Ch.*, 1843, 30. 331.)

Chlorate of Baryta.
$BaO, ClO_5 + Aq$

1 pt. of the anhydrous salt is soluble in

4.38 pts. of water at	0°
2.70	20°
1.92	40°
1.29	60°
1.02	80°
0.79	100°

(Kremers, *Pogg. Ann.*, 99. 54.)

The saturated aqueous solution boils at 111°. (Kremers, *Pogg. Ann.*, 99. 43.) Soluble in about 4 pts. of cold, and in less warm water. Its solubility is so nearly the same as that of chloride of barium that it is not easy to separate the two by crystallization. (Chenevix, from *Phil. Trans.*, 1802, in *Nicholson's Journ. of Nat. Phil.*, 3. 229.) Absolute alcohol only dissolves a trace of it. (Wæchter, *J. pr. Ch.*, 1843, 30. 324.) Insoluble in alcohol. (Vauquelin.) Very sparingly soluble in weak alcohol. (Ot. Gr.)

Chlorate of Berberin. $C_{42}H_{19}NO_{10}, HO, ClO_5$ Easily soluble in pure water. Sparingly soluble in weak saline solutions. Soluble in alcohol.

Chlorate of Bismuth. Known only in solution: obtained by dissolving oxide of bismuth in an aqueous solution of chloric acid. On being evaporated, this solution is decomposed with separation of basic chloride of bismuth. (Wæchter, *J. pr. Ch.*, 1843, 30. 334.)

Chlorate of Brucin. Less soluble than chlorate of strychnine. Soluble in water, and alcohol; more readily in hot than in cold. (Sérullas, *Ann. Ch. et Phys.*, 1830, (2.) 45. pp. 280, 278.)

Chlorate of Cadmium. $CdO, ClO_5 + 2Aq$ Very deliquescent. Melts in its water of crystallization at 80°. Also easily soluble in alcohol. (Wæchter, *J. pr. Ch.*, 1843, 30. 333.)

Chlorate of Cinchonidin (of Pasteur). Soluble in water. May be crystallized from alcohol of 90%. (Leers, *Ann. Ch. u. Pharm.*, 82. 153.)

Chlorate of Cinchonin. $C_{40}H_{24}N_2O_2, HO, ClO_5$ Soluble in water, and alcohol; much more readily in hot than in cold. (Sérullas, *Ann. Ch. et Phys.*, 1830, (2.) 45. pp. 278, 279.)

Chlorate of Cobalt. $CoO, ClO_5 + 6Aq$ Extremely deliquescent. Easily soluble in alcohol. Melts in its water of crystallization at 50°. (Wæchter, *J. pr. Ch.*, 1843, 30. 328.)

Chlorate of Copper.

I.) $CuO, ClO_5 + 6Aq$ Very deliquescent. Melts in its water of crystallization at 65°, and does not solidify again until cooled to 20°. Easily soluble in alcohol. (Wæchter, *J. pr. Ch.*, 1843, 30. 328.)

II.) *basic.* Insoluble in water. Easily soluble in dilute acids. (Wæchter, *loc. cit.*, p. 329.)

Chlorate *of protoxide* of Iron. FeO, ClO_5 Soluble in water, but soon decomposes of itself, with formation of the salt of the sesquioxide, unless the temperature is very low. (Wæchter, *J. pr. Ch.*, 1843, 30. 326.)

Chlorate *of sesquioxide* of Iron.

I.) $Fe_2O_3, 3ClO_5$ Soluble in water. (Wæchter, *loc. cit.*)

II.) *basic.* Insoluble in water. (Wæchter, *loc. cit.*)

Chlorate of Lead. $PbO, ClO_5 + Aq$ Permanent. Very easily soluble in water, and alcohol. (Wæchter, *J. pr. Ch.*, 1843, 30. 329.)

Chlorate of Lime. $CaO, ClO_5 + 2Aq$ Extremely deliquescent. Melts at a low heat in its water of crystallization. Produces much cold in dissolving. Very soluble in alcohol. (Chenevix, from *Phil. Trans.*, 1802, in *Nicholson's Journ. of Nat. Phil.*, 3. 231.) Very deliquescent. When quickly heated, the crystals melt in their water of crystallization at above 100°. Easily soluble in alcohol. (Wæchter, *J. pr. Ch.*, 1843, 30. 325.)

Chlorate of Lithia. $LiO, ClO_5 + Aq$ Very deliquescent. Melts at 50°. Easily soluble in alcohol. (Wæchter, *J. pr. Ch.*, 1843, 30. 322.) Very soluble in water. (Troost.)

Chlorate of Magnesia. $MgO, ClO_5 + 6Aq$ Very deliquescent. Melts in its water of crystallization at 40°. Also very easily soluble in alcohol. (Wæchter, *J. pr. Ch.*, 1843, 30. 325.)

Chlorate of Manganese. Known only in solution. The dilute aqueous solution may be boiled without undergoing decomposition, but on evaporating it to a certain degree of concentration it decomposes. (Wæchter, *J. pr. Ch.*, 1843, 30. 326.)

Chlorate *of dinoxide* of Mercury.

I.) Hg_2O, ClO_5

α = *Soluble modification.* The crystals soon become opaque and lose their lustre when exposed to the air. The unaltered crystals are easily soluble in water, and alcohol, but those which have become opaque leave a small quantity of residue on being dissolved. (Wæchter, *J. pr. Ch.*, 1843, 30. 332.)

β = *Insoluble modification.* Insoluble in water. Completely soluble in acetic acid. (Wæchter, *loc. cit.*) Insoluble in cold, but is decomposed by boiling water. (Vauquelin, in *Berzelius's Lehrb.*, 3. 883.)

II.) *basic*(of β). Insoluble in water.
$2Hg_2O, ClO_5$

Chlorate *of protoxide* of Mercury. $2HgO, ClO_5 + Aq$ More soluble in water than the protochloride, being soluble in about 4 pts. of cold water. (Chenevix, from *Phil. Trans.*, 1802, in *Nicholson's Journ. of Nat. Phil.*, 3. 241.) Decomposed by water to a more basic, insoluble, and a soluble acid salt. (Wæchter, *J. pr. Ch.*, 1843, **30.** 333.)

Chlorate of Morphin. Soluble in water, and alcohol; much more readily in hot than in cold. (Sérullas, *Ann. Ch. et Phys.*, 1830, (2.) **45.** pp. 278, 279.)

Chlorate of Nickel. Very deliquescent. $Ni O, Cl O_5 + 6 Aq$ Melts in its water of crystallization at 80°. Very easily soluble in alcohol. (Wæchter, *J. pr. Ch.*, 1843, **30.** 327.)

Chlorate of Potash. Permanent. Less $K O, Cl O_5$ soluble in water than any of the other metallic chlorates, excepting chlorate of dinoxide of mercury.

100 pts. of water At °C	Dissolve pts. of $K O, Cl O_5$.
0°	3.33
13.32°	5.60
15.37°	6.03
24.43°	8.44
35.02°	12.05
49.08°	18.96
74.89°	35.40
104.78°	60.24

(Gay-Lussac, *Ann. Ch. et Phys.*, (2.) **11.** 314.)

Or, 1 pt. of it is soluble in

30.0	pts. of water at	0°
16.7		15°
8.33		35°
5.26		49°
1.67		104°

(Gmelin's *HandBook*.)

Soluble in about 16 pts. of cold water, and in much less warm water (Chenevix, from *Phil. Trans.*, 1802, in *Nicholson's Journ. of Nat. Phil.*, **3.** 181); in 30.03 pts. of water at 0°; in 17.85 pts. at 13.3°; and in 1 66 pts. at 104.78°; the solution saturated at 0° containing 3.22% of it, that saturated at 13.3° containing 5.30%, and that at 104.78°, 37.59%. (M. R. & P.) Soluble in 16 pts. of water at 18.75°. (Abl. from *Œsterr. Zeitschrift für Pharm.*, **8.** 201. in *Canstatt's Jahresbericht. für* 1854, p. 76.) 100 pts. of water at 15.5° dissolve 6.2 pts. of it, and at 100° 40 pts. (Ure's *Dict.*) 100 pts. of the saturated aqueous solution at its boiling-point (103.3°), contain 40 pts. of the dry salt; or, 100 pts. of water dissolve 66.666 pts. of the dry salt at 103.3°; or, 1 pt. of the dry salt is soluble in 1.5 pts of water at 103.3°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) The saturated aqueous solution boils at 105°. (Kremers, *Pogg. Ann.*, **97.** 19.)

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.0311	5.12
1.0377	6.25

(Kremers, *Pogg. Ann.*, **95.** 120.)

In a solution containing for 100 pts. of water, pts. of anhydrous $K O, Cl O_5$	The boiling is elevated. °	Difference.
0.0	0.0	
14.64	1.0	14.64
29 28	2.0	14.64
43.92	3.0	14.64
58.56	4.0	14.64
61.50	4.2	

The point of ebullition of pure water, observed in a glass tube containing bits of metallic zinc, having been 100.2°. (Legrand, *Ann. Ch. et Phys.*, 1835, (2.) **59.** 434.) Alcohol can dissolve a small portion of it. (Chenevix, *loc. cit.*) Soluble in 120 pts. of alcohol, of 83%, at 16°. (Wittstein.) Soluble in 120 pts. of alcohol, of 77.1%, at 16°; or, 100 pts. of this alcohol dissolve 0.833 pt. of the salt at 16°. (Pohl, *Wien. Akad. Bericht*, **6.** 599.) Soluble in a saturated aqueous solution of chloride of ammonium. More soluble in water containing chloride of sodium, than in pure water. (Margueritte, *C. R.*, **38.** 305.) Soluble in pure concentrated nitric acid, apparently without decomposition at first, and when the solution cools a quantity of chlorate of potash, only slightly contaminated with nitrate, crystallizes out. If the nitric acid is dilute, it may be boiled upon the chlorate without any visible decomposition for several moments, but as the acid becomes more concentrated by evaporation, decomposition of the chlorate ensues. But with nitric acid, containing nitrous acid, as is ordinarily the case, decomposition occurs at once. (Millon, *Ann. Ch. et Phys.*, (3.) **6.** 92.)

Chlorate of Potash with PerManganate of Potash. Soluble in water. The two salts crystallize together in all proportions. (Wœhler.)

Chlorate of Quinine. Soluble in water, and alcohol; much more easily in hot than in cold. (Sérullas, *Ann. Ch. et Phys.*, 1830, (2.) **45.** pp. 278, 279.)

Chlorate of Silver. Very soluble in water, $Ag O, Cl O_5$ being soluble in about 2 pts. of warm water. Somewhat soluble in alcohol. (Chenevix, from *Phil. Trans.*, 1802, in *Nicholson's Journ. of Nat. Phil.*, **3.** pp. 242, 232 note.) Soluble in about 5 pts. of cold water. Also soluble in alcohol. (Wæchter, *J. pr. Ch.*, 1843, **30.** 330.) Soluble in 10 @ 12 pts. of water. (Vauquelin.)

Chlorate of Soda. Deliquescent.
$Na O, Cl O_5$

1 pt. of the anhydrous salt

is soluble in 1.20	pts. of water at	0°
1.02		12°
0.79		30°
0.66		50°
0.56		70°
0.40		90°
0.33		115°
0.30		120°

(Kremers, *Pogg. Ann.*, **92.** 499; and **97.** 10.)

1 pt. of the anhydrous salt is

	I.	II.	III.		
soluble in	1.20	1.22	1.22	pts. of water at	0°
	0.92	1.01			20°
	0.73	0.81			40°
	0.60	0.68			60°
	0.48	0.57			80°
	0.39	0.49			100°

The results in column I. were obtained immediately after the hot solutions had fallen to the given temperatures. Those in column II. are from a new series of experiments, in which the solutions stood during an hour at, after having fallen to, the given temperatures, during which time they were frequently agitated. Those in column III. are from another set of experiments, in which the solutions stood at the given temperatures during 9 hours. (Kremers, *Pogg. Ann.*, **97.** 4.) If a solution, not saturated, be concentrated by boiling, it will become somewhat supersaturated. In a solution thus prepared the boiling temperature was 135° just before crystals began to separate; with the separation of crystals, however, it fell at once to its normal, 132°. (Kremers, *Pogg. Ann.*, **97.** 21.)

Slightly deliquescent. Soluble in 3 pts. of cold,

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and in less warm water. It is extremely difficult to separate this salt from chloride of sodium, as it has nearly the same degree of solubility in water as the latter. Soluble in alcohol, but it cannot readily be separated from chloride of sodium by means of alcohol, since the latter dissolves in alcohol when mixed with chlorate of soda. (Chenevix, from *Phil. Trans.*, 1802, in *Nicholson's Journ. of Nat. Phil.*, **3.** 185.) [Chenevix estimates the solubility of this salt, in water, at too high a figure, as the experiments of Kremers also prove, but his observations on the difficulty of separating it from chloride of sodium are entirely correct. F. H. S.]

Soluble in 3 pts of cold, and in less hot water. Only very slightly soluble in alcohol. (Wæchter, *J. pr. Ch.*, 1843, **30.** 321.) Soluble in 3 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) 100 pts. of water at 15.5° dissolve 35 pts. of it; somewhat more soluble in hot water. (Ure's *Dict.*) The saturated aqueous solution boils at above 125° (Kremers, *Pogg. Ann.*, **92.** 499); at 132°. (Kremers, *Ibid.*, **97.** 10.)

An aqueous solution of sp. gr. at 19.5° (sp. gr. of water at 19.5° = 1)	Contains per cent of NaO, ClO_5.	Pts. of NaO, ClO_5 dissolved in 100 pts. of water.
1.0626 . . .	9.008 . . .	9.90
1.1250	17.232	20.82
1.1836	24.345	32.18
1.2479	31.521	46.03
1.2937 . . .	36.265 . . .	56.90

(Kremers, *Pogg. Ann.*, **95.** 121; the second column is from Gerlach's *Sp. Gew. der Salzlæsungen*, p. 34.) Soluble in 34 pts. of alcohol, of 83%, at 16°, and in a smaller quantity of hot alcohol. Somewhat more easily soluble in alcohol than chloride of sodium. (Berzelius, *Lehrb.*)

Chlorate of Strontia. Deliquescent. Readily soluble in water. More soluble in alcohol than chloride of strontium. (Chenevix, from *Phil. Trans.*, 1802, in *Nicholson's Journ. of Nat. Phil.*, **3.** 230.) Insoluble in alcohol, soluble in spirit. (Wæchter, *J. pr. Ch.*, 1843, **30.** 324.) Easily soluble in alcohol. (Berzelius, *Lehrb.*) Abundantly soluble in alcohol. (Gmelin.) Somewhat less soluble in ordinary alcohol than in water. (Souchay, *Ann. Ch. u. Pharm.*, **102.** 381.)

$Sr O, Cl O_5 + 5 Aq$

Chlorate of Strychnine. Soluble in water, and alcohol; much more readily in hot than in cold. The concentrated aqueous solution solidifies on cooling. (Sérullas, *Ann. Ch. et Phys.*, 1830, (2.) **45.** pp. 280, 278.)

Chlorate *of protoxide* **of Tin.** Soluble in water, but decomposes in the course of a few minutes, with separation of binoxide of tin. (Wæchter, *J. pr. Ch.*, 1843, **30.** 326.)

Chlorate *of protoxide* **of Uranium.** Soluble in water, and in an aqueous solution of chloric acid. (Rammelsberg.)

$Ur O, Cl O_5$

Chlorate of Veratrin. Soluble in water, and alcohol; more readily in hot than in cold. (Sérullas, *Ann. Ch. et Phys.*, 1830, (2.) **45.** pp. 280, 278.)

Chlorate of Zinc. Very deliquescent. Melts in its water of crystallization at 60°. Also very easily soluble in alcohol. (Wæchter, *J. pr. Ch.*, 1843, **30.** 327.) Soluble in water, and alcohol. (Vauquelin.)

$Zn O, Cl O_5 + 6 Aq$

ChlorAuric Acid. Same as *ter*Chloride of Gold, *q. v.* All the metallic chloraurates are easily soluble in water, and are also soluble in alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 261.)

(*ChloroAuric Acid.*)

ChlorAurate of Acetosamin. Ppt.

ChlorAurate of Aconitin. Ppt. Insoluble in chlorhydric acid.

$C_{60} H_{47} N O_{14}, H Cl, Au Cl_3 + 2 Aq$

ChlorAurate of Agrostemmin. Soluble in alcohol.

ChlorAurate of Ammonium.

I.) (*yellow.*) Efflorescent. Easily soluble in water, and alcohol. (Johnston.)

$N H_4 Cl, Au Cl_3 + 2 Aq$

II.) (*red.*) Soluble in water. Partially soluble in alcohol. (Johnston.)

ChlorAurate of AmylStrychnine. Insoluble in water.

ChlorAurate of Anilin. Insoluble in ether. (Hofmann.)

ChlorAurate of Arsen*di***MethylEthylium.**

ChlorAurate of Atropin Sparingly soluble in water, and chlorhydric acid.

$C_{34} H_{23} N O_6, H Cl, Au Cl_3$

ChlorAurate of Barium. Hygroscopic. Soluble in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 261.)

$Ba Cl, Au Cl_3$

ChlorAurate of Bebirin.

ChlorAurate of Butylamin. Soluble in water, and alcohol.

(*ChlorAurate of Tetrylamin.*)

$2 (C_8 H_{11} N, H Cl); Au Cl_3$

ChlorAurate of Cadmium. Permanent. Soluble in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, **17.** pp. 261, 263)

$Cd Cl, Au Cl_3$

ChlorAurate of Caffein. Soluble in water, but is decomposed when boiled for a long time therewith; more soluble in alcohol. (Nicholson.)

$C_{16} H_{10} N_4 O_4, H Cl, Au Cl_3$

ChlorAurate of Calcium. Deliquescent. Soluble in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 261.)

$Ca Cl, Au Cl_3 + 6 Aq$

ChlorAurate of Caprylamin. *Vid.* ChlorAurate of Octylamin.

ChlorAurate of ChlorAnilin. Ppt.

ChlorAurate of Cobalt. Permanent. Soluble in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** pp. 261, 263.)

ChlorAurate of Codein. Ppt. Tolerably easily soluble in chlorhydric acid.

ChlorAurate of Cotarnin.

ChlorAurate of Cumidin. Somewhat soluble in alcohol. (Nicholson, *J. Ch. Soc.*, **1.** 9.)

ChlorAurate of CyanAnilin. Very readily soluble in ether; the solution undergoing decomposition when evaporated. (Hofmann, *J. Ch. Soc.*, **1.** 169.)

$$N \left\{ \begin{matrix} C_{12} H_5 \\ H_2 \end{matrix} \right. . C_2 N, H Cl, Au Cl_3$$

ChlorAurate of Ethylamin. Soluble in water, alcohol, and ether. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 482.)

$C_4 H_7 N, H Cl, Au Cl_3$

ChlorAurate of *tetra***EthylAmmonium.** Only sparingly soluble in cold water; somewhat more soluble in boiling water. Sparingly soluble in chlorhydric acid. (Hofmann.)

$(C_4 H_5)_4 N Cl, Au Cl_3$

ChlorAurate of EthylAnilin.

ChlorAurate of EthylConiin.

ChlorAurate of *di*EthylConiin. Soluble in hot water, but separates out as the solution cools. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **89.** 147.)

ChlorAurate of EthylMethylConiin. $N\left\{\begin{matrix}C_{16}H_{14}''\\ C_2H_3\\ C_4H_5\end{matrix}\right\}Cl, Au\,Cl_3$ Somewhat soluble in hot, less soluble in cold water. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **89.** 140.)

ChlorAurate of EthylNicotin. $N\left\{\begin{matrix}C_{10}H_7'''\\ C_4H_5\end{matrix}\right\}Cl, Au\,Cl_3$ Soluble in hot, less soluble in cold water. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **87.** 7.)

ChlorAurate of *tetr*ÆthylPhosphonium. $P(C_4H_5)_4\,Cl, Au\,Cl_3$ Soluble in boiling, less soluble in cold water.

ChlorAurate of EthylPicolin. $C_{16}H_{11}N, H\,Cl, Au\,Cl_3 = N\left\{\begin{matrix}C_{12}H_6''\\ C_4H_5\end{matrix}\right. H\,Cl, Au\,Cl_3$ Sparingly soluble in cold, readily soluble in boiling water. Insoluble in alcohol, or ether. (Anderson.)

ChlorAurate of EthylPyridin. Sparingly soluble in cold water. Decomposed when boiled with water.

ChlorAurate of EthylStrychnine. Soluble in boiling water.

ChlorAurate of Furfurin.

ChlorAurate of Lithium. Deliquescent. Soluble in water, though less so than chloride of potassium. (Johnston.)

ChlorAurate of LuteoCobalt. $6\,N\,H_3 . Co_2\,Cl_3, Au\,Cl_3$ Insoluble in cold water. Somewhat soluble in boiling water acidulated with chlorhydric acid. (Gibbs & Genth, *Smithson. Contrib.*, vol. **9.**)

ChlorAurate of Magnesium. Deliquescent. $Mg\,Cl, Au\,Cl_3 + 12\,Aq$ Soluble in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** pp. 261, 262.)

ChlorAurate of Manganese. Deliquescent. Soluble in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** pp. 261, 263.)

ChlorAurate of MelAnilin. Difficultly $C_{26}H_{13}N_3, H\,Cl, Au\,Cl_3$ soluble in water, more readily soluble in alcohol. Exceedingly soluble in ether. (Hofmann, *J. Ch. Soc.*, **1.** 296.)

ChlorAurate of Methylamin. Soluble in $N\left\{\begin{matrix}H_2\\ C_2H_3\end{matrix}\right., H\,Cl, Au\,Cl_3$ water, alcohol, and ether. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 458.)

ChlorAurate of *tetra*Methylammonium. $N(C_2H_3)_4\,Cl, Au\,Cl_3$ Soluble in boiling, very sparingly soluble in cold water. (Hofmann, *J. Ch. Soc.*, **10.** 197.)

ChlorAurate of MethylCinchonin.

ChlorAurate of MethylNicotin. Almost $N\left\{\begin{matrix}C_{10}H_7'''\\ C_2H_3\end{matrix}\right. Cl, Au\,Cl_3$ insoluble in cold water and in alcohol. (Stahlschmidt, *Ann. Ch. u. Pharm.*, **90.** 224.)

ChlorAurate of Nickel. Deliquescent. $Ni\,Cl, Au\,Cl_3 + 12\,Aq$ (?) Soluble in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** pp. 261, 263.)

ChlorAurate of Nicotin. Ppt. Insoluble, or but sparingly soluble, in chlorhydric acid. (v. Planta.)

ChlorAurate of Octylamin. Deliquescent. (*ChlorAurate of Caprylamin.*) $C_{16}H_{19}N, H\,Cl, Au\,Cl_3$ Much more soluble in water than the chloroplatinate. Soluble in alcohol, and ether. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 142.)

ChlorAurate of Olanin (of Unverdorben). Sparingly soluble in cold, more freely in boiling water. Soluble in all proportions in alcohol, and ether.

ChlorAurate of Piperidin.

ChlorAurate of Picolin. Soluble in 20 pts. of boiling water. More readily soluble in alcohol than in ether. Soluble in hot dilute sulphuric, chlorhydric, and nitric acids, from which solutions it crystallizes out on cooling. (Unverdorben.)

ChlorAurate of Potassium. Efflorescent. $K\,Cl, Au\,Cl_3 + 5\,Aq$ Readily soluble in water. (Javal.) Easily soluble in alcohol. (Berzelius.)

ChlorAurate of Propyl.
(*ChlorAurate of Trityl.*)
$C_6H_9N, H\,Cl, Au\,Cl_3$

ChlorAurate of Quinolein (or of Chinolin). $N\left\}C_{18}H_7''', H\,Cl, Au\,Cl_3\right.$ Sparingly soluble in water. (Gr. Williams.)

ChlorAurate of Retinin. Insoluble in boiling water.

ChlorAurate of Sinkalin. Sparingly soluble $C_{10}H_{13}NO_2, H\,Cl, Au\,Cl_3$ in cold, more soluble in boiling water. (v. Babo & Hirschbrunn.)

ChlorAurate of Sodium. Permanent. Easily $Na\,Cl, Au\,Cl_3 + 4\,Aq$ soluble in water, and absolute alcohol. Also in an aqueous solution of chloride of sodium.

ChlorAurate of Spartein. Very sparingly soluble in water, and alcohol. Readily soluble, without decomposition, in warm, less soluble in cold chlorhydric acid.

ChlorAurate of Strontium. Permanent. $Sr\,Cl, Au\,Cl_3$ Soluble in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, **17.** 261.)

ChlorAurate of Strychnine. Very sparing- $C_{42}H_{22}N_2O_4, H\,Cl, Au\,Cl_3$ ly soluble in cold, decomposed by boiling water. Soluble in alcohol. (Abel & Nicholson, *J. Ch. Soc.*, **2.** 256.)

ChlorAurate of Tetryl. *Vid.* ChlorAurate of Butyl.

ChlorAurate of Thebain.

ChlorAurate of Toluidin. Soluble in hot, $C_{14}H_9N, H\,Cl, Au\,Cl_3$ less soluble in cold water. (Chautard.)

ChlorAurate of Trityl. *Vid.* ChlorAurate of Propyl.

ChlorAurate of Veratrin. Insoluble in $C_{64}H_{52}N_2O_{16}, H\,Cl, Au\,Cl_3$ water. Soluble in boiling, less soluble in cold spirit. (Merck, *Ann. Ch. u. Pharm.*, **95.** 202.)

ChlorAurate of *tetra*Vinylium. Decomposes at the temperature of boiling.

ChlorAurate of XanthoCobalt. Soluble $N\,O_2 . 5\,N\,H_3 . Co_2O\,Cl_2, Au\,Cl_3 + 2\,Aq$ in hot water.

ChlorAurate of Zinc. Permanent. Soluble $Zn\,Cl, Au\,Cl_3 + 12\,Aq$ (?) in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 261, 263.)

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ChlorAurite of *X*. *Vid. proto*Chloride of Gold with Chloride of *X*.

ChlorAzol. Very sparingly soluble in water. $C_8H_2Cl_3(NO_4)_3$ Easily soluble in alcohol. (Muehlhæuser, *Ann. Ch. u. Pharm.*, **90.** 174.)

ChlorAzoLitmin. Insoluble in water. Sol- $C_{18}H_{10}NO_{20}Cl$ uble in alcohol, ether, and alkaline solutions. (Kane.)

ChlorAzoSuccic Acid. *Vid.* ChloroSuccinimid.

ChlorBenzin. *Vid. ter*Chloride of Benzin.

ChlorButyren. *Vid.* ChloroButylene.

ChlorChinone. *Vid.* ChloroKinone.

ChlorDracasic Acid. *Vid.* Chloranisic Acid.

ChlorDraconesic Acid. *Vid.* Chloranisic Acid.

ChlorErythrolitmin.
$C_{26}H_{22}O_{12}$

ChlorÉthase. *Vid. bi*ChlorEthylene.

ChlorÉthasic Acid. *Vid. mono*ChlorAcetic Acid.

ChlorEtheral. *Vid.* Oxide of *mono*ChlorEthyl.

Chlorethose. *Vid. per*ChlorEthylene.

*Bi*ChlorEthylamin. [Appears to be insolu- $N\left\{\begin{matrix}C_4H_2Cl_2\\H_2\end{matrix}\right.$ ble in water, and unacted upon by acids.]

ChlorEthylate of Ethylidin.
$C_8H_9ClO_2$

ChlorEthylene. Sparingly soluble in water. (*Chloride of Acetyl* [*Acetoyl*]. *Chloride of Aldehydin. Chloride of Vinyl.*) C_4H_3Cl Readily soluble in alcohol; and in all proportions in ether. (Liebig. Soluble in concentrated sulphuric acid.

*Bi*ChlorEthylene. Insoluble in water. (*Chloromethylase. Ethylene bichloré.*) $C_4H_2Cl_2$ Soluble in alcohol, and ether. Is not decomposed by potash-lye. (Laurent.)

*Ter*ChlorEthylene.
C_4HCl_3

*Per*ChlorEthylene. Insoluble in water, (*Proto Chloride of Carbon. Chlorethose. Ethylène perchloré.*) C_4Cl_4 acids, or aqueous solutions of the alkalies. Soluble in alcohol, ether, and the fatty and essential oils. Unacted upon by nitric, chlorhydric, or sulphuric acids. (Faraday.)

ChlorEthyleneSulphurous Acid. *Vid.* ChloroMethylSulphurous Acid.

Per(*quinqui*)ChlorEthylOxalic Acid(Anhydrous). (*Anhydrous Chloroxalovinic Acid. Chloroxethide.*) $C_8Cl_5O_7$ Insoluble in water, but is slowly acidified when in contact with it. Miscible in all proportions with alcohol, and ether. Soluble, with acidification and combination, in cold aqueous solutions of the caustic alkalies. (Malaguti.)

Per(*quinqui*)ChlorEthylOxalic Acid. Very (*Chloroxalovinic Acid. Acid Oxalate of Perchlorethyl. Ethyl Oxalic Acid quintichloré. Chloroxetic Acid.*) $C_8HCl_5O_8 = C_4(C_4Cl_5)HO_8$ quickly deliquescent. Soluble in all proportions in water, alcohol, and ether. (Malaguti.)

*Per*ChlorEthylOxalate of Ammonia. $C_8Cl_5(NH_4)O_8$ Very deliquescent. Soluble in water, and alcohol. The solution is decomposed on boiling. Soluble in all proportions in ether.

*Per*ChlorEthylOxalate of Soda. Soluble in water and in absolute alcohol.

ChlorEthylSelenious Acid.
$C_4H_5ClO, 2SeO_2$

ChlorEthylSulphurous Acid. Insoluble (*Chloro Sulphate of Ethyl.*) $C_4H_5ClO_2, S_2O_6$ in water, by which it is very slowly decomposed. (R. Williamson, *J. Ch. Soc.*, **10.** 100.)

*Bi*ChlorEuxanthic Acid. Insoluble in wa- $C_{42}H_{16}Cl_2O_{22}$ ter. Difficultly soluble in cold, easily soluble in boiling alcohol. Soluble, with combination, in concentrated sulphuric acid. Soluble in ammonia-water, in which solution carbonate of ammonia produces a precipitate.

*Ter*ChlorEuxanthone. Insoluble in water. $C_{40}H_9Cl_3O_{12}$ Soluble in alcohol.

ChlorHelicin.

I.) $C_{26}H_{15}ClO_4$ Tolerably soluble in boiling, almost insoluble in cold water. Tolerably soluble in alcohol. Decomposed by boiling acids, and alkalies. (Piria, *Ann. Ch. et Phys.*, (3.) **14.** 295.)

II.) *an isomer of the above.* Insoluble in water. $C_{26}H_{15}ClO_4$ Scarcely at all soluble in boiling alcohol. (Piria, *loc. cit.*, p. 298.)

ChlorHematosin (?). Soluble in alcohol. (*ChlorHematin.*) $C_{44}H_{22}N_3O_6FeCl_3$ (Mulder.) Not decomposed by cold acids or alkaline solutions.

ChlorHippurin. Insoluble in water. Diffi- $C_{18}H_8ClNO_6$ cultly soluble in ether. Soluble in all proportions in alcohol. Soluble in an alcoholic solution of caustic potash, with scarcely any decomposition, even on boiling; it is precipitated unchanged from this solution on the addition of water. (Schwanert, from *Ann. Ch. u. Pharm.*, **112.** 59 *et seq.*, in *Kolbe's Lehrb.*, **2.** 121.)

*Bi*ChlorHippurin. Easily soluble in ether. $C_{18}H_7Cl_2NO_6$ (*Ibid.*)

ChlorHydranil. *Vid. per*ChlorHydroKinone.

ChlorHydrargyrate of *X*. *Vid.* ChloroMercurate of *X*.

ChlorHydric Acid. Rapidly and largely (*Hydrochloric Acid. Muriatic Acid.*) HCl absorbed by water, which takes up between four and five hundred times its bulk of the gas, at the ordinary temperature and pressure; that is, rather less than an equal weight. (Dalton, in his *New System*, **2.** 287, 294.) 1 volume of water absorbs 480 vols. of the gas at 0°; this amount being not quite equal to the weight of the water. The specific gravity of the saturated aqueous solution is 1.2109. (H. Davy.) 1 vol. of water at 20.5° absorbs 417.822 vols. of it, with considerable elevation of temperature, the volume of water increasing to 1.3438 vols. 1 vol. of the solution of acid consequently contains 311.0415 vols. of H Cl gas. Acid of this strength is of 1.1958 sp. gr., and contains 40.39% by weight of H Cl. (T. Thomson, in his *System of Chem.*, London, 1831, **2.** 188.) At ordinary temperatures 1 vol. of water absorbs about 500 vols. of the gas. (Ot. Gr.) 1 vol. of water absorbs 464 volumes of H Cl gas, and the saturated solution thus obtained, of 1.21 sp. gr., contains 42.4%, by weight, of the gas. (Wittstein's *Handw.*) Water saturated with H Cl at about 0° contains 480 times its own volume of the gas and its sp. gr. = 1.2109; saturated at the ordinary temperature, the liquid contains 0.383 of its weight of HCl and its sp. gr. = 1.192. (Berzelius, *Lehrb.*, **1.** 774.)

100 pts. of alcohol of 36°(B.) absorb 68 pts. of chlorhydric acid gas at 12.5°, with evolution of heat. (Boullay.) Absorbed by ether. (Achard.) Oil of turpentine absorbs 50% of chlorhydric acid gas with elevation of temperature (Thénard); 163 vols. at 22° and 0.724 met. pressure. Isoterebenthene absorbs 34% of it at 24°, with combination; metaterebenthene absorbs only half as much, viz. 17.7% at 24°. (Berthelot.) Oil of lavender absorbs 68.7 vols. of chlorhydric acid gas (Thénard); 210 vols. without being saturated. (Saussure.) Oil of rosemary absorbs 218 vols. of it at 22°, becoming black and turbid. (Saussure.) Soluble in 0.4 vol. of rock-oil from Amiano. (Saussure.) Absorbed, without combination, by caprylic alcohol (hydrate of capryl), at ordinary temperatures, but is evolved when the solution is heated. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 129.) Fuming chlorhydric acid is soluble, without alteration, in cold glycerin. It is also miscible with strong acetic acid. The gas is not absorbed by concentrated sulphuric acid; but is absorbed in large quantity by anhydrous sulphuric acid. (Aimé.)

Solubility of H Cl in water at various temperatures, under a constant pressure, by experiment.

1 gramme of water absorbs, at t° and a pressure of B metres, G grammes of H Cl.

B	0.760	0.762	0.754	0.754	0.739
t°	4.7°	4.8°	7.2°	7.2°	16°
G	0.799	0.801	0.790	0.792	0.738

B	0.753	0.750	0.756	0.757	0.753
t°	16°	24.2°	24.4°	24.5°	35.3°
G	0.741	0.697	0.696	0.697	0.653

B	0.758	0.767	0.756	0.766	0.766
t°	35.4°	43.5°	43.5°	59.2°	59.2°
G	0.657	0.619	0.627	0.562	0.566

From these results the following table is obtained by interpolation.

The barometer being 0m.760, and temperature at °C.	1 gramme of water absorbs grms. of H Cl.	The barometer being 0m.760 and temperature at °C.	1 gramme of water absorbs grms. of H Cl.
0°	0.825	32°	0.665
2°	0.814	34°	0.657
4°	0.804	36°	0.649
6°	0.793	38°	0.641
8°	0.783	40°	0.633
10°	0.772	42°	0.626
12°	0.762	44°	0.618
14°	0.752	46°	0.611
16°	0.742	48°	0.603
18°	0.731	50°	0.596
20°	0.721	52°	0.589
22°	0.710	54°	0.582
24°	0.700	56°	0.575
26°	0.691	58°	0.568
28°	0.682	60°	0.561
30°	0.673		

(Roscoe & Dittmar, *Ann. Ch. u. Pharm.*, 1859, **112.** p. 336, and fig.)

Solubility of H Cl in water at 0°, under different degrees of pressure, by experiment.

P*	0.058	0.321	0.569	0.735	0.737
G*	0.614	0.746	0.796	0.824	0.821

P*	0.755	0.932	0.937	1.263	1.270
G*	0.827	0.851	0.851	0.890	0.887

From these results the following table is obtained by interpolation.

P* m.	G*	P* m.	G*
0.06	0.613	0.35	0.751
0.07	0.628	0.40	0.763
0.08	0.640	0.45	0.772
0.09	0.649	0.50	0.782
0.10	0.657	0.55	0.791
0.11	0.664	0.60	0.800
0.12	0.670	0.65	0.808
0.13	0.676	0.70	0.817
0.14	0.681	0.75	0.824
0.15	0.686	0.80	0.831
0.175	0.697	0.90	0.844
0.20	0.707	1.00	0.856
0.225	0.716	1.10	0.869
0.25	0.724	1.20	0.882
0.275	0.732	1.30	0.895
0.30	0.738		

(Roscoe & Dittmar, *Ann. Ch. u. Pharm.*, 1859, **112.** p. 334, and fig.)

Percentage of Chlorhydric Acid Gas in aqueous chlorhydric acid.

Sp. Gr.	Per cent H Cl gas.	Per cent of acid of 1.20 sp. gr.
1.2000	40.777	100
1.1982	40.369	99
1.1964	39.961	98
1.1946	39.554	97
1.1928	39.146	96
1.1910	38.738	95
1.1893	38.330	94
1.1875	37.923	93
1.1857	37.516	92
1.1846	37.108	91
1.1822	36.700	90
1.1802	36.292	89
1.1782	35.884	88
1.1762	35.476	87
1.1741	35.068	86
1.1721	34.660	85
1.1701	34.252	84
1.1681	33.845	83
1.1661	33.437	82
1.1641	33.029	81
1.1620	32.621	80
1.1599	32.213	79
1.1578	31.805	78
1.1557	31.398	77
1.1536	30.990	76
1.1515	30.582	75
1.1494	30.174	74
1.1473	29.767	73
1.1452	29.359	72
1.1431	28.951	71
1.1410	28.544	70
1.1389	28.136	69
1.1369	27.728	68
1.1349	27.321	67
1.1328	26.913	66
1.1308	26.505	65
1.1287	26.098	64
1.1267	25.690	63
1.1247	25.282	62
1.1226	24.874	61
1.1206	24.466	60
1.1185	24.058	59
1.1164	23.650	58
1.1143	23.242	57
1.1123	22.834	56
1.1102	22.426	55
1.1082	22.019	54
1.1061	21.611	53

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* See foot of the first column on p. 31 of this work.

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Sp. Gr.	Per cent H Cl gas.	Per cent of acid of 1.20 sp. gr.
1.1041	21.203	52
1.1020	20.796	51
1.1000	20.388	50
1 0980	19.980	49
1.0960	19.572	48
1.0939	19.165	47
1.0919	18.757	46
1.0899	18.349	45
1.0879	17.941	44
1.0859	17.534	43
1.0838	17.126	42
1.0818	16.718	41
1.0798	16.310	40
1.0778	15.902	39
1.0758	15.494	38
1.0738	15.087	37
1.0718	14.679	36
1.0697	14.271	35
1.0677	13.863	34
1.0657	13.456	33
1.0637	13.049	32
1.0617	12.641	31
1.0597	12.233	30
1.0577	11.825	29
1.0557	11.418	28
1.0537	11.010	27
1.0517	10.602	26
1.0497	10.194	25
1.0477	9.786	24
1.0457	9.379	23
1.0437	8.971	22
1.0417	8.563	21
1.0397	8.155	20
1.0377	7.747	19
1.0357	7.340	18
1.0337	6.932	17
1.0318	6.524	16
1.0298	6.116	15
1.0279	5.709	14
1.0259	5.301	13
1.0239	4.893	12
1.0220	4.486	11
1.0200	4.078	10
1.0180	3.670	9
1.0160	3.262	8
1.0140	2.854	7
1.0120	2.447	6
1.0100	2.039	5
1.0080	1.631	4
1.0060	1.224	3
1.0040	0.816	2
1.0020	0.408	1

(Ure, in his *Dict. Chem.*, London, 1823, p. 59; also in his *Dict. Arts*, Boston, 1853, **2.** 248; and in Gmelin's *Handbook*, **2.** 325.)

Sp. Gr. at 7.22°.	Per cent H Cl gas.	Sp. Gr. at 7.22°.	Per Cent H Cl gas.
1.21	42.43	1.10	20.20
1.20	40.80	1.09	18.18
1.19	38.38	1.08	16.16
1.18	36.36	1.07	14.14
1.17	34.34	1.06	12.12
1.16	32.32	1.05	10.10
1.15	30.30	1.04	8.08
1.14	28.28	1.03	6.06
1.13	26.26	1.02	4.04
1.12	24.24	1.01	2.02
1.11	22.22		

(Edmund Davy.)

From Davy's results Osann (*Kastner's Archiv.*, 1824, **3.** 372) deduces the formula: $Y = 2.02\ X$, by which to calculate intermediate values; in this formula, $X =$ the sp. gr. of the acid solution, and Y the percentage of H Cl contained in the solution.

An aqueous solution of sp. gr. (at 15.56°)	Contains per cent by weight of H Cl.	Boiling-point.
1.500 ?	47.8	15.56°
1.199	25.6	48.89° ?
1.181	23.4	62.78° ?
1.166	21.6	76.67°
1.154	20.0	87.78°
1.114	18.7	100.00°
1.136	17.5	102.78°
1.127	16.4	105.56°
1.121	15.5	108.89°
1.094	12.1	111.11°
1.075	9.91	108.89°
1.064	8.40	107.22°
1.047	6.49	105.56°
1.035	5.21	103.89°
1.018	2.65	102.22°
1.009	1.36	101.11°

(Kirwan, "with some little addition [as the column of boiling-points] and modification" by Dalton, in his *New System*, **2.** 295.)

Sp. gr.	H Cl per cent.	Sp. gr.	H Cl per cent.
1.203	40.659	1.1060	22.700
1.179	37.000	1.1008	21.512
1.162	33.945	1.0960	20.442
1.149	31.346	1.0902	19.474
1.139	29.134	1.0860	18.590
1.1285	27.206	1.0820	17.790
1.1197	25.517	1.0780	17.051
1.1127	24.026		

(T. Thomson, in his *System*, **2.** 189.)

Chlorhydrate of Ace*di*amin. Soluble in water, alcohol, and a mixture of alcohol and ether. (Strecker, *Ann. Ch. u. Pharm.*, **103.** 328.)

$C_4 H_6 N_2, H Cl$

Chlorhydrate of Acetamid. Readily soluble in water. Readily soluble in warm, less soluble in cold absolute alcohol. (Strecker, *Ann. Ch. u. Pharm.*, **103.** 321.)

$2 C_4 H_5 N O_2, H Cl$

Chlorhydrate of Acetos[Acetoyl]amin. Soluble in water. The concentrated aqueous solution is not miscible with alcohol, separating as a heavy stratum when mixed therewith. It is not precipitated from its dilute aqueous solution by alcohol. (Natanson, *Ann. Ch. u. Pharm.*, **92.** 56.)

(*Chloride of Acetylammonium*(*of Natanson*).)

Chlorhydrate of Aconitin.

$C_{60} H_{47} N O_{14}, 2 H Cl$

Chlorhydrate of Acrolein. Insoluble in water. Readily soluble in alcohol, and ether. Decomposed by strong chlorhydric acid, also by dilute sulphuric and nitric acids. It does not appear to be altered by boiling with water or by the action of dilute solutions of the alkalies. (Geuther & Cartmell.)

$C_6 H_4 O_2, H Cl$

Chlorhydrate of Alanin.

I.) $C_6 H_7 N O_4, H Cl$ Very deliquescent. Very soluble in water, and alcohol.

II.) $2 C_6 H_7 N O_4, H Cl$ Very soluble in water. Sparingly soluble in alcohol.

Chlorhydrate of Alanin with *sesqui*Chloride of Iron. Soluble in 2 pts. of cold, and in

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4 pts. of boiling water. Soluble in oil of cumin. (Unverdorben.)

Chlorhydrate of Allylamin. Soluble in water.

Chlorhydrate of *tri*Allylamin. $NC_{18}H_{15}, HCl$ Soluble in water.

Chlorhydrate of Amarin. $C_{42}H_{18}N_2, HCl$ Sparingly soluble in boiling water. Easily soluble in alcohol, and ether.

Chlorhydrate of "AmidoBenzoic Acid." *Vid.* Chlorhydrate of Benzamic Acid.

Chlorhydrate of *bi*AmidoBenzoic Acid. $C_{14}H_8N_2O_4, 2HCl$ Very easily soluble in water, alcohol, and ether; but only sparingly soluble in chlorhydric acid. The aqueous solution is decomposed on exposure to the air. (Voit.)

Chlorhydrate of AmidoSulphoBenzid. $C_{24}H_9(NH_2)S_2O_4, HCl$ Easily soluble in water, and alcohol. The aqueous solution is partially decomposed when heated. (Gericke, *Ann. Ch. u. Pharm.*, **100.** 212.)

***Bi*Chlorhydrate of *bi*AmidoSulphoBenzid.** $C_{24}H_8(NH_2)_2S_2O_4, 2HCl$ Readily soluble in water, and alcohol. (Gericke, *loc. cit.*)

Chlorhydrate of Ammolin (of Unverdorben). Soluble in water, and alcohol. Insoluble in ether.

Chlorhydrate of Ammonia & of Urea. $2(C_2H_4N_2O_2, NH_4Cl)$; $C_2H_4N_2O_2, HCl$ Readily soluble in water. (Beckmann.)

Chlorhydrate of Amylamin. Permanent. $N\left\{\begin{matrix}C_{10}H_{11}\\H_2\end{matrix}\right., HCl$ Tolerably soluble in water. Soluble in absolute alcohol. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 493.) Sparingly soluble, or insoluble, in absolute ether. (Cahours & Cloez.)

Chlorhydrate of *di*Amylamin. Almost $N\left\{\begin{matrix}(C_{10}H_{11})_2\\H\end{matrix}\right., HCl$ insoluble in cold, more soluble in warm water.

Chlorhydrate of *tri*Amylamin.
$N\left\{(C_{10}H_{11})_3\right., HCl$

Chlorhydrate of AmylAnilin. Rather sparingly soluble in water.

Chlorhydrate of *di*AmylAnilin. Nearly insoluble in water, and in dilute chlorhydric acid. Soluble in alcohol.

Chlorhydrate of AmylChinolin. Soluble in water. (Gr. Williams.)

"**Chlorhydrate of Amylene.**" *Vid.* Chloride of Amyl.

Chlorhydrate of AmylPiperidin. Soluble $N\left\{\begin{matrix}C_{10}H_{11}\\C_{10}H_{10}'''\end{matrix}\right., HCl$ in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 100.)

Chlorhydrate of AmylStrychnine. $C_{42}H_{21}(C_{10}H_{11})N_2O_4, HCl + 8Aq$ Soluble in water. Very easily soluble in alcohol. Insoluble in caustic potash. Ammonia-water decomposes it after a time. (How.)

Chlorhydrate of Anchietin. Crystallizes from hot water, after which it is insoluble in water. (Parrish's *Pharm.*, p. 399.)

Chlorhydrate of Anilin. $C_{12}H_7N, HCl$ Very readily soluble in water, and alcohol. (Zinin.) Very soluble in water, and alcohol. Insoluble in ether. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 151.) It is partially precipitated from the aqueous solution on the addition of concentrated chlorhydric acid. (Hofmann, *J. Ch. Soc.*, **1.** 272.)

Chlorhydrate of Animin (of Unverdorben). Soluble in water.

Chlorhydrate of Anisamate of Ethyl. $N\left\{\begin{matrix}C_{16}H_7O_4\\C_4H_5\\H\end{matrix}\right. . O_2, HCl$ Sparingly soluble in cold, easily soluble in boiling water. Still more easily soluble in alcohol. Tolerably readily soluble in ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 348.)

Chlorhydrate of Anisamate of Methyl. $N\left\{\begin{matrix}C_{16}H_7O_4\\C_2H_3\\H\end{matrix}\right. . O_2, HCl$ Sparingly soluble in cold, very readily soluble in boiling water, and still more easily in alcohol. Soluble in chlorhydric acid. (Cahours, *Ibid.*, p. 351.)

Chlorhydrate of Anisamic Acid. $N\left\{\begin{matrix}C_{16}H_7O_4\\H_2\end{matrix}\right\}O_2, HCl$ Tolerably soluble in water, even when this is cold, but scarcely at all soluble in chlorhydric acid. Tolerably easily soluble in boiling, less soluble in cold alcohol. Very sparingly soluble in ether. Chlorhydric acid precipitates it from the aqueous solution. (Cahours, *Ibid.*, p. 342.)

Chlorhydrate of Anisene. $C_{16}H_8O_2, HCl$? Insoluble in water.

Chlorhydrate of Anisin. $C_{48}H_{24}N_2O_6, HCl + 2Aq$ Sparingly soluble in water. Readily soluble in alcohol. (Bertagnini, *Ann. Ch. u. Pharm.*, **88.** 128.)

Chlorhydrate of Anisol.
$C_{20}H_{12}O_2, HCl$

Chlorhydrate of Anthranilic Acid. $C_{14}H_7NO_4, HCl$ Soluble in warm concentrated chlorhydric acid, separating out again as the solution cools. (Kubel.)

Chlorhydrate of Antimonious Acid. Soluble in chlorhydric acid; the solution is decomposed, with precipitation, by a small quantity of water, but a large amount of water produces no precipitate.

Chlorhydrate of Aricin. $C_{46}H_{26}N_2O_8, HCl$ Soluble in hot, less soluble in cold dilute alcohol.

Chlorhydrate of Arnicin.

Chlorhydrate of Asparagin.

I.) $C_8H_8N_2O_6, HCl$ Permanent. Soluble in water, less soluble in alcohol.

II.) *basic.* $2C_8H_8N_2O_6, HCl$ Permanent. Soluble in water; less soluble in alcohol. (Dessaignes, *Ann. Ch. et Phys.*, (3.) **34.** 152.)

Chlorhydrate of Aspartic Acid.
$C_8H_7NO_8, HCl$

α (*active.*) Deliquesces and decomposes in the air. It is decomposed, with precipitation of aspartic acid (active), when dissolved in water, unless this be acidulated with chlorhydric acid. (Pasteur.)

β (*inactive.*) Permanent. It is decomposed when dissolved in water, though no precipitation occurs, owing to the fact that inactive aspartic acid is readily soluble in water. (Pasteur, *Ann. Ch. et Phys.*, (3.) **34.** 37.)

Chlorhydrate of Atropin. Permanent. Soluble in water. (Geiger & Hesse.) Easily soluble in water, and alcohol. Difficultly soluble in ether. (v. Planta.)

***Bi*Chlorhydrate of AzoNaphthylamin.**

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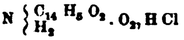
$C_{20}H_{10}N_2, 2HCl$ Sparingly soluble in water, and alcohol. (Zinin.)

Chlorhydrate of AzoPhenylamin. Nearly insoluble in water, alcohol, and ether. (Zinin.)

Chlorhydrate of Bebirin. Readily soluble in water.

Chlorhydrate of Benzamate of Ethyl.

$C_{18}H_{12}NClO_4 = N\left\{\begin{matrix}C_{14}H_5O_2\\C_4H_5\\H\end{matrix}\right..O_2, HCl$
Easily soluble in alcohol; less soluble in ether. Soluble in chlorhydric acid. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 328.)

Chlorhydrate of Benzamic Acid.

$N\left\{\begin{matrix}C_{14}H_5O_2\\H_2\end{matrix}\right..O_2, HCl$
Tolerably readily soluble in pure water, and alcohol; but very sparingly soluble in these liquids when they are charged with chlorhydric acid. More soluble in hot than in cold chlorhydric acid. Ether does not precipitate it from the alcoholic solution. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 324.)

Chlorhydrate of Benzamid. Very instable. (Dessaignes.)
$C_{14}H_7NO_2, HCl$

***Bi*Chlorhydrate of Benzidin.** Permanent. Very soluble in water; still more soluble in alcohol. Almost insoluble in ether.
$C_{24}H_{12}N_2, 2HCl$

Chlorhydrate of Benzylene. *Vid.* Chloride of Toluenyl.

Chlorhydrate of Berberin. Soluble in 600 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 75.) Soluble in alcohol.
$N\}C_{42}H_{19}O_{10}{}''', HCl + 4Aq$

Chlorhydrate of Berberin with Glycocoll. Insoluble, or very sparingly soluble, in water. Soluble in hot spirit. (Horsford, *Am. J. Sci.*, (2.) **4.** 65.)
$C_{42}H_{18}NO_9, C_4H_4NO_8, HCl$

Chlorhydrate of Bergamot-Oil. Soluble in alcohol. (Ohme.)
$3C_{20}H_{16}, HCl + Aq$

Chlorhydrate of Borneol. Insoluble in water. Soluble in alcohol. (Berthelot.)
(*Camphol Chlorhydrique.*)
$C_{20}H_{16}, HCl$

Chlorhydrate of *bi*BromAllylamin. Readily soluble in water, and alcohol. Sparingly soluble in ether. (M. Simpson.)
$C_{12}H_9Br_2N, HCl$

Chlorhydrate of BromAnilin. Soluble in water.
$C_{12}H_6BrN, HCl$

Chlorhydrate of *bi*BromAnilin. Decomposed by warm water.
$C_{12}H_5Br_2N, HCl$

***Bi*Chlorhydrate of BromoCinchonin.** Tolerably soluble in boiling alcohol. (Laurent, *Ann. Ch. et Phys.*, (3.) **24.** 307.)
$C_{40}H_{23}BrN_2O_2, 2HCl$

***Bi*Chlorhydrate *of sesqui*BromoCinchonin.** Soluble in boiling, less soluble in cold alcohol. (Laurent.)
$C_{80}H_{45}Br_3N_4O_4, 4HCl$

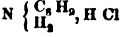
***Bi*Chlorhydrate of *bi*BromoCinchonin.** Sparingly soluble in boiling, less soluble in cold water.
$C_{40}H_{22}Br_2N_2O_2, 2HCl$

Chlorhydrate of BromoCodein.

Chlorhydrate of *bi*BromoMelanilin. Only slightly soluble in water. (Hofmann, *J. Ch. Soc.*, **1.** 300.)
$C_{26}H_{11}Br_2N_3, HCl$

Chlorhydrate of BromoStrychnine. Soluble in alcohol.

Chlorhydrate of Brucin. Permanent. Tolerably easily soluble in water.
$C_{46}H_{26}N_2O_8, HCl$

Chlorhydrate of Butylamin. Deliquescent. Soluble in water. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **42.** 166.)
(*Chlorhydrate of Tetrylamin.*)

$N\left\{\begin{matrix}C_8H_9\\H_2\end{matrix}\right., HCl$

Chlorhydrate of Cacothelin. Decomposed by water. Soluble in chlorhydric acid. (Strecker.)

Chlorhydrate of Caffein.

I.) *normal.* Efflorescent, and decomposes in the air. Decomposed by water, and alcohol. Insoluble in ether. Caffein is easily soluble in concentrated chlorhydric acid; but if water or alcohol be added to this solution, a considerable quantity of hydrated caffein crystallizes out. (Herzog.)
$C_{16}H_{10}N_4O_4, HCl$

II.) *acid.* Decomposed by much water, with separation of caffein.
$C_{16}H_{10}N_4O_4, 2HCl$

Chlorhydrate of Cajputene.

I.) *mono.*
$C_{20}H_{16}, HCl$

II.) *bi.* Sparingly soluble in cold, easily soluble in boiling alcohol, and ether. (Max. Schmidl.)
$C_{20}H_{16}, 2HCl$

Chlorhydrate of Caoutchin. Soluble in absolute alcohol, in ether, and acetate of ethyl, but on adding water or weak alcohol to either of these solutions the whole of the caoutchin is precipitated. (Himly.)
$C_{20}H_{16}, HCl$

Chlorhydrate of *tri*Caproylamin. Deliquescent. Soluble in water, and alcohol. (Gœssmann & Petersen.) Sparingly soluble in water. Easily soluble in alcohol, and ether. (Petersen, *Ann. Ch. u. Pharm.*, **102.** 314.)
$N\}(C_{12}H_{13})_3, HCl$

Chlorhydrate of Caprylamin. *Vid.* Chlorhydrate of Octylamin.

Chlorhydrate of Carapin. Soluble in water.

Chlorhydrate of Carvene. Readily soluble in water, but is decomposed when heated therewith. Easily soluble in hot, rather difficultly soluble in cold alcohol. (Schweizer.)
$C_{20}H_{16}, 2HCl$

Chlorhydrate of Carvol.
$C_{20}H_{14}O_2, HCl$

Chlorhydrate of Cetyl. Soluble in alcohol, especially if this is boiling.

Chlorhydrate of *tri*Cetylamin. Soluble in boiling alcohol.

Chlorhydrate of CetylAnilin. Soluble in alcohol.

Chlorhydrate of *di*CetylAnilin. Somewhat soluble in alcohol.

Chlorhydrate of Chelidonin. Soluble in 325 pts. of water at 18°. Insoluble in ether. (Probst, *Ann. der Pharm.*, 1839, **29.** 127.) Sparingly soluble in alcohol.

Chlorhydrate of ChlorAnilin. Permanent. Soluble in water.
$C_{16}H_6ClN, HCl$

Chlorhydrate of ChlorEtherose. *Vid.* Chloride of *ter*ChlorEthylene.

Chlorhydrate of Chloride of Antimony. Is rendered cloudy when treated with a small quantity of water, but remains clear if a large excess of water be at once added to it.
$SbCl_5, HCl$

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It is as easily precipitated by strong acetic acid as by water. (R. Phillips.)

Chlorhydrate of Chloride of Ethyl with *bin*Oxide of Tin. Soluble in alcohol.
$2 C_4 H_5 Cl, H Cl, 2 Sn O_2 + Aq$

Chlorhydrate of *ter*Chloride of Gold. Deliquescent. Not quite so soluble in water as terchloride of gold. (Berzelius.) Slowly decomposed by alcohol. Decomposed by glycerin. Strong sulphuric acid precipitates out the terchloride of gold in the cold, and decomposes it on boiling.

Chlorhydrate of Chloride of Ruthenium. Soluble in water.
$Ru Cl, H Cl$

Chlorhydrate of Chloride of Silicium.
$Si_2 Cl_3, 2 H Cl$ Instantly decomposed by water. Soluble in large quantity, probably with decomposition, in alcohol, and ether. (Buff & Wœhler, *Ann. Ch. u. Pharm.*, **104.** 97.)

Chlorhydrate of *ter*ChloroBenzin.
(*Ter Chloride of Benzin. Chlor Benzin. ChloroBenzol. Chloro Benzone. Chlorhydrate of Chlorophenise. Hydrochlorate of ter ChloroBenzene.*)
$C_{12} H_6 Cl_6 = C_{12} H_3 Cl_3, 3 H Cl$
Insoluble in water. Sparingly soluble in cold, readily soluble in hot alcohol. Readily soluble in ether. (Mitscherlich, Peligot.)

Chlorhydrate of ChloroBenzoenise. *Vid.* Chloride of ChloroToluene.

Chlorhydrate of ChloroCamphilene.
$C_{20} H_{15} Cl, H Cl$

*Bi*Chlorhydrate of *bi*ChloroCinchonin.
$C_{40} H_{22} Cl_2 N_2 O_2, 2 H Cl$ Sparingly soluble in water. Soluble in about 50 pts. of alcohol. (Laurent, *Ann. Ch. et Phys.*, (3.) **24.** 305.)

Chlorhydrate of ChloroCodein. Very soluble in water.

Chlorhydrate of *bi*ChloroMelAnilin.
$C_{26} H_{11} Cl_2 N_3, H Cl$ Sparingly soluble in water, more readily soluble in alcohol, and still more readily soluble in ether. (Hofmann, *J. Ch. Soc.*, **1.** 299.)

Chlorhydrate of ChloroNaphthalin. *Vid.* Chloride of ChloroNaphthalin.

Chlorhydrate of ChloroNicine. Readily soluble in water, even when this is cold. (St. Evre.)
$C_{20} H_{12} Cl_2 N_2, 2 H Cl$

Chlorhydrate of ChloroNitroHarmin. Tolerably soluble in water; less soluble in chlorhydric acid. Soluble in boiling, less soluble in cold alcohol.

Chlorhydrate of Chlorophenise. *Vid. ter*Chloride of Benzin.

Chlorhydrate of *ter*ChloroPicolin. Insoluble in water. Soluble in alcohol.
$N \left\{ C_{12} H_4 Cl_3''' \right., H Cl$

Chlorhydrate of ChloroStilbene. *Vid.* Chloride of Stilbene.

Chlorhydrate of *bi*ChloroStilbene. *Vid.* Chloride of ChloroStilbene.

Chlorhydrate of *bi*ChloroSulphoBenzid.
$C_{24} H_8 Cl_2 S_2 O_4, 2 H Cl$ Insoluble in water. Soluble in spirit, and ether. Soluble, without decomposition, in dilute alkaline solutions, and in dilute sulphuric and chlorhydric acids. Decomposed by nitric acid. (Gericke, *Ann. Ch. u. Pharm.*, **100.** 213.)

Chlorhydrate of ChloroToluene.
(*Chloride of biChloroToluene. Chlorhydrate of Chlorobenzoenise. HydroChlorate of terChloroToluol. Chloride of Toluenebichloré.*)
$C_{14} H_6 Cl_4 = C_{14} H_5 Cl_3, H Cl$

Chlorhydrate of *bi*ChloroToluene.
(*ChloroDracyl.*)
$C_{14} H_6 Cl_4 = C_{14} H_6 Cl_2, 2 H Cl$

*Bi*Chlorhydrate of *quinqui*ChloroToluene.
(*BiChloride of terChloroToluene. BiHydroChlorate of Chlorobenzoenise. BiHydroChlorate of quinquiChloroToluol. BiChloride of Toluenechloré.*)
$C_{14} H_5 Cl_7 = C_{14} H_3 Cl_5, 2 H Cl$
Soluble in ether. (Deville.)

*Ter*Chlorhydrate of *quinqui*ChloroToluene.
(*TerChloride of biChloroToluene. TerHydroChlorate of quintiChloroToluol. TriChloride of Toluenebichloré.*)
$C_{14} H_6 Cl_8 = C_{14} H_3 Cl_5, 3 H Cl$
Soluble in ether, especially when this is heated under increased pressure. (Deville.)

"Chlorhydrate of ChloroToluol." *Vid.* Chloride of ChloroToluene.

Chlorhydrate of Cholesterin. Insoluble, or very sparingly soluble, in water. Soluble in ether.

I.) Chlorhydrate of Cinchonidin (of Wittstein). Soluble in 27 pts. of cold, and in 0.5 pt. of boiling water; in 5.4 pts. of cold, and in 0.5 pt. of boiling alcohol; and in 10.5 pts. of ether.
$C_{36} H_{20} N_2 O_2, 2 H Cl + 14 Aq$

II.) Chlorhydrate of Cinchonidin (of Pasteur).

a = *normal.* Soluble in 27 pts. of water at 17°. Very easily soluble in alcohol; almost completely insoluble in ether. (Leers, *Ann. Ch. u. Pharm.*, **82.** 155.)
$C_{40} H_{24} N_2 O_2, H Cl + 2 Aq$

b = *acid.* Very easily soluble in water, and spirit. (Leers, *loc. cit.*, p. 156.)
$C_{40} H_{26} N_2 O_2, 2 H Cl + 2 Aq$

Chlorhydrate of α Cinchonin.

I.) *normal.* Easily soluble in water, and alcohol. Almost insoluble in ether.
$C_{40} H_{24} N_2 O_2, H Cl$

II.) *acid.* Very soluble in water, somewhat less soluble in alcohol. (Laurent, *Ann. Ch. et Phys.*, (3.) **24.** 303.) "Chlorhydrate of Cinchonin" is soluble in 24 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.)
$C_{40} H_{24} N_2 O_2, 2 H Cl$

Chlorhydrate of β Cinchonin. Soluble in 22 pts. of cold, and in 3.2 pts. of hot water; in 1 pt. of cold, and in 0.5 pt. of boiling alcohol; and in 550 pts. of ether. (W. Schwabe, in *Kopp & Will's J. B., für* 1860, p. 363.)
$C_{40} H_{24} N_2 O_2, H Cl + 4 Aq$

Chlorhydrate of Citrene.
" " Citronyl.
" " Citryl.
" " Citrylene.
} *Vid.* Chlorhydrate of Lemon-Oil.

Chlorhydrate of *di*Cobaltamin. *Vid.* Chloride of LuteoCobalt.

Chlorhydrate of Codein. Soluble in 20 pts. of water at 15.5°, and in less than 1 pt. of boiling water.
$C_{36} H_{21} N O_6, H Cl + 4 Aq$

Chlorhydrate of Conhydrin. Soluble in water, and alcohol. (Th. Wertheim.)

Chlorhydrate of Coniin. Permanent.

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$C_{16}H_{15}N, HCl$ (Wertheim.) Deliquescent. (Liebig & Blyth.) Extremely soluble in water. [Very soluble in alcohol, and ether.] (Blyth, *J. Ch. Soc.*, **1.** 353.)

Chlorhydrate of Copaiba-Oil.

I.) *solid.* Insoluble in water, or cold alcohol. Sparingly soluble in hot alcohol. Easily soluble in ether. (Blanchet.)

(*Copaiba-Camphor.*) $C_{20}H_{16}, 2HCl$

II.) *liquid.* Soluble in alcohol, and ether. (Gerber.)

(*Chlorhydrate of Copahilene.*)

Chlorhydrate of Corydalin. Easily soluble in water. Also soluble in strong alcohol.

Chlorhydrate of Cotarnin. Readily soluble in water.

$C_{26}H_{13}NO_6, HCl + 5 Aq$

Chlorhydrate of Creatin. Permanent. Soluble in water. (Dessaignes.)

$C_8H_9N_3O_4, HCl$

Chlorhydrate of Creatinin. Very soluble in water. Tolerably soluble in alcohol.

Chlorhydrate of CreatininZinc. Very difficultly soluble in water. Insoluble in alcohol, and ether.

$C_8H_6ZnN_3O_2, HCl$

Chlorhydrate of Cubebene. Readily soluble in alcohol.

$C_{30}H_{24}, 2HCl$

Chlorhydrate of Cumaramin. Easily soluble in water. (Frappoli & Chiozza.)

Chlorhydrate of Cumarin. Readily soluble in water.

Chlorhydrate of Cumidin. Soluble in water, and alcohol. (Nicholson, *J. Ch. Soc.*, **1.** 7.)

$C_{18}H_{13}N, HCl$

Chlorhydrate of Cuminamate of Ethyl. Easily soluble in water, and alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 340.)

Chlorhydrate of Cuminamic Acid. Tolerably easily soluble in water. Difficultly soluble in boiling chlorhydric acid, separating out again as the solution cools; more easily soluble in a mixture of alcohol and chlorhydric acid. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 335.)

$N\left\{\begin{array}{l}C_{20}H_{11}O_2\\H_2\end{array}\right. . O_2, HCl$

Chlorhydrate of Curarin.

Chlorhydrate of Cyamelid. Soluble, with decomposition and evolution of much heat, in water, and alcohol.

(*Chlorhydrate of Cyanic Acid* (CyO,HO,H Cl).)

$C_2H_2NO_2Cl = N\left\{\begin{array}{l}C_2O_2''\\H\end{array}\right., HCl$

Chlorhydrate of CyanAnilin. Extremely soluble in water, and alcohol. These solutions are partially decomposed on evaporation. Insoluble in concentrated chlorhydric acid, which precipitates it from the aqueous solution. Readily soluble in dilute chlorhydric acid, the solution undergoing decomposition when evaporated. Insoluble in ether. (Hofmann, *J. Ch. Soc.*, **1.** 164.)

$N\left\{\begin{array}{l}C_{12}H_5\\H_2\end{array}\right. . C_2N, HCl$

Chlorhydrate of CyanicAcid. *Vid.* Chlorhydrate of Cyamelid.

Chlorhydrate of Cyanethin. Very soluble in water. Soluble in alcohol. (Kolbe & Frankland, *J. Ch. Soc.*, **1.** 72.)

$C_{18}H_{15}N_3, HCl$

Chlorhydrate of Cyanetholin. Soluble in water.

Chlorhydrate of Cyanide of Ethyl. Instantly decomposed by water. (Habich & Limpricht.)

$C_2(C_4H_5)NO_2, HCl$

Chlorhydrate of CyanoCodein. Easily decomposed.

Chlorhydrate of CyanoCumidin. Exceedingly sparingly soluble in water. (Hofmann.)

$NC_{18}H_{12}(C_2N), HCl$

Chlorhydrate of Cymidin. Soluble in water. (Barlow, *Ann. Ch. u. Pharm.*, **98.** 250.)

$C_{20}H_{15}N, HCl$

Chlorhydrate of Cystin. Permanent. Nearly insoluble in water. (O. Henry.)

$C_6H_6NS_2O_4, HCl$

Chlorhydrate of Delphin (or Delphinin). Deliquescent. Soluble in water.

Chlorhydrate of Elemi-Oil.

I.) *solid.*

$C_{20}H_{16}, 2HCl$

II.) *liquid.*

Chlorhydrate of Ethylamin. Very deliquescent. Soluble in water. Soluble in strong boiling alcohol. Less soluble in cold alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 480.) Soluble in mixed alcohol and ether. (Gœssmann.)

$N\left\{\begin{array}{l}C_4H_5\\H_2\end{array}\right., HCl$

Chlorhydrate of Ethylamin with Cyanide of Mercury. Permanent. Easily soluble in water. Difficultly soluble in cold spirit.

$C_4H_7N, HCl; 2HgC_2N$

Chlorhydrate of *di*EthylAmylamin. Deliquescent.

$C_{18}H_{22}NCl = N\left\{\begin{array}{l}(C_4H_5)_2\\C_{10}H_{11}\end{array}\right\}, HCl$

Chlorhydrate of EthylAmylAnilin.

Chlorhydrate of EthylAnilin. Soluble in water, and alcohol. (Hofmann.)

Chlorhydrate of *di*EthylAnilin. Soluble in water, and alcohol.

Chlorhydrate of EthylBrucin. *Vid.* Chloride of EthylBrucin.

Chlorhydrate of EthylCodein. Soluble in water. (How, *J. Ch. Soc.*, **6.** 136.)

Chlorhydrate of EthylConiin. Very deliquescent.

Chlorhydrate of Ethyl*di*Cyan*bi*amin. Soluble in water.

Chlorhydrate of Ethyl CyanAnilin. Very sparingly soluble in concentrated chlorhydric acid.

Chlorhydrate of *di*Ethylene *di*Phenyl*bi*amin.

$N_2\left\{\begin{array}{l}(C_4H_4'')_2\\(C_{12}H_5)_2\end{array}\right., 2HCl$

Chlorhydrate of EthylMorphin. Soluble in water. Soluble in a mixture of alcohol and ether. (How, *J. Ch. Soc.*, **6.** 128.)

Chlorhydrate of Ethyl*tri*Phenylamin. Deliquescent. Soluble in water. (Gœssmann.)

(*Chlorhydrate of EthylbiCinnamylamin.*)

Chlorhydrate of EthylPhosphin.

Chlorhydrate of EthylPhtalidin. Soluble in water. (Dusart, *Ann. Ch. et Phys.*, (3.) **45.** 337.)

Chlorhydrate of EthylPiperidin. Soluble in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 97.)

$C_{14}H_{15}N, HCl$

Chlorhydrate of *di*EthylPlatin(*ous*)*bi*amin. Tolerably soluble in water. Sparingly soluble in alcohol. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 485.)

$N_2\left\{\begin{array}{l}(C_4H_5)_2\\H_2\\Pt'\end{array}\right., HCl$

Chlorhydrate of EthylThiosinnamin. Soluble in water, and spirit. (Weltzien, *Ann. Ch. u. Pharm.*, **94.** 104.)

Chlorhydrate of EthylToluidin. Soluble in water.

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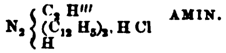
Chlorhydrate of Formicyl*di*Phenyl*bi*amin.



$N_2\left\{\begin{matrix}C_2\,H'''\\(C_{12}\,H_5)_2\\H\end{matrix}\right., H\,Cl$

Chlorhydrate of Fucusin. Very soluble in water.

Chlorhydrate of Furfurin. $C_{30}\,H_{12}\,N_2\,O_6, H\,Cl + 2\,Aq$ Readily soluble in water; less soluble in chlorhydric acid. (Fownes.)

Chlorhydrate of Glaucin. Readily soluble in water, and alcohol. Insoluble in ether.

Chlorhydrate of Glaucopicrin. Soluble in water. Insoluble in ether.

Chlorhydrate of Glyceramin. $C_6\,H_9\,N\,O_4.\,H\,Cl$ Extremely hygroscopic. Slowly, but entirely, soluble in absolute alcohol. Insoluble, or very sparingly soluble, in ether. (Berthelot & De Luca.)

Chlorhydrate of Glycerin. *Vid.* Chlorhydrin.

Chlorhydrate of Glycocoll.

I.) *normal.* $C_4\,H_5\,N\,O_4, H\,Cl$ Slowly deliquescent. Readily soluble in water, and in hot ordinary alcohol. Slightly soluble in absolute alcohol. (Horsford, *Am. J. Sci.*, (2.) **3.** 377.)

II.) *basic.* $2\,C_4\,H_5\,N\,O_4, H\,Cl$ Easily soluble in water, less soluble in alcohol.

Chlorhydrate of Glycocoll with Anhydrous Glycocoll.

I.) $C_4\,H_5\,N\,O_4, H\,Cl\,;\,C_4\,H_4\,N\,O_3$ Permanent. Soluble in water; also in spirit, though less so than in water. (Horsford, *Am. J. Sci.*, (2.) **3.** 378.)

II.) *basic.*
$2\,C_4\,H_5\,N\,O_4, H\,Cl\,;\,C_4\,H_4\,N\,O_3$

Chlorhydrate of Guanin.

I. *normal.*
$C_{10}\,H_5\,N_5\,O_2, H\,Cl + 2\,Aq$

II.) *acid.*
$C_{10}\,H_5\,N_5\,O_2, 2\,H\,Cl$

Chlorhydrate of Guanin with Chloride of Cadmium. $2\,(C_{10}\,H_5\,N_5\,O_2, H\,Cl)\,;\,5\,Cd\,Cl + 9\,Aq$ Permanent. Tolerably readily soluble in water, and in acids. (Neubauer & Kerner, *loc. cit.*)

Chlorhydrate of Guanin with Chloride of Zinc. $C_{10}\,H_5\,N_5\,O_2, H\,Cl\,;\,Zn\,Cl + 3\,Aq$ Difficultly soluble in water. Easily soluble in chlorhydric acid, and in a solution of caustic soda. (Neubauer & Kerner, *Ann. Ch. u. Pharm.*, **101.** 331.)

Chlorhydrate of Harmalin. $C_{26}\,H_{14}\,N_2\,O_2, H\,Cl + 4\,Aq$ Tolerably soluble in water, and alcohol. Very sparingly soluble in an aqueous solution of chloride of sodium, and even less soluble in a solution of nitrate of soda.

Chlorhydrate of Harmin. $C_{26}\,H_{12}\,N_2\,O_2, H\,Cl + 4\,Aq$ Soluble in water, and alcohol.

Chlorhydrate of Hexylamin. *Vid.* Chlorhydrate of Caproylamin.

Chlorhydrate of Hippuramic Acid. $C_{18}\,H_{10}\,N_2\,O_6, H\,Cl$ Gives off chlorhydric acid when exposed to the air. (Schwanert.)

Chlorhydrate of Huanokin. *Vid.* Chlorhydrate of Cinchonin.

Chlorhydrate of Hydride of Cinnamyl $C_{18}\,H_8\,O_2, H\,Cl$ (Cinnamic Aldehyde). Decomposed by water.

Chlorhydrate of HydroCyanHarmalin. $C_{26}\,H_{14}\,N_2\,O_2\,H\,Cy, H\,Cl$ Soluble in water, and alcohol.

Chlorhydrate of Igasurin. Soluble in 2 pts. of warm, and in about 4 pts. of cold water.

Chlorhydrate of IodAnilin. $C_{12}\,H_6\,I\,N, H\,Cl$ Only slightly soluble in cold water; from this solution it is almost entirely precipitated on the addition of chlorhydric acid. More soluble in boiling water. Soluble in alcohol. Insoluble in ether. (Hofmann, *J. Ch. Soc.*, **1.** 276.)

Chlorhydrate of *ter*Iodide of Nicotin.
$N_2\left\{(C_{10}\,H_7''')\right\}I_3, H\,Cl$

Chlorhydrate of *bin*IodoMelAnilin. $C_{26}\,H_{11}\,I_2\,N_3, H\,Cl$ Very sparingly soluble in hot, less soluble in cold water. (Hofmann.)

Chlorhydrate of IodoNicotin. $2\,C_{20}\,H_{14}\,N_2, 3\,I, 2\,H\,Cl$ Soluble in alcohol.

Chlorhydrate of Jervin. Very sparingly soluble in water, and in mineral acids. Soluble in alcohol.

Chlorhydrate of Juniper-Oil (or of Juniperilin).

Chlorhydrate of Lemon-Oil.

I.) *mono.*
$C_{20}\,H_{16}, H\,Cl$

II.) *bi.*
(*Chlorhydrate of Citronyl. Chlorhydrate of Citrene.*)
$C_{20}\,H_{16}, 2\,H\,Cl$ Insoluble in water. Soluble in 5.88 pts. of alcohol, of 0.806 sp. gr., at 14°. (Saussure.) Soluble in ether. (Blanchet & Sell.) Soluble in oil of lemon. (Saussure.) Less soluble in alcohol than the bichlorhydrate of turpentine-oil. (List.)

III.) "**Liquid Lemon-Camphor.**" (*Chlorhydrate of Citrylene. Chlorhydrate of Citryl.*) Soluble in spirit, from which it is precipitated on the addition of water.

Chlorhydrate of Lepidin.
$N\left\}C_{20}\,H_9''', H\,Cl\right.$

Chlorhydrate of Leucin.

I.) $C_{12}\,H_{13}\,N\,O_4, H\,Cl$ Readily soluble in water.

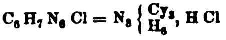
II.) $2\,C_{12}\,H_{13}\,N\,O_4, H\,Cl$ Soluble in ordinary alcohol. (Schwanert, *Ann. Ch. u. Pharm.*, **102.** 230.)

Chlorhydrate of Lobelin.

Chlorhydrate of Lophin. $C_{42}\,H_{16}\,N_2, H\,Cl + Aq$ Nearly insoluble in water. Tolerably easily soluble in alcohol. (Laurent.) More readily soluble in water, and alcohol than the pure base. (Gœssman & Atkinson.) Less soluble in alcohol and ether than the iodhydrate.

***Bi*Chlorhydrate of Mandarin-Oil.** Insoluble in water. Soluble in alcohol, and ether. (Luca.)

Chlorhydrate of Melamin.



$C_6\,H_7\,N_6\,Cl = N_3\left\{\begin{matrix}Cy_3\\H_6\end{matrix}\right., H\,Cl$

Chlorhydrate of MelAnilin. $C_{26}\,H_{13}\,N_3, H\,Cl$ Is the most soluble of the melanilin salts. [Compare Bromhydrate of MelAnilin.] (Hofmann, *J. Ch. Soc.*, **1.** 293.)

Chlorhydrate of MeNaphtylamin. $C_{42}\,H_{17}\,N_3, H\,Cl$ Moderately soluble in water. Very soluble in alcohol, and ether.

Chlorhydrate of Menthene.
(*ChloroMenthene.*)
$C_{20}\,H_{18}, H\,Cl$

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Chlorhydrate of Mesitylene. *Vid.* Chloride of Mesityl.

Chlorhydrate of Methylamin. $N\left\{\begin{matrix}C_2H_3\\H_2\end{matrix}\right., HCl$ Deliquescent. Soluble in water. Easily soluble in hot, less soluble in cold alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 456.)

Chlorhydrate of *bi*Methylamin. $N\left\{\begin{matrix}(C_2H_3)_2\\H\end{matrix}\right., HCl$ Very hygroscopic. Easily soluble in water; almost as soluble in alcohol; but far less soluble in ether. (Petersen, *Ann. Ch. u. Pharm.*, **102.** 322.)

Chlorhydrate of *tri*Methylamin. Very deliquescent. Very soluble in water. Soluble in absolute alcohol. (Winkles, *Ann. Ch. u. Pharm.*, **93.** 326.)

"**Chlorhydrate of Methylene.**" *Vid.* Chloride of Methyl.

Chlorhydrate of MethylEthylAmylamin. Soluble in water.

Chlorhydrate of MethylNitroPhenidin. $C_{14}H_8(NO_4)NO_2, HCl$ Sparingly soluble in cold, readily soluble in boiling water. Soluble in spirit. (Cahours, *Ann. Ch. et Phys.*, (3.) **27.** pp. 445, 447.)

Chlorhydrate of MethylPhenidin. (*Chlorhydrate of Anisidin.*) $C_{14}H_9NO_2, HCl$ Easily soluble, even in dilute alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **27.** 443; & **53.** 341.)

Chlorhydrate of *tri*MethylPhosphin. $P(C_2H_3)_3, HCl$. Ppt. (P. Thénard.)

Chlorhydrate of MethylPiperidin. $C_{12}H_{13}N, HCl$ Soluble in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 93.)

Chlorhydrate of MethylPlatin(*ous*)amin. $C_2H_6ClPtN = N\left\{\begin{matrix}C_2H_3\\H\\Pt'\end{matrix}\right., HCl$ Soluble in boiling, less soluble in cold water. Less soluble in water than the chlorhydrate of *di*methylplatin(*ous*)*bi*amin. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 464.)

Chlorhydrate of *di*MethylPlatin(*ous*)*bi*amin. $C_4H_{10}N_2PtCl = N_2\left\{\begin{matrix}(C_2H_3)_2\\H_3\\Pt'\end{matrix}\right., HCl$ Less soluble in alcohol than in water. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 463.)

Chlorhydrate of MethylUranin.

Chlorhydrate of MeToluidin. Soluble in water acidulated with chlorhydric acid. (Wilson, *J. Ch. Soc.*, **3.** 156.)

Chlorhydrate of Molybdic Acid. Soluble in water and in chlorhydric acid.

Chlorhydrate of Morphine. $C_{34}H_{19}NO_6, HCl + 6Aq$ Permanent. Soluble in 16 @ 20 pts. of cold, and in less than 1 pt. of boiling water; still more soluble in alcohol.

Soluble in 22 pts. of cold, and in less than 1 pt. of boiling water; in 60 pts. of cold, and in 10 pts. of boiling alcohol of 80%. (Wittstein, in his *Handw.*) Soluble in 20 pts. of water at 18.75°. (Abl. from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) More soluble in an aqueous solution of chloride of sodium than chlorhydrate of narcotin, though less soluble than the latter in water.

Chlorhydrate of Naphtylamin. $N\left\{\begin{matrix}C_{20}H_8''\\H\end{matrix}\right., HCl$ Soluble in water. (Schiff.) Rather soluble in water; more readily soluble in alcohol, and ether. (Zinin.) Less soluble in chlorhydric acid than in water. (Piria.)

Chlorhydrate of Narcein. $C_{46}H_{29}NO_{18}, HCl$ Readily soluble in water, and alcohol.

Chlorhydrate of Narcotin. Extremely soluble in water. More soluble in water, but less soluble in an aqueous solution of chloride of sodium than chlorhydrate of morphine. Soluble in boiling, somewhat less soluble in cold alcohol.

Chlorhydrate of Nicotin. $C_{20}H_{14}N_2, 2HCl$ Very deliquescent. Very soluble in water, and alcohol. Insoluble in ether. (Barral, *Ann. Ch. et Phys.*, (3.) **7.** 154.)

Chlorhydrate of Nicotin with Chloride of Cadmium. $C_{20}H_{14}N_2, 2HCl; 5CdCl$ Readily soluble in water. (Gr. Williams, Galetty.)

Chlorhydrate of NiNaphthylamin. $C_{20}H_8N_2O_2, HCl$

Chlorhydrate of NitrAmarin. $C_{42}H_{15}(NO_4)_3N_2, HCl$ Insoluble in water. Almost insoluble in cold, sparingly soluble in strong boiling alcohol. (Bertagnini, *Ann. Ch. et Phys.*, (3.) **33.** 481.)

Chlorhydrate of (*a*)NitrAnilin. $C_{12}H_6(NO_4)N, HCl$ Permanent. Extremely soluble in water, and alcohol. (Muspratt & Hofmann.) Decomposed by water. Readily soluble in chlorhydric acid. (Arppe, *Ann. Ch. u. Pharm.*, **93.** 359.)

Chlorhydrate of (*β*)NitrAnilin. $C_{12}H_6(NO_4)N, HCl$ Decomposed by water. Soluble in chlorhydric acid. (Arppe.)

Chlorhydrate of NitrAzoPhenylamin. $C_{12}H_7(NO_4)N_2, HCl + 2Aq$ Decomposed by pure water. (Gottlieb.) Soluble in dilute chlorhydric acid.

Chlorhydrate of NitroCodein.

Chlorhydrate of NitroCumidin. $C_{18}H_{12}(NO_4)N, HCl + 2Aq$ Soluble in water.

Chlorhydrate of NitroHarmalin. $C_{26}H_{13}(NO_4)N_2O_2, HCl$ Soluble in water; less soluble in dilute aqueous solutions of chloride of sodium or chlorhydric acid.

Chlorhydrate of NitroHarmin. $C_{26}H_{11}(NO_4)N_2O_2, HCl + 4Aq$ Soluble in water, and in boiling alcohol.

Chlorhydrate of *bi*NitroMelAnilin. $C_{26}H_{11}(NO_4)_2N_3, HCl$ Rather difficultly soluble in water. (Hofmann, *J. Ch. Soc.*, **1.** 306.)

Chlorhydrate of NitroMesidin. $C_{18}H_{12}N_2O_4, HCl$ Decomposed by water. Soluble in water acidulated with chlorhydric acid. Soluble in alcohol. (Maule, *J. Ch. Soc.*, **2.** 118.)

Chlorhydrate of NitroPapaverin. Sparingly soluble in water. Easily soluble in chlorhydric acid. Easily soluble in alcohol.

Chlorhydrate of NitroTyrosin. $N\left\{\begin{matrix}C_{14}H_4(NO_4)O_2\\C_2HO_2\\C_2H_3\end{matrix}\right., HCl + 2Aq$ Easily soluble in water, and alcohol.

Chlorhydrate of Octylamin. (*Chlorhydrate of Caprylamin.*) $C_{16}H_{19}N, HCl$ Deliquescent. Soluble in water. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 142.)

Chlorhydrate of Olanin(of Unverdorben.) Soluble in water.

Chlorhydrate of Oxycanthin.

Chlorhydrate of OxyChloride of Chromium.

I.) $Cr_2O_2Cl, 2HCl, 10HO$ Soluble in water.

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II.) Cr_2O_2Cl, HCl, HO(of Peligot). $2\,Cr_2O_3, 2\,Cr_2Cl_3, 8\,HO$(of Moberg). $Cr_2O_3, 2\,HCl$(of Lœwel). Very hygroscopic. Soluble in water, with evolution of heat. (Peligot, *Ann. Ch, et Phys.*, (3.) **16.** 294.)

Chlorhydrate of OxyCobaltiaque(of Fremy). Very soluble in ammonia-water. Immediately decomposed by water. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 279.)

Chlorhydrate of Papaverin. $C_{40}H_{21}NO_8, HCl$ Soluble in boiling water.

Chlorhydrate of ParaNicine. $C_{20}H_{13}N, HCl$ Soluble in water, even when this is cold. (St Evre, in Gerhardt's *Tr.*, **3.** 66.) Insoluble in cold water. (*Idem*, in *Gm.*, **14.** 181.)

Chlorhydrate of Pelosin. $C_{36}H_{21}NO_6, HCl + 2\,Aq$ Very hygroscopic. Readily soluble in water, and alcohol.

Chlorhydrate of Petinin. Very easily soluble in water.

Chlorhydrate of *di*Phenin. Soluble in chlorhydric acid.

Chlorhydrate of PhenoylBenzoylamid. (*Chloride of Benzanilid.*) $N\left\{\begin{matrix}C_{12}H_4''\\C_{14}H_5\end{matrix}\right., HCl$ Decomposed by water, and alcohol. Soluble in ether.

Chlorhydrate of PhenylAcetosamin. (*Chlorhydrate of Acet[o]ylAnilin.*) $C_{16}H_9N, HCl$ Soluble in water, ammonia-water, and alcohol. (Natanson.)

Chlorhydrate of *tri*Phenylamin. Easily soluble in water, and in ordinary alcohol; less easily soluble in absolute alcohol, or anhydrous ether. Its solution soon undergoes decomposition. (Gœssmann, *Ann. Ch. u. Pharm.*, **100.** 60.)

Chlorhydrate of PhenylCarbamic Acid. $C_{14}H_7NO_4, HCl$ Soluble in warm chlorhydric acid, from which it separates as the solution cools. (Kubel.)

Chlorhydrate of PhenylUrea. $C_2H_3(C_{12}H_5)N_2O_2, HCl$ Easily soluble in water.

Chlorhydrate of *di*PhenylUrea. $C_2H_2(C_{12}H_5)_2N_2O_2, 2\,HCl$ Very easily soluble in water; somewhat less soluble in alcohol. (Laurent & Chancel.)

Chlorhydrate of Phorylamin.

Chlorhydrate of Phthalidin. $C_{18}H_9N, HCl$ Soluble in water. Very sparingly soluble, or insoluble, in alcohol. (Dusart, *loc. cit.*)

Chlorhydrate of Picolin. $N\left\{C_{12}H_7'''\right., HCl$ Quickly deliquesces. Soluble in water. (Anderson.)

Chlorhydrate of Picolin with *proto*Chloride of Copper. ? (*ChloroCuprate of Picolin.*) Very readily soluble in water. Soluble in 6 pts. of cold, and in a much smaller quantity of hot absolute alcohol. (Unverdorben.)

Chlorhydrate of Piperidin. $C_{10}H_{11}N, HCl$ Permanent. Very soluble in water, and alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 80.)

Chlorhydrate of Piperin. Decomposed by water. Soluble in alcohol.

Chlorhydrate of *di*Platinamin. *Vid.* Chloride of AmmoniumChloroPlatin(*ous*)ammonium.

*Bi*Chlorhydrate of PlatinoPicolin. $C_{12}NH_5Pt, 2\,HCl$ Insoluble in water. (Anderson, *Ann. Ch. u. Pharm.*, **96.** 203.)

*Bi*Chlorhydrate of PlatinoPicolin with Chloroplatinate of Picolin. $C_{12}NH_5Pt, 2\,HCl;\ C_{12}NH_8Cl, PtCl_2$ Much less soluble than the corresponding pyridin compound. (Anderson.)

*Bi*Chlorhydrate of PlatinoPyridin. $C_{10}H_8PtN, 2\,HCl$, or $N\left\{\begin{matrix}C_{10}H_8'''\\Pt\end{matrix}\right., Cl_2$ Insoluble in water and in acids. Decomposed by a warm solution of caustic potash. (Anderson, *Ann. Ch. u. Pharm.*, **96.** 200.)

*Bi*Chlorhydrate of PlatinoPyridin with ChloroPlatinate of Pyridin. $C_{10}H_8PtN, 2\,HCl;\ C_{10}H_5N, HCl, PtCl_2$ Soluble in hot, less soluble in cold water. (Anderson.)

Chlorhydrate of Platosamin. *Vid.* Chloride of Platin(*ous*)ammonium.

Chlorhydrate of *di*Platosamin. *Vid.* Chloride of Platin(*ous*)*bi*amin. -

Chlorhydrate of PlatosoPyridin. $C_{10}H_4PtN, HCl$ Very sparingly soluble in water; more soluble in boiling alcohol, from which it separates on cooling. (Andersen.)

Chlorhydrate of Propylamin. (*Chlorhydrate of Tritylamin.*) Deliquescent. Readily soluble in water. Soluble in absolute alcohol and in spirit. (Berthelot & De Luca, *Ann. Ch. et Phys.*, (3.) **43.** 266.) Soluble in alcoholic ether. (Parrish's *Pharm.*, p. 418.)

Chlorhydrate of Pyridin. $N\left\{C_{10}H_5'''\right., HCl$ Deliquesces in moist air. Easily soluble in alcohol; less soluble in water. Insoluble in ether.

Chlorhydrate of Quinidin.

I.) *normal.* $C_{40}H_{24}N_2O_4, HCl + 2\,Aq$ Less soluble in water than the corresponding quinine salt. Soluble in 27 pts. of water at 17°. Easily soluble in alcohol. Insoluble in ether.

II.) *acid.* $C_{40}H_{24}N_2O_4, 2\,HCl + 2\,Aq$ Easily soluble in water, without decomposition; also soluble in spirit.

Chlorhydrate of Quinine.

I.) *normal.* ("*basic.*") $C_{40}H_{24}N_2O_4, HCl + 8\,Aq$ Soluble in 26 pts. of cold water, very easily soluble in hot water, and in alcohol. More soluble in water than sulphate of quinine, or chlorhydrate of quinidin.

Soluble in 24 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) 100 pts. of chloroform dissolve 11.1 pts. of it. (Schlimpert, *Kopp & Will's J. B., für* 1859, p. 405.)

II.) *acid.* $C_{40}H_{24}N_2O_4, 2\,HCl$ Very easily soluble in water, with decomposition to the normal salt and free acid.

Chlorhydrate of Quinolein(or of Chinolin). Deliquescent. Soluble in water, and alcohol. Appears to be insoluble in ether. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 172.)

Chlorhydrate of Quinolein with Chloride of Cadmium. $C_{18}H_7N, HCl;\ 2\,CdCl + 2\,Aq$ Very sparingly soluble in water. Sparingly soluble in alcohol. (Williams.)

Chlorhydrate of Quinolein with *proto*Chloride of Tin. Sparingly soluble in alcohol. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 174.)

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Chlorhydrate of Quinolein with Chloride of Uranium.

Chlorhydrate of Retinin. Very soluble in water.

Chlorhydrate of Sanguinarin. Readily soluble in water, and alcohol, especially when these are warm. Insoluble in ether and in concentrated chlorhydric acid. (Probst, *Ann. der Pharm.*, **29**. 121.)

Chlorhydrate of Sarcin.
$N_2\left\{\begin{matrix}C_8H_3'' \\ (C_2N)_2 \\ H_2\end{matrix}\right. . O_2, HCl + 2 Aq$

Chlorhydrate of Sarcosin. Very easily soluble in water. Soluble in alcohol.
$N\left\{C_6H_7O_4, HCl\right.$

Chlorhydrate of Sinamin.

Chlorhydrate of Sinapin. Readily soluble in water. (v. Babo & Hirschbrunn.)

Chlorhydrate of Sinapolin, or of *di*-AllylUrea. Soluble, with partial decomposition, in water.
$C_{14}H_{12}N_2O_2, HCl$

Chlorhydrate of Sinkalin. Deliquescent. Soluble in water. (v. Babo & Hirschbrunn.)

Chlorhydrate of Solanin. Readily soluble in water.

Chlorhydrate of Spartein. Soluble in water.

Chlorhydrate of Strychnine. Soluble in about 40 pts. of water at the ordinary temperature. (Bouchardat, *Ann. Ch. et Phys.*, (3.) **9**. 228.) Easily soluble in alcohol.
$C_{42}H_{22}N_2O_4, HCl + 8 Aq$

Chlorhydrate of Strychnine with Cyanide of Mercury.
$C_{44}H_{22}N_2O_4, HCl; Hg Cy$

Chlorhydrate of SulphoBenzamic Acid.
$C_{14}H_6NS_2O_6Cl$

Chlorhydrate of SulphoBenzoic Acid. Insoluble in cold water. Slowly decomposed by boiling water and by alcohol. Easily soluble in ether.
$C_{14}H_5S_2O_8Cl$

Chlorhydrate of SulphoPhenoylBenzoicylamin.
$N\left\{\begin{matrix}C_{12}H_4S_2O_4'' \\ C_{14}H_5\end{matrix}\right., HCl$

Chlorhydrate of Sulphuric Acid. Slowly dissolved, with decomposition, by cold water. When a small quantity of water is added to a considerable quantity of it an explosion ensues. (Williamson.)
$2SO_3; HCl$

Chlorhydrate of Terebene.

I.) *mono.* Soluble in alcohol, and ether; from which solutions it is precipitated by water. (Cluzel.) Decomposed by alcohol, especially when heated with it. (Blanchet & Sell.)
(*Chlorhydrate of Peucyl or of Peucylene. Chlorhydrate of Terebene(of Deville).*)
$C_{20}H_{16}, HCl$

II.) *basic.*
$2C_{20}H_{16}, HCl$

Chlorhydrate of Tetrylamin. *Vid.* Chlorhydrate of Butylamin.

Chlorhydrate of Thebain. Readily soluble in water. Sparingly soluble in absolute alcohol. Insoluble in ether.
$C_{38}H_{21}NO_6, HCl + 2 Aq$

Chlorhydrate of Theobromin. Decomposed by water, a subsalt being formed. Soluble in concentrated chlorhydric acid. (Glasson.)
$C_{14}H_8N_4O_4, HCl$

Chlorhydrate of Thiacetonin. Readily soluble in water; much less soluble in cold alcohol. Very easily soluble in boiling alcohol. Insoluble in ether. (Stædeler.)

Chlorhydrate of Thialdin. Tolerably soluble in cold water, less soluble in alcohol, more readily soluble in both when warm. Insoluble in ether.
$N\left\{C_{12}H_{13}S_4''', HCl\right.$

Chlorhydrate of Thiosinamin.

Chlorhydrate of Thymene.
$C_{20}H_{16}, HCl$

Chlorhydrate of Toluamic Acid. More readily soluble in alcohol than in water. Sparingly soluble in cold, more soluble in boiling water acidulated with chlorhydric acid. (Cahours, *Ann. Ch. et Phys.*, (3.) **53**. 332.)
$C_{16}H_9NO_4, HCl$

Chlorhydrate of Toluenylamin(or of Toluidin). Easily soluble in water, and alcohol. Sparingly soluble in ether. (Muspratt & Hofmann.)
$N\left\{\begin{matrix}C_{14}H_7 \\ H_2\end{matrix}\right., HCl$

Chlorhydrate of *tri*Toluenylamin. Only sparingly soluble in cold water.
$N\left\{(C_{14}H_7)_3, HCl\right.$

Chlorhydrate of Tritylamin. *Vid.* Chlorhydrate of Propylamin.

Chlorhydrate of Turpentine-Oil.

I.) *mono.* Imparts its taste to water. (Cluzel.) Insoluble in water. Soluble in boiling, less soluble in cold alcohol. Soluble in 3 pts. of alcohol of 0.806 sp. gr., at 14°. (Saussure.) The alcoholic solution is rendered milky by water. (Trommsdorff.) Readily soluble in oil of turpentine, and oil of almonds. (Trommsdorff.) Readily soluble in ether. Decomposed when boiled with concentrated sulphuric acid. (Blanchet & Sell.) Ordinary nitric acid neither dissolves nor decomposes it. (Cluzel.) Concentrated nitric acid dissolves it with decomposition. (Oppermann.) Slightly decomposed when heated with alcoholic potash to 150° @ 160°. (Buttlerow.) Soluble in terpinol. (List.)
(*Artificial Camphor. Chlorhydrate of Camphene; or of Dadyle.*)
$C_{20}H_{16}, HCl$

II.) *bi.* Very easily soluble in alcohol. (List.) Decomposed by boiling with water or alcohol. (List.)
(*Lemon Camphor.*)
$C_{20}H_{16}, 2 HCl$

Chlorhydrate of Tyrosin. Insoluble in water, but is decomposed thereby. Easily soluble in absolute alcohol, also in spirit of 85%, but the latter solution soon deposits pure tyrosin. (C. Wicke, *Ann. Ch. u. Pharm.*, **101**. 315.)
$C_{18}H_{10}NO_5, HCl + Aq$

Chlorhydrate *of sesquioxide* of Uranium. Deliquescent. Readily soluble in water, alcohol, and ether. (Klaproth.)
Ur_2O_3, HCl

Chlorhydrate *of sesquioxide* of Uranium with Chloride of Potassium. Very readily soluble, with decomposition, in water. (Péligot.)
$Ur_2O_3, HCl; KCl + Aq$

Chlorhydrate of Urea.

I.) *normal.* Deliquesces, with decomposition, in the air. Instantly decomposed by water. Soluble, without decomposition, in absolute alcohol.
$C_2H_4N_2O_2, HCl$

II.) *basic.* Slightly deliquescent. (Dessaignes.)
$2C_2H_4N_2O_2, HCl$

Chlorhydrate of Urea, and Chloride of Ammonium, with Urea.
$C_2H_4N_2O_2, HCl; 2(C_2H_4N_2O_2, NH_4Cl)$

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Very easily soluble in water. Soluble in mixed alcohol and ether. (Beckmann, *Ann. Ch. u. Pharm.*, **91.** 367.)

Chlorhydrate of Valeraldin. Soluble in boiling, less soluble in cold spirit. (Beissenhirtz, *Ann. Ch. u. Pharm.*, **90.** 110.)
$C_{30} H_{31} N S_4, H Cl$

Chlorhydrate of Veratrin. Readily soluble in water, and alcohol.

Chlorhydride of Cyanogen. *Vid.* Chloride of Cyanogen with Cyanhydric Acid.

***Tri*Chlorhydrin.**
(*Chloride of Glyceryl.*)
$C_6 H_5{}''', Cl_3$
(*Isomeric with Chloride of Chloro Propylene.*)

Chlorhydrin. Miscible with its own volume of water. With 8 or 10 vols. of water it forms a very stable emulsion. Miscible with ether. (Berthelot.)
(*Chlorhydrate of Glycerin.*)
$C_7 H_6 Cl O_4$

***Bi*Chlorhydrin.** Miscible with ether. It does not form a stable emulsion with water.
$C_6 H_6 Cl_2 O_2$

***Epi*Chlorhydrin.**
(*Oxide of Chloro Glyceryl.*)
$C_6 H_5 Cl O_2$

***Epidi*Chlorhydrin.**
$C_4 H_4 Cl_2$

Chlorhydro *di*Bromhydrin.
(*Isomeric with Bromide of Chloro Propylene.*)
$C_6 H_5 Br_2 Cl$

ChlorhydroKinone. Very soluble in water, alcohol, and ether. (Wœhler.)
(*Colorless Chlorhydrokinone. Hydroquinone monochloré.*)
$C_{12} H_5 Cl O_4$

ChlorHydroKinone with ChloroKinone. Soluble in water, and spirit.
(*Chlor Kinhydrone. Brown Chlor Hydro Kinone.*)
$C_{24} H_8 Cl_2 O_8 = C_{12} H_5 Cl O_4, C_{12} H_3 Cl O_4$

***Bi*ChlorHydroKinone.** Very sparingly soluble in cold, easily soluble in boiling water. Easily soluble in alcohol, and ether; also in hot acetic acid. Sparingly soluble in boiling, less soluble in cold chlorhydric acid. Soluble, without alteration, in warm concentrated sulphuric acid, separating out on cooling. Soluble in solutions of caustic ammonia and of potash. (Stædeler.)
(*Colorless bi Chlor Hydro Kinone. Hydroquinone bichloré.*)
$C_{12} H_4 Cl_2 O_4$

***Bi*ChlorHydroKinone with *bi*ChloroKinone.** Scarcely at all soluble in cold, easily soluble in boiling water. Readily soluble in alcohol, ether, and hot acetic acid. Soluble in concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water. Soluble in aqueous solutions of caustic potash and ammonia. (Stædeler.)
(*Bi Chlor Kinhydrone. Violet or Yellow bi Chlor Hydro Kinone.*)
$C_{24} H_6 Cl_4 O_8$ (yellow) & $+ 4 Aq$ (violet) $= C_{12} H_4 Cl_2 O_4, C_{12} H_2 Cl_2 O_4,$ & $+ 4 Aq$

***Ter*ChlorHydroKinone.** Sparingly soluble in cold water. Slowly soluble in hot water, with decomposition. Easily soluble in alcohol, and ether. Soluble in warm concentrated sulphuric acid, without decomposition. (Stædeler.)
(*Hydroquinone trichloré.*)
$C_{12} H_3 Cl_3 O_4$

***Ter*ChlorHydroKinone with *ter*ChloroKinone.** Only sparingly soluble in boiling water. Easily soluble in ether, and in hot alcohol, from which it is precipitated on the addition of water.
(*Ter Chlorkinhydrone. Yellow tri Chlor Hydrochinone.*)
$C_{24} H_4 Cl_6 O_8 = C_{12} H_3 Cl_3 O_4, C_{12} H Cl_3 O_4$

***Quadri*ChlorHydroKinone.** Insoluble in water. Readily soluble in alcohol, and ether. Soluble in boiling acetic acid. Readily soluble in cold dilute aqueous solution of caustic potash. Soluble in ammonia-water, especially when this is hot. Unacted upon by hot concentrated sulphuric acid. (Stædeler.)
(*Chlorhydranil. Hydroquinone perchloré.*)
$C_{12} H_2 Cl_4 O_4$

***Quadri*ChlorHydroKinone with *per*ChloroKinone.**
(*Per Chlorkinhydrone.*)
$C_{24} H_2 Cl_8 O_8 = C_{12} H_2 Cl_4 O_4, C_{12} Cl_4 O_4$

ChlorHydroQuinone. *Vid.* ChlorHydroKinone.

ChlorHypoSulphate of *X*. *Vid.* Chloride of *X* with Hyposulphate of *X*.

ChlorHypoSulphite of ChloroCarbonic Oxide. *Vid.* Sulphite of Chloride of *ter*ChloroMethyl.

Chloric Oxide. *Vid.* HypoChloric Acid.

Chlorides. All the metallic chlorides are soluble in water, excepting chloride of silver and dichloride of mercury, which are insoluble, and the chlorides of lead and bismuth, which are difficultly soluble. (Persoz, *Chim. Moléc.*, p. 463.)

"Chloride of Acetyl"(Acetoyl). *Vid.* Chloride of *bi*ChlorEthyl.

"Chloride of Acetyl"(Acetoyl). *Vid.* *mono*ChlorEthylene.
$C_4 H_3 Cl$

Chloride of Acetyl. Decomposed by water. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 297.)
(*ChlorAcetyl. Chloride of Acetoxyl. Chloride of Othyl. Acetic Chloride.*)
$C_4 H_3 O_2, Cl$

***Bi*Chloride of Acetyl(acetoxyl).** *Vid.* Oxide of *bi*ChlorEthyl.

***Ter*Chloride of Acetyl(acetoyl).** *Vid.* Chloride of ChlorEthylene.
$C_4 H_3 Cl_3$

Chloride of Acetyl*chloré*. *Vid.* Chloride of ChlorAcetyl.
$C_4 H_2 Cl_2 O_2$

Chloride of Acetyl with Hydride of Acetyl(Aldehyde). Very slowly decomposed by cold, quickly decomposed by hot water. Readily soluble, with decomposition, in a dilute solution of caustic potash. (Simpson.)
$C_4 H_3 O_2 Cl ; C_4 H_4 O_2$

Chloride of AcetylAmmonium(of Natanson). *Vid.* Chlorhydrate of Acetosamin.

Chloride of Allyl.
$C_6 H_5 Cl$

Chloride of *tetr*Allylium. Soluble in water.

Chloride of Aluminum.

I.) *mono.*

$a =$ *anhydrous.* Deliquescent. Soluble in water, with evolution of much heat.
$Al_2 Cl_3$

Soluble in 1.432 pts. of water at 15°. (Gerlach's determination. See his table of sp. grs., below.) Soluble in 1 pt. of strong alcohol at 12.5°. (Wenzel, in his *Verwandtschaft*, p. 300 [T.]. Abundantly soluble in alcohol, and ether. Insoluble in rock-oil.

$b = Al_2 Cl_3 + 12 Aq$ Very deliquescent. Very soluble in water, and alcohol.

Soluble in about 0.25 pt. of water; and in about 2 pts. of pure alcohol at the ordinary temperature, and in 1.5 pts. of the same alcohol when boiling. (Thomson's *System of Chem.*, London, 1831, **2.** 815.)

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An aqueous solution of sp. gr. (at 15°)	Contains per cent of Al_2Cl_3.	An aqueous solution of sp. gr. (at 15°)	Contains per cent of Al_2Cl_3.
1.00721 . .	1	1.17092 . .	22
1.01443	2	1.17953	23
1.02164	3	1.18815	24
1.02885	4	1.19676	25
1.03606	5	1.20584	26
1.04353	6	1.21493	27
1.05099	7	1.22406	28
1.05845	8	1.23310	29
1.06591	9	1.24219	30
1.07337	10	1.25184	31
1.08120	11	1.26149	32
1.08902	12	1.27115	33
1.09684	13	1.28080	34
1.10466	14	1.29046	35
1.11248	15	1.30066	36
1.12073	16	1.31086	37
1.12897	17	1.32106	38
1.13721	18	1.33126	39
1.14545	19	1.34146	40
1.15370	20	1.35224	41
1.16231 . .	21	1.35359 . .	41.126*

(Th. Gerlach, *Sp. Gew. der Salzlœsungen*, 1859, p. 16.)

* Mother liquor.

An aqueous solution containing 19.15% of Al_2Cl_3 boils at 103.4°; one of 38.3% boils at 112.8°. (Gerlach's *Sp. Gew. der Salzlœsungen*, p. 103.)

II.) *basic*. Normal chloride of aluminum can part with ⅓ of its acid without becoming insoluble in water; but compounds more basic than this are insoluble. (Ordway.)

Chloride of Aluminum & of Potassium. $KCl; Al_2Cl_3$ Deliquescent. Readily soluble in water, with evolution of heat and decomposition.

Chloride of Aluminum & of Sodium. $NaCl; Al_2Cl_3$ Soluble in water, with evolution of heat, and apparently with decomposition. (Wœhler.)

Chloride of Aluminum with OxyChloride of Phosphorus. $Al_2Cl_3; POCl_3$ Deliquescent. Decomposed by water, with evolution of heat. Soluble in warm oxychloride of phosphorus, from which solution it separates on cooling.

Chloride of Aluminum with Phosphuretted Hydrogen. $PH_3; Al_2Cl_3$ Decomposed by water.

Chloride of Aluminum with Sulphydric Acid. Deliquescent. Instantly decomposed by water. (Wœhler.)

Chloride of AmmonioIridium. $5NH_3.Ir_2,Cl_3$ Difficultly soluble in water. Soluble, for the most part, with decomposition, in ammonia-water. Completely soluble in caustic potash. (Claus, *Beiträge*, pp. 90, 92.)

Chloride of AmmonioRhodium. $5NH_3.Rh_2,Cl_3$ Difficultly soluble in water. Insoluble in alcohol. Completely soluble in aqueous solutions of caustic potash and ammonia. Only very difficultly decomposed by oxygen acids. (Claus, *Beiträge*, p. 87.)

Chloride of Ammonium. (*Muriate of Ammonia. HydroChlorate of Ammonia. SalAmmoniac.*) NH_4Cl Permanent. Soluble in water, with reduction of temperature. The aqueous solution saturated at 18.75° contains 27.02% of the salt; or, 100 pts. of water at 18.75° dissolve 37.02 pts. of it; or, 1 pt. of the salt is soluble in 2.7 pts. of water at 18.75°. The sp. gr. of this solution = 1.08. (Karsten, *Berlin Abhandl.*, 1840, p. 101.) Soluble in 2.803 pts. of water at 15°. (Gerlach's determination, see his table of sp. grs., below.) Soluble in 2.72 pts. of water at 19°; or 100 pts. of water at 19° dissolve 36.8 pts. of it; or, the aqueous solution saturated at 19° contains 26.9% of it, and is of 1.0767 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.) Soluble in 2.727 pts. of water at 10°. (Gren's *Handbuch*, **1.** 488 [T.]); in 2.24 pts. of water at 62.5°. (Wenzel, in his *Verwandtschaft*, p. 309 [T.].) The aqueous solution saturated at 10° is of 1.072 sp. gr. [T.]. Soluble in 2.72 pts. of cold, and in 1 pt. of boiling water. The saturated cold solution contains 26.88% of it, and the boiling saturated solution 50%. (M. R. & P.) Soluble in 3 pts. of water at 18.75. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) Soluble in 6 pts. of cold, and in 1 pt. of boiling water. (Fourcroy.) 100 pts. of water at 18.5° dissolve 36.75 pts. of it. The aqueous solution saturated at its boiling-point (114.2°) contains in 100 pts. 88.9 pts. of the salt. (Berzelius, *Lehrb.*, **3.** 280.) 100 pts. of water at 15.5° dissolve 33 @ 36 pts. of it, and at 100° 100 pts. (Ure's *Dict.*) The aqueous solution saturated at 15° is of 1.075209 sp. gr., and contains dissolved in every 100 pts. of water at least 31.88 pts. of the salt. (Michel & Krafft, *Ann. Ch. et Phys.*, **41.** pp. 478, 482.) 100 pts. of the aqueous solution saturated at the boiling-point (113.5°) contain 50 pts. of the dry salt; or, 100 pts. of water at 113.5° dissolve 100 pts. of it; or, 1 pt. of the salt is soluble in 1 pt. of water at 113.5°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) The aqueous solution saturated at 10° contains 23.8% of it (Eller); in the cold, 14.3% (Fourcroy); at 38° (of B.'s therm.) 23.5% (Boerhave); and at 12.5° 24.4%. (Hassenfratz, *Ann. de Chim.*, **28.** 291.) When the solution is boiled, a portion of ammonia volatilizes; even when the salt is exposed to the air it loses some ammonia. (Emmet, *Am. J. Sci.*, (1.) **18.** 255.) When the aqueous solution is evaporated upon a water-bath, it is decomposed to a slight extent, a little ammonia being evolved. (Fresenius, *Quant.*, p. 123.) Soluble in alcohol. (Berzelius, *Lehrb.*) Very sparingly soluble in alcohol. (Gmelin.) Difficultly soluble in spirit. (Fresenius, *Quant.*, p. 123.) Soluble in 14.1 pts. of boiling highly rectified spirit. (Wenzel, in his *Verwandtschaft*, p. 300 [T.].)

100 pts. of alcohol
of 0.900 sp. gr. dissolve 6.5 pts. of it.
" 0.872 " " 4.75 "
" 0.834 " " 1.5 "
(Kirwan, *On Mineral Waters*, p. 274 [T.].)

Though somewhat soluble in pure absolute alcohol, it is absolutely insoluble in alcohol when in the presence of chlorides of the methylamins. (Winkles, *Ann. Ch. u. Pharm.*, **93.** 324.) Insoluble in ether. Insoluble in bisulphide of carbon. (Fordos & Gélis, *Ann. Ch. et Phys.*, (3.) **32.** 393.) Less soluble in chlorhydric acid than in water, being even precipitated when the acid is added to its strong aqueous solution. (Vogel.) When crystals of chloride of sodium are added to a saturated aqueous solution of chloride of ammonium they dissolve, to a certain extent, while chloride of ammonium is precipitated. When the reaction is completed the solution, at 18.75°, is of 1.1788 sp. gr. and contains 32.62% of mixed salt; or, 100 pts. of water have dissolved 48.42 pts. of salt: viz. 26.36 pts. of NaCl and 22.06 pts. of NH_4Cl.

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The same mixed solution is obtained when a mixture of $NaCl$ and NH_4Cl is dissolved in water. If equal weights of saturated solutions of $NaCl$ and NH_4Cl be mixed together, nothing separates. One may even dissolve more $NaCl$ or more NH_4Cl in this solution without separating the other. But when mixed in certain other proportions, the addition of new quantities of $NaCl$ or of NH_4Cl will cause the precipitation of the other. (Karsten, *Berlin Abhandl.*, 1840, pp. 106, 107.) In like manner, when chloride of potassium is added to a saturated solution of chloride of ammonium it dissolves, while chloride of ammonium is precipitated. When the reaction has ceased, the solution, at 18.75°, contains 31.6% of mixed salt. A solution identical with this is obtained when a mixture of KCl and NH_4Cl is treated with water, 100 pts. of water dissolving 46.1 pts. of mixed salt, viz. 16.27 pts. of KCl and 29.83 pts. of NH_4Cl. (Karsten, *Berlin Abhandl.*, 1840, p. 109.) When nitrate of ammonia is added to a saturated solution of chloride of ammonium it dissolves, while NH_4Cl is precipitated; the reaction continuing until a definite equilibrium is attained. The mixed solution finally obtained is identical with that prepared by treating a mixture of the two salts with water. (Karsten, *Berlin Abhandl.*, 1840, p. 110.) But if chlorate of potash be dissolved in the saturated solution of chloride of ammonium, nitrate of ammonia will dissolve therein without causing any precipitation. Moreover, if chlorate of potash be added to a solution from which chloride of ammonium has been precipitated by nitrate of ammonia, it causes the chloride of ammonium to redissolve. (Margueritte, *C. R.*, **38.** 306.) Chloride of ammonium is slowly dissolved by a saturated solution of nitrate of soda, at first to a clear solution, but subsequently chloride of sodium separates out. (Karsten, *Berlin Abhandl.*, p. 128.) It is also soluble in a saturated solution of nitrate of potash, the solution thus obtained containing, at 18.75°, 42.82% of mixed salt; or, 100 pts. of water dissolve 74.89 pts. of mixed salt, viz. 30.56 pts. KO, NO_5, and 44.33 pts. NH_4Cl. This solution is of different composition from that obtained by treating a mixture of the two salts with water, the latter containing, at 18.75°, 44.28% of mixed salt. Consequently, 100 pts. of water dissolve 79.46 pts. of mixed salt, viz. 39.84 pts. NH_4Cl, and 38.62 pts. KO, NO_5. (Karsten, *Berlin Abhandl.*, 1840, p. 119.) When nitrate of baryta is added to a saturated solution of chloride of ammonium it dissolves, at first without causing any precipitation of the latter, but after a certain amount has been dissolved the solution of further portions occasions the precipitation of chloride of ammonium, the reaction continuing until a certain definite limit has been attained. The solution thus obtained is identical with that made by treating a mixture of the two salts with water. Chloride of ammonium is soluble in a saturated solution of nitrate of baryta. The solution prepared at 18.75° contains 32.07% of mixed salt. 100 pts. of water dissolve, therefore, 47.2 pts. of mixed salt, viz. 38.6 pts. NH_4Cl, and 8.6 pts. BaO, NO_5. This solution is of different composition from that obtained by treating a mixture of the two salts with water. This last, prepared at 18.75°, contains 35.98% of mixed salt. 100 pts. of water, consequently, dissolve 56.2 pts. of mixed salt, viz. 39.18 pts. NH_4Cl, and 17.02 pts. BaO, NO_5. (Karsten, *Berlin Abhandl.*, 1840, pp. 110, 119.) Chloride of ammonium is soluble in a saturated solution of sulphate of soda. It is also soluble in a saturated solution of sulphate of potash. The solution thus prepared, saturated at 18.75°, contains 33.02% of mixed salt. 100 pts. of water consequently dissolve 49.3 pts. of mixed salt, viz. 38.2 pts. NH_4Cl and 11.1 pts. KO, SO_3. This solution is of different composition from that prepared by treating a mixture of the two salts with water. This last, at 18.75°, contains 32.86% of mixed salt, i. e. 100 pts. water dissolve 51.2 pts. mixed salt, viz. 37.92 pts. NH_4Cl, and 13.28 pts. KO, SO_3. (Karsten, *Berlin Abhandl.*, 1840, p. 120.) Chloride of ammonium is soluble in a saturated solution of sulphate of copper, at first to a clear solution, but subsequently with precipitation of a double sulphate of ammonia and copper. (Karsten, *loc. cit.*, p. 128.) It is slowly and difficultly soluble in a saturated solution of sulphate of magnesia, while a double sulphate of ammonia and magnesia separates out. In a saturated solution of sulphate of zinc also, it dissolves with formation of a double sulphate. (Karsten, *Berlin Abhandl.*, 1840, p. 129.)

An aqueous solution of sp. gr. (at 15°)	Contains per cent of NH_4Cl.	An aqueous solution of sp. gr. (at 15°)	Contains per cent of NH_4Cl.
1.00316	1	1.04524	15
1.00632	2	1.04805	16
1.00948	3	1.05086	17
1.01264	4	1.05367	18
1.01580	5	1.05648	19
1.01880	6	1.05929	20
1.02180	7	1.06204	21
1.02481	8	1.06479	22
1.02781	9	1.06754	23
1.03081	10	1.07029	24
1.03370	11	1.07304	25
1.03658	12	1.07375	26
1.03947	13	1.07658	26.297*
1.04325	14		

(Gerlach, *Sp. Gew. der Salzlœsungen*, 1859, p. 11.)

* Mother liquor.

An aqueous solution of sp. gr. (at 19°)	Contains (by experiment) per cent of NH_4Cl.
1.0264	8.98
1.0522	17.95
1.0767	26.93

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 341.)

From these results Schiff calculates the following table by means of the formula, $D = 1 + 0.00294\ p + 0.0000008\ p^2 - 0.00000016\ p^3$; in which D = the sp. gr. of the solution, and p the percentage of substance in the solution.

An aqueous solution of sp. gr. (at 19°)	Contains per cent of NH_4Cl.	An aqueous solution of sp. gr. (at 19°)	Contains per cent of NH_4Cl.
1.0029	1	1.0467	16
1.0058	2	1.0495	17
1.0087	3	1.0523	18
1.0116	4	1.0551	19
1.0145	5	1.0579	20
1.0174	6	1.0606	21
1.0203	7	1.0633	22
1.0233	8	1.0660	23
1.0263	9	1.0687	24
1.0293	10	1.0714	25
1.0322	11	1.0741	26
1.0351	12	1.0768	27
1.0380	13	1.0794	28
1.0409	14	1.0820	29
1.0438	15	1.0846	30

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 74.)

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An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of NH_4Cl.	An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of NH_4Cl.
1.0029	1	1.0300	10
1.0059	2	1.0358	12
1.0089	3	1.0416	14
1.0118	4	1.0474	16
1.0149	5	1.0532	18
1.0179	6	1.0590	20
1.0209	7	1.0642	22
1.0239	8	1.0693	24
1.0269	9		

(Hassenfratz, *Ann. de Chim.*, **28.** 298.)

In a solution containing for 100 pts. of water pts. of anhydrous NH_4Cl	The boiling-point is elevated.	Difference.
0.0	0°	
7.8	1	7.8
13.9	2	6.1
19.7	3	5.8
25.2	4	5.5
30.5	5	5.3
35.7	6	5.2
41.3	7	5.6
47.3	8	6.0
53.5	9	6.2
59.9	10	6.4
66.4	11	6.5
73.3	12	6.9
80.5	13	7.2
88.1	14	7.6
88.9 (saturated.)	14.2	0.8

The point of ebullition of pure water, observed in a glass tube containing bits of metallic zinc, having been 100°. (Legrand, *Ann. Ch. et Phys.*, 1835, (2.) **59.** 436.) An aqueous solution containing 10% of NH_4Cl boils at 101.7°; one of 20% boils at 104.4°. (Gerlach's *Sp. Gew. der Salzlœsungen*, p. 97.)

Chloride of Ammonium & of Antimony.
I.) $2NH_4Cl; SbCl_3 + 2 Aq$
II.) $3NH_4Cl; SbCl_3 + 3 Aq$
Permanent in dry air. Decomposed by much water. (Poggiale.)

Chloride of Ammonium & of Bismuth.
I.) $2NH_4Cl; BiCl_3$ Decomposed by water.
II.) $3NH_4Cl; BiCl_3$ Decomposed by water.

Chloride of Ammonium & of Cadmium.
$NH_4Cl; CdCl$ Sparingly soluble in water. Slightly soluble in alcohol, and wood-spirit; but less so than chloride of cadmium. (Croft.)

Chloride of Ammonium & of Cobalt.
$NH_4Cl; 2CoCl + 12 Aq$ Deliquescent. (Hautz.)

Chloride of Ammonium & *dichloride* of Copper. Water decomposes it, dissolving out the chloride of ammonium. (Becquerel.)

Chloride of Ammonium & *protochloride* of Copper.
I.) $NH_4Cl; CuCl + 2 Aq$ Less soluble than chloride of copper in water. (Graham.) Soluble in water, with partial decomposition. Moderately soluble in alcohol, especially in hot, without decomposition. (Cap & Henry.)
II.) $NH_4Cl; 2CuCl + 4 Aq$ Soluble in 2 pts. of water. (Hautz.)

Chloride of Ammonium & of Cupr(*ic*)ammonium.
$NH_4Cl; N\left\{\begin{matrix}H_3\\Cu\end{matrix}\right., Cl$ Decomposed by water. (Ritthausen.)

Chloride of Ammonium & of Iodine.
$NH_4Cl; ICl_3$ Much more readily soluble in water than the potassium compound.

Chloride of Ammonium & *protochloride* of Iridium.
$NH_4Cl; IrCl$ Soluble in water and in absolute alcohol. (Berzelius, *Lehrb.*) Soluble in weak alcohol. (Claus.)

Chloride of Ammonium & *sesquichloride* of Iridium.
I.) $2NH_4Cl; Ir_2Cl_3$ Soluble in water, from which solution it is precipitated in great part on the addition of alcohol. (Berzelius, *Lehrb.*)
II.) $3NH_4Cl; Ir_2Cl_3 + 3 Aq$ Possesses similar properties to the corresponding rhodium salt, in combination with which it crystallizes in all proportions, but is less soluble in a dilute aqueous solution of chloride of ammonium. (Claus, *Beiträge*, pp. 75, 13.)

Chloride of Ammonium & *protochloride* of Iron.
$NH_4Cl; FeCl$ Easily soluble in water. Insoluble in alcohol. (Winckler; A. Vogel.)

Chloride of Ammonium & *sesquichloride* of Iron.
I.) $2NH_4Cl; Fe_2Cl_3 + 2 Aq$ & $+ 3 Aq$ Deliquescent. Soluble in water, without decomposition. (Fritzsche, in *Gm.*) Decomposed by water. [?] (Fritzsche, in *Ot. Gr.*) Soluble in 3 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.)
II.) *Mixtures of* NH_4Cl *& of* Fe_2Cl_3 *in various proportions.* More deliquescent in proportion to the amount of iron. One sample examined by Geiger was soluble in 3 pts. of cold water. When the aqueous solution is evaporated, nearly pure chloride of ammonium crystallizes out at first.

Chloride of Ammonium & of Lead.

Chloride of Ammonium & of Magnesium.
$NH_4Cl; 2MgCl + 12 Aq$ Deliquescent. (Hautz.) Permanent. Soluble in 6 pts. of cold water. (Fourcroy.)

Chloride of Ammonium & of Manganese.
I.) $NH_4Cl; MnCl + 2 Aq$
II.) $NH_4Cl; 2MnCl + 4 Aq$ Soluble in 1.5 pts. of water at ordinary temperatures. (Hautz.)

Chloride of Ammonium & *protochloride* of Mercury.
(*Sel Alembroth.*)
I.) $NH_4Cl; HgCl$ Permanent. Soluble in 0.66 pt. of water at 10°, and in nearly all proportions in boiling water. [Compare *proto*Chloride of Mercury.]
II.) $NH_4Cl; 2HgCl$ Soluble in water.
III.) *with excess of chloride of ammonium.* Soluble in water.

Chloride of Ammonium, of Mercury, & of Sodium.
$NH_4Cl; 2HgCl; 4NaCl$ Soluble in water. (Kosmann, *Ann. Ch. et Phys.*, (3.) **27.** 243.)

Chloride of Ammonium & of Mercury with Sulphate of Mercury.
$NH_4Cl; HgCl; 2(HgO, SO_3)$ Soluble in water acidulated with nitric acid. Decomposed by ether, which dissolves the chloride of mercury. (Kosmann, *Ann. Ch. et Phys.*, (3.) **27.** 238.)

Chloride of Ammonium & *protochloride* of Molybdenum. [Soluble in water. ?]

Chloride of Ammonium & *bichloride* of Molybdenum.
$NH_4Cl; MoCl_2$ Permanent. Soluble in water. (Berzelius.)

Chloride of Ammonium & of Nickel.
$NH_4Cl; 2NiCl + 12 Aq$ Soluble in water. (Tupputi.)

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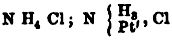
Chloride of Ammonium & *protochloride* of Osmium.

Chloride of Ammonium & *sesquichloride* of Osmium. Permanent. Soluble in water, sometimes with separation of a basic salt; less soluble in alcohol.

Chloride of Ammonium & *terchloride* of Osmium. Soluble in water, and alcohol. (Berzelius.)

Chloride of Ammonium & of Platin(*ous*)-ammonium. Soluble in water, or at least in an aqueous solution of chloride of ammonium.



$NH_4Cl;\ N\left\{\begin{matrix}H_3\\Pt'\end{matrix}\right., Cl$

Chloride of Ammonium & of Rhodium.

I.) $2NH_4Cl;\ Rh_2Cl_3 + 2Aq$ More difficultly soluble in water than No. 2. (Claus, *Beiträge*, p. 73.) Soluble in water; but insoluble in alcohol of 36° Bm. (Vauquelin, *Ann. de Chim.*, **93.** 204 [Gm.].) Soluble in water. (Fremy, *Ann. Ch. et Phys.*, (3.) **44.** 396.) Insoluble in alcohol. (Wollaston.)

II.) $3NH_4Cl;\ Rh_2Cl_3 + 3Aq$ Permanent. Easily soluble in water, though somewhat more difficultly than the corresponding sodium salt. Also soluble in a dilute aqueous solution of chloride of ammonium, but insoluble in spirit. After standing for some time, or on boiling, the aqueous solution changes color, and appears to contain No. 1. (Claus, *Beiträge*, pp. 71, 72.)

Chloride of Ammonium & *sesquichloride* of Ruthenium. The crystals do not dissolve readily in water, yet they separate with difficulty from their aqueous solution. Insoluble in a cold aqueous solution of chloride of ammonium. (Claus.) Insoluble in alcohol.

$2NH_4Cl;\ Ru_2Cl_3$

Chloride of Ammonium & of Silver. Decomposed by much water, chloride of silver being precipitated. (A. Vogel.) Soluble in an aqueous solution of chloride of ammonium.

$NH_4Cl;\ AgCl$

Chloride of Ammonium & *protochloride* of Tellurium. Decomposed by water.

$NH_4Cl;\ TeCl$

Chloride of Ammonium & *bichloride* of Tellurium. Soluble, without decomposition, in a small quantity of water; but is decomposed when treated with much water, or with alcohol.

$NH_4Cl;\ TeCl_2$

Chloride of Ammonium & *protochloride* of Tin.

I.) $NH_4Cl;\ SnCl + Aq$ Permanent. Easily soluble in cold water, the solution becoming turbid when boiled. (Apjohn.)

II.) $2NH_4Cl;\ SnCl + 3Aq$ Permanent. Decomposed by water. (Poggiale.)

Chloride of Ammonium & *bichloride* of Tin. Permanent. Soluble in 3 pts. of water at 14.5° [18° ?]. The concentrated solution is not decomposed by boiling, but on being diluted and then boiled, decomposition occurs. (Bolley.)

(*Chloro Stannate of Ammonium. Pink Salt.*)
$NH_4Cl;\ SnCl_2$

Chloride of Ammonium & of Titanium. Soluble in water. (H. Rose.)

$3NH_4Cl;\ 2TiCl$

Chloride of Ammonium & *basic sesquichloride* of Uranium. Very deliquescent. Very soluble in water. (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** 39.)

$3NH_4Cl;\ 2Ur_2O_3, Ur_2Cl_3 + 6Aq.$, or
"$(NH_4Cl, (Ur_2O_2)Cl + 2Aq)$"

Chloride of Ammonium & *basic chloride* of Vanadium. Insoluble in water.

Chloride of Ammonium & of Zinc.

I.) $NH_4Cl;\ ZnCl + Aq$ Deliquesces in moist air. Soluble, without decomposition, in water. (Schindler.) Very slightly deliquescent. Very soluble in cold, and still more soluble in hot water. (Pierre, *Ann. Ch. et Phys.*, (3.) **16.** 249.)

II.) $NH_4Cl;\ 2ZnCl + 4Aq$ Deliquescent. Very soluble in water. (Hautz.)

Chloride of Ammonium with Cyanide of Mercury.

I.) $NH_4Cl;\ 2HgCy$ Soluble in water, and alcohol. It is not decomposed by acids, excepting when these are hot. (Brett.)

II.) $2NH_4Cl;\ HgCy$

Chloride of Ammonium with *bi*Cyanide of Platinum.

$NH_4Cl;\ PtCy_2$

Chloride of Ammonium with FerroCyanide of Ammonium. Permanent. Very soluble in water, though less soluble than chloride of ammonium. The solution is decomposed by boiling. (Bunsen.)

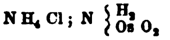
(*ChloroFerroCyanide of Ammonium.*)
$NH_4Cl;\ 2NH_4Cy, FeCy + 3Aq$

Chloride of Ammonium with Iodide of Lead.

I.) $3NH_4Cl;\ 2PbI$ Decomposed by water, which abstracts the chloride of ammonium. (Vœlckel.)

II.) $2NH_4Cl;\ PbI + 2Aq$ Decomposed by water. (Poggiale.)

Chloride of Ammonium with Osmiamid. Soluble in pure water, but is rapidly decomposed by boiling water. Entirely insoluble in a dilute aqueous solution of chloride of ammonium, and in alcohol. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 523.) Insoluble in water, or in an aqueous solution of chloride of ammonium. (Fremy, *Ann. Ch. et Phys.*, (3.) **44.** 391.)



$NH_4Cl;\ N\left\{\begin{matrix}H_2\\OsO_2\end{matrix}\right.$

Chloride of Ammonium with Sulphuric Acid (Anhydrous). Instantly decomposed by moisture. (Berzelius, *Lehrb.*, **3.** 280.)

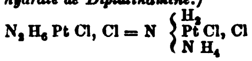
$NH_4Cl;\ XSO_3$

Chloride of Ammonium with Urea. More soluble than urea in water containing chloride of ammonium. It may be repeatedly crystallized in presence of an excess of urea, but is partially decomposed by pure water. (Dessaignes.)

$NH_4Cl, C_2H_4N_2O_2$

Chloride of Ammonium ChloroPlatin(*ous*)-ammonium. Difficultly soluble in cold, but completely soluble in boiling water. (Gros, *Ann. der Pharm*, 1838, **27.** 249.) Nearly insoluble in water, or ammonia-water. Soluble in a cold aqueous solution of caustic potash, from which it is reprecipitated on the addition of chlorhydric acid; decomposed by boiling the potash solution. (Buckton, *J. Ch. Soc.*, **5.** 216.)

(*Gros's Chloride. BiChlorhydrate de Diplatinamine.*)



$N_2H_6PtCl, Cl = N\left\{\begin{matrix}H_2\\PtCl\\NH_4\end{matrix}\right., Cl$

Chloride of Amyl. Insoluble in water. (Cahours.) Insoluble in concentrated chlorhydric acid, and in saline solutions. (Balard, *Ann. Ch. et Phys.*, (3.) **12.** 300.) Miscible in all proportions with alcohol, ether, and amylalcohol.

$C_{10}H_{11}Cl$

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Chloride of *tetr***Amylammonium.** Deliquescent.
$N \{ (C_{10}H_{11})_4, Cl$

Chloride of Amylene.
$C_{10}H_{10}'', Cl_2$

Chloride of AmylNicotin. Soluble in water. (Stahlschmidt, *Ann. Ch. u. Pharm.*, **90.** 226.)

Chloride of AmylStrychnium. *Vid.* Chlorhydrate of AmylStrychnine.

Chloride of Angelicyl.
$C_{10}H_7O_2, Cl$

Chloride of Anisoyl.
(*Chlorhydrate of Anisene.*)
$C_{16}H_9O_2, Cl$

Chloride of Anisyl. Decomposed by water, alcohol, and wood-spirit. (Cahours, *Ann. Ch. et Phys.*, (3.) **23.** 351.)
$C_{16}H_7O_4, Cl$

*Ter***Chloride of Antimony.** Deliquescent. $SbCl_3$ Decomposed by a large quantity of water into an insoluble basic, and a soluble acid chloride. Soluble in absolute alcohol. (Gmelin.) Soluble, without becoming cloudy, in an aqueous solution of chloride of sodium. Soluble in chlorhydric acid, in which solution, unless it be strongly acid, a precipitate is produced on the addition of much water. If to a solution thus rendered milky by water enough dilute chlorhydric acid is added to clear it, and nitric acid then added, no precipitate is produced at once; and the aqueous milky solution may even be rendered clear by adding nitric acid, but in both cases the solutions become troubled again after a time. (H. Rose, *Tr.*) Water does not produce a precipitate in solutions of terchloride of antimony, when these contain tartaric acid, or citric acid. (Spiller.)

*Ter***Chloride of Antimony with Chloride of Barium.**
$2\,BaCl; SbCl_3 + 5\,Aq$

*Ter***Chloride of Antimony with Chloride of Calcium.**
$2\,CaCl; SbCl_3 + 5\,Aq$

*Ter***Chloride of Antimony with Chloride of Cumarin.** Soluble in water, with subsequent decomposition. (Delalande, *Ann. Ch. et Phys.*, (3.) **6.** 350.)

*Ter***Chloride of Antimony with Chloride of Magnesium.**
$2\,MgCl; SbCl_3 + 5\,Aq$

*Ter***Chloride of Antimony with Chloride of Potassium.** Soluble in water, without decomposition. (Jacquelin.) More soluble than *b* in water.
$a = 2\,KCl; SbCl_3$

$b = 3\,KCl, SbCl_3$ Deliquescent. Decomposed by hot water. (Poggiale.)

*Ter***Chloride of Antimony with Chloride of Sodium.** Soluble in water. (Poggiale.)
$3\,NaCl; SbCl_3$

*Ter***Chloride of Antimony with Chloride of Strontium.**
$2\,SrCl; SbCl_3 + 5\,Aq$

*Ter***Chloride of Antimony with Sulphide of Antimony.** Ppt. Insoluble in dilute chlorhydric acid.

*Quinqui***Chloride of Antimony.** Deliquesces $SbCl_5$ with decomposition. Decomposed by water, with evolution of heat. Soluble in chlorhydric acid. If no chlorhydric acid be present, it is decomposed when the least possible quantity of water is added; a basic salt and free chlorhydric acid — but no acid salt — being formed. (H. Rose, *Pogg. Ann.*, **83.** 146.)

*Quinqui***Chloride of Antimony with Chloride of Cyanogen.** Immediately decomposed by water.
$SbCl_5; CyCl$

Chloride of Antimony & of Ethyl. Decomposed by water.

Chloride of Antimony & *bichloride* **of Sulphur.** Decomposed by water.
$SbCl_5; 3\,SCl_2$

Chloride of Antimony with Cyanide of Ethyl. Instantly decomposed by water, and alcohol. It cannot be recrystallized from ether. (Henkel.)
$C_6H_5N; SbCl_5$

Chloride of Antimony with Cyanide of Methyl. Instantly decomposed by water, and alcohol. It cannot be recrystallized from ether. (Henkel.)
$C_4H_3N; SbCl_5$

Chloride of Antimony with Phosphuretted Hydrogen. Decomposed by water.

Chloride of ArsenEthylium. Deliquescent. Readily soluble in water, and spirit. Insoluble in ether. (Landolt, *Ann. Ch. u. Pharm.*, **89.** 332.)
$As(C_4H_5)_4Cl + 8\,Aq$

Chloride of ArsenEthylium & *protochloride* **of Mercury.** Insoluble in water.

Chloride of Arsen*tri***Ethyl.**
$(C_4H_5)_3As, Cl_2$

Chloride of Arsen*di***Ethyl with** *prot***Oxide of Mercury.** Very difficultly soluble in cold, more easily soluble in boiling water. Very difficultly soluble in alcohol. Unacted upon by dilute, decomposed by concentrated nitric acid.
$(C_4H_5)_2As, Cl_2; 4\,HgO$

Chloride of Arsen*tri***Ethyl with** *din***Oxide of Mercury.** Tolerably easily soluble in hot, less soluble in cold water, and alcohol.
$(C_4H_5)_3As, Cl_2; Hg_2O$

Chloride of ArsenEthylium. Very deliquescent. Easily soluble in water, and alcohol. Insoluble in ether.
$As\{(C_4H_5)_4Cl + 8\,Aq$

*Ter***Chloride of Arsenic.** Soluble in a $a = AsCl_3$ small amount of water, but is decomposed by a larger quantity, as well as on boiling, to arsenious acid and free chlorhydric acid. Miscible with alcohol. (Gmelin.) Also miscible with oil of turpentine and with olive-oil. (J. Davy.) Easily soluble in water, alcohol, ether, and the essential oils. When in contact with much water it is gradually decomposed to AsO_3 and HCl. (Dumas.) Soluble in alcohol, and ether. Somewhat soluble in chlorhydric acid. (Penny & Wallace.)

$b = AsCl_3 + 3\,HO$ With water it behaves like the anhydrous compound.

Chloride of Arsenic & of Sulphur.
I.) $AsCl_3; 2\,SCl$ } Decomposed by water. (H.
II.) $AsCl_3; 3\,SCl$ } Rose.)

*Bi***Chloride of ArsenMethyl.** Tolerably readily soluble in water. (Bæyer.)
AsC_2H_3'', Cl_2

*Quadri***Chloride of ArsenMethyl.**
$AsC_2H_3Cl_4$

Chloride of ArsenMethylEthylium. Very deliquescent.

Chloride of Barium. Permanent. 1 pt. of the crystallized salt is soluble in 2.18 pts. of water at 21.5°; or 100 pts. of water at 21.5° dissolve 46 pts. of it; or the solution saturated at 21.5° contains 31.5% of it, and 26.8% of the anhydrous salt, and is of 1.2878 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.) 1 pt. of the anhydrous salt is soluble in 2.862 pts. of water at 15°. (Gerlach's determination, see his table of sp. grs., below.)
$BaCl + 2\,Aq$

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100 pts. of water at °C.	Dissolve pts. of the anhydrous salt, $BaCl$.	Dissolve pts. of the cryst. salt $BaCl + 2Aq$.
15.64°	34.86	43.50
49.31°	43.84	55.63
74.89°	50.94	65.51
105.48°	59.58	77.89

(Gay-Lussac, *Ann. Ch. et Phys.*, (2.) **11.** pp. 309, 310.)

The equation of the curve of solubility of chloride of barium is, $y = 0.2711\,x^\circ + 30.62$. (Gay-Lussac, *loc. cit.*), or 100 pts. of water dissolve of the anhydrous salt, pts. $= 32.62 + 0.2711\,T^\circ$. (H. Kopp.) By direct experiment, Kopp found that 100 pts. of water at 17.4° dissolved 36.7 pts. of the salt; according to the formula, 37.3 pts. should have been dissolved. (H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 262.)

100 pts. of water at °C.	Dissolve of crystallised Chloride of Barium ($BaCl + 2Aq$), pts.
16.25°	39.6
20.00	42.2
22.50	43.7
37.50	51.0
50.00	65.0
62.50	48.0
75.00	63.0
87.00	65.0
100.00	72.0

(Brandes, *Buchner's Repertitorium*, **14.** pp. 451, 105, cited in *Berzelius's Jahresbericht*, **4.** 102.)

The aqueous solution saturated at 18.1° contains 35.51% of the crystallized salt; hence 100 pts. of water at 18.1° dissolve 44.31 pts. of the salt, or 1 pt. of the salt is soluble in 2.257 pts. of water at 18.1°. The specific gravity of this solution = 1.2851. (Karsten, *Berlin Abhandl.*, 1840, p. 101.) The aqueous solution saturated at 15° is of 1.282345 sp. gr., and contains dissolved in every 100 pts. of water at least 34.379 pts. of the anhydrous, or 42.757 pts. of the crystallized salt. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.) Soluble in 2.67 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) 100 pts. of the aqueous solution saturated at its boiling point (104.4°) contain 45 pts. of the dry salt; or 100 pts. of water dissolve 81.81 pts. of it at 104.4°; or, 1 pt. of the dry salt is soluble in 1.2222 pts. of water at 104.4°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) The aqueous solution saturated at its boiling-point (104 4°) contains 60.1 pts. of the anhydrous salt, and 70.36 pts. of the crystallized salt in 100 pts. of water. (Berzelius, *Lehrb.*, citing Legrand.) The aqueous solution saturated at 12.5 contains 28.3% of [the crystallized ?] salt. (Hassenfratz, *Ann. de Chim.*, **28.** 291.) 1 pt. of anhydrous chloride of barium is soluble in 2.86 pts. of water at 15.5°, and in 1.67 pts. of water at the boiling temperature; the crystallized salt is soluble in 2.3 pts. of water at 15.5°, and in 1.28 pts. at the boiling temperature. The solution saturated at 15.5° contains 25.84% of the anhydrous salt and 30.20% of the crystallized; while the saturated boiling solution contains 37.33% of the anhydrous and 43.22% of the crystallized salt. (M. R. & P.) 100 pts. of water at 15.5° dissolve 20 pts. of it, and at 87.7° 43 pts. It is more soluble in boiling water. (Ure's *Dict.*) It is liable to form supersaturated solutions. (Ogden.)

An aqueous solution of sp. gr. (at 15°)	Contains per cent of $BaCl$.	An aqueous solution of sp. gr. (at 15°)	Contains per cent of $BaCl$.
1.00917	1	1.13778	14
1.01834	2	1.14846	15
1.02750	3	1.15999	16
1.03667	4	1.17152	17
1.04584	5	1.18305	18
1.05569	6	1.19458	19
1.06554	7	1.20611	20
1.07538	8	1.21892	21
1.08523	9	1.23173	22
1.09508	10	1.24455	23
1.10576	11	1.25736	24
1.11643	12	1.27017	25
1.12711	13	1.28267	25.97*

(Th. Gerlach, *Sp. Gew. der Salzlœsungen*, 1859, p. 14.)

* Mother liquor.

An aqueous solution of sp. gr. (at 21.5°)	Contains (by experiment) per cent of $BaCl + 2Aq$.
1.2878	31.53
1.1770	21.02
1.1123	14.01
1.0816	10.51
1.0531	7.00
1.0261	3.50

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 333.)

From these results Schiff calculates the following table by means of the formula, $D = 1 + 0.007243\,p + 0.0000453\,p^2 + 0.0000006567\,p^3$; in which D = the sp. gr. of the solution and p the percentage of substance contained in the solution.

Sp. gr. (at 21.5°).	Per Cent of $BaCl + 2Aq$.	Per cent of $BaCl$.
1.0073	1	0.853
1.0147	2	1.705
1.0222	3	2.558
1.0298	4	3.410
1.0374	5	4.263
1.0452	6	5.115
1.0530	7	5.968
1.0610	8	6.821
1.0692	9	7.673
1.0776	10	8.526
1.0861	11	9.379
1.0947	12	10.231
1.1034	13	11.084
1.1122	14	11 936
1.1211	15	12.789
1.1302	16	13.641
1.1394	17	14.494
1.1488	18	15.346
1.1584	19	16.199
1.1683	20	17.051
1.1783	21	17.904
1.1884	22	18.756
1.1986	23	19.609
1.2090	24	20.461
1.2197	25	21.314
1.2304	26	22.166
1.2413	27	23.019
1.2523	28	23.871
1.2636	29	24.724
1.2750	30	25.577

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 73.)

An aqueous solution of sp. gr. (at 19 5°) (sp. gr. of water at 19.5° = 1)	Contains pts. of $BaCl$ dissolved in 100 pts. of water.
1.0760	8.88
1.1521	18.24
1.2245	27.53
1.2837	35.44

(Kremers, *Pogg. Ann.*, **99.** 444.)

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The sp. gr. of a solution saturated at 8° is 1.27 (Anthon, *Ann. der Pharm.*, 1837, **24.** 211); at 18.1° it is 1 2851. (Karsten.)

An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of the salt.	An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of the salt.
1.0073	1	1.0919	12
1.0146	2	1.1014	14
1.0217	3	1.1309	16
1.0289	4	1.1504	18
1.0360	5	1.1700	20
1.0430	6	1.1901	22
1.0503	7	1.2227	24
1.0575	8	1.2363	26
1.0647	9	1.2600	28
1.0720	10		

(Hassenfratz, *Ann. de Chim.*, **28.** 298.)

In a solution containing for 100 pts. of water, pts. of anhydrous Ba Cl	The point of ebullition is elevated.	Difference.
0.0	0.0°	
11.0	0.5°	11.0
19.6	1.0°	8 6
26.2	1.5°	6.6
32.5	2.0°	6.3
38.6	2.5°	6.1
44.5	3.0°	5.9
50.3	3.5°	5.8
56.0	4.0°	5.7
60.1	4.4°	

The point of ebullition of pure water, observed in a glass tube containing bits of metallic zinc, having been 100.2°. (Legrand, *Ann. Ch. et Phys.*, 1835, (2.) **59.** 432.) An aqueous solution containing 10% of Ba Cl boils at 100.6°; one of 20% boils at 101.9°. (Gerlach's *Sp. Gew. der Salzlœsungen*, p. 102.) The crystals are soluble in 400 pts. of boiling absolute alcohol; more easily soluble in spirit. (In Gmelin & in Schubarth's *Tech. Chem.*) Insoluble in absolute alcohol. (H. Rose.) Soluble in from 6885 @ 8108 pts. of 99.3% alcohol at 14.5°, and in 4857 pts. of the same alcohol at the temperature of ebullition. (Fresenius, *Ann. Ch. u. Pharm.*, 1846, **59.** 127.) Insoluble in cold absolute alcohol, but dissolves in about 400 pts. of it when boiling. (Bucholz, in his *Beiträge*, **3.** 24 [T.].) Sensibly soluble in alcohol of 0.808 sp. gr. (Thomson, in his *System of Chem.*, London, 1831, **2.** 813.)

100 pts. of alcohol of sp. gr.	Dissolve of the anhydrous salt, pts.	Dissolve of the cryst. salt, pts.
0.900	1.00	1.56
·0.848	0.29	0.43
0.834	0.185	0.32
0.817	0.09	0.06

(Kirwan, *On Mineral Waters*, p. 274 [T.].)

A solution (saturated at 15°) in alcohol of sp. gr.	A solution (saturated at 15°) in alcohol of per cent by weight.	Contains per cent of crystallised chloride of barium.
1.000	0	30.25
0.986	10	23.7
0.972	20	18.0
0.958	30	12.8
0.939	40	9.3
0.895	60	3.4
0.847	80	0.5

(H. Schiff, *Ann. Ch. u. Pharm.*, 1861, **118.** 365.)

Less soluble in water acidulated with chlorhydric acid than in pure water, and insoluble in concentrated chlorhydric acid; hence a considerable amount of the salt is precipitated from its aqueous solution on the addition of chlorhydric acid. (Berzelius, *Lehrb.*, **3.** 355.) It has also been stated that chloride of barium is very difficultly soluble in nitric acid, but this is incorrect, the fact being that nitrate of baryta is very difficultly soluble in chlorhydric or nitric acid. (H. Wurtz, *Am. J. Sci.*, (2.) **25.** 376.) If chloride of sodium be added to a saturated aqueous solution of chloride of barium a portion of it dissolves, while chloride of barium is precipitated, the reaction continuing until the amounts of the two salts in solution have attained a certain definite equilibrium. (Karsten, *Berlin Abhandl.*, 1840, p. 109.) When a mixture (in excess) of chloride of barium and chloride of sodium is treated with water, 100 pts. of the water dissolve, at 17°, 38.6 pts. of the mixed salts, of which 4.1 pts. are Ba Cl: at 18.3°, 39.2 pts. of the mixed salts, of which 4.2 pts. are Ba Cl. At 17° or at 18.3° the solubility of pure chloride of sodium = 35.9; that of chloride of barium
{ at 17° = 37.2.
{ at 18.3° = 37.6.

At 17° Found: 38.6 = 34.5 Na Cl + 4.1 Ba Cl.
Calcul.: 38.6 = 35.9 " + 2.7 "
" 18.3° Found: 39.2 = 35.0 " + 4.2 "
Calcul.: 39.2 = 35.9 " + 3.3 "

As a general law, when a mixture of two salts of a single acid is treated with water the salt of the stronger base dissolves as if no other salt than itself were present. (H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 268.) When chloride of potassium is added to a saturated solution of chloride of barium it dissolves, while the latter is precipitated; this reaction continues until a definite solution of the two salts is obtained, which is identical with that made by treating a mixture of the two salts with water. (Karsten, *Berlin Abhandl.*, 1840, p. 110.) When a mixture (in excess) of the chlorides of barium and potassium is treated with water, 100 pts. of the water dissolve, at 16.8°, 45.9 pts. of the mixed salts, of which 18.2 pts. are Ba Cl; at 16.6°, 45.4 pts. of the mixed salts, of which 18.2 pts. are Ba Cl.

At 16.6° or 16.8° the solubility of pure chloride of potassium = 33.8; that of chloride of barium =
{ at 16.6°, 37.1.
{ at 16.8°, 37.2.

At 16.6° Found: 45.4 = 27.2 K Cl + 18.2 Ba Cl.
Calcul.: 45.4 = 33.8 " + 11.6 "
At 16.8° Found: 45.9 = 27.7 K Cl + 18.2 Ba Cl.
Calcul.: 45.9 = 33.8 " + 12.1 "

These salts furnish a remarkable exception to the general law, that when a mixture of two salts of a single acid is treated with water the salt of the stronger base dissolves as if no other salt were present; this exception is explained by the fact that the two combine, forming a double salt which has its own peculiar coefficient of solubility. (H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 267.) Chloride of barium is soluble in a saturated solution of nitrate of baryta. Chloride of barium is exceedingly slowly soluble in a saturated solution of nitrate of soda, with separation of nitrate of baryta; it is rapidly soluble in a saturated solution of nitrate of potash, but only to form nitrate of baryta which separates out. (Karsten, *Berlin Abhandl.*, 1840, pp. 129, 130.)

CHLORIDE OF BARIUM with GLYCOCOLL. $C_4H_4NO_3$, Ba Cl + 2 Aq Permanent. More soluble in hot than in cold water; less soluble in alcohol than in water. (Horsford.)

CHLORIDE OF BARIUM & OF LEAD.

CHLORIDE OF BARIUM & OF MERCURY. Ba Cl; 8 Hg Cl + 2 Aq Effloresces in dry air. Soluble in water. (Bonsdorff.)

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Chloride of Barium & *sesquichloride* **of Ruthenium.** Decomposed by alcohol, which dissolves out the sesquichloride of ruthenium.

Chloride of Barium & of Silver.

Chloride of Barium & *protochloride* **of Tin.**
$BaCl ; SnCl + 4 Aq$

Chloride of Barium & *bichloride* **of Tin.**
$BaCl ; SnCl_2 + 5 Aq$

Chloride of Barium with **Cyanide of Mercury.** Efflorescent. Easily soluble in water and in dilute alcohol. (Brett.)
$BaCl ; 2 HgCy + 6 Aq$

Chloride of Barium with **Fluoride of Barium.** Difficultly soluble in water, though much more readily soluble than fluoride of barium alone. But water decomposes it to a certain extent, so that when it is washed upon a filter more chloride of barium than fluoride of barium is dissolved out. (Berzelius, *Lehrb.*, **3.** 356.)
$BaCl ; BaFl$

Chloride of Benzanilidyl. *Vid.* Chloride of PhenoylBenzoicyl.

Chloride of Benzil. Insoluble, or very sparingly soluble, in water, by which it is slowly decomposed. Quickly decomposed by alkaline solutions. (Cahours, *Ann. Ch. et Phys.*, (3.) **23.** 350.)
$C_{28}H_{11}O_4, Cl$

*Ter***Chloride of Benzin.** *Vid.* Chlorhydrate of *ter*ChloroBenzin.

Chloride of BenzoicylSulphoPhenoylamid. Fumes in the air. Decomposed by water. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **53.** 303.)
$N\left\{\begin{matrix}C_{12}H_4S_2O_4''\\C_{14}H_5\\H\end{matrix}\right., Cl$

Chloride of Benzol ($C_{14}H_6''$). Insoluble in water. Easily soluble in alcohol, and ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **23.** 331.)
(*ChloroBenzol. Hydride of ChloroBenzoyl. Chloride of Benzylene.*)
$C_{14}H_6'', Cl_2$

Chloride of Benzoyl. Insoluble in water. It is decomposed, however, and thus dissolved, by boiling water. Decomposed by hot alcohol, and by ammonia-water. Unacted on by ether. Miscible in all proportions with bisulphide of carbon.
(*ChloroBenzoyl.*)
$C_{14}H_5O_2, Cl$

Chloride of Benzoyl with **Hydride of Benzoyl.** Decomposed by warm water, or alcohol. Sparingly soluble in cold alcohol. (Laurent & Gerhardt.)
$C_{14}H_5O_2Cl ; C_{14}H_5\left.\begin{matrix}O_2\\H\end{matrix}\right\}$

Chloride of Benzoyl*chloré*. *Vid.* Chloride of ChloroBenzoyl.

Chloride of Benzyl. *Vid.* Chloride of Toluenyl.

Chloride of Benzylene. *Vid.* Chloride of Benzol ($C_{14}H_6''$).

*Bi***Chloride of Bismuth.** Very hygroscopic. Decomposed by water, and, with partial solution, by dilute mineral acids. (Schneider, *Ann. Ch. u. Pharm.*, **97.** 195.)
$BiCl_2$

*Ter***Chloride of Bismuth.**

I.) $BiCl_3$ Deliquesces with decomposition. Decomposed by water, with elevation of temperature, an insoluble oxychloride being precipitated, while chlorhydric acid remains in solution, no acid salt being formed. (H. Rose, *Pogg. Ann.*, **83.** 145.) Soluble in dilute chlorhydric acid.

It is not decomposed by water when in presence of citric acid. (Spiller.)

II.) *basic.* *Vid.* Oxychloride of Bismuth.

Chloride of Bismuth & of Potassium.
$2 KCl ; BiCl_3 + 4 Aq$ Decomposed by water.

Chloride of Bismuth & of Sodium.

I.) $NaCl ; BiCl_3 + 3 Aq$ Deliquescent.

II.) $2 NaCl ; BiCl_3 + 2 Aq$ Permanent. Decomposed by water.

Chloride of Bismuth with **Selenide of Bismuth.** Unacted upon by water. Scarcely at all acted upon by chlorhydric acid. Easily and completely dissolved, with decomposition, by nitric acid. (Schneider.)
$BiCl_3 ; 2 BiSe_3$

Chloride of Bismuth with **Sulphide of Bismuth.** Unacted upon by water, or by cold dilute acids. Decomposed by hot acids. (Schneider.)
$BiCl_3 ; 2 BiS_3$

Chloride of BismuthEthyl. Not completely soluble in water. Soluble in alcohol. (Dunhaupt.)
(*Chloride of Bisethyl.*)
C_4H_5Bi'', Cl_2

Chloride of Borneol. Soluble in alcohol.
(*Chloride of Camphol.*)
$C_{20}H_{17}Cl$

Chloride of Boron. Rapidly absorbed by water, with decomposition to boracic and chlorhydric acids. It is also absorbed and decomposed by alcohol, wood-spirit, and fusel-oil.
BCl_3

Chloride of Bromine. Soluble in water. Decomposed by sunlight. (Lœwig.) Ether abstracts it from the aqueous solution.

Chloride of BromoNaphthalin. Sparingly soluble in boiling ether. (Laurent.)
(*Subchloride of Bromonaphtase*)
$C_{20}H_7Br'', Cl_2$

Chloride of *bi***BromoNaphthalin.** Very sparingly soluble in alcohol, and ether. (Laurent.)
(*Chloride of Bronaphtèse.*)
$C_{20}H_6Br_2, 2 Cl_2$

*Bi***Chloride of** *bi***BromoChloroNaphthalin.** Very sparingly soluble in ether. (Laurent.)
(*PerChloride of Bronaphtese* ($C_{20}H_6Br_2, Cl_5$) (Laurent, at first). *Chloride of Bromichlonaphtèse.*)
$C_{20}H_5Br_2Cl_5 = C_{20}H_5Br_2Cl, 2 Cl_2$

Chloride of Butoyl.
C_8H_7, Cl

Chloride of Butyl. Insoluble in water. (Kolbe's *Lehrb.*, **1.** 289.)
(*Chloride of Tetryl. Butylchlorhydric Ether.*)
C_8H_9Cl

Chloride of Butylene. Insoluble in water. Readily soluble in alcohol, and ether. (Kolbe, *J. Ch. Soc.*, **2.** 169.)
(*Chloride of Tetrylene.*)
C_8H_8'', Cl_2

"**Chloride of Butyrile.**" *Vid.* ChloroButylene.
C_8H_7Cl

Chloride of Butyryl. Instantly decomposed by water. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **38.** 299.)
(*Butyric Chloride.*)
$C_8H_7O_2, Cl$

Chloride of Cacodyl.
(*ChlorArsin.*)

I.) $(C_2H_3)_2As, Cl$ Not perceptibly soluble in water. Miscible with alcohol. Insoluble in ether.

II.) *basic.*
$3 C_4H_6AsCl ; C_4H_6AsO$

III.) *ter.* Decomposed by water. Soluble in ether; also soluble in bisulphide of carbon, but less so than in ether. (A. Bæyer.)
$As(C_2H_3)_2, Cl_3$

Chloride of Cacodyl & of Copper. Decomposed by boiling water. Insoluble in water, alcohol, or ether.
$As(C_2H_3)_2Cl ; Cu_2Cl$

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Chloride of Cacoplatyl. Soluble in boiling water, and alcohol.
(Chloride of Cacodyl Platinum.)
$C_4H_7AsPtClO_2 = \left.\begin{matrix}C_2H_3\\C_2H_2Pt\end{matrix}\right\} As, Cl + 2 Aq$

Chloride of Cadmium. Deliquescent. Easily soluble in water. (Stromeyer; John.)
$CdCl$, & $+ 2 Aq$

The anhydrous salt is soluble in
0.71 pt. of water at 20°
0.72 " " " 40°
0.72 " " " 60°
0.70 " " " 80°
0.67 " " " 100°
(Kremers, *Pogg. Ann.*, **104.** 162.)

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.1063	13.0
1.2106	26.9
1.3100	41.1
1.4060	55.8
1.5060	72.5
1.7266	114.2

(Kremers, *Pogg. Ann.*, **104.** 155, & **106.** 587.)
Readily soluble in alcohol.
Soluble in strong chlorhydric acid. (H. Wurtz.)
Soluble in ammonia-water, with combination.

Chloride of Cadmium & of Cobalt. Deliquescent.
$2 CdCl; CoCl + 12 Aq$

Chloride of Cadmium & of Copper.
$CdCl; CuCl + 4 Aq$

Chloride of Cadmium & of Iron.
$2 CdCl; FeCl + 12 Aq$

Chloride of Cadmium & of Magnesium.
I.) $CdCl; 2 MgCl + 12 Aq$
II.) $2 CdCl; MgCl + 12 Aq$

Chloride of Cadmium & of Manganese.
$2 CdCl; MnCl + 12 Aq$

Chloride of Cadmium & of Nickel.
I.) $CdCl; 2 NiCl + 12 Aq.$
II.) $2 CdCl; NiCl + 12 Aq.$

Chloride of Cadmium & of Potassium.
I.) $KCl; CdCl$ Less soluble in water than the corresponding bromine compound. 100 pts. of water at 15.5° dissolve 33.45 pts. of it. Slightly soluble in alcohol, and wood-spirit; less so than chloride of cadmium. (Croft, *Phil. Mag.*, (3.) **21.** 356.)
II.) $KCl; 2 CdCl + Aq$
III.) $2 KCl; CdCl$ More soluble in water than No. 2. (v. Hauer.)

Chloride of Cadmium & of Sodium. 100 pts. of water at 15.5° dissolve 71.32 pts. of it; or 1 pt. of the salt is soluble in 1.4 pts. of water, at 15 5°. Slightly soluble in alcohol, and wood-spirit; less so than chloride of cadmium. (Croft, *Phil. Mag.*, (3.) **21.** 367.)
$NaCl; CdCl$

Chloride of Cadmium & of Strontium.
$2 CdCl; SrCl + 7 Aq$

Chloride of Cadmium with Urea. Very readily soluble in water. Not absolutely insoluble in alcohol. (Neubauer & Kerner, *Ann. Ch. u. Pharm.*, **101.** 338.)
$2 CdCl; C_2H_4N_2O_2$

Chloride of Cadmium*ter*amin. Extremely sparingly soluble in cold water. (Schueler, *Ann. Ch. u. Pharm.*, **87.** 43.)
(Ammonio Chloride of Cadmium.)
$N\left\{H_9 . Cd, Cl\right.$

Chloride of Cadmiumammonium. Soluble in warm, less soluble in cold ammonia-water. (Croft.)
$N\left\{\begin{matrix}H_3\\Cd\end{matrix}\right. Cl$

Chloride of Cajputene.
$C_{20}H_{16}, Cl_2$

Chloride of Calcium.
I.) *normal.* Very deliquescent. The anhydrous salt is very soluble in water, with evolution of heat. The anhydrous salt is soluble in 1.459 pts. of water at 15°. (Gerlach's determination, see his table of sp. grs., below.)
$CaCl$, & $+ 6 Aq$

The anhydrous salt
is soluble in 1.58 pts. of water at 10.2°
" " 1.35 " " " 20°
" " 0.83 " " " 40°
" " 0.72 " " " 60°

A very strongly supersaturated solution of this salt occurred on one occasion when a solution saturated at the ordinary temperature was left in melting ice during three hours, crystals having been frequently thrown in meanwhile. (Kremers, *Pogg. Ann.*, **103.** 65.) Soluble in 1.5 pts. of cold, and in 0.8 pt. of boiling water. (Fourcroy.) The aqueous solution saturated in the cold contains 40.7% of it (Fourcroy); at 12.5°, 53.8% of it. (Hassenfratz, *Ann. de Chim.*, **28.** 291.) The crystallized salt ($CaCl + 6 Aq$) is also very deliquescent; and is soluble in water with reduction of temperature. It is soluble in 0.5 pt. of water at 0°, in 0.25 pt. at 16°, and in every proportion of hot water. (Gmelin's *Hand-Book.*) The hydrated salt is also readily soluble in alcohol.

Soluble in 0.5 pt. of water at 0°, in 0.25 pt. at 15.5°, and extremely soluble in boiling water. The solution saturated at 0° contains 66.66% of it, and that saturated at 15.5°, 80%. (M. R. & P.) The crystallized salt is soluble in 0.25 pt. of water at 18.75°. (Abl, from *Oesterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.)

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.0545	6.97
1.0954	12.58
1.1681	23.33
1.2469	36.33
1 3234	50.67
1.3806	62.90

(Kremers, *Pogg. Ann.*, **99.** 444.)

An aqueous solution of sp. gr. (at 15°)	Contains per cent of Ca Cl.	An aqueous solution of sp. gr. (at 15°)	Contains per cent of Ca Cl.
1.00852	1	1.20279	22
1.01704	2	1.21308	23
1.02555	3	1.22336	24
1.03407	4	1.23365	25
1.04259	5	1.24450	26
1.05146	6	1.25535	27
1.06033	7	1.26619	28
1.06921	8	1.27704	29
1.07808	9	1.28789	30
1.08695	10	1.29917	31
1.09628	11	1.31045	32
1.10561	12	1.32174	33
1.11494	13	1.33302	34
1.12427	14	1.34430	35
1.13360	15	1.35610	36
1.14332	16	1.36790	37
1.15305	17	1.37970	38
1.16277	18	1.39150	39
1.17250	19	1.40330	40
1.18222	20	1.41104	40.66*
1.19251	21		

(Th. Gerlach, *Sp. Gew. der Salzlœsungen*, 1859, p. 13.)

* Mother liquor.

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An aqueous solution of sp. gr. (at 18.3°)	Contains (by experiment) per cent of Ca Cl + 6 Aq.
1.3950	80.70
1.2455	53.80
1.1569	35.88
1.1155	26.90
1.0738	17.94
1.0368	8.97

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 332.)

From these results Schiff calculates the following table, by means of the formula, $D = 1 + 0.003935\ p + 0.00001346\ p^2 - 0.0000000335\ p^3$, in which D = the sp. gr. of the solution, and p the percentage of substance in the solution.

Sp. gr. (at 18.3°)	Per cent of Ca Cl + 6 Aq	Per cent of Ca Cl
1.0039	1	0.507
1.0079	2	1.014
1.0119	3	1.521
1.0159	4	2.028
1.0200	5	2.534
1.0241	6	3.041
1.0282	7	3.548
1.0323	8	4.055
1.0365	9	4.562
1.0407	10	5.068
1.0449	11	5.575
1.0491	12	6.082
1.0534	13	6.587
1.0577	14	7.096
1.0619	15	7.601
1.0663	16	8.107
1.0706	17	8.611
1.0750	18	9.121
1.0794	19	9.625
1.0838	20	10.136
1.0882	21	10.643
1.0927	22	11.150
1.0972	23	11.657
1.1017	24	12.164
1.1062	25	12.670
1.1107	26	13.177
1.1153	27	13.684
1.1199	28	14.191
1.1246	29	14.698
1.1292	30	15.204
1.1339	31	15.711
1.1386	32	16.218
1.1433	33	16.725
1.1480	34	17.232
1.1527	35	17.738
1.1575	36	18.245
1.1622	37	18.752
1.1671	38	19.259
1.1719	39	19.766
1.1768	40	20.272
1.1816	41	20.779
1.1865	42	21.286
1.1914	43	21.793
1.1963	44	22.300
1.2012	45	22.806
1.2062	46	23.313
1.2112	47	23.820
1.2162	48	24.327
1.2212	49	24.834
1.2262	50	25.340
1.2312	51	25.847
1.2363	52	26.354
1.2414	53	26.861
1.2465	54	27.368
1.2516	55	27.874
1.2567	56	28.381
1.2618	57	28.888
1.2669	58	29.395
1.2721	59	29.902
1.2773	60	30.408
1.2825	61	30.915
1.2877	62	31.422
1.2929	63	31.929
1.2981	64	32.436
1.3034	65	32.942
1.3087	66	33.449
1.3140	67	33.956
1.3193	68	34.463
1.3246	69	34.970
1.3300	70	35.476

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 71.)

An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of Ca Cl.	An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of Ca Cl.
1.0125	2	1.1547	28
1.0212	4	1.1670	30
1.0319	6	1.1803	32
1.0429	8	1.1935	34
1.0540	10	1.2067	36
1.0650	12	1.2198	38
1.0759	14	1.2330	40
1.0870	16	1.2478	42
1.0979	18	1.2528	44
1.1000	20	1.2789	46
1.1212	22	1.2949	48
1.1323	24	1.3120	50
1.1445	26	1.3310	52

(Hassenfratz, *Ann. de Chim.*, **28.** 299.)

An aqueous solution of sp. gr.	Contains per cent of Ca Cl.	An aqueous solution of sp. gr.	Contains per cent of Ca Cl.
1.45	41.91	1.21	23.93
1.42	40.43	1.18	20.85
1.39	38.31	1.15	17.60
1.36	36.49	1.12	14.42
1.33	34.57	1.09	11.23
1.30	32.35	1.06	7.66
1.27	29.67	1.03	3.95
1.24	26.86		

(Richter, *Stöchiom.*, **3.** 171; and *Gmelin's Handbook*, **3.** 208.)

In a solution containing for 100 pts. of water, pts. of anhydrous Ca Cl	The boiling-point is elevated.	Difference.
0.0	0°	
10.0	1°	10.0
16.5	2°	6.5
21.6	3	5.1
25.8	4	4,2
29.4	5	3.6
32 6	6	3.2
35.6	7	3.0
38.5	8	2.9
41.3	9	2.8
44.0	10	2.7
46.8	11	2.8
49.7	12	2.9
52.6	13	2.9
55.6	14	3.0
58.6	15	3.0
61.6	16	3.0
64.6	17	3.0
67.6	18	3.0
70.6	19	3.0
73.6	20	3.0
76.7	21	3.1
79.8	22	3.1

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In a solution containing for 100 pts. of water, pts. of anhydrous Ca Cl	The boiling-point is elevated.	Difference.
82.9	23°	3.1
86.0	24	3.1
89.1	25	3.1
92.2	26	3.1
98.4	28	6.2
104.6	30	6.2
110.9	32	6.3
117.2	34	6.3
123.5	36	6.3
129.9	38	6.4
136.3	40	6.4
142.8	42	6.5
149.4	44	6.6
156.2	46	6.8
163.2	48	7.0
170.5	50	7.3
178.1	52	7.6
186.0	54	7.9
194.3	56	8.3
203.0	58	8.7
212.1	60	9.1
221.6	62	9.5
231.5	64	9.9
241.9	66	10.4
252.8	68	10.9
264.2	70	11.4
276.1	72	11.9
288.5	74	12.4
301.4	76	12.9
314.8	78	13.4
325.0 (Saturated.)	79.5	10.2

The point of ebullition of pure water, observed in a glass tube containing bits of metallic zinc, having been 100.1°. (Legrand, *Ann. Ch. et Phys.*, 1835, (2.) **59.** 437.) The saturated aqueous solution boils at 180° (Legrand), with partial decomposition. (Kremers, *Pogg. Ann.*, **99.** 43.) An aqueous solution containing 10% of Ca Cl boils at 101.4°; one of 20% boils at 104.2°; one of 30% at 109.7°; and one of 40% at 118°. (Gerlach's *Sp. Gew. der Salzlœsungen*, p. 101.) Soluble in 1 pt. of strong boiling alcohol. (Wenzel, in his *Verwandtschaft*, p. 300 [T.].) Dry chloride of calcium is soluble in 8 pts. of alcohol at 15° (Bergman, *Essays*, **1.** 144), and in 1 pt. of boiling spirits of wine. (*Ibid.*, p. 182.) Very easily soluble in absolute alcohol, with evolution of heat.

Soluble in 0.7 pt. of boiling absolute alcohol. (Ot. Gr.) 1 pt. of the anhydrous salt is soluble in 1.43 pts. of absolute alcohol at 78.3°. (Graham.) Soluble in wood-spirit.

Soluble in all proportions in lignone. (Liebig.) Insoluble in lignone. (L. Gmelin.) Insoluble in acetone.

Soluble in butylic alcohol (hydrate of butyl), with combination. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **42.** 137.) Soluble to a certain extent in propylic alcohol (hydrate of propyl). (Berthelot, *Ann. Ch. et Phys.*, (3.) **43.** 399.) Soluble in caprylic alcohol (hydrate of capryl), with combination, *v. inf.* (Bouis.) Ether precipitates it from the alcoholic solution. (Dœbereiner.) It is soluble in many of the compound ethers (Strecker, *Ann. Ch. u. Pharm.*, **91.** 357); as, in acetate of ethyl, with combination (Liebig), and in lactate of ethyl, very readily, with combination. (Strecker.) Soluble in considerable quantity in anhydrous sulphocyanide of amyl. (Medlock, *J. Ch. Soc*, **1.** 374.) Soluble in valyl. (Kolbe, *J. Ch. Soc.*, **2.** 161.) Very readily soluble in concentrated acetic acid. (Liebig.) Soluble in a saturated aqueous solution of nitrate of potash, with elevation of temperature. (Fourcroy & Vauquelin, *Ann. de Chim.*, **11.** 137.) Insoluble in oil of caraway.

II.) *basic.* *Vid.* Oxychloride of Calcium.

Chloride of Calcium & of Mercury.

I.) $Ca\,Cl;\ 2\,Hg\,Cl + 6\,Aq$ Exceedingly deliquescent. Very easily soluble in water. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 133.)

II.) $Ca\,Cl;\ 5\,Hg\,Cl + 8\,Aq$ Tolerably permanent. When treated with cold water it is decomposed, chloride of calcium being dissolved, while protochloride of mercury (Hg Cl) remains, but on warming the mixture complete solution ensues. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 132.)

Chloride of Calcium & of Tin.
$Ca\,Cl;\ Sn\,Cl_2 + 5\,Aq$

Chloride of Calcium with Cyanide of Mercury.

I.) $Ca\,Cl;\ 2\,Hg\,Cy$ Soluble in water, and alcohol. (Brett.)

II.) ditto $+ 6\,Aq$ Efflorescent. Very soluble in water. (Poggiale.)

Chloride of Calcium with Hydrate of Capryl(Caprylic Alcohol). Very deliquescent. More soluble in cold than in hot caprylic alcohol. It is decomposed by water. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 104.)

Chloride of Calcium with Hydrate of Methyl(Wood-spirit). $2\,C_2H_4O_2;\ Ca\,Cl$ Very deliquescent. Decomposed by boiling water. Soluble in wood-spirit. (Kane.)

Chloride of Calcium with Lactate of Ethyl. $Ca\,Cl;\ C_{20}H_{20}O_{12}$

Chloride of Calcium with Lactate of Lime. $2\,Ca\,Cl;\ C_{12}H_{10}Ca_2O_{12} + 12\,Aq$ Permanent. Very easily soluble in water and in boiling ordinary alcohol; rather difficultly soluble in cold alcohol. Only slightly soluble in cold, but rather abundantly soluble in boiling absolute alcohol. Insoluble in ether. On recrystallizing it from the aqueous solution a salt containing less Ca Cl is obtained, and it would even appear that all of the latter might be eliminated by repeated recrystallization. (Engelhardt & Maddrell, *Ann. Ch. u. Pharm.*, 1847, **63.** 113.)

Chloride of Calcium with Oxalate of Lime.

I.) $2\,Ca\,Cl;\ C_4Ca_2O_8 + 14\,Aq$ Permanent. Decomposed by water. (Fritzsche.)

II.) $Ca\,Cl;\ 2\,(C_4Ca_2O_8) + 24\,Aq$ Decomposed by water. (Souchay & Lenssen, *Ann. Ch. u. Pharm.*, **100.** 317.)

Chloride of Calcium with Platinate of Lime. (*Herschel's precipitate.*) $Ca\,Cl;\ Ca\,O,\ 2\,Pt\,O_2 + 7\,Aq$ Readily soluble in chlorhydric acid, also, before drying, in nitric acid.

Chloride of Calcium with PlatinoCyanide of Calcium. Soluble in an aqueous solution of chloride of calcium. (Quadrat.)

Chloride of Calcium with PlatinoPlatiniCyanide of Calcium. Deliquescent. Very soluble in water. (Quadrat.)

Chloride of Calcium with Sulphide of Calcium. Deliquescent. (Berthier.)

"Chloride of Capryl." *Vid.* Chloride of Octyl.

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Chloride of Capryl.
(*Binoxide of ChloroCaprylene.*)
$C_{16}H_{15}O_2, Cl$

Chloride of Caprylene.
$C_{16}H_{16}'', Cl_2$

***Proto*Chloride of Carbon.** *Vid. per*Chlor Ethylene.

***Bi*Chloride of Carbon.** *Vid.* Chloride of *per*ChloroMethyl.

***Per*(or *sesqui*)Chloride of Carbon.** *Vid.* Chloride of *per*ChlorEthylene.
C_4Cl_6

***Di*Chloride of Carbon**(Julin's). Insoluble either in hot or in cold water. Readily soluble in boiling alcohol of 1.816 sp. gr., from which solution it separates for the most part on cooling. (Phillips & Faraday.) Soluble in ether. Soluble in hot oil of turpentine, from which it separates on cooling. (Julin.) Insoluble in water. Easily soluble in alcohol, and ether. (Regnault.) Unacted on by boiling nitric, chlorhydric, or sulphuric acids, or by a solution of potash.
C_4Cl_2

Chloride of Carbonic Oxide(or **of Carbonyl**). *Vid.* ChloroCarbonic Acid.

Chloride of Carbonyl & of Copper. Decomposes in the air. Insoluble in water, by which it is decomposed. (Berthelot, *Ann. Ch. et Phys.*, (3.) **46.** 488.)
(*DiChloride of Copper with Carbonic Oxide.*)
$C_2H_4Cu_4Cl_2O_6 = \left.\begin{matrix} C_2O_2'' \\ 2\,Cu_2Cl \end{matrix}\right\} + 4\,Aq$

Chloride of Carbonyl with Cyanide of Ethyl. Instantly decomposed by water, and alcohol. It cannot be recrystallized from ether. (Henkel.)
$C_6H_5N, C_2O_2Cl_2$

Chloride of Cerium.

I.) *proto.*

a = *anhydrous.* Deliquescent. Easily soluble in water, and alcohol. (Mosander.)
$Ce\,Cl$

b = *hydrated.* Deliquescent. Soluble in 1 pt. of water at ordinary temperatures; and in 3 @ 4 pts. of alcohol. (Dumas, *Tr.*)
$Ce\,Cl + Aq$

II.) *sesqui.* Known only in solution, and this is partially decomposed when gently heated, or completely by long-continued boiling.
Ce_2Cl_3

III.) *basic.* Compounds containing 3, and less than 3, equivalents of base to one of acid may be obtained soluble in water, but those more basic than this are insoluble. (Ordway, *Am. J. Sci.*, (2.) **26.** 205.)

Chloride of Cerium & of Mercury(HgCl). Permanent. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 247.)

Chloride of Cetyl. Insoluble in water. Easily miscible with alcohol, and ether. Unacted upon by boiling potash-lye or by dilute acids. Scarcely at all attacked by strong nitric acid.
(*Chlorhydrate of Cetene.*)
$C_{32}H_{33}Cl$

Chloride of ChlorAcetyl. Decomposed by water and by alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **49.** 60.)
(*Chloride of Acetyl monochloré.*)
$C_4H_2Cl_2O_2 = C_4H_2ClO_2, Cl$

Chloride of *ter*ChlorAcetyl. Soluble in water, with decomposition. Decomposed by alcohol. (Malaguti.)
(*Aldehyde perchloré.*
ChlorAldehyde.)
$C_4Cl_4O_2 = C_4Cl_3O_2, Cl$

Chloride of ChlorAllyl.
$C_6H_4Cl_2 = C_6H_4Cl, Cl$

Chloride of *bi*ChlorAllyl.
$C_6H_3Cl_3 = C_6H_3Cl_2, Cl$

Chloride of *ter*ChlorAllyl.
$C_6H_2Cl_4 = C_6H_2Cl_3, Cl$

Chloride of *quadri*ChlorAllyl.
$C_6HCl_5 = C_6HCl_4, Cl$

Chloride of *quinqui*ChlorAllyl.
$C_6Cl_6 = C_6Cl_5, Cl$

Chloride of *octi*ChlorAmyl.
$C_{10}H_2Cl_9 = C_{10}H_2Cl_8, Cl$

Chloride of Chlorethose. *Vid.* Chloride of *per*ChlorEthylene.

Chloride of ChlorEthyl. Insoluble in water. Miscible in all proportions with alcohol, and ether. (Kolbe's *Lehrb.*, **1.** 186.)
(*Chloride of Aldehyde. Monochlorinated Hydrochloric Ether. Chloride of Ethylchloré. Isomeric with Chloride of Ethylene.*)
C_4H_4Cl, Cl

Chloride of *bi*ChlorEthyl. Insoluble in water. Miscible with alcohol. Unacted upon by an aqueous solution of caustic potash, and is decomposed by alcoholic potash only after long-continued boiling. (*Ibid.*, p. 669.)
(*Chloride of Acetyl(Acetoyl). Isomeric with Chloride of ChlorEthylene.*)
$C_4H_3Cl_3 = C_4H_3Cl_2, Cl$

Chloride of *ter*ChlorEthyl. Insoluble in water. Miscible with alcohol. Unacted upon by an aqueous solution of caustic potash, but is decomposed when boiled with alcoholic potash. (*Ibid.*, p. 670.)
(*Chloride of Chlor Acetyl (Acetoyl).*)
$C_4H_2Cl_4 = C_4H_2Cl_3, Cl$

Chloride of *quadri*ChlorEthyl. Not miscible with water. Soluble in alcohol.
(*Chloride of biChlorAcetyl (Acetoyl).*)
$C_4HCl_5 = C_2HCl_4, Cl$

Chloride of *per*ChlorEthyl. Identical with Chloride of *per*ChlorEthylene("Sesquichloride of Carbon").

Chloride of ChlorEthylene. Insoluble in water. Soluble in alcohol, and ether. (Kolbe's *Lehrb.*, **1.** 362.)
(*PerChloride of Acetyl.*
Chlorure de Chloréthose.
Chlorure d'éthylène chloré.)
$C_4H_3Cl_3 = C_4H_3Cl'', Cl_2$

Chloride of *bi*ChlorEthylene. Insoluble in water. Soluble in alcohol, and ether. (Kolbe's *Lehrb.*, **1.** 365.)
(*PerChloride of Formyl.*
Chlorure d'Ethylenebichloré.
Chlorure de Chloréthése)
$C_4H_2Cl_4 = C_4H_2Cl_2'', Cl_2$

Chloride of *ter*ChlorEthylene. Insoluble in water.
(*Chlorure d'Ethylène trichloré.*
Chlorhydrate of Chloretherose.)
$C_4HCl_5 = C_4HCl_3'', Cl_2$

Chloride of *per*ChlorEthylene. Very sparingly soluble in water, and as difficultly soluble in aqueous solution of the caustic alkalies. Easily soluble in alcohol, but much more readily in hot than in cold. Water precipitates it from the alcoholic solution. More soluble in ether; also soluble in the fixed and volatile oils. Unacted upon by chlorhydric acid, or by sulphuric acid. Nor is it decomposed by aqueous solutions of the caustic or sulphuretted alkalies. Soluble in boiling nitric acid, from which it separates on the addition of water, and partly on cooling. (Faraday.) Soluble in acetate of ethyl-perchloré(Terchloracetate of Perchlorethyl) and in ether. (F. Leblanc, *Ann. Ch. et Phys.*, (3.) **10.** pp. 201, 202, 203.) Soluble in alcohol and in ether, from which it is precipitated by water. (Bouis, *Ann. Ch. et Phys.*, (3.) **20.** 452.)
(*Sesquichloride of Carbon.*
PerChloride of Carbon.
Chlorure de Chlorethose.
Chlorure d'Ethylène perchloré.)
$C_4Cl_6 = C_4Cl_4'', Cl_2$

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Chloride of *per*ChlorEthylene with Chloride of Cyanogen.

I.) $C_{12} N_4 Cl_{14} = C_8 N_4 Cl_8 ; C_4 Cl_6$ Insoluble in water, but is soon decomposed thereby. Soluble in alcohol, from which it is precipitated by water. Soluble in ether. (Bouis, *Ann. Ch. et Phys.*, (3.) **20.** 448.)

II.) $C_{20} N_4 Cl_{22} = C_8 N_4 Cl_4 ; 3\, C_4 Cl_6$ Insoluble in water. Soluble in alcohol; more soluble in ether. (Bouis, *loc. cit.*, p. 452.)

III.) $C_{12} N_4 Cl_{14} O_4 = \left.\begin{matrix} C_8 N_4 Cl_8 \\ O_4 \end{matrix}\right\} ; C_4 Cl_6$ Insoluble in water. Soluble in alcohol, and ether. (Bouis, *loc. cit.*, p. 454.)

Chloride of ChloroBenzoyl. Decomposed by boiling water after a time. Decomposed at once by concentrated ammonia-water; more slowly by dilute ammonia and by solutions of the fixed alkalies. (Limpricht & v. Uslar.)

(*Chloride of Benzoyl chloré. Oxide of biChloro Benzylene.*)
$C_{14} H_4 Cl_2 O_2 = C_{14} H_4 Cl O_2, Cl$

Chloride of ChloroButylene.
$C_8 H_7 Cl, Cl_2$

***Ter*Chloride of *bi*ChloroCinnamene.**
$C_{16} H_6 Cl_2'', 3\, Cl_2$

Chloride of ChloroMethyl.
(*Bichloride of Methylene. Chlorure de Méthyl-chloré.*)
$C_2 H_2 Cl_2 = C_2 H_2 Cl, Cl$

Chloride of *Bi*ChloroMethyl. Insoluble in water. Very soluble in alcohol, and ether. Sparingly soluble in water. (Soubeiran.) Mixes in all proportions with alcohol (Soubeiran), from which it may be partially precipitated by water. (Liebig.) Readily soluble in common ether. (Liebig.) Miscible with oil of turpentine. (Huraut & Larocque, *C. R.*, **26.** 103 [*Gm.*].) Insoluble in concentrated sulphuric acid.

(*Chloroform. Chloretherid. Perchloride of Formyl.*)
$C_2 H Cl_3 = C_2 H Cl_2, Cl$

Chloroform dissolves fats, resins, and, in general, organic matters rich in carbon. It is the best solvent known for caoutchouc.

As a general rule it readily dissolves the akaloids and neutral crystalline vegetable principles. (Parrish's *Pharm.*, p. 318.)

Chloride of *per*ChloroMethyl. Insoluble in water. Easily soluble in alcohol, and ether.

(*Chloride of Methyle perchloré. Bichloride of Carbon. Perchloride of Carbon.*)
$C_2 Cl_4 = C_2 Cl_3, Cl$

Chloride of MethylSelenious Acid.
$C_2 H_4 Cl Se_2 O_5 = Se_2 (C_2 H_3) O_4, Cl + Aq$ Permanent. Very easily soluble in water, and alcohol.

Chloride of *bi*ChloroMethylSulphurous Acid. Soluble in water, and alcohol.

(*Sulphite of Chloride of Carbon.*)
$C_2 H Cl_3 S_2 O_4$

Chloride of *ter*ChloroMethylSulphurous Acid. Insoluble in water and in acids. Partially decomposed when heated in water. Soluble in alcohol, ether, and bisulphide of carbon. The alcoholic solution is precipitated by water. Also soluble in the fixed and volatile oils, and in ammonia-water. (Berzelius & Marcet, Kolbe.)

$C_2 Cl_4 S_2 O_4$

***Bi*Chloride of ChloroNaphthalin.**
$C_{20} H_7 Cl, 2\, Cl_2$

α = *Solid modification.* Insoluble in water. Sparingly soluble in alcohol. Tolerably soluble in ether, being more readily soluble than α bichloride of naphthalin.

β = *Liquid modification.*

Chloride of *bi*ChloroNaphthalin.
$C_{20} H_6 Cl_2'', Cl_2$

***Bi*Chloride of *bi*ChloroNaphthalin.**
$C_{20} H_6 Cl_2, 2\, Cl_2$ There are three isomeric modifications:

α = *Liquid modification.*

β = *Liquid modification* "(*X*)." Soluble in ether.

γ = *Crystalline modification* "(*C*)." Sparingly soluble in ether, and still less soluble in alcohol.

Chloride of *bi*ChloroNitroMethyl. Very sparingly soluble in water. Easily soluble in alcohol, and ether. Unacted on by boiling sulphuric, chlorhydric, or nitric acids, or by aqueous alkaline solutions. (Stenhouse.)

(*ChloroPicrin. Chloride of NitroMethylperchloré.*)
$C_2 Cl_3 N O_4 = C_2 (N O_4) Cl_2, Cl$

Chloride of Chloro*bi*NitroMethyl. Water dissolves traces of it. Very soluble in alcohol, and ether. Very sparingly soluble in chlorhydric and in nitric acids. Insoluble in aqueous, but readily soluble in alcoholic solutions of potash. (Marignac.)

(*Volatile liquor of Marignac.*)
$C_2 Cl_2 N_2 O_8 = C_2 (N O_4)_2 Cl, Cl$

Chloride of ChloroPhenyl. *Vid.* Hydride of *ter*ChloroPhenyl.

Chloride of ChloroPropylene.
$C_6 H_5 Cl'', Cl_2$

Chloride of *bi*ChloroPropylene.
$C_6 H_4 Cl_2'', Cl_2$

Chloride of *ter*ChloroPropylene.
$C_6 H_3 Cl_3'', Cl_2$

Chloride of *quadri*ChloroPropylene.
$C_6 H_2 Cl_4'', Cl_2$

Chloride of *quinqui*ChloroPropylene.
$C_6 H Cl_5, Cl_2$

Chloride of *per* ChloroPropylene.
$C_6 Cl_6'', Cl_2$

Chloride of ChloroStilbene. Somewhat less soluble in ether than chlorostilbene. Soluble in a mixture of alcohol and ether.

$C_{28} H_{11} Cl, Cl_2$

Chloride of ChloroSalyl.

***Ter*Chloride of ChloroSalyl.** Insoluble in boiling water or in hot potash-lye. (Kolbe & Lautemann.)

$C_{14} H_4 Cl_4$

Chloride of ChloroToluene. *Vid.* Chlorhydrate of ChloroToluene.

Chloride of ChlorOxethose. *Vid.* Oxide of *per*ChlorEthyl.

Chloride of ChlorOxyNaphthyl. Insoluble in water. Soluble, without decomposition, in concentrated sulphuric acid. Very sparingly soluble in alcohol, and ether. (Laurent.)

(*OxyChloroNaphtalose. OxiChloroxenaphtose.*)
$C_{20} H_4 Cl_2 O_4$

Chloride of *per*ChlorOxyNaphthyl. Insoluble in water or alcohol. Sparingly soluble in boiling ether, more readily soluble in boiling naphtha. (Laurent.)

(*Oxide of ChlorOxeNaphtalise.*)
$C_{20} Cl_6 O_4$

***Proto*Chloride of Chromium.**
$Cr Cl$

I.) *Ordinary, colorless.* Soluble in water, with evolution of heat. The solution soon decomposes when exposed to the air. (Péligot, *Ann. Ch. et Phys.*, (3.) **12.** 530.)

II.) *Peach-blossom colored.* Insoluble in water. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 459.)

III.) *basic.* Insoluble in water, soluble in chlorhydric acid. (Moberg.)

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***Sesqui*CHLORIDE OF CHROMIUM.**
$Cr_2 Cl_3$
a = common or soluble modification. Deliquescent. Soluble in water. (H. Rose.) Deliquescent. Readily soluble in water. (T. Thomson, *Phil. Trans*, 1827, Part I. p. 204.) Deliquescent. Very soluble in water. Decomposed by hot water. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 459.) Soluble in a concentrated aqueous solution of chloride of ammonium. (Claus, *Beiträge*, p. 8.) Soluble in alcohol.

There are two definite hydrates, $Cr_2 Cl_3 + 6 Aq$, soluble in water with evolution of heat, and $Cr_2 Cl_3 + 12 Aq$, very soluble in water, also soluble in alcohol. (Péligot, *Ann. Ch. et Phys.*, (3.) **12.** 537.)

b = basic. Basic chlorides of chromium which contain 5 or 6, and less, equivalents of base to one of acid may be obtained soluble in water; compounds containing more base than this are insoluble. (Ordway, *Am. J. Sci.*, (2.) **26.** 203.) Sesquibasic chloride of chromium is soluble in water. (Moberg.) For the compounds $Cr_2 O_3, 2 Cr_2 Cl_3 + 8 Aq$, of Moberg, and $Cr_2 O_3, 2 H Cl$ of Lœwel, see, *pro tem.*, Chlorhydrate of Oxychloride of Chromium.

c = Insoluble, or violet modification. "Insoluble in
$Cr_2 Cl_3$
water. It is true that some authors * attribute to it a greater or less degree of solubility; but these statements are erroneous. It is certain that sublimed sesquichloride of chromium is *entirely insoluble in water, either cold or boiling.* It is no more soluble in water charged with any of the acids. Nor is it attacked by concentrated boiling sulphuric acid or by aqua-regia. It dissolves, however, with marvellous facility, with development of heat, in water which contains protochloride of chromium in solution, the presence even of $\frac{1}{10000}$ part of Cr Cl in the water being sufficient to produce this solution." "I have not sought to go further; — doubtless, however, a smaller quantity of the protochloride would suffice." (Péligot, *Ann. Ch. et Phys.*, (3.) **12.** 533.) Again, Péligot asserts that sesquichloride of chromium is insoluble either in hot or in cold water. It is, however, soluble in all proportions in water which contains a small quantity of protochloride of chromium; $\frac{1}{40000}$, or even less, of the last-named substance being sufficient to bring about the solvent action. (Péligot, *Ann. Ch. et Phys.*, (3.) **14.** 240.) A suspicion was thrown upon the above statement of Péligot by Pelouze (*Ibid.*, (3.) **14.** 249), who asserted that violet sesquichloride of chromium is slowly soluble in boiling water. It is slowly decomposed by boiling concentrated sulphuric acid. An addition of very small quantities of protochloride of tin renders the sesquichloride of chromium soluble both in cold and in hot water. Other bodies, having more or less affinity for chlorine, also cause the solution of sesquichloride of chromium; for example, protochloride of iron, protochloride of copper, or hyposulphite of soda; but none of these are so efficacious as protochloride of tin, nor is the latter so powerful as protochloride of chromium. Ordinary chlorides — i. e. those having no special affinity for chlorine, such as the alkaline chlorides, chloride of ammonium or bichloride of tin — exert no solvent action upon sesquichloride of chromium. (Pelouze, *Ann. Ch. et Phys.*, (3.) **14.** 251.) The presence also of a small quantity of sesquichloride of titanium will enable water to dissolve a large quantity of the violet chloride of chromium. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **20.** 390.) In reply to Pelouze's strictures, Péligot has shown that the experiments of this chemist were probably made upon an impure article; and has reiterated his previous assertion, thus: — Violet sesquichloride of chromium is insoluble in pure water. By continued boiling with water traces of it are dissolved, with decomposition. If, however, a trace of protochloride of chromium is present, the sesquichloride dissolves very readily in water. (Péligot, *Ann. Ch. et Phys.*, (3.) **16.** 298.) The insoluble modification of sesquichloride of chromium is not acted upon by chlorhydric, sulphuric, or nitric acids, nor by boiling aqua-regia. (H. Rose; Fellenberg.)

***Proto*CHLORIDE OF CHROMIUM & OF POTASSIUM.** Deliquescent. Very soluble in water, with subsequent decomposition. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 460.)

CHLORIDE OF CINNAMENE (or OF STYROL).
(*Chlore Styrol.*)
$C_{16} H_8, Cl_2$
Insoluble in water. Miscible in all proportions with alcohol, and ether.

CHLORIDE OF CINNAMYL.
$C_{18} H_7 O_2, Cl$
Decomposed by water, and alcohol. (Cahours.)

CHLORIDE OF CITRACONYL.
(*Chloride of Pyrocitryl. Chlorure Pyrocitrique.*)
$C_{10} H_4 Cl_2 O_4 = \left.\begin{matrix} C_{10} H_4 O_4'' \\ Cl_2 \end{matrix}\right\}$

CHLORIDE OF COBALT.

I.) *normal.*

a = anhydrous. Absorbs water from the air and
$Co Cl$
combines with it. Slowly, but abundantly soluble in water. Soluble in absolute alcohol. Sparingly soluble in ether. (Dœbereiner; Gehlen.)

b = $Co Cl + X Aq$ Permanent. Easily soluble in water, and alcohol. When heated, it melts in its water of crystallization. (Berzelius, *Lehrb.*)

II.) *sesqui.* Is obtained in solution when hy-
$Co_2 Cl_3$
drated sesquioxide of cobalt is dissolved in cold chlorhydric acid, but the solution soon undergoes decomposition, especially if it be heated. (Berzelius, *Lehrb.*)

CHLORIDE OF COBALT & OF MERCURY.
$Co Cl; Hg Cl$
Quickly deliquescent. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 249.)

CHLORIDE OF COBALT with CYANIDE OF MERCURY.
$Co Cl; 2 Hg Cy + 7 Aq$
Soluble in water. (Poggiale.)

CHLORIDE OF COBALT*bi*AMIN.
$N_2 \left\{ H_6 . Co, Cl = 2 N H_3 . Co Cl \right.$
Partially soluble in water. (H. Rose, *Pogg. Ann.*, **20.** 157 [*Gm.*].)

CHLORIDE OF COBALT*ter*AMIN.
(*Ammonio Chloride of Cobalt.*)
$N_3 \left\{ H_9 . Co, Cl + Aq = 3 N H_3 . Co Cl + Aq \right.$
Soluble, without decomposition, in ammonia-water, but is immediately decomposed by pure water, with separation of an insoluble basic salt. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 268.)

***Di*CHLORIDE OF COPPER.**
(*Improperly "protoChloride of Copper."*)
$Cu_2 Cl$
Insoluble in water. Insoluble in dilute sulphuric acid, or in sulphurous acid. (Pèan de St. Gilles.) Soluble in strong chlorhydric acid, from which it is precipitated on the addition of water, and in solu-

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* Thus, Jacquelin had stated that the "insoluble modification" of $Cr_2 Cl_3$ is soluble in 2000 pts. of water at 90°, in 1000 pts. at 100°, and in 68 pts. at 136° (under pressure).

tions of ammonia and of chloride of sodium. Sparingly soluble in ether, from which water precipitates it. (Gehlen.)

*Proto*Chloride of Copper.

I.) *normal.* Very deliquescent. The aqueous solution saturated at 12.5° contains 38.9% of it. (Hassenfratz, *Ann. de Chim.*, **28.** 291.) Very soluble in water. Tolerably soluble in alcohol, and ether. (Gehlen; Gladstone, *J. Ch. Soc.*, **8.** 215.) Soluble in 1 pt. of strong alcohol at 82.5°. (Wenzel, in his *Verwandtschaft*, p. 300 [T.].)

$Cu\,Cl, \& + Aq$

An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of the salt.	An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of the salt.
1.0100 . .	2	1.1239 . .	22
1.0206	4	1.1369	24
1.0311	6	1.1499	26
1.0425	8	1.1629	28
1.0540	10	1.1760	30
1.0653	12	1.1904	32
1.0767	14	1.2080	34
1.0881	16	1.2273	36
1.0995	18	1.2466 . .	38
1.1110 . .	20		

(Hassenfratz, *Ann. de Chim.*, **28.** 299.)

Soluble in picolin, with combination. (Unverdorben.) Soluble in an aqueous solution of chloride of ammonium. (Claus, *Beiträge*, p. 8.) Largely soluble in a concentrated aqueous solution of chloride of sodium. (Boussingault, *Ann. Ch. et Phys.*, (2.) **51.** 353.)

II.) *basic.* *Vid.* OxyChloride of Copper.

*Proto*Chloride of Copper & of Ethylamin.

*Proto*Chloride of Copper & of Mercury (Hg Cl). Tolerably permanent. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 249.)

*Proto*Chloride of Copper, of Mercury, & of Potassium. Permanent. Soluble in boiling water and hydrated alcohol, without decomposition in either case, unless the solution be rapidly cooled. Insoluble in absolute alcohol. (Bonsdorff.)

$3\,(K\,Cl, Hg\,Cl)\,;\ Cu\,Cl + 2\,Aq$

*Di*Chloride of Copper & of Platin(*ous*)*bi*amin. Soluble in water, from which alcohol precipitates it. (Buckton, *J. Ch. Soc.*, **5.** 219.)

$Cu_2\,Cl\,;\ N_2 \{ H_6 . Pt', Cl$

*Proto*Chloride of Copper & of Platin(*ous*)*bi*amin. Sparingly soluble in cold water. Decomposed by boiling water. (Buckton, *J. Ch. Soc.*, **5.** 218.)

$Cu\,Cl\,;\ N_2 \{ H_6 . Pt', Cl$

*Di*Chloride of Copper & of Potassium. Soluble in water. (Mitscherlich.)

$2\,K\,Cl\,;\ Cu_2\,Cl$

*Proto*Chloride of Copper & of Potassium. Easily soluble in water, and alcohol. (Berzelius.)

$K\,Cl\,;\ Cu\,Cl + 2\,Aq$

*Di*Chloride of Copper & of Sodium. Very easily soluble in water. (Mitscherlich.)

$Cu_2\,Cl\,;\ Na\,Cl$

*Proto*Chloride of Copper & of Sodium. Soluble in alcohol of 0.837 sp. gr. (Berzelius, *Lehrb.*, **2.** 492.) Easily soluble in an aqueous solution of chloride of sodium. (Boussingault.)

Chloride of Copper with HypoSulphite of Copper. Soluble in a warm, less soluble in cold, aqueous solution of chloride of ammonium. (v. Hauer.)

$Cu\,Cl\,;\ Cu_2\,O, 3\,S_2\,O_2$

*Proto*Chloride of Copper with Picolin. Decomposed by water and by dilute alcohol. Soluble in 300 pts. of cold, and in 100 pts. of boiling absolute alcohol. (Unverdorben.)

*Proto*Chloride of Copper with Urea. Soluble in water, with decomposition.

$Cu\,Cl\,;\ C_2\,H_4\,N_2\,O_2$

*Di*Chloride of Copper with Xanthogenamid.

I.) $Cu_2\,Cl\,;\ N \begin{cases} C_2\,S_2'' \\ C_4\,H_5 . O, HO \\ H \end{cases}$ Almost insoluble in water or in cold alcohol, but tolerably easily soluble in warm alcohol. On boiling the alcoholic solution it is partially decomposed. Soluble to a considerable extent in saline solutions, but is reprecipitated on diluting with water. (Debus.)

II.) $Cu_2\,Cl\,;\ 2\,N \begin{cases} C_2\,S_2'' \\ C_4\,H_5 . O, HO \\ H \end{cases}$ Insoluble in water. Easily soluble in hot alcohol.

III.) $Cu_2\,Cl\,;\ 3\,N \begin{cases} C_2\,S_2'' \\ C_4\,H_5 . O, HO \\ H \end{cases}$ Soluble in cold alcohol, and the alcoholic solution may be heated to boiling without undergoing decomposition.

IV.) $Cu_2\,Cl\,;\ 4\,N \begin{cases} C_2\,S_2'' \\ C_4\,H_5 . O, HO \\ H \end{cases}$ Somewhat soluble in water. Soluble in alcohol, even cold, and much more readily than the preceding compounds.

Chloride of Cresyl.

Chloride of Cumol ($C_{20}\,H_{12}''$). Insoluble in water. Easily soluble in alcohol, and ether. Unacted upon by an aqueous solution of caustic potash. (Cahours, *Ann. Ch. et Phys.*, (3.) **23.** 346.)

(*Chloro Cuminol. Chloro Cumol. Hydride of Chloro Cumyl.*)
$C_{20}\,H_{12}'', Cl_2$

Chloride of Cumyl. Decomposes in moist air; it is also decomposed by water, and alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **23.** 348.)

$C_{20}\,H_{11}\,O_2, Cl$

Chloride of Cupr(*ic*)*bi*amin. Soluble in water, and in hot ammonia-water. (Kane.)

(*Ammonio proto Chloride of Copper.*)
$N_2 \{ H_6 . Cu, Cl + Aq$

Chloride of Cupr(*ic*)*ter*amin. Soluble in water. (Faraday; H. Rose.)

$N_3 \{ H_9 . Cu, Cl$

Chloride of Cupr(*eous*)ammonium. Decomposed by water. Unacted upon by alcohol. Soluble, with decomposition, in acids. (Ritthausen.)

$N \begin{cases} H_3 \\ Cu_2 \end{cases}, Cl$

Chloride of Cupr(*eous*)ammonium & of Cupr(*ic*)ammonium.

$N \begin{cases} H_3 \\ Cu_2 \end{cases} Cl\,;\ N \begin{cases} H_3 \\ Cu \end{cases} Cl$

Chloride of Cupr(*ic*)ammonium. Decomposed by water. (Kane.)

$N \begin{cases} H_3 \\ Cu \end{cases}, Cl$

Chloride of Cyan*bi*amin. Permanent. Unacted upon by water, even when boiling. Not decomposed by chlorhydric acid. Soluble, with decomposition, in concentrated sulphuric acid, and difficultly in nitric acid, also in an aqueous solution of caustic potash. (Berzelius, *Lehrb.*)

(*Ammonio Chloride of Cyanogen.*)
$C_2\,H_6\,N_3\,Cl = N_2 \{ H_6 . C_2\,N, Cl$

Chloride of Cyanammonium. Permanent. Insoluble, as such in water, though decomposed thereby to a trifling extent. Unacted upon by chlorhydric acid.

$C_2\,H_3\,N_2\,Cl = N \begin{cases} H_3 \\ C_2\,N \end{cases}, Cl$

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Decomposed, with solution, by sulphuric acid. Difficultly soluble in nitric acid, also in an aqueous solution of caustic potash. (Berzelius, *Lehrb.*)

Chloride of Cyanogen.
$Cy\,Cl = C_2\,N\,Cl$

α) *Gaseous modification.* Water absorbs 25 times its own volume at 20° and the ordinary pressure; alcohol 100 vols.; and ether 50 vols. (Sérullas.) The aqueous solution is decomposed on heating. The alcoholic solution decomposes after standing for several days.
$Cy\,Cl$

Soluble to almost any extent in caoutchin. (Himly.)

β) *Liquid modification.* Very sparingly soluble in water. (A. Wurtz.) Insoluble in water, but soluble in alcohol. (Berzelius, *Lehrb.*) Soluble in anhydrous ether. (W. Henke.)
$Cy_2\,Cl_2 = C_4\,N_2\,Cl_2$

γ) *Solid modification.* Very sparingly soluble in cold, more easily soluble, with decomposition, in hot water. (Sérullas.) Very soluble in alcohol, and ether. (Liebig.) The solution in absolute alcohol may be kept without alteration, but the solution in spirit soon decomposes.
$Cy_3\,Cl_3 = C_6\,N_3\,Cl_3$

(α)Chloride of Cyanogen & *pentachloride* of Antimony. Decomposed by water.
$Cy\,Cl\,;\,Sb\,Cl_5$

(α)Chloride of Cyanogen & *sesquichloride* of Iron.

(α)Chloride of Cyanogen & of Titanium. Rapidly soluble in water, with decomposition and great disengagement of heat. Soluble in warm bichloride of titanium without alteration. (Wœhler.)
$Cy\,Cl,\,2\,Ti\,Cl_2$

Chloride of Cyanogen with Cyanhydric Acid. Perceptibly soluble in water. (A. Wurtz.)
$C_6\,N_3\,Cl_2\,H = Cy_2\,Cl_2\,;\,Cy\,H$

Chloride of Cyanogen with Cyanide of Ethyl. Instantly decomposed by water, and alcohol. (Henke.)
$Cy\,Cl\,;\,C_6\,H_5\,N$

Chloride of Cyanogen with Oxide of Ethyl. Insoluble in water. Decomposed by boiling with water. Easily soluble in alcohol, and ether. (Aimé.) Does not exist. (Bouis.)
$2\,C_4\,H_5\,O\,;\,Cy\,Cl$

Chloride of Cyanogen with Oxide of Methyl.
$2\,C_2\,H_3\,O\,;\,Cy\,Cl$

Chloride of Cymene. Insoluble in water, and but slightly soluble in alcohol. (Sieveking.)
$C_{20}\,H_{14}{}'',\,Cl_2$

Chloride of Didymium.

I.) $Di\,Cl + 4\,H\,O$ Deliquescent. Very soluble in water, and alcohol. Its solutions are partially decomposed by evaporation. (Marignac, *Ann. Ch. et Phys.*, (3.) **38.** 160.)

II.) *basic.* *Vid.* OxyChloride of Didymium.

Chloride of Didymium & of Mercury.
$Di\,Cl\,;\,3\,Hg\,Cl + 8\,Aq$

Chloride of Ethyl. Soluble in 50 pts. of water (Thénard); in 60 pts. (Pfaff); in 24 pts. (?). Soluble in 1 volume of water at 18°. (Thénard.)
(*Chlorhydric Ether. Isomeric with Hydride of ChlorEthyl.*)
$C_4\,H_5\,Cl$

Soluble in all proportions in alcohol, and ether. Miscible with cacodyl.

It may be separated from the alcoholic solution by means of neutral tartrate of potash. (Funcke.)

Chloride of ethyl dissolves fatty oils and also several essential oils and resins, as well as sulphur and phosphorus.

Chloride of Ethyl & of Iron($Fe_2\,Cl_3$). Decomposed by water.

Chloride of Ethyl & of Tin($Sn\,Cl_2$). Decomposed by water.

Chloride of Ethyl with FerroCyanide of Ethyl. Soluble, with decomposition, in a mixture of alcohol and ether. (Buff.)
$2\,C_4\,H_5\,Cl\,;\,2\,Fe\,Cy,\,4\,C_4\,H_5\,Cy + 12\,Aq$

Chloride of Ethyl*chloré*. *Vid.* Chloride of ChlorEthyl.

Chloride of *tetra*Ethylammonium. Very deliquescent. Easily soluble in water, and alcohol.
$N\left\{(C_4\,H_5)_4,\,Cl\right.$

Chloride of *tri*EthylAmylammonium. Very deliquescent. Soluble in water.
$C_{22}\,H_{26}\,N\,Cl = N\left\{\begin{matrix}(C_4\,H_5)_3\\ C_{10}\,H_{11}\end{matrix}\right\}Cl$

Chloride of EthylBrucin. Soluble in water.

Chloride of Ethylene. Almost entirely insoluble in water. Soluble in all proportions in alcohol, and ether.
(*Dutch Liquid. Oil of olefiant gas. Oil of the Dutch Chemists. ChlorÆtherin. ChlorElayl. Chlorhydrate of Chloride of Acetyl.*)
$C_4\,H_4{}'',\,Cl_2$

Very sparingly soluble in water, more readily soluble if chlorhydric acid be present. Soluble in alcohol. (Morin.)

Chloride of Ethylene*chloré*. *Vid.* Chloride of ChlorEthylene.

Chloride of Ethylidene.
(*Isomeric with Chloride of Ethylene.*)
$C_4\,H_4{}',\,Cl_2$

Chloride of EthylMethylConiin. Deliquescent. Readily soluble in water. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **89.** 139.)

Chloride of EthylNicotin. Soluble in water. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **87.** 6.)

Chloride of *tri*EthylPhenylammonium. Soluble in water.

Chloride of Ethyl*tri*Phenylammonium. Soluble in alcohol.

Chloride of *tri*EthylPhosphin.

Chloride of *tetra*EthylPhosphonium. Deliquescent. Soluble in water, and alcohol. Insoluble in ether.

Chloride of *di*EthylPiperylammonium. Very deliquescent. Soluble in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 98.)
$C_{18}\,H_{20}\,N\,Cl = N\left\{\begin{matrix}C_{10}\,H_{10}{}''\\ (C_4\,H_5)_2\end{matrix}\right.,\,Cl$

Chloride of EthylPlatinammonium & of Platinum. Somewhat more readily soluble than sulphate of lime in water. More soluble in alcohol than in water. (Zeise.)
$C_4\,H_7\,N\,Pt_2\,Cl_2 = N\left\{\begin{matrix}C_4\,H_5\\ Pt\\ H_2\end{matrix}\right.,\,Cl\,;\,Pt\,Cl$

Chloride of *di*EthylPlatin*bi*ammonium. Tolerably soluble in water; but scarcely at all soluble in alcohol.
$C_8\,H_{16}\,N_2\,Pt\,Cl = N_2\left\{\begin{matrix}(C_4\,H_5)_2\\ H_3\\ Pt\,.\,H\end{matrix}\right.,\,Cl$

Chloride of *di*EthylPlatin*bi*ammonium & *protochloride* of Platinum. Ppt.
$C_8\,H_{14}\,N_2\,Pt_2\,Cl_2 = N_2\left\{\begin{matrix}(C_4\,H_5)_2\\ H_3\\ Pt\,.\,H\end{matrix}\right.,\,Cl\,;\,Pt\,Cl$

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Chloride of EthylQuinine. Soluble in water, much more readily in hot than in cold. (Strecker, *Ann. Ch. u. Pharm.*, **91.** 168.)
$C_{40}H_{24}(C_4H_5)N_2O_4, Cl$

Chloride of EthylStrychnine. Readily soluble in water.

Chloride of EthylSulphurous Acid. Insoluble in water. Readily soluble in alcohol. (Gerhardt & Chancel.)
$C_4H_5S_2O_4Cl$

Chloride of EthylThiosinamin. ? Soluble in absolute alcohol.

*Per***Chloride of Formyl.** *Vid.* Chloride of *bi*ChloroMethyl.

"**Chloride of Formyl.**" *Vid.* *bi*ChlorEthylene.
$C_4H_2Cl_2$

Chloride of Furfurin & *bichloride* **of Iridium.**

Chloride of Furfurin & *bichloride* **of Lead.**

Chloride of Furfurin & *protochloride* **of Mercury.** Ppt.

Chloride of FuscoCobalt.
(*Chlorhydrate of FuscoCobaltiaque.*)

I.) "$4NH_3 . Co_2Cl_2O + 8 Aq$" Readily soluble in water. Decomposed by boiling water. Alcohol precipitates it from the aqueous solution. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 291.)

II.) *granular.* Soluble in cold water, from which it is reprecipitated on the addition of chloride of ammonium. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 293.)
"$NH_3 . Co_2ClO_2 + 5 Aq$"

Chloride of Glucinum.

I.) *normal.*

a = *anhydrous.* Deliquescent. Readily soluble in water, with great elevation of temperature. (Rose; Wœhler; Bussy.) Readily soluble in alcohol. (Vauquelin.)
Gl_2Cl_3

b = *hydrated.* Permanent. Easily soluble in water, and alcohol. (Awdejew.)
$Gl_2Cl_3 + 12 Aq$

II.) *basic.* The compound containing nearly, but not quite, three equivalents of base to one of acid is still soluble in water. But compounds more basic than this are insoluble. (Ordway, *Am. J. Sci.*, (2.) **26.** 207.)

Chloride of Glucinum & *proto***Chloride of Mercury.** (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 136.)

*Proto***Chloride of Gold.** Insoluble in water. Gradually decomposed by cold, quickly decomposed by hot water, with formation of the terchloride and precipitation of metallic gold.
$AuCl$

*Ter***Chloride of Gold.** (*ChlorAuric Acid.*) Deliquescent. Easily soluble in water. (Berzelius.) Soluble in 1.47 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) The aqueous solution, after long standing, deposits some gold. (Basseyre.) Soluble in alcohol, forming a tolerably stable solution. The alcoholic solution gradually deposits metallic gold. (Gmelin.) Readily soluble in ether, which abstracts it from its aqueous solution. (Proust.) The ethereal solution is decomposed when exposed to light. (Sage), and by long keeping. Very soluble in chlorhydric acid.
$AuCl_3 + 6 Aq$

Readily soluble in nitric acid of 1.43 sp. gr. It is not decomposed by evaporation with an excess of nitric acid. (H. Wurtz, *Am. J. Sci.*, (2.) **25.** 382.)

Chloride of Gold & of Nickel.

*Proto***Chloride of Gold & of Potassium.** (*ChlorAurite of Potassium.*) Decomposed by water and by chlorhydric acid.
$AuCl; KCl$

Chloride of Gold & of Sodium. Soluble in water, and alcohol. (Meillet.)
$AuCl; NaCl$

*Ter***Chloride of Gold with Cyanide of Ethyl.** Instantly decomposed by water, and by alcohol. It cannot be recrystallized from ether. (Henke.)
$C_6H_5N, AuCl_3$

*Ter***Chloride of Gold with Cyanide of Methyl.** Instantly decomposed by water and by alcohol. It cannot be recrystallized from ether. (Henke.)
$C_4H_3N, AuCl_3$

*Ter***Chloride of Gold with Picolin.** Sparingly soluble in boiling, nearly insoluble in cold water. (Unverdorben.)

Chloride of Gros's Radical. *Vid.* Chlorhydrate of Platinamin.

*Proto***Chloride of Iodine.**

a) *liquid.* Deliquescent. Very soluble in water. (Gay-Lussac.) Soluble in alcohol, and ether. Ether abstracts it from the aqueous solution. (Dumas.)
ICl

β) *solid.* Decomposed by water. Easily soluble in alcohol, and ether. (Trapp.)
ICl

*Ter***Chloride of Iodine.** Deliquescent. Soluble in water, with partial decomposition. Ether does not remove it from the aqueous solution (Dumas), unless protochloride of iodine be present, in which case the terchloride is also taken up. (Sérullas.) If when dry it be treated with anhydrous alcohol or ether, these remove chloride of iodine and chlorhydric acid, leaving iodic acid. (Berzelius, *Lehrb.*) When the somewhat concentrated aqueous solution is mixed with a certain quantity of sulphuric acid, the terchloride of iodine is precipitated unchanged; on warming the mixture, it redissolves, and again separates on cooling. (*Ibid.*)
ICl_3

Chloride of Iodine & of Magnesium. Deliquescent. (Filhol.) Resembles the potassium salt.
$MgCl; ICl_3 + 5 Aq$

Chloride of Iodine & of Potassium. Efflorescent. Very soluble in water, from which it crystallizes as the solution cools. The aqueous solution rapidly decomposes, especially when dilute. Much less soluble than the corresponding ammonium compound. Decomposed by ether, which removes the terchloride of iodine. (Filhol.)
$KCl; ICl_3$

Chloride of Iridammonium. Insoluble in water. (Skoblikoff.)
$N\left\{\begin{matrix}H_3\\Ir\end{matrix}\right., Cl$

*Proto***Chloride of Iridium.**
$IrCl$

α) *Insoluble modification.* Insoluble in water. Very sparingly soluble in boiling chlorhydric acid. Scarcely at all soluble in boiling aqua-regia. (Berzelius.) Unacted upon by sulphide of ammonium; or by boiling chlorhydric, nitric, or sulphuric acids, aqua-regia, or solutions of potash or of carbonate of potash. (Fellenberg.)

β) *Soluble modification.* Completely soluble in a small quantity of boiling water, but a larger quantity of water throws down most of the chloride of iridium in the insoluble state. This soluble modification (*β*) probably contains some chlorhydric acid in chemical combination. (Berzelius.) Very easily soluble in chlorhydric acid.

*Bi***Chloride of Iridium.** *Vid.* ChlorIridic Acid.

*Sesqui*Chloride of Iridium. When obtained $Ir_2 Cl_3$ by sublimation it is insoluble in water; but when obtained by decomposing the nitrate with chlorhydric acid it is soluble in water.

*Sesqui*Chloride of Iridium & of Lead. Ppt. $3 Pb Cl; Ir_2 Cl_3$ (Claus, *Beiträge*, p. 26.)

*Sesqui*Chloride of Iridium & *dichloride* of $3 Hg_2 Cl; Ir_2 Cl_3$ Mercury. (Claus, *Beiträge*, p. 26.)

*Proto*Chloride of Iridium & of Potassium. $K Cl; Ir Cl$ Soluble in water. Insoluble in alcohol, but cannot be completely precipitated from the aqueous solution by alcohol. (Berzelius.)

*Sesqui*Chloride of Iridium & of Potassium. $3 K Cl; Ir_2 Cl_3 + 6 Aq$ Easily efflorescent. Easily soluble in water. Insoluble in alcohol. (Claus; Berzelius.) Insoluble in a saturated aqueous solution of chloride of potassium, but is soluble in a less thoroughly saturated solution. (Berzelius, *Lehrb.*, **2.** 444.)

*Sesqui*Chloride of Iridium & of Potassium with Hyposulphate of Potash. (*Chlorhyposulphate of Iridium with Chloride of Potassium.*) $2 K Cl; Ir_2 Cl_3; 2 K O, S_2 O_4, \& + 4 Aq$ Readily soluble in water. Insoluble in alcohol. (Claus.)

Chloride of Iridium & of Silver. Insolu- $3 Ag Cl; Ir_2 Cl_3$ ble in water or acids. Difficultly soluble in ammonia-water. (Claus.)

*Proto*Chloride of Iridium & of Sodium. $Na Cl; Ir Cl$ Deliquescent. Soluble in water, and alcohol. (Berzelius.)

*Sesqui*Chloride of Iridium & of Sodium.

I.) $3 Na Cl; Ir_2 Cl_3 + 24 Aq$ Readily efflorescent. Soluble in water. Melts in its water of crystallization at 50°. Completely insoluble in spirit.

The compound ($Ir_2 Cl_3, 4 Na Cl + 27 Aq$) of Karmrodt & Urlaub (*Ann. Ch. u. Pharm.*, **81.** pp. 120 – 122) was a mixture of the iridium and rhodium salts. (Claus, *Beiträge*, pp. 74, 62.)

II.) $2 Na Cl; Ir_2 Cl_3$ Deliquescent. Soluble in water, and alcohol. (Berzelius, *Lehrb.*, **3.** 998.)

*Sesqui*Chloride of Iridium with HypoSulphate & Sulphite of Potash.

I.) $Ir_2 Cl_3; 2 K O, S_2 O_4; 2 (K O, S O_2) \& + 12 Aq$ Partially decomposed by being dissolved in hot water. More easily soluble in a solution of potash than in water. (Claus.)

II.) $4 (K O, S O_2); 2 Ir O; S_2 O_4, Cl$ Decomposed, with partial solution, by water. (Claus.)

*Proto*Chloride of Iron.

a = $Fe Cl$ Very deliquescent. Very easily soluble in water, with evolution of heat.

Soluble in 2 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) Soluble in 1 pt. of strong alcohol at 82.5°. (Wenzel, in his *Verwandtschaft*, p. 300 [*T.*].) Insoluble in ether. Sparingly soluble in a mixture of alcohol and ether. The aqueous solution is decomposed when in contact with the air, a basic salt being deposited.

b = $Fe Cl + 4 Aq$ Deliquescent. Soluble in 0.68 pt. of water. Soluble in alcohol. (Reimann.)

*Sesqui*Chloride of Iron.

I.) *normal.*

a = *anhydrous.* Deliquescent. Soluble in water, $Fe_2 Cl_3$ with evolution of heat. Soluble in alcohol, and ether; but in the light these solutions, especially the latter, soon undergo decomposition.

Soluble in an aqueous solution of chloride of ammonium (Claus, *Beiträge*, p. 8); also in a cold saturated solution of chloride of potassium. (W. Gibbs, *Am. J. Sci.*, (2.) **31.** 70.)

b = $Fe_2 Cl_3 + 6 Aq$ Deliquescent, with evolution of heat. (Fritzsche.) Soluble in alcohol. Ether dissolves out $Fe_2 Cl_3$, leaving the water.

c = $Fe_2 Cl_3 + 12 Aq$ Less deliquescent than the anhydrous or the 6-hydrated salt. Soluble in alcohol. Ether dissolves out $Fe_2 Cl_3$, leaving the water.

II.) *basic.* All of these basic compounds may $Fe_2 Cl_3; (Fe_2 O_3)^{1 \text{ to } 23}$ be obtained dissolved in water. Their aqueous solutions may be diluted to any extent, or boiled, without undergoing change. Sesquioxide of iron is precipitated, however, when they are mixed with almost any saline solution. After having been dried, the more basic compounds are no longer soluble in water, but the decibasic and the still more acid compounds do not lose their solubility by drying. (Ordway, *Am. J. Sci.*, (2.) **26.** 201.)

*Proto*Chloride of Iron & of Mercury. $Fe Cl; Hg Cl + 4 Aq$ Deliquescent. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 248.)

*Proto*Chloride of Iron & of Osmium. Soluble in water. (Berzelius, *Lehrb.*, **3.** 1006.)

*Proto*Chloride of Iron & of Potassium. $Fe Cl; K Cl + x Aq$ Easily soluble in water. (Berzelius.)

*Sesqui*Chloride of Iron & of Potassium. $2 K Cl; Fe_2 Cl_3 + 2 Aq$ Decomposed by water; if only a small quantity of water be added to it a portion remains undissolved, but a larger quantity of water dissolves the whole of it. It is less easily decomposed by water than the corresponding ammonium compound. (Fritzsche.)

Chloride of Lactyl. Decomposed by $C_6 H_4 O_2'', 2 Cl$ water, and alcohol.

Chloride of Lanthanum. Very soluble in water. (Mosander.)

Chloride of Lead.

I. *normal.* Permanent. Slowly soluble in 135 $Pb Cl$ pts. of water at 12.5°, and in a much smaller quantity of hot water. (Bischof.) Soluble in 30 [? 130] pts. of cold, and in 22 pts. of hot water. Insoluble in strong alcohol. (Wittstein's *Handw.*) Soluble in 30 pts. of water, at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) 100 pts. of water at 15.5° dissolve 4.59 pts. of it. (Ure's *Dict.*) Insoluble in alcohol of 94%. Very sparingly soluble in cold or hot alcohol of 76%. (Bischof.) Insoluble in alcohol, unless this contains more than 34% of water, in which case it is soluble, and so much the more readily in proportion as the spirit is weaker. (Berzelius, *Lehrb.*) Soluble in 534 pts. of water containing chloride of calcium. (Bischof.) Soluble in acetic acid. (Bergman, *Essays*, **1.** 140.) Its solubility in water is not much increased by the addition of acids. (Fresenius, *Qual.*) Chlorhydric acid, and

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several salts, especially chloride of calcium, diminish its solubility in water, and precipitate a portion of it from the saturated aqueous solution. But on the other hand, it is soluble in considerable quantity in concentrated chlorhydric acid, from which solution it is precipitated for the most part on diluting with water. (Berzelius, *Lehrb.*, **3.** 710.) When recently precipitated, chloride of lead is readily soluble in aqueous solutions of the soluble hyposulphites, though less abundantly than chloride of silver. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 27.) Soluble in an aqueous solution of acetate of soda.

Readily soluble in an aqueous solution of nitrate of ammonia. (Bolley.) Soluble in alkaline solutions.

Insoluble in an aqueous solution of chloride of sodium? (Anthon?) Soluble in 1636 pts. of cold water containing chlorhydric acid. It is soluble in concentrated chlorhydric acid, from which solution it is precipitated by water. (Bischof.) On the other hand, being less soluble in water acidulated with chlorhydric acid than in pure water, chlorhydric acid can precipitate it from the concentrated aqueous solution.

Chlorhydric acid no longer precipitates it from a solution of nitrate of lead when 100 pts. of water are present. (Pfaff.) Soluble in hot, but insoluble in cold concentrated sulphuric acid. (Hayes.) Soluble in dilute nitric acid; from this saturated solution chlorhydric acid precipitates a portion of it at once. (Gladstone.) Very easily and completely decomposed by hot nitric acid. (H. Wurtz, *Am. J. Sci.*, (2.) **25.** 381.) Soluble in an aqueous solution of caustic potash. When treated with ammonia-water, it is converted into a basic chloride without being modified in external appearance. (H. Rose, *Tr.*)

II.) *BiChloride of Lead?* $Pb\,Cl_2$ (?) Very instable. Decomposed by much water. It unites with alkaline chlorides to form compounds readily soluble in water. (Sobrero & Selmi, *Ann. Ch. et Phys.*, (3.) **29.** 165.)

III.) *basic. Vid.* Oxychloride of Lead.

Chloride of Lead & of Platin(*ous*)*bi*amin. $Pb\,Cl;\,N_2\left\{H_6\,.\,Pt',\,Cl\right.$ Soluble in hot, very much less soluble in cold water. Insoluble in alcohol and in chlorhydric acid. (Buckton, *J. Ch. Soc.*, **5.** 213.)

Chloride of Lead & of Rhodium.

I.) $2\,Pb\,Cl;\,Rh_2\,Cl_3$
II.) $3\,Pb\,Cl;\,Rh_2\,Cl_3$ } Insoluble in water. (Claus, *Beiträge*, pp. 73, 23.)

*Proto***Chloride of Lead & of Sodium.**

*Bi***Chloride of Lead & of Sodium.** $2\,Pb\,Cl_2;\,9\,Na\,Cl$ Very soluble in water. (Sobrero & Selmi, *Ann. Ch. et Phys.*, (3.) **29.** 165.)

Chloride of Lead with Fluoride of Lead. (*Chlorofluoride of Lead.*) $Pb\,Cl;\,Pb\,Fl$ Slightly soluble, without decomposition, in water. Easily soluble in nitric acid. (Berzelius.)

Chloride of Lead with Iodide of Lead. (*ChlorIodide of Lead.*) $2\,Pb\,Cl;\,Pb\,I$

Chloride of Lead with Phosphate of Lead. (*ChloroPhosphate of Lead.*)

I.) $Pb\,Cl;\,2\,Pb\,O,\,H\,O,\,P\,O_5$ Insoluble in boiling water. Soluble in dilute nitric acid. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **22.** 505.)

II.) $2\,(3\,Pb\,O,\,c\,P\,O_5);\,Pb\,Cl$ Ppt.

III.) $3\,(3\,Pb\,O,\,c\,P\,O_5);\,Pb\,Cl$

IV.) $3\,(3\,Pb\,O,\,c\,P\,O_5);\,Pb\,Cl + Aq$ Insoluble in water. (Heintz.)

Chloride of Lead with Phosphite of Lead. (*ChloroPhosphite of Lead.*) $Pb\,Cl;\,2\,Pb\,O,\,P\,O_3$ Decomposed by boiling water. (Berzelius.)

Chloride of Lead with Sulphate of Lead. (*ChloroSulphate of Lead.*) $2\,Pb\,Cl;\,Pb\,O,\,S\,O_3 + Aq$ Insoluble in water, or an aqueous solution of chloride of sodium. (Becquerel, *C. R.*, 1845, **20.** 1523.)

Chloride of Lead with Sulphide of Lead. $Pb\,Cl;\,3\,Pb\,S$ Decomposed by boiling water, which dissolves out the chloride of lead. Unacted upon by dilute, decomposed by concentrated chlorhydric acid. (Huenefeld.)

Chloride of Lead with Tartrate of Lead. Appears to be insoluble in water, or an aqueous solution of chloride of sodium. (Becquerel, *C. R.*, 1845, **20.** 1525.)

Chloride of Lithium. $Li\,Cl + 2\,Aq\ \&\ 4\,Aq$ More quickly deliquescent than any other known salt. (Berzelius, *Lehrb.*) More deliquescent than chloride of calcium. (Troost.) Exceedingly soluble in water. (C. Gmelin.)

1 pt. of the anhydrous salt

is soluble in	1.57	pts. of water at	0°
"	1.24	" "	20°
"	0.96	" "	65°
"	0.87	" "	80°
"	0.77	" "	95°
"	0.78	" "	96°
"	0.72	" "	140°
"	0.69	" "	160°

(Kremers, *Pogg. Ann.*, **99.** 47, and **103.** 65.)

1 pt. of the anhydrous salt is soluble in 1.315 pts. of water at 15°. (Gerlach's determination, see his table of sp. grs., below.) The saturated aqueous solution boils at 171°. (Kremers, *Pogg. Ann.*, **99.** 43.)

An aqueous solution containing per cent of Li Cl	Boils at °C.
5	100.7°
10	102.3°
15	105.1°
20	109.2°
25	114°
30	119 9°
35	127.1°
40	135.6°

(Gerlach's *Sp. Gew. der Salzlœsungen*, p. 96.)

An aqueous solution of sp. gr. (at 15°)	Contains per cent of Li Cl.
1.0580	10
1.1172	20
1.1819	30
1.2557	40
1.2827	43.2 *

(Gerlach, *Sp. Gew. der Salzlœsungen*, Freiberg, 1859, p. 10.)

* Mother liquor.

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.0278	5.04
1.0541	10.38
1.0896	18.39
1.1247	27.09
1.1832	43.51
1.2362	60 26

(Kremers, *Pogg. Ann.*, **99.** 444.)

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Easily soluble in absolute alcohol. (C. Gmelin.) Easily soluble in a mixture of equal parts of absolute alcohol and ether. (Berzelius; Rammelsberg; also Lawrence Smith, *Am. J. Sci.*, (2.) **16.** 57.)

Chloride of Lithium & *protochloride* **of Mercury.** There are two salts, one of which is permanent, the other deliquescent. (v. Bonsdorff.)

Chloride of LuteoCobalt. Slowly soluble in cold, decomposed by boiling water. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 285.) Is not decomposed by boiling water. Acids, like chlorhydric, sulphuric, and nitric, precipitate it from the cold aqueous solution. These acids, when warm, do not alter the salt; on heating the mixture it becomes slightly yellow, and on cooling, all the salt which has been dissolved separates out. Insoluble in ammonia-water. Completely insoluble in cold, and only soluble to an insignificant extent in boiling absolute alcohol. (Rogojski, *Ann. Ch. et Phys.*, (3.) **41.** 450, & *J. pr. Ch.*, **56.** 496.) More soluble than chloride of purpureocobalt in water acidulated with chlorhydric acid. (Rogojski, *Ann. Ch. et Phys.*, (3.) **41.** 447.) Readily soluble in hot, much less soluble in cold water. Insoluble in alcohol, in chlorhydric acid, or in solutions of the alkaline chlorides, which precipitate it unchanged from the aqueous solution. (Gibbs & Genth, *Smithson. Contrib.*, vol. **9.** p. 36 of the memoir.)

(*Chlorhydrate of LuteoCobaltiaque. Chlorhydrate of diCobaltinamin.*)
$6\,NH_3\,.\,Co_2,\,Cl_3$

Chloride of LuteoCobalt with Chromate of LuteoCobalt.
(*Crystallizing together in all proportions.*)

Chloride of LuteoCobalt with Sulphate of LuteoCobalt. Soluble in water. (Rogojski, *Ann. Ch. et Phys.*, (3.) **41.** 453.)

(*Sulphato Chloride of Luteo Cobalt. Chloro Sulphate of diCobaltamin.*)
$6\,NH_3\,.\,Co_2\,O_3,\,8\,SO_3\,;\,6\,NH_3\,.\,Co_2\,Cl_3$
(of Rogojski).
(*Isomorphous mixture of its two components*(according to Gibbs & Genth).

Chloride of Magnesium.

$a = Mg\,Cl$ Deliquescent. Soluble in water, with evolution of heat.

Soluble in 1.857 pts. of water at 15°. (Gerlach's determination, see his table of sp. grs., below.) Soluble in 1 pt. of cold water. (Fourcroy.) An aqueous solution saturated in the cold contains 50% of it (Fourcroy); and at 12.5°, 64.8%. (Hassenfratz, *Ann. de Chim.*, **28.** 291.) 100 pts. of water at 15.5° dissolve 200 pts. of it. (Ure's *Dict.*) Dry chloride of magnesium is soluble in 7 pts. of alcohol at 15°. (Bergman, *Essays*, **1.** 144); in 5 pts. of alcohol at a moderate heat. (*Ibid.*, p. 183.)

100 pts. of alcohol of sp. gr.	Dissolve of chloride of magnesium, dried at 48.8°, pts.
0.900	21.25
0.848	23.75
0.834	36.25
0.817	50.00

(Kirwan, *On Mineral Waters*, p. 274 [T.].)

An aqueous solution of sp. gr. (at 15°)	Contains per cent of Mg Cl.	An aqueous solution of sp. gr. (at 15°)	Contains per cent of Mg Cl.
1.00844	1	1.05970	7
1.01689	2	1.06844	8
1.02533	3	1.07718	9
1.03378	4	1.08592	10
1.04222	5	1.09495	11
1.05096	6	1.10398	12
1.11300	13	1.22737	25
1.12203	14	1.23777	26
1.13106	15	1.24817	27
1.14045	16	1.25857	28
1.14984	17	1.26897	29
1.15922	18	1.27937	30
1.16861	19	1.29029	31
1.17800	20	1.30121	32
1.18787	21	1.31213	33
1.19775	22	1.32305	34
1.20762	23	1.33397	35
1.21750	24	1.33406	35.008*

(Th. Gerlach, *Sp. Gew. der Salzlœsungen*, Freiberg, 1859, p. 12.)

* Mother liquor.

An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of chloride of magnesium [Mg Cl + 6 Aq].	An aqueous solution of sp gr. (at 12.5)	Contains per cent of chloride of magnesium [Mg Cl + 6 Aq].
1.0068	2	1.1190	34
1.0136	4	1.1266	36
1.0204	6	1.1343	38
1.0274	8	1.1420	40
1.0340	10	1.1507	42
1.0408	12	1.1597	44
1.0476	14	1.1686	46
1.0544	16	1.1777	48
1.0612	18	1.1870	50
1.0681	20	1.1963	52
1.0751	22	1.2068	54
1.0823	24	1.2164	56
1.0895	26	1.2261	58
1.0967	28	1.2380	60
1.1040	30	1.2507	62
1.1114	32	1.2646	64

(Hassenfratz, *Ann. de Chim.*, **28.** 299.)

A solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.0826	10.7
1.1592	22.0
1.2388	35.3
1.3235	51.5

(Kremers, *Pogg. Ann.*, **104.** 155.)

An aqueous solution containing 10% of Mg Cl boils at 101.6°; one of 20% boils at 106.2°; and one of 30% at 115.6°. (Gerlach's *Sp. Gew. der Salzlœsungen*, p. 98.) The aqueous solution cannot be evaporated to dryness without undergoing decomposition, a portion of the chlorhydric acid of the salt being evolved. When one equivalent of Mg Cl, in aqueous solution, is mixed with a solution of an equivalent of sulphate of potash ($K\,O,\,S\,O_3$), 0.43 of it are decomposed to sulphate of magnesia, which may be precipitated by adding alcohol, while 0.57 of it remain unchanged; when mixed with a solution of an equivalent of sulphate of soda ($Na\,O,\,S\,O_3$), 0.458 of it are decomposed as before, while 0.542 of it remain unchanged. (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.)

$b = Mg\,Cl + 6\,Aq$ Deliquescent. Soluble in 0.658 pt. of cold, and in 0.273 pt. of hot water; in 5 pts. of alcohol of 0.90 sp. gr., and in 2 pts. of alcohol of 0.817 sp. gr. When heated it melts in its water of crystallization.

Soluble in 0.1828 pt. of strong alcohol at 82.5°. (Wenzel, in his *Verwandtschaft*, p. 300 [T.].)

An aqueous solution of sp. gr. (at 24°)	Contains (by experiment) per cent of $\mathrm{Mg\,Cl} + 6\,\mathrm{Aq}$.
1.2784	72.36
1.1756	48.24
1.1141	32.16
1.0843	24.12
1.0551	16.08
1.0268	8.04

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 333.) From these results Schiff calculates the following table, by means of the formula, $D = 1 + 0.003427\,p + 0.0000022\,p^2 + 0.000000054\,p^3$; in which D = the sp. gr. of the solution, and p the percentage of substance in the solution.

Sp. gr. (at 24°).	Per cent of $\mathrm{Mg\,Cl} + 6\,\mathrm{Aq}$.	Per cent of Mg. Cl.
1.0069	2	0.936
1.0138	4	1.872
1.0207	6	2.802
1.0276	8	3.744
1.0345	10	4.680
1.0415	12	5.616
1.0485	14	6.552
1.0556	16	7.488
1.0627	18	8.424
1.0698	20	9.360
1.0770	22	10.296
1.0842	24	11.232
1.0915	26	12.168
1.0988	28	13.104
1.1062	30	14.040
1.1137	32	14.976
1.1212	34	15.912
1.1288	36	16.848
1.1364	38	17.784
1.1441	40	18.720
1.1519	42	19.656
1.1598	44	20.592
1.1677	46	21.528
1.1756	48	22.464
1.1836	50	23.400
1.1918	52	24.336
1.2000	54	25.272
1.2083	56	26.208
1.2167	58	27.144
1.2252	60	28.080
1.2338	62	29.016
1.2425	64	29.952
1.2513	66	30.888
1.2602	68	31.824
1.2692	70	32.760
1.2783	72	33.696
1.2875	74	34.632
1.2968	76	35.568
1.3063	78	36.504
1.3159	80	37.440

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 72.) Schiff admits (*Ibid.*, 1860, **113.** 355) that Gerlach's table is more accurate than his own. Schiff's solutions were not, like Kremers's, prepared from the crystallized salt.

CHLORIDE OF MAGNESIUM & *protochloride* OF MERCURY.

I.) $\mathrm{Mg\,Cl};\ \mathrm{Hg\,Cl} + 6\,\mathrm{Aq}$ Exceedingly deliquescent. More soluble in water than No. 2. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 136.)

II.) $\mathrm{Mg\,Cl};\ 3\,\mathrm{Hg\,Cl} + 5\,\mathrm{Aq}$ Permanent. When treated with water it suffers decomposition at first, the chloride of magnesium dissolving before the chloride of mercury, but finally complete solution ensues, and the double salt is again deposited as the solution evaporates spontaneously. Easily soluble in alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 135.)

CHLORIDE OF MAGNESIUM & OF POTASSIUM.

$2\,\mathrm{Mg\,Cl};\ \mathrm{K\,Cl} + 12\,\mathrm{Aq}$ Deliquesces to a solution of Mg Cl, while K Cl remains undissolved. (Liebig.) It is decomposed in the same way by water, and alcohol.

CHLORIDE OF MAGNESIUM & OF SODIUM.

$2\,\mathrm{Mg\,Cl};\ \mathrm{Na\,Cl} + 2\,\mathrm{Aq}$

CHLORIDE OF MAGNESIUM & *bichloride* OF TIN.

$\mathrm{Mg\,Cl},\ \mathrm{Sn\,Cl_2} + 5\,\mathrm{Aq}$

CHLORIDE OF MAGNESIUM with *proto*CYANIDE OF MERCURY.

$\mathrm{Mg\,Cl};\ 2\,\mathrm{Hg\,Cy} + 2\,\mathrm{Aq}$ Easily soluble in water and in weak alcohol. (Poggiale.)

CHLORIDE OF MAGNESIUM with OXYCHLORIDE OF PHOSPHORUS.

$2\,\mathrm{Mg\,Cl};\ \mathrm{P\,O_2\,Cl_3}$ Very deliquescent. Soluble in water, with decomposition. Very sparingly soluble in warm oxychloride of phosphorus. (Casselmann, *Ann. Ch. u. Pharm.*, **98.** 223.)

CHLORIDE OF MANGANESE.

a = *anhydrous*. Deliquescent.
$\mathrm{Mn\,Cl}$

Soluble in 1.609 pts. of water at 10°
“ 1.167 “ “ 31.25°
“ 0.818 “ “ 62.5°
“ 0.818 “ “ 87.5°
“ 0.808 “ “ 106.25°

Or, 100 pts. of water (at °C)	Dissolve pts. of anhydrous Mn Cl.
10°	62.16
31.25	85.72
62.5	122.22
87.5	122.22
106.25	123.81

Or, the aqueous solution saturated at
10° contains 38.33% of Mn Cl
31.25° “ 46.15 “
62.5° “ 55.00 “
87.5° “ 55.00 “
106.25° “ 55.32 “

(Brandes, *Pogg. Ann.*, 1831, **22.** pp. 263 - 266.)

A solution in alcohol of 75 per cent, saturated at °C	Contains per cent of Mn Cl.
10	23.1
25	36.1
43.75	37.5
87.5 (boiling)	32.2
A solution in absolute alcohol, saturated at °C	
11.25°	33.3
37.5	33.3
76.25 (boiling)	36.2

Or, 1 pt. of Mn Cl is soluble in 2 pts. of absolute alcohol at 11.25°, and at 37.5, and in 1.7 pts. of this menstruum at 76.25°. Or, 100 pts. of absolute alcohol dissolve 50 pts. of Mn Cl at 11.25° and 37.5°, and 58 pts. of it at 76.25°. These numbers refer to recently prepared alcoholic solutions, but when these are kept for some time much of the chloride crystallizes out. A solution in absolute alcohol which had been weakened in this manner was found to contain only 21% of Mn Cl at 10°. (Brandes, *loc. cit.*, pp. 266 - 270.) When 15 @ 20 vols. of ether are added to 1 vol. of absolute alcohol saturated with chloride of manganese the latter is completely precipitated. (Dœbereiner.) Insoluble in oil of turpentine. (Brandes, *loc. cit.*, p. 272.)

b = *hydrated*. Deliquescent.
$\mathrm{Mn\,Cl} + 4\,\mathrm{Aq}$

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Soluble in 0.66 pt. of water at 10°
" 0.37 " " 31.25°
" 0.16 " " 62.5°
" 0.16 " " 87.5°
" 0.15 " " 106.25°

Or, 100 pts. of water at °C	Dissolve pts. of $Mn\,Cl + 4\,Aq$.
8°	151
31.25	265
62.5	641
87.5	641
106.25	656

Or, the aqueous solution saturated
at 8° contains 60.2% of $Mn\,Cl + 4\,Aq$
31.25° " 72.6 "
62.5° " 86.5 "
87.5° " 86.5 "
106.25° " 86.9 "

(Brandes, *Pogg. Ann.*, 1831, **22.** pp. 263 – 266.)

Soluble in 0.8 pt. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) When the crystallized salt is heated, it becomes soft at 37.5°, melts to a thick liquid at 50°, which becomes more fluid as the heat is increased, being quite mobile at 87.5°, and boiling at 106.25°. (Brandes, *loc. cit.*, p. 261.)

Soluble in 1.75 pts. of alcohol of 75%, at 10°
" 0.75 " " 25°
" 0.69 " " 43.75°
" 0.97 " " 87.5°

Or, 100 pts. of alcohol of 75 per cent, at °C	Dissolve pts. of $Mn\,Cl + 4\,Aq$.
10°	53
25°	132
43.75°	144
87.5°	100.1

Or, the solution in alcohol, of 75%, saturated at 10° contains 36.3% of $Mn\,Cl + 4\,Aq$.
" 25° " 57.7 " "
" 43.75° " 59.0 " "
" 87.5° " 50.6 " "
(Brandes, *loc. cit.*, pp. 266 – 270.)

Insoluble in absolute ether, at the ordinary temperature, and none of its water of crystallization is abstracted by ether. (Brandes, *loc. cit.*, p. 266.) Insoluble in boiling oil of turpentine, and loses but little water during the experiment. (*Ibid.*, p. 272.) When one equivalent of Mn Cl, in aqueous solution, is mixed with a solution of an equivalent of sulphate of potash ($K\,O,\ S\,O_3$) $\frac{425}{1000}$ of it are decomposed to sulphate of manganese, which may be precipitated by adding alcohol, while $\frac{575}{1000}$ of it remain unchanged. (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.)

*Sesqui*CHLORIDE OF MANGANESE. (*Chlorhydrate of Manganic Oxide.*) $Mn_2\,Cl_3$ When sesquioxide ($Mn_2\,O_3$) or peroxide ($Mn\,O_2$) of manganese is dissolved in cold, somewhat concentrated chlorhydric acid, — an excess of acid being avoided, — a solution is obtained, which on being decomposed by the addition of much water, deposits hydrated sesquioxide of manganese ($Mn_2\,O_3$, $3\,H\,O$.) (Forchammer; H. Rose, *Pogg. Ann.*, **83.** 147.)

*Per*CHLORIDE OF MANGANESE. $Mn_2\,Cl_7$ Soluble in water. (Dumas.)

*Proto*CHLORIDE OF MANGANESE & OF MERCURY. $Mn\,Cl;\ Hg\,Cl + 4\,Aq$ Deliquescent. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 247.)

CHLORIDE OF MANGANESE with CYANIDE OF MERCURY. $Mn\,Cl;\ 2\,Hg\,Cy + 8\,Aq$ Efflorescent. Very soluble in water. (Poggiale.)

CHLORIDE OF MANNICYL. $C_{12}\,H_{10}\,O_6\,Cl_2$ Easily soluble in ether. (Berthelot.)

CHLORIDE OF MERCUR(*ic*)AMMONIUM. (*Fusible White Precipitate*, according to Kane.) $N\left\{\begin{matrix}H_3\\Hg\end{matrix}\right.Cl$ Soluble in warm, less soluble in cold ammonia-water. (Mitscherlich.)

CHLORIDE OF *di*MERCUR(*ic*)AMMONIUM. (*Infusible White Precipitate. Amido Chloride of Mercury.*) $N\left\{\begin{matrix}H_2\\2\,Hg\end{matrix}\right..Cl, \&+2\,Aq$ Permanent. Insoluble in cold water. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 413.) Soluble in about 600 pts. of water. Insoluble in alcohol. (Wittstein's *Handw.*) Soluble in 719.98 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) Scarcely at all soluble in cold, decomposed by boiling water. Soluble, with combination, in boiling dilute sulphuric acid; also soluble in hot dilute nitric acid. (Kosmann, *Ann. Ch. et Phys.*, (3.) **27.** 238.) Soluble in the mineral acids and in aqueous solutions of nitrate, sulphate, and acetate of ammonia, when these salts are mixed with free ammonia. (Pelouze & Fremy, *Tr.*) Easily soluble in chlorhydric acid, also in nitric and sulphuric acids. (Fourcroy.) Easily soluble in cyanhydric acid. (Hennel.) Soluble in warm aqueous solutions of chloride of ammonium, and of nitrate of ammonia. (Brett.) Completely insoluble in cold water, but soluble to a certain extent in aqueous solutions of the alkaline chlorides, which partially decompose it with formation of protochloride of mercury (Hg Cl). This decomposition is greater in hot than in cold solutions. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 180.)

CHLORIDE OF *tetra*MERCUR(*ic*)AMMONIUM. (*Amidoxychloride of Mercury.*) $N\,Hg_4\,Cl + 2\,H\,O =$ "$N\,H_2\,Hg,\ Hg\,Cl + 2\,Hg\,O$" Slightly soluble in water. Easily soluble in nitric, and chlorhydric acids. (Kane.)

CHLORIDE OF MERCUR(*ic*)AMMONIUM & *protochloride* OF MERCURY.

I.) $N\left\{\begin{matrix}H_3\\Hg\end{matrix}\right., Cl;\ Hg\,Cl$ Insoluble in water, but turns yellow when boiled therewith for some time. (H. Rose.) Decomposed by water, with partial solution. (Kane.) Partially soluble in water. (Grouvelle.)

II.) $N\left\{\begin{matrix}H_3\\Hg\end{matrix}\right.Cl;\ 2\,Hg\,Cl + Aq$ (*Fusible White Precipitate* (of Duflos, and Riegel).) Insoluble in cold, somewhat decomposed by boiling water. Soluble in acids, even in strong acetic acid.

CHLORIDE OF *di*MERCUR(*ic*)AMMONIUM & *protochloride* OF MERCURY. $N\left\{\begin{matrix}H_2\\2\,Hg\end{matrix}\right.Cl;\ 2\,Hg\,Cl$ Decomposed by cold water. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 413.)

CHLORIDE OF *di*MERCUR(*ic*)AMMONIUM & *protochloride* OF MERCURY with PROTOXIDE OF MERCURY. $2\,N\left\{\begin{matrix}H_2\\2\,Hg\end{matrix}\right.Cl;\ 3\,Hg\,Cl;\ 2\,Hg\,O$ Insoluble in cold water. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 413.)

CHLORIDE OF *tetra*MERCUR(*ic*)AMMONIUM & *protochloride* of MERCURY. $N\,(Hg_4)\,Cl;\ Hg\,Cl$ (*Nitrochloride of Mercury.*) Insoluble in boiling water, alkaline solutions, nitric or dilute sulphuric acids, but is gradually dissolved by boiling concentrated sulphuric acid, and by chlorhydric acid. (Mitscherlich.)

CHLORIDE OF *di*MERCUR(*ic*)AMMONIUM with PROTOXIDE OF MERCURY.

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I.) $N\left\{\begin{matrix}H_2\\ 2\,Hg\end{matrix}\right. Cl\,;\,2\,Hg\,O$ Insoluble in warm water.

II.) $3\,N\left\{\begin{matrix}H_2\\ 2\,Hg\end{matrix}\right. Cl\,;\,4\,Hg\,O$ Insoluble in cold water. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 413.)

• **Chloride of Mercur**(*ous*)**ammonium.** (*AmmoniodiChloride of Mercury. ChloroMercurate of Ammonia.*) $N\left\{\begin{matrix}H_3\\ Hg_2\end{matrix}\right. Cl$ Decomposes in the air.

Chloride of *di***Mercur**(*ous*)**ammonium.** (*AmidoChloride of Mercury. diChlorAmidide of Mercury.*) $N\left\{\begin{matrix}H_2\\ 2\,Hg_2\end{matrix}\right. Cl$ Permanent. Insoluble in water. Unacted upon by boiling water. Decomposed by acids. (Kane.)

Chloride of Mercur(*ous*)**Ethyl.** (*Chloride of HydrargEthyl.*) $C_4H_5Hg_2, Cl$ Nearly insoluble in water. Sparingly soluble in cold, freely soluble in boiling alcohol. Sparingly soluble in ether. (Duenhaupt.)

Chloride of Mercur(*ous*)**Methyl.** $C_2H_3Hg_2, Cl$ Ppt.

Chloride of *tetra***Mercur**(*ic*)**Phosphonium** & *protochloride* of **Mercury.** $P\,(Hg_4)\,Cl\,;\,2\,Hg\,Cl + 3\,Aq$ Decomposed by boiling, and gradually by cold water. (H. Rose.)

*Di***Chloride of Mercury.** (*Calomel. Subchloride of Mercury. Submuriate of Mercury. Mercurous Chloride.*) $Hg_2\,Cl$ When prepared in the moist way, it is almost absolutely insoluble in cold, but is gradually decomposed to a slight extent by boiling water.

Sparingly soluble, with decomposition, in boiling distilled water free from air:— thus, 1.2 grms. of calomel being placed in a flask containing 20 grms. of boiling distilled water, the whole maintained at the temperature of ebullition during an hour, and the flask securely closed until cold, afforded 0.002 grm. of corrosive sublimate. When the water is boiled in contact with air, the decomposition of the dichloride is very much greater, but simple protochloride of mercury is no longer produced, an oxychloride being formed, as has been shown by Guibourt. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 176.) Soluble in 1152 pts. of boiling water. (Rouelle.) Soluble in 12000 pts. of boiling water. (Dumas, *Tr.*)

Insoluble in spirit, but when boiled for a long time therewith it is decomposed to a slight extent.

Insoluble in ether. (Lassaigne.) Insoluble at the ordinary temperature in very dilute acids, but slowly soluble at more elevated temperatures; the solution gradually becomes complete at the temperature of boiling, with decomposition. When treated with warm chlorhydric acid, or with aqueous solutions of the alkaline chlorides, dichloride of mercury is completely transformed to protochloride, which dissolves, and metallic mercury. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** 343.) A mixture of 0.6 grm. $Hg_2\,Cl$, 0.6 grm. chlorhydric acid, and 10 grms. of water being left during 24 hours, at the temperature of 40° or 50°, out of contact with the air, 0.004 grm. of corrosive sublimate (Hg Cl) was produced. The same mixture in contact with the air afforded 0.014 grm. of Hg Cl. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 176.) Tolerably rapidly soluble, with decomposition, in concentrated chlorhydric acid. Soluble, with decomposition, in boiling nitric acid, and in cold chlorine-water, or aqua-regia. (Fresenius, *Quant.*, p. 146.) Soluble in a hot or warm aqueous solution of chloride of ammonium; less readily soluble in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.) Somewhat soluble in aqueous solutions of chloride of ammonium, chloride of potassium, and chloride of sodium; traces of it are also dissolved by solutions of chloride of barium, and chloride of calcium. (Pettenkofer.) When treated with aqueous solutions of the chlorides of ammonium, sodium, potassium, or barium, especially chloride of ammonium, it is partially decomposed, some protochloride of mercury (Hg Cl) being formed and dissolved. This decomposition, but slight in the cold, is more rapid in hot solutions; it is also greater in proportion as the solution of the alkaline salt employed is more concentrated; out of contact with the air, but little decomposition occurs, but when exposed to the air, oxygen is absorbed, and the decomposition is greater. In presence of dextrin the decomposition appears to be more rapid; sugar and albumen do not seem to modify it, while fatty matters and gum-arabic retard it. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** pp. 171 - 176, & 184 [quantitative results are given by M.].) The amount of protochloride of mercury formed by the action of chloride of ammonium upon calomel may even be greater than would be formed by the action of an equivalent quantity of chlorhydric acid. Thus, in an experiment where 0.3 grm. of calomel, 1.2 grms. of chloride of ammonium, and 10 grms. of distilled water were allowed to act upon each other at the ordinary temperature during 24 hours, 0.019 grm. of protochloride of mercury was formed; while from 0.3 grm. of calomel, 0.673 grm. of chlorhydric acid (the chlorine of which is equivalent to that in the 1.2 grms. of chloride of ammonium), and 10 grms. of water, placed in the same circumstances, only 0.008 grm. of protochloride of mercury was formed. This is not the case, however, with all the salts of mercury, for many of them afford more protochloride when treated with chlorhydric acid than with chloride of ammonium. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 185.) Soluble in aqueous solutions of sulphate of ammonia; but insoluble in solutions of nitrate or succinate of ammonia or of sulphate, nitrate, or tartrate of potash. (Wittstein.) When digested with an aqueous solution of acetate of ammonia at 18.8° @ 25°, even if this have an acid reaction, it is decomposed to a certain extent, protochloride of mercury being formed and dissolved. (Weppen, from *Arch. d. Pharm.*, (2.) **9.** 236, in *J. pr. Ch.*, 1837, **11.** 182.) As Buchner has already shown, dichloride of mercury is decomposed by a solution of caustic ammonia, with formation of protochloride of mercury and metallic quicksilver, which separates, and the same result is obtained when a solution of carbonate of ammonia is substituted for the ammonia-water. (Weppen, *Ibid.*, *J. pr. Ch.*, p. 183.) Easily soluble in an aqueous solution of protonitrate of mercury. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 317.) Easily soluble in a warm aqueous solution of bichloride of platinum. (v. Bonsdorff, *Pogg. Ann.*, 1830, **19.** 353.) Decomposed by ammonia-water, and by solution of carbonate of ammonia, with separation of metallic mercury. (Wittstein.) Very soluble, with decomposition, in warm nitric acid.

Soluble in strong hot chlorhydric acid, with separation of mercury (Proust); soluble in hot dilute chlorhydric acid without separation of mercury. (Guibourt.) Soluble in cold cyanhydric acid, with separation of metallic mercury and formation of protochloride and cyanide of mercury.

1 grain of chlorhydric acid diluted with 250,000 grains of water affords a perfectly distinct precipi-

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tate of dichloride of mercury on the addition of a solution of nitrate of dinoxide of mercury. (Pfaff.)

*Proto*CHLORIDE OF MERCURY.

(Bichloride of Mercury.
Corrosive sublimate.)

Hg Cl

I.) *normal*. Permanent. Soluble in 18.5 pts. of water at 13.8°, or 100 pts. of water at 13.8° dissolve 5.4 pts. of it. Its degree of solubility increases greatly with the temperature, but in what ratio it is not easy to ascertain with precision. (J. Davy, *Phil. Trans.*, 1822, p. 358.) Soluble in 2 @ 3 pts. of boiling water.

Soluble in 3 pts. of boiling water. (Wenzel, *Verwandtschaft*, p. 310. [T.].) Soluble in 18.23 pts. of water at 10°, and in 3 pts. of water at 100°. The solution saturated at 10° contains 5.2% of it, and the solution saturated at 100° contains 25%. (M. R. & P.) Soluble in 18.46 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) Soluble in 16 pts. of cold, and in 3 pts. of warm water. (Dumas, *Tr.*)

100 pts. of water at °C.	Dissolve pts of Hg Cl.
0°	5.73
10	6.57
20	7.39
30	8.43
40	9.62
50	11.34
60	13.86
70	17.29
80	24.30
90	37.05
100	53.96

(Poggiale, *Ann. Ch. et Phys.* (3.) **8.** 468.)

An aqueous solution saturated at 8° is of 1.041 sp. gr. (Anthon, *Ann. der Pharm.*, 1837, **24.** 211.) The saturated aqueous solution boils at 101.1°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.)

Soluble in 2.5 pts. of cold alcohol. (Richter); in 3 pts. of cold alcohol (Karls); in 2.5 pts. of alcohol, of 0.833, at the ordinary temperature, and in 1.167 pts. of the same alcohol at boiling (Berzelius's *Lehrb.*); in 1.132 pts. of boiling alcohol [T.]; in 2 pts of alcohol, of 0.816 sp. gr., at 15.5°, forming a solution of 1.08 sp. gr. (J. Davy, *Phil. Trans.*, 1822, p. 358.)

Soluble in 2.57 pts. of alcohol of 39° (Cartier) at 10°
" 2.9 " " " 38° " " 10°
" 3.6 " " " 35° " " 10°
" 4.2 " " " 30° " " 10°
" 9.3 " " " 22° " " 10°
" 14.6 " " " 15° " " 10°
(N. E. Henry.)

It is mostly precipitated from a saturated solution in absolute alcohol on the addition of an amount of water equal to one quarter the bulk of the alcoholic solution. (Dœbereiner.) Soluble in 4 pts. of ether (Karls); in 4.1 pts. (N. E Henry.); in 2.86 pts. of ether of 0.745 sp. gr., forming a solution of 1.08 sp. gr. The solvent power of the ether does not appear to be increased by elevation of temperature, nor diminished by its reduction; the boiling-point of the solution also appears to be the same as that of pure ether. (J. Davy, *Phil. Trans.*, 1822, p. 359.) Ether abstracts it from the aqueous solution (Orfila), and the quantity thus removed is greater in proportion as the solution is more concentrated. From a solution of 1 pt. Hg Cl in 20 pts. of water, an equal volume of ether takes up 0.7 pt.; while if the remaining aqueous solution is again shaken with its own volume of fresh ether, it gives up to the latter only 0.1 pt. A solution of Hg Cl in 400 pts. of water, when agitated with 100 pts. of ether, loses only 0.3 pt. of the salt. (Lassaigne.) The saturated ethereal solution is of 1.08 sp. gr. (J. Davy.) 4 pts. of ether alone dissolve 1 pt of Hg Cl; on addition of 1.33 pts. of camphor, the same quantity of ether dissolves 1.33 pts.; with 4 pts. of camphor, it dissolves 2 pts.; with 8 pts. of camphor, 4 pts.; and with 16 pts. of camphor, 8 pts. of Hg Cl. (Karls, *Pogg. Ann.*, **10.** 608, [*Gm.*].) 3 pts. of alcohol which at ordinary temperatures dissolve 1 pt. of Hg Cl, take up 2 pts. of that compound on the addition of 1 pt. of camphor; 3 pts. on the addition of 3 pts. of camphor; 6 pts. on the addition of 6 pts. of camphor. (Karls, *Pogg. Ann.*, **10.** 608 [*Gm.*].) 16 pts. of alcohol of 0.865 sp. gr. dissolve 7 pts. of Hg Cl, and 9.6 pts. after the addition of 4 pts. of camphor; by agitation with finely pulverized Hg Cl a solution is at length obtained containing 25 pts. of camphor and 16 pts. of protochloride of mercury in 4 pts. of alcohol. This solution is syrupy, of 1.326 sp. gr., and deposits a small quantity of dichloride of mercury. Mixed with water, it deposits camphor, and when covered with water and left to itself for a considerable time, it deposits camphor, together with crystals of Hg Cl. When diluted with alcohol, it exhibits, with reagents, the reactions of protochloride of mercury. (Simon, *Pogg. Ann.*, **37.** 553 [*Gm.*].) Abundantly soluble in oil of turpentine and the other essential oils. When a mixture of corrosive sublimate and of oil of turpentine, cinnamon, nutmeg, juniper, caraway, peppermint, cloves, or almonds, is gently heated, decomposition ensues. (J. Davy, *Phil. Trans.*, 1822, pp. 359, 360.) Freely soluble in glycerin. (Parrish's *Pharm.*, p. 236.) Abundantly soluble in boiling creosote, from which it separates for the most part as the solution cools. (Reichenbach.) Its solubility in water is augmented by the presence of acids, chlorhydric acid especially dissolving much of it. It is not altered in these circumstances. (Dumas, *Tr.*) Soluble in 0.5 pt. of chlorhydric acid, of 1.158 sp. gr., at 23.3°, forming a solution of 2.412 sp. gr.; when the temperature is allowed to fall a few degrees, the solution suddenly becomes solid, from the formation of a mass of crystals, which rapidly melt when the containing vessel is held in the warm hand. (J. Davy, *Phil. Trans.*, 1822, p. 361.) More soluble in chlorhydric acid than in water, one cubic inch of boiling concentrated chlorhydric acid dissolving about 1000 grains of it. (J. Davy [1812 ?], in *Berzelius's Lehrb.*) Abundantly soluble, with combination, in cold chlorhydric acid, the solution subsequently becoming solid from the formation of crystals; more soluble in hot chlorhydric acid. (Boullay, *Ann. Ch. et Phys.*, (2.) **34.** 343.) "It is commonly stated in systematic works that corrosive sublimate is soluble in sulphuric and nitric acids as well as in chlorhydric acid. But from my experiments this does not appear to be the case. $\frac{1}{10}$ of a grain of Hg Cl having been added to 50 grains of nitric acid of 1.45 sp. gr., and the mixture heated for some time at 32.2°, the Hg Cl did not diminish in bulk, nor did it appear to dissolve even at the boiling-point of the acid, nor did the acid appear turbid on cooling, nor were any crystals deposited. A similar experiment was made with $\frac{1}{10}$ of a grain of Hg Cl and 63 grains of concentrated sulphuric acid; at 32.2° the sublimate did not dissolve, and on the application of heat fumes appeared, the salt rose through the acid, and a delicate crust of it was formed in the cool part of the vessel.

(J. Davy, *Phil. Trans.*, 1822, p. 361.) More readily soluble in nitric acid than in water, but crystallizes out again when the solution is cooled or evaporated. (Berzelius, *Lehrb.*, **3.** 845.) It is not decomposed by monohydrated sulphuric acid. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 373.) Soluble in sulphuric, nitric, iodic and chromic acids, without decomposition. (Millon, *loc. cit.*, p. 390.) Extremely difficultly soluble in nitric acid, which moreover exerts no decomposing action upon it, either when concentrated or dilute. (H. Wurtz, *Am. J. Sci.*, (2.) **25.** 381.) A saturated aqueous solution of chloride of ammonium at 15.5° is capable of dissolving very nearly its own weight of Hg Cl, and the solution thus obtained is capable of taking up more chloride of ammonium; thus 25.3 grains of a saturated solution of chloride of ammonium, after having taken up 25.1 grains of Hg Cl, dissolved 7 grains more of chloride of ammonium. From this experiment it would appear that corrosive sublimate is about 17 times more soluble in a saturated solution of chloride of ammonium than in water, and not 30 times, as is stated by some authors. (J. Davy, *loc. cit.*) A mixture of protochloride of mercury, chloride of ammonium, and water containing

Water, Grains.	NH_4Cl, Grains.	Hg Cl, Grains.	Is liquid at
9	6.75	34	60°
9	3.37	17	29.4°* and solidifies at 12.7°.
9	3.37	8.5	12.7°†
9	10.12	25.5	about 40.5°, and deposits some crystals at 15.5°.

(J. Davy. *Phil. Trans.*, 1822, pp. 362, 363.)

* Sp. gr. of the solution = 1.98.
† " " " 1.58.

1 pt. of a saturated aqueous solution of chloride of sodium dissolves 1.289 pts. of Hg Cl at 14°; that is, 23.9 times more than is dissolved by the same quantity of water. This solution of chloride of sodium saturated with chloride of mercury can now take up a considerable quantity of chloride of sodium, a crystalline double salt subsequently separating. (Voit, *Ann. Ch. u. Pharm.*, **104.** 354.) A saturated aqueous solution of chloride of sodium, composed of 20 grains of water and 7 of salt, dissolved 32 grains of Hg Cl at 15.5°; gently heated, 3 grains more were dissolved, and remained in solution on cooling, but on a further addition of Hg Cl, the solution formed by heat deposited crystals on cooling. The solution containing 35 grains of Hg Cl was of 2.14 sp. gr. As with chloride of ammonium, the solubility of chloride of sodium appears to be increased by combining with corrosive sublimate, but in a less degree. (J. Davy, *Phil. Trans.*, 1822, p. 364.) A saturated aqueous solution of chloride of potassium, formed of 21 grains of water and 7 grains of chloride of potassium, being gently heated, dissolved 8 grains of Hg Cl. On cooling to 15.5°, only a few crystals were deposited, but when cooled to 10° it became nearly solid. (J. Davy, *loc. cit.*) A saturated aqueous solution of chloride of barium, formed of 20 grains of water and of 8.7 grains of crystallized chloride of barium, dissolved 16 grains of Hg Cl at 15.5°, and 4 grains more when gently heated; on cooling, a few crystals were deposited. The solution was of 1.9 sp. gr. After standing for several hours it deposited a small number of crystals. (J. Davy, *Phil. Trans.*, 1822, pp. 363, 364.) A solution of chloride of magnesium, prepared by neutralizing with magnesia 31 grains of chlorhydric acid of 1.58 sp. gr., dissolved 40 grains of Hg Cl, and when gently heated 25 grains more. This solution remained transparent on cooling, and was of 2.83 sp. gr. When 5 grains more of Hg Cl were added, these also were dissolved on heating, but crystals separated when this solution was cooled. (J. Davy, *Phil. Trans.*, 1822, p. 364.) Easily and abundantly soluble in a saturated cold solution of chloride of potassium, but crystals soon begin to separate from the solution, unless this be heated or diluted with water. If it be heated to 50° @ 60° a considerable quantity more of Hg Cl may be dissolved, but on cooling the solution solidifies. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** pp. 123–128.) Soluble in a cold aqueous solution of chloride of sodium, with combination, the compound, Na Cl, 2 Hg Cl + 4 Aq, crystallizing out on evaporation. A hot solution of this compound dissolves a considerable quantity of Hg Cl, but on cooling this crystallizes out again as such. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 128.) Soluble in an aqueous solution of the chlorides of manganese, zinc, iron (Fe Cl), cobalt (Co Cl), nickel, and copper (Cu Cl). (*Ibid.*, pp. 247–249.)

II.) *acid.*

a = Hg Cl, H Cl Decomposed by water.

b = Hg Cl, 2 H Cl Decomposed by water. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** pp. 343–345.)

III.) *basic.* *Vid.* OxyChloride of Mercury.

*Proto*CHLORIDE OF MERCURY & OF NICKEL.

I.) *oblique rhombic prisms.* Deliquescent.

II.) *regular.* Permanent. Crystallizes out before No. 1°. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 249.)

*Proto*CHLORIDE OF MERCURY & *sesquichloride* OF OSMIUM. Soluble in water. (Berzelius, *Lehrb.*, **3.** 1006.)

*Proto*CHLORIDE OF MERCURY & OF PLATIN(*ous*)*bi*AMIN. Easily soluble in boiling, much less soluble in cold water. Insoluble in chlorhydric acid. (Buckton, *J. Ch. Soc.*, **5.** 215.)

$Hg\,Cl;\ N_2\left\{H_6 . Pt',\ Cl\right.$

*Proto*CHLORIDE OF MERCURY & OF POTASSIUM.
(*Chloro Mercurate of Potassium.*)

I.) K Cl; Hg Cl + Aq Permanent. Soluble in water. Very slowly soluble in alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** p. 126.)

II.) K Cl; 2 Hg Cl + 2 Aq Soluble in water. Very slowly soluble in alcohol. (v. Bonsdorff, *loc. cit.*, pp. 125, 127.)

III.) K Cl; 4 Hg Cl + 4 Aq Very easily soluble in water, especially when this is hot. A solution which is perfectly clear at 18° deposits a large quantity of crystals at 15°. Very slowly soluble in alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** pp. 124, 128.)

*Di*CHLORIDE OF MERCURY & *sesquichloride* OF RHODIUM.

I.) $2\,Hg_2Cl;\ Rh_2Cl_3$
II.) $3\,Hg_2Cl;\ Rh_2Cl_3$ } Insoluble in water. (Claus, *Beiträge*, pp. 73, 23.)

*Proto*CHLORIDE OF MERCURY & OF SODIUM.

I.) Na Cl; Hg Cl Deliquescent. (Voit.) Easily soluble in water. The solution being readily decomposed when evaporated.

II.) Na Cl; 2 Hg Cl + 3 Aq Permanent. Soluble in water. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 129.) Soluble in 0.33 pt. of water at 15°. (Schindler.) Exceedingly soluble in water, and alcohol. Soluble in 275 pts. of ether. (Lassaigne.)

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Chloride of Mercury & of StibEthylium. $Sb\{(C_4H_5)_4Cl; 3HgCl$ Soluble in water, and alcohol. Insoluble in ether. (Lœwig.)

Chloride of Mercury & of Strontium. $SrCl; HgCl + 2Aq$ Permanent. Easily soluble in water. (v. Bonsdorff.)

*Di***Chloride of Mercury** & *protochloride* **of Sulphur.** $Hg_2Cl; SCl$ Decomposed by water to Hg Cl, which dissolves, and sulphur. (Capitaine.)

*Di***Chloride of Mercury & of Tin.** $Hg_2Cl; SnCl$ Decomposed by water. (Capitaine.)

*Proto***Chloride of Mercury & of Yttrium.** Appears to be deliquescent. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 136.)

*Proto***Chloride of Mercury & of Zinc.** Very deliquescent. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 248.)

*Proto***Chloride of Mercury with ButylSulphide of Mercury.** $C_8H_9HgS_2; HgCl$, or, $C_8H_8S_2, 2HgCl; C_8H_8S_2, Hg_2S$ Insoluble in alcohol or oil of turpentine. Entirely insoluble in ether. Soluble in oil of coal-tar. (Anderson.)

*Proto***Chloride of Mercury with** *bi***Chromate of Ammonia.**

I.) $NH_4O, 2CrO_3; HgCl + Aq$
II.) $3(NH_4O, 2CrO_3); HgCl$
Soluble in water. (Richmond & Abel.)

*Proto***Chloride of Mercury with** *mono***Chromate of Potash.** $KO, CrO_3; 2HgCl$ Readily soluble in water. Soluble in dilute chlorhydric acid. (Darby, *J. Ch. Soc.*, **1.** 22.)

*Proto***Chloride of Mercury with** *bi***Chromate of Potash.** $KO, 2CrO_3; HgCl$ Readily soluble in hot, less soluble in cold water. Decomposed by absolute alcohol, and ether. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 388.)

Chloride of Mercury with Coniin. $C_{16}H_{15}N; 4HgCl$ Insoluble in water or ether. Very sparingly soluble in alcohol. Easily soluble in chlorhydric acid. (Blyth, *J. Ch. Soc.*, **1.** 355.)

*Proto***Chloride of Mercury with Creatinin.** Ppt.

*Proto***Chloride of Mercury with** *proto***Cyanide of Mercury.** $HgCl; HgCy$ Permanent. Readily soluble in water. (Liebig.) Decomposed by strong alcohol, which dissolves out the chloride of mercury. (Mialhe, *Ann. Ch. et Phys.*, (3) **5.** 181.)

Chloride of Mercury with Cyanide of Mercury, & Nicotin. $C_{20}H_{14}N_2; 4HgCl; 2HgCy$ Easily soluble, without decomposition, in cold or boiling water, and in alcohol. Decomposed by chlorhydric acid. (Bœdeker.)

Chloride of Mercury with EthylSinamin. $C_{12}H_{10}N_2; 8HgCl$ Ppt.

Chloride of Mercury with Gelatin. Soluble both in alkaline and neutral solutions of iodide of potassium, and in most dilute acids. (Melsens, *Ann. Ch. et Phys*, (3.) **26.** 221.)

Chloride of Mercury with Guanin. $C_{10}H_5N_5O_2; 2HgCl + 5Aq$ Very difficultly soluble in water, and still less soluble in alcohol. Easily soluble in acids, and in an aqueous solution of cyanide of potassium. (Neubauer & Kerner.)

Chloride of Mercury with Iodine (of Lassaigne). Is said not to exist.

*Proto***Chloride of Mercury with** *prot***Iodide of Mercury.**

I.) $HgCl; HgI$ Ppt. (Boullay, *Ann. Ch. et Phys.*, (2.) **34.** 366.)

II.) $2HgCl; HgI$ Soluble in water. (Liebig.)

Chloride of Mercury with Lutidin. $C_{14}H_9N; 2HgCl$ Somewhat soluble in boiling water, with partial decomposition; more soluble in boiling alcohol, from which it separates unchanged as the solution cools. (Anderson.)

Chloride of Mercury with Nicotin.

I.) $C_{20}H_{14}N_2; 2HgCl$ Insoluble in water or ether. Sparingly soluble in alcohol. (Ortigosa.)

II.) $C_{20}H_{14}N_2; 6HgCl$ Sparingly soluble in water, and alcohol. Decomposed by boiling water. Easily soluble in weak chlorhydric acid. (Bœdeker.)

*Proto***Chloride of Mercury with Nitrate of Mercury.** $4HgCl; NH_4O, NO_5$ Insoluble, or nearly insoluble, in water. Decomposed by ether, which dissolves out the Hg Cl. (Kosmann, *Ann. Ch. et Phys.*, (3.) **27.** 240.)

*Proto***Chloride of Mercury with Odmyl, &c.** $C_8H_8S_2, HgCl; C_8H_8S_2, Hg_2S$ Insoluble in water. Soluble in some hundred parts of boiling alcohol. About as soluble in oil of turpentine as in alcohol; but most abundantly soluble in the most volatile oil of coal-tar. (Anderson.)

Chloride of Mercury with Oxide of Cacodyl. $2HgCl; C_4H_6AsO$ 100 pts. of water at 18° dissolve 0.21 pt. of it, and at boiling 3.47 pts. Also soluble in alcohol; more in boiling than in cold. (Bunsen, *Ann. Ch. u. Pharm.*, 1841, **37.** 47.)

*Proto***Chloride of Mercury with OxyChloride of Phosphorus.**

*Proto***Chloride of Mercury with Phosphide of Mercury.** $8HgCl; P\{Hg_3 + 8Aq$ Very slowly decomposed by damp air. Quickly decomposed by boiling water. Also decomposed by acids and alkalies. (H. Rose.)

*Proto***Chloride of Mercury with Picolin.** (*Chloro Mercurate of Picolin.*) $C_{12}H_7N; 2HgCl$ Sparingly soluble in cold, more soluble in warm water. The aqueous solution is decomposed when boiled for some time. Soluble in boiling, less soluble in cold alcohol. Easily soluble in dilute chlorhydric acid. (Anderson.) Soluble in 10 pts. of boiling water. Soluble in warm, less soluble in cold alcohol, and ether. (Unverdorben.)

Chloride of Mercury with Quinolein. $2HgCl; C_{18}H_7N$ Readily soluble in hot water, from which it separates on cooling.

Chloride of Mercury with SelenioCyanide of Mercury. $HgC_2NSe_2; HgCl$ Scarcely soluble in cold, rather more readily soluble in hot water. Very soluble in alcohol. Very soluble, with slight decomposition,

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in dilute chlorhydric acid. (Crookes, *J. Ch. Soc.*, **4.** 16.)

CHLORIDE OF MERCURY with SINAMIN. Ppt.
$N \left\{ \begin{matrix} C_6 H_5 \\ C_2 N \\ H \end{matrix} \right. ; 2 Hg Cl$

CHLORIDE OF MERCURY with STRYCHNINE. $C_{42} H_{22} N_2 O_4 ; 2 Hg Cl$ Insoluble in water, alcohol, or ether. Soluble in sulphuric acid. (Abel & Nicholson, *J. Ch. Soc.*, **2.** 258.)

*Proto*CHLORIDE OF MERCURY with SULPHATE + OF AMMONIA, MERCURY, AND QUININE. $Hg Cl; (N H_4 O, Hg O, 6 Quin), 14 S O_3$ Rather difficultly soluble in water; more easily soluble in alcohol. (Kosmann, *Ann. Ch. et Phys.*, (3.) **27.** 250.)

*Proto*CHLORIDE OF MERCURY with SULPHATE OF STRYCHNINE. $2 Hg Cl ; C_{42} H_{22} N_2 O_4, H S O_4$

*Proto*CHLORIDE OF MERCURY with SULPHIDE OF COPPER & OF MERCURY. $2 Hg Cl; 3 Cu S; 2 Hg S$ Permanent. Insoluble in water, or in chlorhydric acid. Soluble, with decomposition, in aqua-regia. Decomposed by an aqueous solution of caustic potash. (Rammelsberg.)

*Proto*CHLORIDE OF MERCURY with SULPHIDE OF ETHYL. $Hg Cl ; C_4 H_5 S$ Sparingly soluble in cold water or alcohol; easily soluble in boiling alcohol. Easily soluble in boiling, less soluble in cold ether or wood-spirit. (A. Loir, *Ann. Ch. et Phys.*, (3.) **39.** 441.)

CHLORIDE OF MERCURY with SULPHIDE OF ETHYL & OF MERCURY. $Hg Cl; \left. \begin{matrix} Hg \\ C_4 H_5 \end{matrix} \right\} S_2$ Difficulty soluble in water, alcohol, or ether. Only slightly acted upon by nitric acid.

CHLORIDE OF MERCURY with SULPHIDE OF METHYL. $Hg Cl ; C_2 H_3 S$ Soluble in hot, less soluble in cold alcohol, ether, and wood-spirit. (Loir, *Ann. Ch. et Phys.*, (3.) **39.** 449.)

*Proto*CHLORIDE OF MERCURY with SULPHIDE OF MERCURY. $Hg Cl ; 2 Hg S$ Insoluble in water, even boiling, or in hot or cold dilute or concentrated sulphuric, nitric, or chlorhydric acids. Decomposed by boiling nitric acid. (H. Rose.)

CHLORIDE OF MERCURY with SULPHIDE OF MERCUR(*ic*)ALLYL. $3 Hg Cl ; C_6 H_5 Hg S_2$ Insoluble in water. Sparingly soluble in alcohol, and ether.

CHLORIDE OF MERCURY with SULPHIDE OF MERCUR(*ic*)ETHYL. $Hg Cl ; C_4 H_5 Hg S_2$ Very sparingly soluble in water, alcohol, and ether. Somewhat soluble in boiling alcohol. (Debus.)

CHLORIDE OF MERCURY with SULPHITE OF AMMONIA. $3 Hg Cl ; 2 (N H_4 O, S O_2)$ Somewhat soluble in cold, decomposed by boiling water. (Péan de St. Gilles, *Ann. Ch. et Phys.*, (3.) **36.** 95.)

CHLORIDE OF MERCURY with SULPHOCARBAMATE OF AMYL. (*Xanthamylamid.*) $4 Hg Cl ; C_{12} H_{13} N O_2 S_2$ Insoluble in water, by which it is slowly decomposed. Very sparingly soluble in cold, but more soluble in boiling alcohol, and ether. (M. W. Johnson, *J. Ch. Soc.*, **5.** 147.)

CHLORIDE OF MERCURY with TARTRATE OF POTASH. $Hg Cl; 2 C_8 H_5 K O_{12} + 6 Aq$ Difficultly soluble in water. Kosmann, *Ann. Ch. et Phys.*, (3.) **27.** 245.)

CHLORIDE OF MERCURY with THIOSINAMIN. $C_8 N_2 S_2 H_8 ; 4 Hg Cl$ Ppt. Soluble in acetic acid. (Will.)

CHLORIDE OF MERCURY with UREA. $2 Hg Cl ; C_2 H_4 N_2 O_2$ Difficultly soluble in cold, decomposed by boiling water. Soluble in boiling absolute alcohol, from which it separates on cooling. (Neubauer & Kerner, *Ann. Ch. u. Pharm.*, **101.** 326.)

CHLORIDE OF MESITYL. $C_6 H_5 Cl$ Insoluble, or very sparingly soluble, in water. Soluble in alcohol. (Kane.)

CHLORIDE OF METHYL.
(*Methylic Chloride. HydrochloricMethylEther. Chlorhydrate of Methylene.*)
$C_2 H_3 Cl$

1 volume of water at	7°	dissolves	5.304	vols. of it.
"	14°	"	4.172	"
"	20°	"	3.462	"
"	25°	"	3.034	"

At 6° a crystalline hydrate is formed. (Bæyer, *Ann. Ch. u. Pharm.*, **103.** 183.) 1 vol. of water at 16° dissolves 2.8 vols. of it. (Dumas & Péligot.) Soluble in about $\frac{1}{4}$ volume of water. (Berthelot, *loc. inf. cit.*) Abundantly soluble in alcohol; somewhat less soluble in ether. (Bunsen.) Soluble in about $\frac{1}{35}$ volume of absolute alcohol; and, without decomposition, in $\frac{1}{40}$ volume of glacial acetic acid. (Berthelot, *Ann. Ch. et Phys.*, (3.) **52.** 100.)

CHLORIDE OF *tri*METHYLACETOS[ACETOYL]-AMMONIUM.
(*Chloride of triMethyl Vinylammonium.*)
$C_{10} H_{12} N Cl = N \left\{ \begin{matrix} (C_2 H_3)_3 \\ C_4 H_3 \end{matrix} \right\} Cl$

CHLORIDE OF *tetra*METHYLAMMONIUM. $N (C_2 H_3)_4 Cl$ Hygroscopic.

CHLORIDE and IODIDE OF *tetra*METHYLAMMONIUM.

I.) *bichloride.* $N (C_2 H_3)_4, Cl_2 I$ Soluble, with partial decomposition, in water, especially when this is warm.

II.) *terchloride.* $N (C_2 H_3)_4, Cl_3 I$ Soluble, with decomposition, in water. (Weltzien.)

III.) *quadrichloride.* $N (C_2 H_3)_4, Cl_4 I$

IV.) *quinquichloride.* $N (C_2 H_3)_4, Cl_5 I$ Soluble in water; not removed therefrom by ether.

CHLORIDE OF METHYL*chloré*. *Vid.* Chloride of ChloroMethyl.

CHLORIDE OF METHYLCINCHONIN. Soluble in water. (Stahlschmidt, *Ann. Ch. u. Pharm.*, **90.** 221.)

CHLORIDE OF METHYLENE. $C_2 H_2 Cl_2$ Insoluble, or but sparingly soluble, in water. (Buttlerow.)

"*Bi*CHLORIDE OF METHYLENE." *Vid.* Chloride of monoChloroMethyl.

CHLORIDE OF METHYL*di*ETHYLAMYLAMMONIUM.
$C_{20} H_{24} N Cl = N \left\{ \begin{matrix} C_{10} H_{11} \\ C_2 H_3 \\ (C_4 H_5)_2 \end{matrix} \right\} Cl$

CHLORIDE OF METHYLNICOTIN. Soluble in water.

CHLORIDE OF METHYLTUNGSTEN. Soluble in water. (Riche.)

*Proto*CHLORIDE OF MOLYBDENUM. There are

$Mo\,Cl$ two isomeric compounds, one of which is soluble, the other insoluble, in water. (Berzelius.)

*Bi*CHLORIDE OF MOLYBDENUM. Deliquescent. $Mo\,Cl_2$ Soluble in water, with evolution of so much heat that the liquid boils. When the aqueous solution is exposed to the air, oxidation ensues.

*Ter*CHLORIDE OF MOLYBDENUM. Soluble in $Mo\,Cl_3$ water. (Berzelius, *Lehrb.*)

*Proto*CHLORIDE OF MOLYBDENUM & OF POTASSIUM. Efflorescent. Partially soluble in water. (Berzelius.)

*Ter*CHLORIDE OF MOLYBDENUM with MOLYBDIC ACID. $2\,Mo\,O_3;\ Mo\,Cl_3$ Easily and completely soluble even in a small quantity of water. Also soluble in alcohol. (H. Rose, in *Berzelius's Lehrb.*, 3. 1035.)

CHLORIDE OF NAPHTHALIN. (*Subchloride of Naphthalin.*) $C_{20}\,H_8'',\ Cl_2$ Insoluble in water. Soluble in all proportions in ether; less soluble in alcohol. (Laurent.)

*Bi*CHLORIDE OF NAPHTHALIN.
$C_{20}\,H_8,\ 2\,Cl_2$

I.) *Modification a.* Insoluble in water. Scarcely at all soluble in cold, and only very slightly soluble in boiling alcohol; somewhat more soluble in ether. Tolerably soluble in ether at 100° (in a sealed tube). Very soluble in boiling, almost insoluble in cold oil of petroleum. (Laurent.)

II.) *Modification β.* Very easily soluble in alcohol, ether, and oil of petroleum.

CHLORIDE OF NICKEL.

I.) *mono.*

a = *anhydrous.* $Ni\,Cl$ Soluble in water, with evolution of heat. Immediately after sublimation, before it has been exposed to the air, it dissolves very slowly, and only after long-continued boiling in water. (Fellenberg.) Soluble in alcohol. Slowly soluble in ammonia-water.

Even hot chlorhydric acid dissolves the sublimed chloride with difficulty. (Proust.)

b = $Ni\,Cl + 9\,Aq$ Deliquesces or effloresces according as the air is moist or dry. Soluble in 1 5 @ 2 pts. of cold water. Easily soluble in alcohol. (Tupputi.) Difficultly soluble in alcohol. (Berzelius, *Lehrb.*, 3. 658.)

II.) *basic.* Difficultly soluble in water.

CHLORIDE OF NICKEL with CYANIDE OF MERCURY. $Ni\,Cl;\ 2\,Hg\,Cy + 7\,Aq$ Deliquescent. Soluble in water.

CHLORIDE OF NICKEL*bi*AMIN. $N_2 \left\{ H_6 \,.\, Ni,\ Cl \right.$ Soluble in water, the solution undergoing decomposition when boiled. Insoluble in alcohol. (Erdmann.)

CHLORIDE OF NICKEL*ter*AMIN. $N_3 \left\{ H_9 \,.\, Ni,\ Cl \right.$ Partially soluble, with decomposition, in water. (H. Rose.)

CHLORIDE OF NITRANISYL. $C_{16}\,H_6\,N\,O_8\,Cl$ Decomposes in moist air. Decomposed by alcohol. (Cahours.)

CHLORIDE OF NITROBENZOYL. (*ChloroNitroBenzoyl.*) $C_{14}\,H_4\,(N\,O_4)\,O_2,\ Cl$ Insoluble in water, but is gradually decomposed thereby. Decomposed at once by alcohol, and wood-spirit. Soluble in ether, without alteration even on boiling. (Cahours.)

CHLORIDE OF NITROGEN. $N\,Cl_3$ Gradually decomposes when in contact with water. (Ot. Gr.) Miscible with bisulphide of carbon, terchloride of phosphorus, and protochloride of sulphur. With alcohol, and ether, it forms compounds insoluble in alcohol. (Pelouze & Fremy.)

CHLORIDE OF NITROMETHYL*chloré*. *Vid.* Chloride of ChloroNitroMethyl.

CHLORIDE OF *bi*NITROMETHYLENE. *Vid.* Chloride of *per*Chloro*bi*NitroMethyl.

CHLORIDE OF *bi*NITROPHENYL. (*BiNitroChloroBenzene. BiNitroChloroPhenile. Chlorhydrophénide binitré.*) $C_{12}\,H_3\,(N\,O_4)_2\,Cl$ Insoluble in water. Sparingly soluble in cold, somewhat more soluble in warm alcohol. (Laurent & Gerhardt.)

CHLORIDE OF *ter*NITROPHENYL. (*Chloride of Picryl. ChloroPicryl.*) $C_6\,H_2\,(N\,O_4)_3\,Cl$ Decomposed by water. Soluble in alcohol, and ether. (Pisani.)

CHLORIDE OF OCTYL. (*Chloride of Capryl. Chlorcapryl. Caprylchlorhydric Ether.*) $C_{16}\,H_{17}\,Cl$ Insoluble in water. Very sparingly soluble in alcohol. (Bouis.)

CHLORIDE OF ŒNANTHYL. (*Hydride of Chlor Œnanthyl.*) $C_{14}\,H_{13}\,O_2\,Cl$ Decomposed by water. (Cahours.)

CHLORIDE OF ŒNANTHYLENE. $C_{14}\,H_{14}'',\ Cl_2$ Insoluble in water. (Limpricht.)

*Proto*CHLORIDE OF OSMIUM. Hygroscopic. $Os\,Cl$ It requires only a very small quantity of water for its solution, but the aqueous solution can only exist in a very concentrated state, and if to such a solution there is added only a very little more water than is necessary to dissolve the chloride, the solution becomes cloudy, and osmium is reduced. A large quantity of water decomposes the solution at once with precipitation of metallic osmium, while osmic and chlorhydric acids remain in solution. If decomposition has once been commenced, by the addition of a small quantity of water it continues gradually. Soluble in concentrated aqueous solutions of the alkaline chlorides, with combination and partial decomposition. (Berzelius's *Lehrb.*)

*Sesqui*CHLORIDE OF OSMIUM. Not known $Os_2\,Cl_3$ except in combination.

*Bi*CHLORIDE OF OSMIUM. Soluble in a small $Os\,Cl_2$ quantity of water, but is decomposed by much water, like the protochloride. (Berzelius's *Lehrb.*)

*Proto*CHLORIDE OF OSMIUM & OF POTASSIUM. Much more soluble in water than in alcohol. (Berzelius.)

*Sesqui*CHLORIDE OF OSMIUM & OF POTASSIUM. Slightly soluble in alcohol.

*Proto*CHLORIDE OF OSMIUM & OF ZINC. Soluble in water. (Berzelius, *Lehrb.*, 3. 1006.)

CHLORIDE OF PALLAD*bi*AMIN. $N_2 \left\{ H_6 \,.\, Pd,\ Cl + Aq \right.$ Easily soluble in water. (Fehling.)

CHLORIDE OF PALLADAMMONIUM.
(*Ammonio Chloride of Palladium.*)

I.) *red.* $N \left\{ \begin{matrix} H_3 \\ Pd \end{matrix} \right.,\ Cl$ Insoluble in cold, soluble, with decomposition, in boiling water. Slowly soluble in cold, quickly soluble in warm water acidulated with chlorhydric acid. Easily soluble in concentrated chlorhydric or nitric acids. Soluble in ammonia only after continuous boiling. (Fischer; Fehling.)

II.) *yellow.* Insoluble in boiling water. (Fischer.)

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On boiling with water, and then allowing the whole to cool during several hours, one part of the compound remains dissolved in 382 pts. of water when the temperature has fallen to 16°. (Lampadius.) Sparingly soluble in chlorhydric or nitric acids, and this only when heated. Easily soluble in a cold solution of ammonia. (Fischer.) Much more soluble than the red compound in a cold solution of ammonia. (Fehling.)

*Di*CHLORIDE OF PALLADIUM. Deliquescent.
(*SubChloride of Palladium.*)
$Pd_2\,Cl$
Soluble in water and in aqueous solutions of chloride of ammonium, iodide of potassium, or of caustic ammonia, with separation of some metallic palladium (about $\frac{1}{5}$ or $\frac{1}{6}$ of that contained in the dichloride) in either case. The clear aqueous solution, which consists of a mixture of proto and dichloride, is rendered turbid when diluted with more water. (Kane, *Phil. Trans.*, 1842, p. 281.)

*Proto*CHLORIDE OF PALLADIUM.

I.) *normal.*

a = *anhydrous.* Slowly but completely soluble in
$Pd\,Cl$
water. (Fellenberg.) Slightly soluble in water. Much more readily soluble in water acidulated with chlorhydric acid. (Vauquelin.) Alcohol precipitates from the aqueous solution a basic salt, while an acid salt remains dissolved.

b = *hydrated.* Very deliquescent. (Kane, *Phil.*
$Pd\,Cl + 2\,Aq$
Trans., 1842, p. 280.) It combines with basic metallic chlorides, forming salts easily soluble in water, and alcohol.

II.) *basic.* *Vid.* OxyChloride of Palladium.

*Bi*CHLORIDE OF PALLADIUM. Known only in acid solution and in combination.

*Proto*CHLORIDE OF PALLADIUM & OF *X*. *Vid.* ChloroPalladite of *X*.

*Bi*CHLORIDE OF PALLADIUM & OF *X*. *Vid.* ChloroPalladiate of *X*.

*Bi*CHLORIDE OF PELARGONENE.
(*BiChloride of Nonylene.*)
$C_{18}\,H_{18},\,Cl_2$

CHLORIDE OF PELARGYL. Decomposed by
$C_{18}\,H_{17}\,O_2,\,Cl$
alcohol. (Cahours, *J. Ch. Soc.*, **3.** 241.)

CHLORIDE OF PHENOYLBENZOICYL. Fumes
(*Chloride of Benzanilidyl.*)

$$C_{26}\,H_{10}\,N\,Cl = N\left\{\begin{matrix} C_{12}\,H_4{}'' \\ C_{14}\,H_5, \\ H \end{matrix}\right. Cl$$

in the air. Decomposed by water, and alcohol. Easily soluble, without decomposition, in dry ether. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **53.** 307.)

CHLORIDE OF PHENYL. Insoluble as such in
(*Chlorhydrophenid. ChloroBenzene.*)
$C_{12}\,H_5\,Cl$
water. Water, and especially a solution of caustic potash, soon decomposes it. (Laurent & Gerhardt.) Soluble in alcohol, and ether. Insoluble in ammonia-water. Partially soluble in cold, easily in a hot solution of caustic potash. (Schrugham, *J. Ch. Soc.*, **7.** 238.)

CHLORIDE OF PHENYLACONITIN.

$$C_{24}\,H_8\,N\,Cl\,O_6 = N\left\{\begin{matrix} C_{12}\,H_3\,O_6{}''' \\ C_{12}\,H_5 \end{matrix}\right\}Cl$$

CHLORIDE OF PHENYLSULPHUROUS ACID.
$C_{12}\,H_5\,S_2\,O_4\,Cl$
Insoluble in water. Easily soluble in alcohol.

CHLORIDE OF PHLORETYL. Decomposed by
$C_{18}\,H_9\,O_4,\,Cl$
water.

CHLORIDE OF PHORYL. Soluble in alcohol.
$C_{18}\,H_{13},\,Cl$
(Liès-Bodard.)

*Ter*CHLORIDE OF PHOSPHORUS. Slowly sol-
(*ProtoChlorure de Phosphore.*)
$P\,Cl_3$
uble in water, with decomposition. (H. Davy.) Abundantly soluble in Kremers's compound of sulphurous acid and pentachloride of phosphorus ($P\,Cl_5 + 2\,S\,O_2$).

*Quinqui*CHLORIDE OF PHOSPHORUS. Decom-
(*Pentachloride of Phosphorus. Deutochlorure de Phosphore.*)
$P\,Cl_5$
posed by water, with evolution of heat. Soluble in Kremers's compound of sulphurous acid and pentachloride of phosphorus ($P\,Cl_5 + 2\,S\,O_2$).

Soluble, without decomposition, in warm chloride of benzoyl, from which solution it separates on cooling. (Gerhardt.) Somewhat soluble, without decomposition, in bisulphide of carbon. (Schiff, *Ann. Ch. u. Pharm.*, **102.** 118.) "Chloride of Phosphorus" is soluble in bisulphide of carbon. (Corenwinder, *Ann. Ch. et Phys.*, (3.) **30.** 243.) Easily soluble in oil of turpentine, with evolution of heat.

Easily soluble in caoutchin. (Himly.)

CHLORIDE OF PHOSPHORUS & OF SULPHUR. *Vid.* Sulpho-perChloride of Phosphorus.

*Ter*CHLORIDE OF PHOSPHORUS with CYANIDE
$C_4\,H_3\,N,\,P\,Cl_3$
OF METHYL. Decomposed by water. (Hencke.)

CHLORIDE OF PICRYL. *Vid.* Chloride of *ter*NitroPhenyl.

CHLORIDE OF PLATIN(*ous*)*bi*AMIN.
(*Chlorhydrate of diPlatosamine. AmmonioprotoChloride of Platinum.*)

a = *anhydrous.* Absorbs one equivalent of water
$N_2\left\{H_6\,.\,Pt,\,Cl\right.$
from the air very rapidly. Soluble in 4 pts. of water at 16.5°; and more soluble in boiling water. Alcohol and ether precipitate from it the aqueous solution. (Reiset, *Ann. Ch. et Phys.*, (3.) **11.** pp. 419, 420.) Exceedingly easily soluble in water, and about as readily in an aqueous solution of chloride of ammonium. Insoluble in absolute alcohol, and only very sparingly soluble in ordinary alcohol. Easily soluble in dilute chlorhydric acid. (Peyrone, *Ann. Ch. et Phys.*, (3.) **12.** pp. 196–198.) As prepared by Reiset's method (solution of the chloride of Platin(ous)amin & of Platinum [green salt of Magnus] in boiling ammonia-water, and subsequent crystallization), Peyrone found it a little less readily soluble in water, and alcohol than when prepared by the action of ammonia upon an aqueous solution of protochloride of platinum. (*Ann. Ch. et Phys*, (3.) **12.** 207.) This is to be attributed to the presence of impurities.

b = *hydrated.* Permanent. (Reiset, *loc. cit.*)
$N_2\left\{H_6.Pt,\,Cl + Aq\right.$

CHLORIDE OF PLATIN(*ous*)*bi*AMIN & OF PLATINUM.
(*Green Salt of Magnus. ChloroPlatinate of diPlatosamine.*)
$N_2\left\{H_6\,.\,Pt,\,Cl\,;\,Pt\,Cl\right.$
Insoluble in, and is not decomposed by, water, alcohol, or chlorhydric acid. (Magnus.) Completely insoluble in water. (Gros, *Ann. der Pharm.*, 1838, **27.** 242.) Soluble, after long-continued boiling, in an aqueous solution of caustic ammonia, with combination (Reiset, *Ann. Ch. et Phys.*, (3.) **11.** 418; Peyrone, *Ibid.*, (3.) **12.** 206), and in concentrated solutions of ammoniacal salts, as the nitrate, sulphate, or chlorhydrate, from which solutions the yellow chloride of platin(ous)ammonium is deposited on cooling. (Reiset, *Ann. Ch. et Phys.*, (3.) **11.** 427.) Almost as easily soluble in a boiling aqueous solution of carbonate of ammonia as in caustic ammonia, but some carbonate of platin(ous)-

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biamin is liable to separate out. (Peyrone, *Ann. Ch. et Phys.*, (3.) **12.** 207.) Also soluble in a boiling aqueous solution of bichloride of platinum, from which solution chloroplatinate of platin(ous)-biamin separates on cooling. (Reiset, *Ann. Ch. et Phys.*, (3.) **11.** 429.) It is not in the least decomposed by boiling with aqueous solutions of the caustic alkalies; or by boiling dilute chlorhydric or sulphuric acids, in both of which it is completely insoluble. Easily decomposed by nitric acid. (Gros, *Ann. der Pharm.*, **27.** 245.)

Chloride of Platin(*ous*)*bi*amin & *protochloride* of Tin. Ppt. Easily soluble in a warm aqueous solution of protochloride of tin.

Chloride of Platin(*ous*)*bi*amin & *bichloride* of Tin. Insoluble in alcohol or chlorhydric acid. (Buckton, *J. Ch. Soc.*, **5.** 219.)

Chloride of Platin(*ous*)*bi*amin & of Zinc.
$N_2\left\{ H_6 . Pt, Cl; ZnCl \right.$ Very readily soluble in water, from which it is precipitated on the addition of alcohol. (Buckton, *J. Ch. Soc.*, **5.** 217.)

***Bi*Chloride of Platin(*ic*)ammonium.**

I.) $N\left\{\begin{matrix}H_3\\Pt\end{matrix}\right. Cl_2$ Insoluble in cold, decomposed by boiling water. Also decomposed by much washing. (Kane, *Phil. Trans.*, 1842, p. 300.) Insoluble in cold, very slightly soluble in boiling water, or in water acidulated with chlorhydric acid. By boiling with ammonia-water it is converted into chloride of ammoniumchloroplatin(*ous*)ammonium (Gros's Chloride). Soluble in a boiling aqueous solution of caustic potash, without evolving ammonia.

II.) $(N\left\{\begin{matrix}H_3\\Pt\end{matrix}\right., Cl_2)_2$ Soluble in water.

Chloride of *di*Platin(*ic*)Ammonium. Very soluble in water. (Gerhardt, in his *Traité*, **4.** 620 (note).)

Chloride of Platin(*ous*)ammonium. There are several isomeric modifications of this compound.
(*Chloride of Platosammonium. Chlorhydrate of Platosamine.*)
$N\left\{\begin{matrix}H_3\\Pt\end{matrix}\right., Cl$

α.) (*yellow.*) Soluble in boiling, but almost insoluble in cold water. Very easily soluble in ammonia-water, with combination. (Reiset, *Ann. Ch. et Phys.*, (3.) **11.** pp. 427, 428.) Sparingly soluble in cold, somewhat more soluble in boiling water. Very sparingly soluble in chlorhydric and sulphuric acids, but finally dissolves without alteration. Much more easily soluble, with decomposition, in nitric acid, and in ammonia-water than the green modification (*γ*). Scarcely at all acted upon at the ordinary temperature by monohydrated sulphuric acid, but on heating the mixture, decomposition ensues. Soluble in aqueous solutions of the alkaline carbonates. (Peyrone, *Ann. Ch. et Phys.*, (3.) **12.** pp. 193 – 195, 200.) When prepared directly (as by dropping potash lye into a solution of protochloride of platinum neutralized with carbonate of ammonia at 13°) it is soluble in about 33 pts. of boiling water. But when prepared by reduction it requires nearly 140 pts. of boiling water to dissolve it. (Peyrone, *Ann. Ch. u. Pharm.*, **61.** 180.)

β.) *red.*

1st variety. Insoluble in cold water. Decomposed by boiling water, with separation of metallic platinum. Soluble in nitric acid. Ammonia converts it into the green modification (*γ*). (Peyrone, *Ann. Ch. et Phys.*, (3.) **16.** 464.)

2d variety. Tolerably soluble in cold and much more easily in boiling water, without decomposition. With nitric acid, and with ammonia it behaves like the 1st variety. (Peyrone, *Ann. Ch. et Phys.*, (3.) **16.** 465.)

γ.) *green.* *Vid.* Chloride of Platin(*ous*)*bi*amin & of Platinum.

δ.) *orange-red.* Very sparingly soluble in cold water, and in about 50 pts. of boiling water. Readily soluble in boiling ammonia-water, without passing into the green modification. Decomposed by nitric acid. (Peyrone, *Ann. Ch. et Phys.*, (3.) **16.** 467.) Much more easily attacked by a solution of sulphite of ammonia than the green modif. (*γ*). (Peyrone, *Ann. Ch. u. Pharm.*, **61.** 179.)

Chloride of (*α*) Platin(*ous*)ammonium with Sulphite of Ammonia & of Platin(*ous*)*bi*amin.
$N\left\{\begin{matrix}H_3\\Pt\end{matrix}\right., Cl; 2(NH_4O, SO_2);$
$N_2\left\{ H_6 . Pt, O, HO, 2SO_2 + 2Aq \right.$

Chloride of Platin(*ous*)ammonium with Sulphite of Platin(*ous*)*bi*amin.
$N\left\{\begin{matrix}H_3\\Pt\end{matrix}\right., Cl; N_2\left\{ H_6 . PtO, HO, 2SO_2 + 2Aq \right.$

***Proto*Chloride of Platinum.**

I.) *normal.*

$PtCl$ There are two modifications:

α.) *green modif.* Permanent. Insoluble in water, and cannot be moistened by water. (Berzelius, *Lehrb.*) Insoluble in water, or in a mixture of 2 pts. of alcohol and 1 pt. of ether. Soluble in ammonia-water. (Reiset, *Ann. Ch. et Phys.*, (3.) **5.** 476, & (3.) **11.** pp. 417, 418.) Insoluble in water. (Raewsky, *Ann. Ch. et Phys.*, (3.) **22.** 280.) Insoluble in alcohol of 38°. Unacted on in the cold by a somewhat concentrated aqueous solution of iodide of potassium, but on heating the mixture, combination ensues with formation of an insoluble salt. (Lassaigne, *Ann. Ch. et Phys.*, 1832, (2.) **51.** 117.) Not decomposed by boiling sulphuric or nitric acids, but gradually dissolves in boiling concentrated chlorhydric acid, the solution containing nothing but protochloride. (Berzelius, *Lehrb.*) Soluble in boiling aqua-regia with formation of bichloride; if air be present, chlorhydric acid also converts it into bichloride. (Gm.)

β.) *brown modif.* Insoluble in water. Very easily soluble in chlorhydric acid, being much more easily soluble than the green modification. (Magnus.) Soluble in an aqueous solution of bichloride of platinum. (H. Rose, *Tr.*)

II.) *basic.* *Vid.* OxyChloride of Platinum.

***Bi*Chloride of Platinum.** Hygroscopic.
$PtCl_2 \,\&\, + 8Aq$ Soluble in water, with evolution of heat. (Dumas, *Tr.*) Soluble in water; also in alcohol, with gradual decomposition. Readily soluble in ether, the solution undergoing decomposition when exposed to daylight. (Gehlen.) Soluble in a mixture of 2 pts. of alcohol and 1 pt. ether, but is liable to be reduced to a slight extent, when treated therewith, a small quantity of protochloride of platinum being formed. (Reiset, *Ann. Ch. et Phys.*, (3.) **5.** 476.) When dry it is quickly and abundantly soluble in anhydrous acetone, with subsequent decomposition. (Zeise, *Ann. Ch. u. Pharm.*, 1840, **33.** 34.) Insoluble in concentrated sulphuric acid. (Dumas, *Tr.*)

***Proto*Chloride of Platinum & of *X*.** *Vid.* ChloroPlatinite of *X*.

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***Bi*Chloride of Platinum & of *X*.** *Vid.* ChloroPlatinate of *X*.

***Bi*Chloride of Platinum with Cyanide of Ethyl.** $C_6H_5N; PtCl_2$ Instantly decomposed by water and by alcohol. It cannot be recrystallized from ether. (Henke.)

***Bi*Chloride of Platinum with Glycocoll.** $C_4H_5NO_3, PtCl_2 + 2Aq$ Soluble in water. Only sparingly soluble in alcohol. (Horsford.)

***Proto*Chloride of Platinum with *prot*Iodide of Platinum.** Insoluble in water. Slightly soluble in alcohol. Soluble in a solution of caustic potash, from which it is precipitated, unchanged, by sulphuric acid. (Mather.)

***Bi*Chloride of Platinum with Lophin.** $4C_{42}H_{17}N_2; 3PtCl_2$ Ppt.

***Proto*Chloride of Platinum with Methylamin.** *Vid.* Chlorhydrate of *di*MethylPlatin(*ous*)*bi*amin.

***Bi*Chloride of Platinum with Nitric Oxide.** Deliquescent. Decomposed by water. (Rogers & Boyé.)

***Bi*Chloride of Platinum with Odmyl, &c.** $C_8H_8S_2, PtCl_2; C_8H_8S_2, PtS$ Ppt. (Anderson.)

***Bi*Chloride of Platinum with *tri*Phenylamin.** $C_{36}H_{15}N, PtCl_2$ (?) Ppt. in alcohol.

Chloride of Platinum with Picolin. Soluble in boiling, much less soluble in cold water. (Unverdorben.)

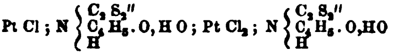
***Proto*Chloride of Platinum with Strychnine.** Difficultly soluble in water. (Abel & Nicholson, *J. Ch. Soc.*, **2.** 262.)

***Bi*Chloride of Platinum with Sulphide of Ethyl.** $C_8H_{10}S_2; PtCl_2$ Very soluble in boiling, less soluble in cold alcohol. Water precipitates it from the alcoholic solution. (Loir, *Ann. Ch. et Phys.*, (3.) **39.** 446.)

***Bi*Chloride of Platinum with Sulphide of Methyl.** $C_4H_6S_2; PtCl_2$ Soluble in boiling, less soluble in cold alcohol. (Loir, *Ann. Ch. et Phys.*, (3.) **39.** 450.)

***Bi*Chloride of Platinum with Xanthamylamid.** Insoluble, or but sparingly soluble, in water. Easily soluble in alcohol.

***Proto*- and *bi*Chloride of Platinum with Xanthogenamid** (*Hydrate of SulphoCarbonylEthylammonium*).



$$PtCl; N\left\{\begin{matrix}C_2S_2''\\C_4H_5\\H\end{matrix}\right..O, HO; PtCl_2; N\left\{\begin{matrix}C_2S_2''\\C_4H_5\\H\end{matrix}\right..O, HO$$

Insoluble in water, alcohol, or ether. Unacted upon by potash, or by nitric or chlorhydric acids. Slightly attacked by warm concentrated sulphuric acid. Easily soluble in aqua-regia. (Debus.)

***Bi*Chloride of Platinum*tri*Phenylammonium.**

$$N\left\{\begin{matrix}(C_{12}H_5)_3\\Pt\end{matrix}\right.Cl_2$$

Permanent. Readily soluble in water and in hydrated alcohol. (Gœssmann, *Ann. Ch. u. Pharm.*, **100.** 63.)

Chloride of Platinum Pyridin. *Vid. Bi*Chlorhydrate of PlatinoPyridin.

Chloride of Platosammonium. *Vid.* Chloride of Platin(*ous*)ammonium.

Chloride of *di*Plumbic*tri*Ethyl. $Pb_2(C_4H_5)_3, Cl$ Insoluble in water. Soluble in alcohol, and ether. (Buckton.)

Chloride of Potassium. KCl Permanent. Soluble in water, with reduction of temperature. Soluble in 3.016 pts. of water at 15°. (Gerlach's determination, see his table of sp. grs., below.) Soluble in 3.03 pts. of water at 17.5°; or, 100 pts. of water at 17.5° dissolve 33 pts. of it; or, the aqueous solution saturated at 17.5° contains 24.8% of it and is of 1.1729 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.)

100 pts. of water at °C.	Dissolve pts. of K Cl.
0°	29.21
19.35°	34.53
52.39°	43.59
79.58°	50.93
109.60°	59.26

(Gay-Lussac, *Ann. Ch. et Phys.*, (2.) **11.** 308.)

The equation of the curve of the solubility of chloride of potassium is $y = 0.2738\ x° + 29.23$. (Gay-Lussac, *loc. cit.*, (2.) **11.** 309.) 100 pts. of water dissolve parts of the salt $29.23 + 0.2738\ T°$. (H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 261.)

By direct experiment Kopp found that 100 pts. of water dissolved of the salt

at 11.8° 34.6 pts.; by the formula this would be 32.5
" 13.8° 34.9 " " " " " 33.0
" 15.6° 35 " " " " " 33.5

In other words, 1 pt. of the salt is soluble in 2.89 pts. of water at 11.8°; in 2.87 pts. at 13.8°; and in 2.85 pts. at 15.6°. (Kopp.) The boiling-point of the saturated aqueous solution is 110° (Kremers, *Pogg. Ann.*, **99.** 43); 108.3°, and the solution contains 59.4% of the salt. (Berzelius, *Lehrb.* **3.** 93.) The solution saturated at 17.5° contains 24.95% of the salt; or, 100 pts. of water dissolve 33.24 pts. of the salt at 17.5°; or, 1 pt. of the salt is soluble in 3.008 pts. of water at 17.5°. The sp. gr. of this solution = 1.1635. (Karsten, *Berlin Abhandl.*, 1840, p. 101.) 100 pts. of water at 12° dissolve 32 pts. of it, and at 100° 59.4 pts. (Ot. Gr.) Soluble in 3 pts. of water at a moderate temperature, and in 2 pts. of boiling water (Bergman, *Essays*, **1.** 179); in 3.33 pts. of water, either hot or cold (Fourcroy); in 3 pts. of water at 15°; and in 1.68 pts. at 110°. The solution saturated at 15° contains 25% of it, and the solution saturated at 110° contains 37.2%. (M. R. & P.) Soluble in 3.5 pts. of water at 0°, and in less than 1 pt. of hot water. (Schubarth, *Tech. Chem.*) 100 pts. of water at 15.5° dissolve 30.7 – 33.0 pts. of it. (Ure's *Dict.*) The aqueous solution saturated at 15° is of 1.180949 sp. gr., and contains dissolved in every 100 pts. of water, at least 35.405 pts. of the salt. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.)

The aqueous solution saturated at any temperature contains 25% of it (Fourcroy); at 12.5°, 30.5% of it. (Hassenfratz, *Ann. de Chim.*, **28.** 291.)

An aqueous solution of sp. gr., at 15° (sp. gr. of water at 15° = 1)	Contains per cent of K Cl.	An aqueous solution of sp. gr., at 15° (sp. gr. of water at 15° = 1)	Contains per cent of K Cl.
1.00650 . .	1	1.09345 . .	14
1.01300	2	1.10036	15
1.01950	3	1.10750	16
1.02600	4	1.11465	17
1.03250	5	1.12179	18
1.03916	6	1.12894	19
1.04582	7	1.13608	20
1.05248	8	1.14348	21
1.05914	9	1.15088	22
1.06580	10	1.15828	23
1.07271	11	1.16568	24
1.07962	12	1.17234 . .	24.9*
1.08654 . .	13		

(Gerlach, *Sp. Gew. der Salzlæsungen*, Freiberg, 1859, pp. 9, 10.)

* Mother liquor.

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An aqueous solution of sp. gr. (at 17.5°)	Contains (by experiment) per cent of K Cl.
1.0170	2.75
1.0360	5.50
1.0529	8.25
1.0730	11.00
1.1115	16.50
1.1729	24.75

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 340.) From these results Schiff calculates the following table by means of the formula, $D = 1 + 0.006217 p + 0.00003574 p^2 - 0.00000018 p^3$; in which D = the sp. gr. of the solution, and p the percentage of substance in the solution.

An aqueous solution of sp. gr. (at 17.5°)	Contains per cent of K Cl.	An aqueous solution of sp. gr. (at 17.5°)	Contains per cent of K Cl.
1.0062	1	1.0866	13
1.0125	2	1.0937	14
1.0189	3	1.1008	15
1.0254	4	1.1080	16
1.0319	5	1.1152	17
1.0385	6	1.1225	18
1.0451	7	1.1298	19
1.0518	8	1.1372	20
1.0586	9	1.1446	21
1.0655	10	1.1521	22
1.0725	11	1.1597	23
1.0795	12	1.1673	24

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 76; compare **113.** 184.)

An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of K Cl.	An aqueous solution of sp. gr. (at 12.5)	Contains per cent of K Cl.
1.0047	1	1.0612	12
1.0095	2	1.0701	14
1.0143	3	1.0801	16
1.0192	4	1.0901	18
1.0240	5	1.1000	20
1.0288	6	1.1090	22
1.0338	7	1:1178	24
1.0388	8	1.1264	26
1.0438	9	1.1344	28
1.0490	10	1.1420	30

(Hassenfratz, *Ann. de Chim.*, **28.** 298.)

An aqueous solution of sp. gr., at 19.5° (sp. gr. of water at 19.5° = 1)	Contains	
	Per cent of K Cl	Pts. of K Cl dissolved in 100 pts. of water.
1.0382	5.979	6.36
1.0733	11.269	12.70
1.1075	16.269	19.43
1.1436	21.309	27.08
1.1720	25.133	33.57

(Kremers, *Pogg. Ann.*, **95.** 119; the second column from Gerlach's *Sp. Gew. der Salzlœsungen*, p. 33.)

In a solution containing for 100 pts. of water, pts. of anhydrous K Cl	The point of ebullition is elevated.	Difference.
0.0	0.0°	
4.7	0.5	4.7
9.0	1.0	4.3
13.2	1.5	4.2
17.1	2.0	3.9
20 9	2.5	3.8
24.5	3.0	3.6
28.0	3.5	3.5
31.4	4.0	3.4
34.6	4.5	3.2
37.8	5.0	3.2
41.0	5.5	3.2
44.2	6.0	3.2
47.4	6.5	3.2
50.5	7.0	3.1
53.7	7.5	3.2
56.9	8.0	3.2
59.4	8.3	

The point of ebullition of pure water, observed in a glass tube containing bits of metallic zinc, having been 100.25°. (Legrand, *Ann. Ch. et Phys.*, 1835, (2.) **59.** 432.) An aqueous solution containing 10% of K Cl boils at 101.1°; one of 20% boils at 103.4°. (Gerlach's *Sp. Gew. der Salzlœsungen*, p. 94.) Scarcely at all soluble in absolute alcohol. Somewhat difficutly soluble in spirit. (Fresenius, *Quant.*, p. 120.)

100 pts. of

alcohol of	0.900	sp. gr.	dissolve	4.62	pts. of it.
"	0.872	"	"	1.66	".
"	0.834	"	"	0.38	"
"	0.817	"	"	0.00	"

(Kirwan, *On Mineral Waters*, p. 274 [T.].)

A solution (saturated at 15°) in alcohol of		Contains per cent of K Cl.
Sp. gr.	Per cent by weight	
1.000	0	24.6
	8.5	20.4
0.986	10	19.8
	17.4	16.0
0.972	20	14.7
0.958	30	10.7
0.939	40	7.7
0 917	50	5.0
0.895	60	2.8
0.847	80	0.45

(H. Schiff, *Ann. Ch. u. Pharm.*, 1861, **118.** pp. 365, 366.)

Soluble in 48 pts. of boiling alcohol. (Wenzel, in his *Verwandtschaft*, p. 300 [T.].) Insoluble in absolute alcohol containing chloride of lithium. (Mitscherlich, *Lehrb.*, **2.** 85.) A solution in wood-spirit, of 40% (by weight), saturated at 15°, contains 9.2% of it. (H. Schiff, *Ann. Ch. u. Pharm.*, 1861, **118.** 365.) Very sparingly soluble in a mixture of equal parts of absolute alcohol and ether. (Berzelius; Rammelsberg.) Ether precipitates it from the alcoholic solution. (Dœbereiner.) Almost absolutely insoluble in a mixture of equal pts. of anhydrous alcohol and ether; 500 milligrs. of K Cl treated with 10 grms. of such a solution yielded only $\frac{8}{10}$ of a millegramme to the liquid. (J. Lawrence Smith, *Am. J. Sci.*, (2.) **16.** 56.) Soluble in glycerin. (Pelouze.) Insoluble in bisulphide of carbon. (Bæyer.) Much less soluble in very dilute chlorhydric acid than in water. (Fresenius, *Quant.*, p. 120.) When pieces of chloride of ammonium are added to a saturated aqueous solution of chloride of potassium they are dissolved, while a portion of the latter is precipitated. When the reaction has ceased, the solution, at 18.75°, contains 31.616% of mixed salt. Or, 100 pts. of water have dissolved 45.91 pts. of mixed salt. A solution identical with this may be obtained when a mixture of K Cl and NH_4 Cl is treated with water. By experiment 100 pts. of water dissolved 46.1 pts. mixed salt, viz. 16.27 pts. K Cl and 29.83 pts. NH_4 Cl. (Karsten, *Berlin Abhandl.*, 1840, p. 109.) When chloride of sodium is added to a saturated solution of chloride of potassium it dissolves, while K Cl is precipitated, until the amount of the two salts in solution have reached a certain definite equilibrium. (Karsten, *loc. cit.*, p. 109.) Chloride of potassium dissolves in a saturated solution of chloride of ammonium plus chloride of sodium, while portions of both these salts separate out. (Karsten, *loc. cit.*, p. 132.) When chloride of barium is added to a solution of chloride of potassium it dissolves without precipitating K Cl at first, but after a time K Cl begins to fall, and this continues until a certain definite amount of Ba Cl has been dissolved. The mixed solution thus obtained is identical with

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that prepared by treating a mixture of the two salts with water. (Karsten, *Berlin Abhandl.*, 1840, p. 110.) For the solubility of chloride of potassium when mixed with chloride of barium, see the last-named salt. Chloride of potassium is soluble in a saturated solution of nitrate of potash, the latter being meanwhile precipitated until a certain definite limit is attained, when the reaction ceases. A solution of sp. gr. identical with the above is obtained when a mixture of the two salts is treated with water. [See Nitrate of Potash.] (Karsten, *Berlin Abhandl.*, 1840, p. 113.) It is soluble in a saturated solution of nitrate of soda without causing any precipitation; it is also soluble in a saturated solution of nitrate of baryta. (Karsten.) Soluble in a saturated solution of sulphate of potash, with precipitation of the latter. The solution thus obtained, at 18.75°, contains 25.86% of mixed salt. Or, 100 pts of water dissolve 34.87 pts. of mixed salt, viz. 33.12 pts. of KCl and 1.75 pts. of KO, SO_3. A solution identical with the above is obtained when a mixture of the two salts is treated with water. (Karsten, *Berlin Abhandl.*, 1840, p. 112.) When a mixture of chloride of potassium and sulphate of potash is treated with water at 14.8°, 100 pts. of the water dissolve 30.2 pts. of the mixed salts, of which 2.0 pts. are sulphate of potash. At 15.8°, 30.2 pts. of the mixed salts are dissolved, of which 2.3 pts. are sulphate of potash; at 16.1°, 30.4 pts. of the mixed salts, of which 3.3 pts. are sulphate of potash. At these temperatures the solubility of pure KCl is from 33.3 to 33.6, the mean being 33.5; that of KO, SO_3 is from 10.9 to 11.2, the mean being 11.1.

$$\text{Found} \begin{cases} 30.2 = 28.2 + 2.0 \\ 30.2 = 27.9 + 2.3 \\ 30.4 = 27.1 + 3.3 \end{cases}$$

$$\text{Calcul.} \left.\begin{matrix} 33.5 \\ 11.1 \end{matrix}\right\} 44.6 : 33.5 : 11.1 = 30.3 : 22.8 : 7.5$$

(H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 264.)

For the solubility of mixed chloride of potassium and nitrate of potash see the last-named salt. Soluble in a saturated solution of sulphate of soda with formation of sulphate of potash; also soluble in a saturated solution of nitrate of ammonia, with formation of chloride of ammonium and nitrate of potash, which separate. In a saturated solution of sulphate of magnesia it is converted into sulphate of potash. (Karsten, *loc. cit.*, p. 130.) When one equivalent of KCl, in aqueous solution, is mixed with a solution of an equivalent of sulphate of zinc (ZnO, SO_3), 0.84 of it are decomposed to sulphate of potash, which may be precipitated by adding alcohol, while 0.16 of it remain unchanged; when mixed with a solution of an equivalent of sulphate of manganese (MnO, SO_3), 0.58 of it are decomposed as before, while 0.42 of it remain unchanged; when mixed with a solution of an equivalent of sulphate of magnesia (MgO, SO_3), 0.56 of it are decomposed, while 0.44 of it remain unchanged. (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.)

Chloride of Potassium & of Rhodium.

I.) $2KCl; Rh_2Cl_3 + 2Aq$ Permanent. Rather difficultly soluble in water. (Claus, *Beiträge*, p. 72.) More soluble than chloroplatinate of potassium in an aqueous solution of chloride of potassium. (Berzelius.) Insoluble, or but sparingly soluble, in alcohol. (Berzelius.) Insoluble in a strong cold aqueous solution of chloride of potassium. (W. Gibbs, *Am. J. Sci.*, (2.) **31.** 70.)

II.) $3KCl; Rh_2Cl_3 + 6Aq$ Efflorescent. Considerably more difficultly soluble than the other salts [of the formula $3MCl; Rh_2Cl_3$?]. After standing for some time, or on boiling, the aqueous solution changes color, and appears to be changed to No. 1. (Claus, *Beiträge*, p. 72.)

Chloride of Potassium & *sesquichloride* of Ruthenium.
$2KCl; Ru_2Cl_3$ Somewhat sparingly soluble in cold, more readily soluble in boiling water. Insoluble in alcohol of 80%; it is, nevertheless, only partially precipitated from the aqueous solution by means of alcohol. Soluble in alcohol when in presence of soluble metallic chlorides. Nearly insoluble in a concentrated aqueous solution of chloride of ammonium.

The neutral aqueous solution decomposes very readily on standing, and especially when heated. (Claus.)

Chloride of Potassium & of Silver. Decomposed by water, with separation of chloride of silver. Soluble in an aqueous solution of chloride of potassium.
$KCl; AgCl$

Chloride of Potassium & of Tellurium. Deliquescent. Decomposed by water, and by absolute alcohol. (Berzelius.)

Chloride of Potassium & of Thorium.
$KCl; ThCl$ Deliquescent. Very soluble in water. Easily soluble in alcohol.

Chloride of Potassium & *protochloride* of Tin.
$2KCl; SnCl + 3Aq$ Soluble in water.

Chloride of Potassium & *bichloride* of Tin.
$KCl; SnCl_2$ Permanent.

Chloride of Potassium & *basic sesquichloride* of Uranium.
$3KCl; 2Ur_2O_3, UrCl_3 + 6Aq$, or "$(KCl, (Ur_2O_2)Cl + 2Aq)$" Easily soluble in water, and alcohol. (Arfvedson.) Extremely soluble in water, but with decomposition and separation of KCl, unless the water is acidulated with chorhydric acid. (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** 37.)

Chloride of Potassium & of Yttrium.
$KCl; YrCl$ Soluble in water, with evolution of heat.

Chloride of Potassium & of Zinc.
$KCl; ZnCl + Aq$ More deliquescent than the corresponding ammonium compound. Soluble in water. (Schindler.) Very deliquescent. Soluble in 1 pt. of water at ordinary temperatures. Apparently soluble in all proportions in boiling water. (Pierre, *Ann. Ch. et Phys.*, (3.) **16.** 248.)

Chloride of Potassium with Chromic Acid. *Vid.* Chromate of Chloride of Potassium.

Chloride of Potassium with Cyanide of Mercury.
$KCl; 2HgCy + Aq$ Soluble in 6.75 pts. of water at 18°. (Brett.) Soluble in alcohol. (Desfosses.)

Chloride of Potassium with *bi*Cyanide of Platinum.
$KCl; PtCy_2 + 2Aq$ Efflorescent. Easily soluble in water, and alcohol. (Knop & Schnedermann.)

Chloride of Potassium with Glycocoll.
$C_4H_4NO_3; KCl$ Readily deliquescent. Soluble in water. (Horsford.)

Chloride of Potassium with Iodate of Potash.
$KCl; KO, 2IO_5 + Aq$ Efflorescent. Soluble in 19 [18 @ 20 in Berzelius's *Lehrb.*] pts. of water at 15°. The aqueous solution is decomposed when evaporated by heating. (Sérullas.) Cold alcohol decomposes it, dissolving out the iodate. (Filhol.)

Chloride of Potassium with Sulphite of

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$3KCl; IrO, 2SO_2$ Iridium. Very soluble in water. (Claus.)

Chloride of Potassium with *bi*Sulphite of Osmium. $3KCl; OsO, 2SO_2$ Very soluble in water. (Claus.)

Chloride of Potassium with Sulphuric Acid(*anhydrous*). $KCl; XSO_3$ Instantly decomposed by moisture.

Chloride of Propyl. (*Chloride of Trityl. Propyl-Chlorhydric Ether.*) C_6H_7Cl Insoluble in water. (Berthelot, *Ann. Ch. et Phys.*, (3.) **43.** 405.)

Chloride of Propylene. C_6H_6'', Cl_2 Insoluble, or very sparingly soluble, in water.

Chloride of Pteleyl. *Vid.* *Ter*Chloro-Mesitylene.

Chloride of PurpureoCobalt. (*Chlorhydrate de Roséo-Cobaltiaque*(of Fremy).) $5NH_3 . Co_2, Cl_3$ Sparingly soluble in cold water, 1 pt. of it being soluble in 244 pts. of water at 15.5°; it is slightly decomposed, however, by cold water, and completely on boiling the aqueous solution, but this decomposition may be prevented by keeping the solution slightly acid with chlorhydric acid. Crystallizes on cooling the boiling solution in water acidulated with a few drops of chlorhydric acid. Completely precipitated from the aqueous solution on the addition of alcohol, chlorhydric acid, or saturated aqueous solutions of the chlorides of ammonium and sodium. The salt is not decomposed by boiling chlorhydric acid. (Claudet, *Phil. Mag.*, (4.) **2.** pp. 253, 254.) Nearly insoluble in cold water; but is soluble, without decomposition, in boiling water to which a few drops of chlorhydric acid have been added. From this solution it crystallizes on cooling. A neutral aqueous solution is readily decomposed by boiling, but it may be boiled for a very long time with concentrated chlorhydric acid, without decomposition. Chlorhydric acid and the alkaline chlorides precipitate it from its solutions almost completely, slowly in the cold, but instantly on boiling. Insoluble in alcohol. (Gibbs & Genth, *Smithson. Contrib.*, Vol. **9.** pp. 22 – 27 of the memoir.) Scarcely at all soluble in cold water. Entirely insoluble in water acidulated with chlorhydric acid, or containing chloride of ammonium. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 302.) Less soluble than chloride of luteo-cobalt in water acidulated with chlorhydric acid. (Rogojski, *Ann. Ch. et Phys.*, (3.) **41.** 447.)

Chloride of PyroCitryl. *Vid.* Chloride of Citraconyl.

Chloride of PyroMucyl. $C_{10}H_3O_4, Cl$ Decomposed by water.

*Proto*Chloride of Rhodium. $RhCl$ Insoluble in water, or in chlorhydric or nitric acids. Unacted on by boiling solutions of caustic potash or carbonate of potash. (Fellenberg.) Insoluble in water or chlorhydric acid. Unacted upon in the cold, but is decomposed by boiling potash. (Berzelius.) Claus (*Beiträge*, p. 64) denies the existence of the compound (2 Rh Cl; Rh_2Cl_3) mentioned by Berzelius.

*Sesqui*Chloride of Rhodium. Rh_2Cl_3 Unacted upon by boiling acids like concentrated chlorhydric acid or aqua-regia. When boiled for a long time with concentrated potash-lye it swells up, and is then slightly soluble in strong boiling chlorhydric acid. (Claus, *Beiträge*, p. 64.) Deliquescent. Soluble in water, alcohol, and chlorhydric acid. (Berzelius; Wollaston.)

Chloride of Rhodium & of Silver.

I.) $2AgCl; Rh_2Cl_3$ } Insoluble in water. (Claus,
II.) $3AgCl; Rh_2Cl_3$ } *Beiträge*, pp. 73, 23.)

*Proto*Chloride of Rhodium & of Sodium. Soluble in water. (Fremy, *Ann. Ch. et Phys.*, (3.) **44.** 396.)

*Sesqui*Chloride of Rhodium & of Sodium. (*ChloroRhodiate of Sodium.*) $3NaCl; Rh_2Cl_3 + 24$ (not 18) Aq Exceedingly efflorescent. Easily soluble in water. Melts in its water of crystallization at 50°. Completely insoluble in spirit. But when mixed with a large quantity of metallic chlorides soluble in spirit a portion of it also dissolves. (Claus, *Beiträge*, pp. 70, 62.) Soluble in 1.5 pts. of water. (Wollaston.)

Chloride of RoseoCobalt. $5NH_3 . Co_2, Cl_3 + 2Aq$ Soluble in cold water, the solution being easily decomposed when heated. Nearly insoluble in strong chlorhydric acid. (Gibbs & Genth, *Smithson. Contrib.*, Vol. **9.**)

"Chloride of RoseoCobalt" (of Fremy). *Vid.* Chloride of PurpureoCobalt.

*Proto*Chloride of Ruthenium. $RuCl$ Insoluble in water, and in acids. Only slightly acted upon by a solution of caustic potash. (Claus.)

*Sesqui*Chloride of Ruthenium. Ru_2Cl_3 Deliquescent. Soluble in water and in alcohol. (Claus.)

*Bi*Chloride of Ruthenium. $RuCl_2$

*Sesqui*Chloride of Ruthenium & of Sodium. Deliquescent. Easily soluble in alcohol.

Chloride of Salicyl. $C_{14}H_5O_4, Cl$ Decomposed by water, alcohol, and wood-spirit. (Gerhardt.)

Chloride of SelenEthyl. C_4H_5Se, Cl Sparingly soluble in water; somewhat more soluble in chlorhydric acid. Soluble in ammonia-water. (Joy.)

*Di*Chloride of Selenium. Se_2Cl Slowly decomposed by cold water. (Berzelius.) Slowly decomposed by cold, instantly by hot water. (Sacc, *Ann. Ch. et Phys.*, (3.) **22.** 124.)

*Bi*Chloride of Selenium. $SeCl_2$ Soluble in water, with evolution of heat and decomposition. (Berzelius.)

*Ter*Chloride of Silicon. $SiCl_3$ Decomposed by water, being dissolved for the most part if an excess of water be present; but when mixed with an equal volume of water the liquid becomes gelatinous from the silica which separates. (Berzelius, *Lehrb.*, **1.** 326.)

Chloride of Silver. $AgCl$ As good as insoluble in water. When chloride of silver is left for some hours in contact with pure water at 20° @ 22°, and especially if the temperature be elevated to 75°, traces of it go into solution; more chlorine than silver, however, is thus dissolved, consequently the solvent action of the water must depend, in part, at least, upon a decomposition of the chloride of silver. (Mulder, *Die Silber-Probirmethode*, p. 74.) When 1 pt. of silver is precipitated as chloride of silver in presence of 1000000 pts. of water a slight bluish milkiness may still be observed; but in order to have a distinctive characteristic precipitate with this amount of water 4 pts. of silver should be present.

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Dilute nitric acid does not increase the solubility of chloride of silver in the least, but in stronger nitric acid chloride of silver is not absolutely insoluble: thus, if a solution of $\frac{1}{20}$ milligr. silver be mixed with 50cc. of nitric acid of 1.2 sp. gr., and enough solution of chloride of sodium to neutralize the nitrate of silver be added, the precipitate which forms at first will disappear, but the addition now of a trace either of chloride of sodium or of nitrate of silver to this solution will occasion the formation of a persistent precipitate. (Mulder, *Die Silber-Probirmethode*, p. 24.) 1 pt. of nitrate of silver causes an opalescence when mixed with chlorhydric acid, even in presence of 120000 pts. of water (Pfaff); even in presence of 240000 pts. of water. (Harting.) 1 pt. of silver gives a slight turbidity with chlorhydric acid in presence of 200000 pts. of water; a scarcely opalescent cloudiness in presence of 400000 pts. of water, and the same after the lapse of 15 minutes in presence of 800000 pts. of water. (Lassaigne.) Soluble in 3072 pts. of water (Monnet); or 100 pts. of water dissolve 0.0333 pt. of it. Insoluble, or very nearly insoluble, in most of the acids, with the exception of concentrated chlorhydric acid, from which it is almost completely precipitated on the addition of water.

Soluble in 200 pts. of strong chlorhydric acid; and in 600 pts. of the same chlorhydric acid diluted with twice its weight of water. (Pierre, *N. J. Pharm.*, **12.** 237, in *Gmelin's Handbook*, **6.** 428.) Tolerably dilute chlorhydric acid can dissolve chloride of silver: thus, a solution of 1 pt. of nitrate of silver in 15000 pts. of water becomes turbid when chlorhydric acid is added to it, but the addition of more acid renders the solution clear again. (Reinsch.) Chloride of silver is more or less soluble in dilute chlorhydric acid. If this acid is added to water in which the precipitate of $\frac{1}{1000000}$ pt. silver is suspended, as Ag Cl, the milkiness disappears completely. The solubility of chloride of silver in chlorhydric acid increases with elevation of temperature, the chloride of silver separating out again as the solution cools. (Mulder, *op. cit.*, p. 25.) Sparingly soluble in a hot alcoholic solution of chlorhydric acid, from which it separates in part on cooling. (Erdmann.) Sparingly soluble in concentrated bromhydric acid. (Lœwig.) Insoluble in nitric acid. (Wackenroder.) Entirely unacted upon by boiling nitric acid of 1.43 sp. gr. (H. Wurtz, *Am. J. Sci.*, (2.) **25.** 382.) As has been previously stated, the solubility of chloride of silver in dilute nitric acid may be admitted to be the same as its solubility in water; $\frac{1}{2000000}$ pt. of silver cannot be detected in the presence of either by precipitating it as chloride of silver; but $\frac{1}{1000000}$ pt. can be detected in both cases. (Mulder, *op. cit.*, p. 25.) 1 pt. of silver, in the form of chloride of silver, dissolves at 25° in 83000 pts. of water containing free nitric acid and 0.33 pt. of chlorhydric acid. (Mulder, *op. cit.*, p. 87.) Insoluble in cold concentrated sulphuric acid; but on boiling, the acid decomposes a portion of it while another portion dissolves; this does not separate again on cooling.

In dilute sulphuric acid chloride of silver is no more soluble than in dilute nitric acid. (Mulder, *op. cit.*, p. 26.) Unacted upon by cold sulphurous acid, but slight decomposition ensues when the acid is heated. (A. Vogel.) Perceptibly soluble in a warm solution, less soluble in a cold solution, of tartaric acid. (Mulder, *op. cit.*, p. 26.) Chloride of silver is soluble in solutions of all the metallic chlorides which are soluble in water: — thus, aqueous solutions of the chlorides of sodium, potassium, calcium, strontium, and barium all dissolve it, especially when they are hot; chloride of magnesium, and ammonium, and protochloride of mercury, also dissolve some chloride of silver, the Hg Cl dissolving the least of it. (Mulder, *op. cit.*, p. 27.) Horn silver [i. e., fused chloride of silver ?] is insoluble in an aqueous solution of chloride of sodium. (J. Davy, *Phil. Trans.*, 1822, p. 365.) Readily soluble, when recently precipitated, in a hot aqueous solution of chloride of ammonium, and from this solution it is not precipitated by chlorhydric acid. A solution of nitrate of ammonia is a very imperfect solvent of it. (Brett, *Phil. Mag*, 1837, (3.) **10.** pp. 97, 98.) Insoluble in solutions of the ammoniacal salts, excepting chloride of ammonium. (Wittstein.) Sparingly soluble in strong aqueous solutions of chloride of potassium, chloride of sodium, and a few other metallic chlorides.

Soluble in a strong solution of chloride of calcium. (Wetzlar.) Soluble in an aqueous solution of chloride of roseocobalt. (Gibbs & Genth, *Smith. Contrib.*, vol. 9.) It is also soluble in aqueous solutions of the nitrates of soda, potash, lime, magnesia, and ammonia; — at the ordinary temperature this solubility is not considerable, but increases so much by heat, that hot solutions, which are perfectly clear, become strongly clouded as they cool, owing to separation of the chloride of silver. (Mulder, *op. cit.*, p. 28.) [I have had frequent occasion to observe the truth of this last remark, at least as far as regards solutions of nitrate of ammonia. F. H. S.] It is more soluble in a solution of nitrate of soda in proportion as the amount of this salt increases; it is also more readily soluble as the relative quantity of water is increased, thus: at a temperature of 15° @ 20°,

There are dissolved milligrs. of Ag Cl	In Na O, N O_5, grammes.	and H O, cc.
1.33	0.787	100
1.93	0.787	200
3.99	2.361	300
2.53	2.787	100

At higher temperatures it is more soluble. (Mulder, *op. cit.*, pp. 49 to 53.)

There are dissolved milligrs. of Ag Cl	In Na O, N O_5, grammes.	and H O, cc.	at temp. of
0.86	0.787	100	5°
1.33	0.787	100	15° – 17°
1.46	0.787	100	18°
2.33	0.787	100	30°
3.99	0.787	100	45° – 55°

(Mulder, *op. cit.*, pp. 56 – 58.)

At 25°, 100000 pts. of water containing a little free nitric acid and 0.787 grm. of Na O, N O_5, dissolve 2.128 milligrs. of Ag Cl. If, the other conditions remaining the same, 2 grammes of Na O, N O_5 be added to the above, then 2.526 milligrs. (or $\frac{1}{6}$ more) Ag Cl will dissolve. (Mulder, *op. cit.*, p. 71.) 1 pt. of silver in 200000 pts. of water containing 0.79 pt. of nitrate of soda can be readily detected by means of chloride of sodium at the ordinary temperature; but at 75° the precipitate dissolves, separating out again, however, as the solution cools; in 200000 pts. of water containing 1574 pts. of nitrate of soda one part of silver can readily be detected by chloride of sodium at the ordinary temperature; but at 75° the precipitate dissolves, and remains in solution after cooling. (Mulder, *op. cit.*, p. 66.) If only a small quantity of nitrate of soda is present less chloride of silver is dissolved in proportion to the weight of the nitrate of soda than when a large quantity of this salt is present. (Mulder, *op. cit.*, p. 68.) An

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aqueous solution of nitrate of protoxide of mercury also dissolves considerable quantities of chloride of silver, but most of the remaining nitrates do not do so. (Mulder, *op. cit.*, p. 28.) Soluble in an aqueous solution of nitrate of protoxide of mercury, from which solution it is easily precipitated by chlorhydric acid and by solutions of chloride of sodium or chloride of ammonium, also with tolerable completeness by an excess of a solution of nitrate of silver, but not by nitric acid. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 317.) When the hot solution of chloride of silver in nitrate of protoxide of mercury is cooled, or diluted with water, crystals of Ag Cl separate out. The Ag Cl is precipitated from this solution on the addition of solutions of the alkaline acetates. (Liebig, *Ann. Ch. u. Pharm.*, **81.** 128.) Soluble to a considerable extent in an aqueous solution of nitrate of protoxide of mercury. (Lœwig.) Much more soluble in hot than in a cold solution of nitrate of protoxide of mercury, and much more soluble in this solution than in a solution of nitrate of ammonia. Chloride of sodium precipitates it from this solution. In presence of acetate of soda or of ammonia this solubility is much less marked. Acetate of soda precipitates it from its solution in nitrate of mercury. (Mulder, *op. cit.*, pp. 195-197.) Imperfectly soluble in an aqueous solution of nitrate of silver. (Wackenroder.) It is not dissolved to an appreciable extent by a solution of nitrate of copper, nor by solutions of the nitrates of iron, manganese, cadmium, cobalt, zinc, or nickel. (Mulder, *op. cit.*, pp. 59-62.) Insoluble, or exceedingly sparingly soluble, in a solution of nitrate of lead. (Mulder, *op. cit.*, p. 178.) Insoluble in a solution of sulphate of soda. (Mulder, *op. cit.*, p. 163.) Very readily soluble in an aqueous solution of cyanide of potassium. (Liebig.) Readily soluble, with decomposition, in an aqueous solution of hyposulphurous acid. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 397.) When recently precipitated, chloride of silver is soluble in aqueous solutions of any of the soluble hyposulphites, and with especial ease in a somewhat concentrated solution of hyposulphite of soda which dissolves it in large quantity, and almost as readily as water dissolves sugar; a solution of hyposulphite of potash, even when very dilute, also readily dissolves it, as does a solution of hyposulphite of strontia. Mutual decomposition occurs, and a solution of intense sweetness is produced; this solution becomes slightly turbid on standing, but the decomposition may be retarded, if not altogether prevented, by dilution. Alcohol precipitates from it a syrup. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** pp. 27, 11, 19, 21, 397.) When recently precipitated, it is soluble in an aqueous solution of arsenite of potash. (Reynoso.) Abundantly soluble in ammonia-water. (Wackenroder.) Easily soluble in ammonia-water, even after it has been fused. (Dumas, *Tr.*) [After having been thoroughly boiled with water and having stood at rest for some time subsequent to its precipitation, it is very difficultly soluble in strong ammonia-water. F. H. S.] As soluble in coniin as in ammonia-water. (Blyth, *J. Ch. Soc.*, **1.** 350.) Soluble in an aqueous solution of methylamin. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 453.) Also soluble in a solution of amylamin, though less so than in ammonia-water. (Wurtz.) Soluble in caprylamin. (Bouis.) Soluble in aqueous solutions of sinamin and thiosinamin. Insoluble in cold dilute solutions of the caustic alkalies, but is decomposed by hot concentrated solutions, especially if it be treated with them before it has become dry. (Gregory.) Decomposed by a solution of carbonate of potash.

Slightly soluble in a cold solution of carbonate of potash. (Wittstein.)

SubCHLORIDE OF SILVER. Chloride of silver which has become violet-colored by exposure to the light is much less soluble than the pure white chloride in an aqueous solution of nitrate of soda.

(*DiChloride of Silver?*)
$Ag_2 Cl$?

Mulder (*op. cit.*, p. 54) does not doubt but that chloride of silver which has been decomposed by light as completely as possible is entirely insoluble in a solution of nitrate of soda.

It is decomposed by ammonia-water, and by boiling chlorhydric acid or solutions of chloride of sodium or chloride of ammonium; all of which extract Ag Cl and leave Ag. (Scheele; Wœhler.) Perfectly soluble in ammonia. (Berthollet.) Unacted upon by nitric acid. (Wetzlar.).

CHLORIDE OF SILVER & OF SODIUM. Soluble in a strong aqueous solution of chloride of sodium. This solution is decomposed by the addition of much water. (Wetzlar.)

CHLORIDE OF SILVER & OF TELLURIUM.

CHLORIDE OF SILVER with CYANIDE OF POTASSIUM. (Liebig.)

CHLORIDE OF SODIUM. Permanent, when pure. Slowly absorbs water from moist air. (Fresenius.) It causes only a slight reduction of temperature while dissolving in water. (Gay-Lussac.)

(*Muriate of Soda. Common Salt.*)
Na Cl

100 pts.	of water	at	—15°	dissolve	32.73	pts.	of it.
"	"	"	—10°	"	33.49	"	"
"	"	"	— 5°	"	34.22	"	"
"	"	"	0°	"	35.52	"	"
"	"	"	+ 5°	"	35.63	"	"
"	"	"	9°	"	35.74	"	"
"	"	"	14°	"	35.87	"	"
"	"	"	25°	"	36.13	"	"
"	"	"	40°	"	36.64	"	"
"	"	"	50°	"	36.98	"	"
"	"	"	60°	"	37.25	"	"
"	"	"	70°	"	37.88	"	"
"	"	"	80°	"	38.22	"	"
"	"	"	90°	"	38.87	"	"
"	"	"	100°	"	39.61	"	"
"	"	"	109.7°	"	40.35	"	"

(Poggiale, *Ann. Ch. et Phys.*, (3.) **8.** 469.)

100 pts. of water at 0° dissolve a little more than [at 13.89°.

"	"	"	13.89°	"	35.81	pts.	of it.
"	"	"	16.90°	"	35.88	"	"
"	"	"	59.93°	"	37.14	"	"
"	"	"	109.73°	"	40.38	"	"

(Gay-Lussac, *Ann. Ch. et Phys.*, (2.) **11.** 310.)

100 pts.	of water	at	12°	dissolve	35.91	pts.	of it.
"	"	"	boiling	"	39.92	"	"

(Fehling, *Ann. Ch. u. Pharm.*, **77.** 382.)

100 pts. of water at 25° dissolve 35.7 pts. of it.
(H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 262.)

100 pts. of water at 18 75° dissolve 36.53 pts. of it.
(C. J. B. Karsten, *Berlin Abhandl.*, 1840, p. 101.)

100 pts.	of water	at	1°	dissolve	36.121	pts.	of it.
"	"	"	18.75°	"	36.724	"	"
"	"	"	100°	"	41.076	"	"

(G. Karsten, *Karsten u. Dechen's Archiv.*, **20.** 48.)

100 pts.	of water	at	1.25°	dissolve	36.119	pts.	of it.
"	"	"	boiling	"	39.324	"	"

(Unger, *J. pr. Chem.*, **8.** pp. 285, 294.)

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100 pts. of water at 18.75° dissolve 37.741 pts. of it.
(Bischof.)

100 pts. of water at 18.75 dissolve 35.40 pts. of it.
“ “ “ 100° “ 36.95 “ “
(“Karsten” [?], cited by Unger, *J. pr. Chem.*, **8.** 285.)

100 pts. of water at 10° @ 15° dissolve 35.42 pts. of it.
(Bergman.)

100 pts. of water at 106°+ dissolve 42.86 pts. of it.
(Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.)

100 pts. water at 15.56° dissolve { 34.2 – 25.9 / 35.42 } pts. of it.
“ “ 100° “ 36.16 pts. of it.
(Ure's *Dict.*, two sets of observations.)

100 pts. of water at 20° dissolve 35.9 pts. of it.
(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.)

100 pts. of cold water dissolve 35.4 pts. of it.
“ boiling “ “ 36.2 “ “
(Berzelius, cited by Unger, *loc. cit.*)

100 pts. of water dissolve 37 pts. of it at all temperatures. (Fuchs & G. Reichenbach, *Kastner's Archiv.*, 1826, **7.** 413.) The aqueous solution saturated at 15° is of 1.207148 sp. gr., and contains dissolved in every 100 pts. of water at least 35.837 pts. of the salt. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.) From Gay-Lussac's experiments, H. Kopp deduces the following formula: — 100 pts. of water dissolve of the salt, parts = 35.48 + 0.024748 $T°$ — 0.00011000 T^2 + 0.0000026555 T^3. By this formula the solubility of the salt would be less at 0° than at ordinary temperatures, though Gay-Lussac thought that he had observed the contrary. By direct experiment Kopp found that 100 pts. of water dissolved of Na Cl, at 25°, 35.8 pts., and 35.6. According to the formula the solubility should be, at this temperature, 36 pts. (H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 262.)

1 pt. of Na Cl is soluble in 2.78 pts. water at 13.89°.
“ “ “ “ 2.70 “ “ 59.93°.
“ “ “ “ 2.48 “ “ 109.73°.
(Gay-Lussac, *Ann. Ch. et Phys.*, (2.) **11.** 310.)

1 pt. of Na Cl is soluble in 2.505 pts. water, at boiling. (Fehling, *Ann. Ch. u. Pharm.*, **77.** 382.)

1 pt. of Na Cl is soluble in 2.8 pts. water at 25°.
(H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 262.)

1 pt. of Na Cl is soluble in 2.738 pts. water at 18.75°.
(C. J. B. Karsten, *Berlin Abhandl.*, 1840, p. 101.)

1 pt. of Na Cl is soluble in 2.7685 pts. water at 1°.
“ “ “ “ 2.7230 “ 18.75°.
“ “ “ “ 2.4345 “ 100°.
(G. Karsten, *Karsten u. Dechen's Archiv.*, **20.** 48.)

1 pt. of Na Cl is soluble in 2.77 pts. water at 1.25°.
“ “ “ “ 2.56 “ “ boiling.
(Unger, *J. pr. Chem.*, **8.** pp. 285, 294.)

1 pt. of Na Cl is soluble in 2.6496 pts. water at 18.75°.
(Bischof.)

1 pt. of Na Cl is soluble in 2.333 pts. water at 106°+
(Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.)

1 pt. of Na Cl is soluble in 2.78 pts. of water at 20°.
(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.)

1 pt. of Na Cl is soluble in 2.789 pts. water at 15°.
(Gerlach's determination, see his table of sp. grs., below.)

1 pt. of Na Cl is soluble in 3 pts. of water at 18.75°.
(Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p 76.)

Soluble in 2 8235 (“ 2$\frac{14}{17}$ ”) pts. of water at a moderate heat.
“ 2.7647 (“ 2$\frac{13}{17}$ ”) “ of boiling water.
(Bergman, *Essays*, **1.** 180.) [The numbers (“soluble in 2.59 pts. of cold water and in 2.77 pts. of hot water”) attributed to Bergman in Gmelin's Handbook, **3.** 112, appear to be erroneous.] Soluble in 2.857 pts. of water, either cold or boiling. (Fourcroy, cited by Hassenfratz, *Ann. de Chim.*, **28.** 290.) When chemically pure, 1 pt. of chloride of sodium is soluble in 2.7 pts. of water, either cold or boiling; or 100 pts. of water dissolve 37 pts. of it; or the saturated aqueous solution contains 27% of it. (Fuchs & G. Reichenbach, *Kastner's Archiv.*, 1826, **7.** 413.) In the cited article, Fuchs specially insists that “pure chloride of sodium requires precisely as much cold as hot water for its solution” (p. 410). But the assertion has been decidedly contradicted by Poggiale (*Ann. Ch. et Phys.*, (3.) **8.** 476), by Fehling (*Ann. Ch. u. Pharm.*, **77.** 382), and by Unger (*J. pr. Chem.*, **8.** 294). It is, moreover, disproved by the experiments of the other observers above cited. Bergman (*Essays*, 1779, **1.** 231) long ago condemned the notion in these terms: “Some moderns contend that more of common salt is taken up by cold than by warm water; but this assertion is contrary to the nature of things and to experience: upon accurate examination, I found the quantities taken up by boiling water, and by water of a moderate heat, to be respectively as 77 to 71.5.” Poggiale (*loc. cit.*) was unable to perceive that the solubility of chloride of sodium is greater at 0° than at 14°, as had been thought to be the case by Gay-Lussac.

The aqueous solution
saturated at 1° contains 26.536% of Na Cl
“ 18.75° “ 26.860% “ “
“ 100° “ 29.116% “ “
(G. Karsten, *Karsten's Archiv.*, **20.** 48.)

G. Karsten has reduced the experiments of several other observers to per cents; thus, according to Unger (*J. pr. Ch.*, **8.** 294), the aqueous solution saturated at 1.25° contains 26.535% Na Cl, and that saturated at the temperature of boiling contains 28.225%; according to C. J. B. Karsten, the solution saturated at 18.75° contains 26.75%; and according to Bischof, 27.40% at the latter temperature; “but as both Unger's, C. J. B. Karsten's, and my own (G. Karsten) results are lower, this is doubtless too high.” According to Gay-Lussac, the solution saturated at from 14° @ 20° contains 26.362% of it; and at 100°, 28.724%. According to Bergman, the solution saturated in the cold contains 26.154%; and the warm saturated solution 26.562%. “But since these determinations are much lower than those of any subsequent observer, it is probable that the solutions were not saturated.” (G. Karsten, *Karsten u. Dechen's Archiv.*, **20.** 48.) The solution saturated at 20° contains 26.4% of Na Cl, and is of 1.2021 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.) That saturated at 10° contains from 27.8% to 30.4% of it (Eller); at 38° (of B.'s thermometer), 23.7% (Bœrhave); in the cold, 22.2% (Fourcroy); at 12.5°, 30.1% (Hassenfratz, *Ann. de Chim.*, **28.** 291); at all temperatures, 27.0% (Fuchs). 100 pts. of a solution saturated at 12° contain 26.423 pts. of Na Cl; 100 pts. of a solution saturated at its boiling-point contain 28.53 pts. of Na Cl. (Fehling, *Ann. Ch. u. Pharm.*, **77.** 382.) 100 pts. of the saturated solution, at its boiling-point (224° F. = 106°+ C.), contain 30 pts. of Na Cl. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.)

Na Cl is not deposited from its boiling aqueous solution, unless the vessel containing it is open to the air. (Unger, *J. pr. Ch.*, 1836, **8.** 293.) Since

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the solubility of chloride of sodium in water is nearly the same for temperatures between 0° and 100°, little or no tendency to form supersaturated solutions is observed at these temperatures, but at temperatures below 0°, and especially below —10°, the phenomenon is well marked. Thus, if a tube in which a saturated solution of salt is boiling be loosely stopped with a pledget of cotton-wool, and after cooling be thrust into a freezing mixture of snow and salt at —19°, it may be left there for some time without any separation of the salt, but when the tube is taken up from the snow and the cotton removed from its orifice, so that fresh air can reach the solution, crystals of hydrated chloride of sodium separate out immediately. The success of this experiment is liable to be impaired by the water condensed on the sides of the tube, which often freezes before the solution of salt has been cooled to the desired point. (Schrœder, *Ann. Ch. u. Pharm.*, 1859, **109.** 46.)

An aqueous solution containing per cent of Na Cl	Boils at °C., according to Bischof.	G. Karsten.	Legrand.
5 per cent	101.50°	101.10°	100.80°
10 "	103.03°	102.38°	101.75°
15 "	104.63°	103.83°	103.00°
20 "	106.26°	105.46°	104.60°
25 "	107.93°	107.27°	106.60°
29.4	107.9° to 108.99°		

(Cited by G. Karsten in *Karsten u. Dechen's Archiv.*, **20.** pp. 45, 49.)

In a solution containing for 100 pts. of water, pts. of anhydrous Na Cl	The point of ebullition is elevated.	Difference.
0.0	0.0°	
4.4	0.5	4.4
7.7	1.0	3.3
10.8	1.5	3.1
13.4	2.0	2.6
15.9	2.5	2.5
18.3	3.0	2.4
20.7	3.5	2.4
23.1	4.0	2.4
25.5	4.5	2.4
27.7	5.0	2.2
29.8	5.5	2.1
31.8	6.0	2.0
33.9	6.5	2.1
35.8	7.0	1.9
37.7	7.5	1.9
39.7	8.0	2.0
41.2	8.4	

The point of ebullition of pure water having been 100.2°, observed in a glass tube containing bits of metallic zinc. (Legrand, *Ann. Ch. et Phys.*, 1835, (2.) **59.** 431.)

An aqueous solution containing per cent of Na Cl	Boils at °C.
5	100.9°
10	101.9°
15	103.3°
20	105.3°
25	107.6°

(Gerlach, *Sp. Gew. der Salzlœsungen*, p. 93.)

An aqueous solution of sp. gr. at 15° (sp. gr. of water at 15° = 1)	Contains per cent of Na Cl.	An aqueous solution of sp. gr. at 15° (sp. gr. of water at 15° = 1)	Contains per cent of Na Cl.
1.00725	1	1.11146	15
1.01450	2	1.11938	16
1.02174	3	1.12730	17
1.02899	4	1.13523	18
1.03624	5	1.14315	19
1.04366	6	1.15107	20
1.05108	7	1.15931	21
1.05851	8	1.16755	22
1.06593	9	1.17580	23
1.07335	10	1.18404	24
1.08097	11	1.19228	25
1.08859	12	1.20098	26
1.09622	13	1.20433	26.395*
1.10384	14		

(Gerlach, *Sp. Gew. der Salzlœsungen*, pp. 8, 9.) (See also a table of the sp. gr. of solutions of Na Cl for each degree of temperature between 0° and 100°. *Ibid.*, p. 118, *et seq.*)

* Mother liquor.

An aqueous solution of sp. gr.	Contains per cent of Na Cl.
1.037	5
1.074	10
1.112	15
1.154	20
1.192	25
1.204	26.43

(Dahlmann, *Liebig & Kopp's Jahresbericht*, 1854, **7.** 323.)

An aqueous solution of sp. gr. (at 20°)	Contains (by experiment) per cent of Na Cl.
1.0201	2.94
1.0402	5.88
1.0617	8.82
1.0847	11.76
1.1299	17.64
1.2021	26.46

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 340.) From these results Schiff calculates the following table by means of the formula, $D = 1 + 0.006533\,p + 0.00005785\,p^2 - 0.0000006073\,p^3$; in which D = the sp. gr. of the solution, and p the percentage of substance in the solution.

An aqueous solution of sp. gr. (at 20°)	Contains per cent of Na Cl.	An aqueous solution of sp. gr. (at 20°)	Contains per cent of Na Cl.
1.0066	1	1.1090	15
1.0133	2	1.1168	16
1.0201	3	1.1247	17
1.0270	4	1.1327	18
1.0340	5	1.1408	19
1.0411	6	1.1490	20
1.0483	7	1.1572	21
1.0556	8	1.1655	22
1.0630	9	1.1738	23
1.0705	10	1.1822	24
1.0781	11	1.1906	25
1.0857	12	1.1990	26
1.0934	13	1.2075	27
1.1012	14		

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 76; compare **113.** 185.)

A solution of sp. gr. (at 12.5°)	Contains per cent of Na Cl.	A solution of sp. gr. (at 12.5°)	Contains per cent of Na Cl.
1.0064	1	1.0775	12
1.0128	2	1.0910	14
1.0192	3	1.1045	16
1.0256	4	1.1182	18
1.0320	5	1.1320	20
1.0384	6	1.1462	22
1.0448	7	1.1608	24
1.0502	8	1.1760	26
1.0576	9	1.1920	28
1.0640	10	1.2100	30

(Hassenfratz, *Ann. de Chim.*, **28.** 298.)

An aqueous solution of sp. gr., at 19.5° (sp. gr. of water at 19.5° = 1)	Contains	
	Per cent of Na Cl.	Pts. of Na Cl dissolved in 100 pts. of water.
1.0460	6.402	6.84
1.0895	12.265	13.98
1.1303	17.533	21.26
1.1712	22.631	29.25
1.2036	26.530	36.11

(Kremers, *Pogg. Ann.*, **95.** 120. The second column is from Gerlach's *Sp. Gew. der Salzlœsungen*, p. 33.) An aqueous solution saturated at 18.75° is of 1.2046 sp gr. (C. J. B. Karsten); a solution saturated at 8° is of 1.205 sp. gr. (Anthon, *Ann. der Pharm.*, 1837, **24.** 210.)

G. Karsten, in his memoir (*Karsten u. Dechen's Archiv.*, Vol. 20) cited above, has published a very elaborate and complete table of the sp. grs. of solutions of salt, to which we would refer the reader who may desire special information upon the subject.

Contrary to the assertion of various authors, chloride of sodium is soluble in alcohol, and seems to be much more so when accompanied by chlorate of soda. (Chenevix, from *Phil. Trans.*, 1802, in *Nicholson's Journ. of Nat. Phil.*, **3.** 185.)

100 pts. of
alcohol of 0.900 sp. gr. dissolve 5.8 pts. of it.
" 0.872 " " 3.67 "
" 0.834 " " 0.5 "

(Kirwan, *On Mineral Waters*, p. 274 [T.].)

100 pts. of alcohol which contains per cent by weight of absolute alcohol	Dissolve at 25° C. pts. of Na Cl.
0.0	35.70
8.4	30.49
16.7	24.84
25.1	19.30
33.4	16.08
41.8	13.28
50.2	11.28
58.5	.7.96
66.9	5.95
75.2	3.75
83.6	1.59

(H. Kopp, from his *Ueber die Modification der mittlern Eigenschaft u. s. w.*, p. 171, in *Ann. Ch. u. Pharm.*, 1841, **40.** 206.)

Alcohol of 75% *by wt.* dissolves 0.661% Na Cl at 14°
" 75 " 0.700 " 15.25°
" 75 " 0.736 " 38°
" 75 " 1.033 " 71.5°
" 95.5 " 0.174 " 15.0°
" 95.5 " 0.171 " 77.25°

(R. Wagner, *J. pr. Ch.*, **40.** 448.)

A solution (saturated at 15°) in alcohol of		Contains per cent of Na Cl.
Sp. Gr.	Per cent by weight	
1.000	0	26.4
0.986	10	22.2
0.972	20	18.4
0.958	30	14.9
0.939	40	11.7
0.917	50	8.9
0.895	60	5.6
0.847	80	1.2

(H. Schiff, *Ann. Ch. u. Pharm.*, 1861, **118.** 365.)

Schiff (*loc. cit.*, p. 366) remarks that R. Wagner's determination of the solubility of Na Cl in alcohol of 75% (*vid. sup.*) does not agree with his own results. A solution in wood-spirit, of 40% (by weight), saturated at 15°, contains 13% of it. (H. Schiff, *Ann. Ch. u. Pharm.*, 1861, **118.** 365.)

Ether precipitates it from the alcoholic solution. (Gmelin.) Very sparingly soluble in a mixture of equal parts of absolute alcohol and ether. (Berzelius; Rammelsberg.) Almost absolutely insoluble in a mixture of equal volumes of anhydrous alcohol and ether; 500 milligrs. of Na Cl treated with such a solution yielded only $\frac{1}{2}$ a milligrm. to the liquid. (J. Lawrence Smith, *Am. J. Sci.*, (2.) **16.** 57.) 100 pts. of a mixture of equal volumes of 96% alcohol and 98% ether, dissolves 0.11 pt. of Na Cl. (W. Mayer, *Ann. Ch. u. Pharm.*, **98.** 205.) Insoluble in oil of turpentine. (T. S. Hunt, *Am. J. Sci.*, (2.) **19.** 417.) Soluble in glycerin. (Pelouze.) Much less soluble in very dilute chlorhydric acid than in water. Concentrated chlorhydric acid precipitates it from the aqueous solution.

Soluble in an aqueous solution of chloride of ammonium with elevation of temperature, all of the NH_4Cl being precipitated. (Vauquelin, *Ann. de Chim.*, **13.** 94.) When bits of chloride of ammonium are added to a saturated aqueous solution of chloride of sodium a portion of the latter salt is precipitated while chloride of ammonium dissolves until the solution, at 18.75°, is of 1.1799 sp. gr. This solution contains 32.64% of saline matter. Or, 100 pts. of water dissolve 48.44 pts. of the mixed salts, viz. 26.38 pts. of Na Cl and 22.06 pts. of NH_4Cl. The same solution may be prepared by acting on a mixture of Na Cl and NH_4Cl with pure water. (Karsten, *Berlin Abhandl.*, 1840, pp. 106, 107.) If equal weights of saturated solutions of Na Cl and NH_4Cl be mixed, the mixture is capable of dissolving a further portion of either of these salts without precipitating any of that already dissolved; if the solutions have been mixed in other proportions, however, precipitation may of course occur. (Karsten.)

Insoluble in a saturated solution of chloride of calcium. (Vauquelin, *Ann. de Chim.*, **13.** 95.) Chloride of sodium is much more soluble in hot than in cold water which contains in solution chloride of magnesium or chloride of calcium, pure chloride of sodium separating out as the solutions cool. On the other hand, a considerable quantity of chloride of sodium is precipitated when its aqueous solution, saturated at the ordinary temperature, is mixed with a solution of chloride of magnesium, or chloride of calcium, similarly saturated. According to Fuchs, these reactions depend upon the strong affinity of the deliquescent salts for water at the ordinary temperature, they being thus enabled to deprive the chloride of sodium of a portion of its solvent; and upon the fact that they melt in their own water of crystallization at temperatures below that at which the saturated solution of chloride of sodium boils. (Fuchs & G. Reichenbach, *Kastner's Archiv.*, 1826, **7.** 410, *et seq.*) Less soluble in a concentrated solution of chloride of calcium than in pure water. (Hermann.)

Soluble in a saturated solution of chloride of barium, with elevation of temperature and precipitation of $Ba\,Cl$. (Vauquelin, *Ann. de Chim.*, **13.** 94.) If crystals of chloride of barium be added to a saturated solution of $Na\,Cl$ they are dissolved, at first without separation of $Na\,Cl$, but after a certain amount has been thus dissolved, the solution of further portions occasions the precipitation of $Na\,Cl$, and this reaction goes on until the amounts of the two salts in solution have attained a certain definite equilibrium. (Karsten, *Berlin Abhandl.*, 1840, p. 109.) [See also under Chloride of Barium.] Soluble in a saturated solution of chloride of potassium, with elevation of temperature and precipitation of $K\,Cl$. (Vauquelin, *Ann. de Chim.*, **13.** 94.) When chloride of potassium is added to a saturated solution of chloride of sodium it dissolves, while $Na\,Cl$ is precipitated until a certain definite equilibrium is attained. (Karsten, *loc. cit.*, p. 109.)

Soluble in a saturated solution of nitrate of ammonia, without causing any precipitation of the latter. (Karsten.) Soluble in a saturated solution of nitrate of ammonia, from which solution it is not displaced by salts which would precipitate it from its solution in pure water. (Margueritte, *C. R.*, **38.** 307.) Soluble in a solution of nitrate of soda, with elevation of temperature and precipitation of $Na\,O, N\,O_5$. The solution obtained marks 29° B. (Vauquelin, *Ann. de Chim.*, **13.** 92.) When crystals of nitrate of soda are added to a saturated solution of chloride of sodium, the former rapidly dissolve while $Na\,Cl$ is precipitated. After the reaction is completed the solution at 18.75° contains 43.9% of mixed salt. Or, 100 pts. of water dissolve 78.11 pts. of mixed salt, viz. 25.22 pts. $Na\,Cl$, and 52.89 pts. $Na\,O, N\,O_5$. A mixed solution of identical composition is obtained when mixed $Na\,Cl$ and $Na\,O, N\,O_5$ are treated with water. (Karsten, *loc. cit.*, p. 108.)

Soluble in a saturated solution of nitrate of potash, with slight elevation of temperature. The mixed solution obtained is now capable of dissolving more nitrate of potash; the solubility of the latter appearing to increase in the same ratio as the quantity of chloride of sodium present. [See also under Nitrate of Potash.] (Fourcroy & Vauquelin, *Ann. de Chim.*, **11.** 130, *et seq.*) When a mixed solution of chloride of sodium and of nitrate of potash is evaporated at the boiling temperature, $Na\,Cl$ separates out, while $K\,O, N\,O_5$ remains in solution. At the ordinary temperature the converse of this is true, $K\,O, N\,O_5$ separating out before $Na\,Cl$. (Vauquelin, *Ann. de Chim.*, **13.** 97.) Soluble in a saturated solution of nitrate of potash, a few needles of $K\,O, N\,O_5$ separating out at first, but these soon re-dissolve. The solution thus obtained at 18.13° contains 40.34% of mixed salt. Or, 100 pts. of water dissolve 67.7 pts. of mixed salt, viz. 38.25 pts. $Na\,Cl$ and 29.45 pts. $K\,O, N\,O_5$. This solution is not of the same composition as that prepared by treating a mixture of the two salts with water. Such a solution prepared at 18.75° contained 43.73% of mixed salt. Or, 100 pts. of water dissolve 77.72 pts. of mixed salt, viz. 39.19 pts. $Na\,Cl$ and 38.53 pts. $K\,O, N\,O_5$. (Karsten, *Berlin Abhandl.*, 1840, p. 118.) Soluble in a saturated solution of nitrate of baryta (Karsten, *loc. cit.*), with diminution of temperature and without occasioning any precipitation. (Vauquelin, *loc. cit.*, p. 93.) Insoluble in a solution of nitrate of lime. Somewhat soluble in a saturated solution of nitrate of magnesia, with slight elevation of temperature and deposition of a small portion of $Mg\,O, N\,O_5$. (Vauquelin, *loc. cit.*, **13.** 93.)

Soluble in a saturated solution of sulphate of ammonia, with elevation of temperature and precipitation of a considerable portion of $N\,H_4\,O, S\,O_3$. (Vauquelin.) Soluble in a cold saturated solution of sulphate of soda, with elevation of temperature, and precipitation of some $Na\,O, S\,O_3$. At the boiling temperature, however, $Na\,Cl$ is precipitated, when sulphate of soda is added to the solution. (Vauquelin, pp. 90 – 92.) Soluble in a saturated solution of sulphate of soda, at first without any precipitation, but subsequently with precipitation of $Na\,O, S\,O_3$. A solution of the same sp. gr. as the above is obtained when a mixture of the two salts is treated with water at the same temperature. (Karsten, *Berlin Abhandl.*, 1840, p. 114.) Soluble in a saturated solution of sulphate of potash (Karsten), with elevation of temperature and precipitation of some $K\,O, S\,O_3$. (Vauquelin.) Soluble in a saturated solution of sulphate of magnesia, with slight diminution of temperature, and precipitation of some $Mg\,O, S\,O_3$. (Vauquelin, *loc. cit.*, pp. 90 – 92; Karsten, *loc. cit.*, p. 115.) Soluble in a saturated solution of sulphate of copper (Karsten); and of sulphate of zinc, a quantity of a double salt ($Na\,O, S\,O_3$; $Zn\,O, S\,O_3$) separating. (Karsten, *loc. cit.*, p. 127.) When one equivalent of chloride of sodium ($Na\,Cl$), in aqueous solution, is mixed with a solution of an equivalent of sulphate of zinc ($Zn\,O, S\,O_3$), 0.72 of it are decomposed to sulphate of soda, which may be precipitated by adding alcohol, while 0.28 of it remain unchanged; when mixed with a solution of an equivalent of sulphate of magnesia 0.545 of it are decomposed as before, while 0.455 of it remain unchanged. (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.) Soluble in a saturated solution of acid sulphate of alumina, with diminution of temperature; no precipitate is formed. (Vauquelin, *loc. cit.*, pp. 90 – 92.)

Soluble in a solution of chlorate of potash. The solution thus obtained can now dissolve a further portion of $K\,O, Cl\,O_5$. (Margueritte, *C. R.*, **38.** 305.)

b = $Na\,Cl + 4\,Aq$ Crystallizes from saturated solutions of common salt, at temperatures below —5° @ —10°.

Efflorescent at temperatures below 0°, but partially deliquescent at temperatures above 0°. (Fuchs, *Kastner's Archiv.*, 1826, **7.** 415.)

Chloride of Sodium & *bichloride* of Tin.

I.) $Na\,Cl;\ Sn\,Cl_2$ Hygroscopic. (Wittstein.)

II.) $Na\,Cl;\ Sn\,Cl_2 + 5\,Aq$ Permanent; efflorescing only in warm air. Very easily soluble. (Bolley.)

Chloride of Sodium & of Uranium (basic). Soluble in water.

Chloride of Sodium & of Zinc. Easily soluble in water, apparently with decomposition. (Schindler.)

Chloride of Sodium with *proto*Cyanide of Mercury.
$Na\,Cl;\ 2\,Hg\,Cy$ Readily soluble, especially in hot water. Sparingly soluble in alcohol. (Poggiale; Brett.)

Chloride of Sodium with Glucose (Grape sugar).
$2\,C_{12}\,H_{12}\,O_{12};\ Na\,Cl + 2\,Aq$ Permanent. Soluble in 3.685 pts. of cold water. Difficultly soluble in alcohol. Very sparingly soluble in alcohol of 96%. Melts in its water of crystallization at 120°, when rapidly heated.

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Insoluble in oil of turpentine. (T. S. Hunt, *Am. J. Sci.*, (2.) **19.** 416.)

Chloride of Sodium with Glycocoll. Soluble in water; less soluble in alcohol. (Horsford.)

Chloride of Sodium with Iodate of Soda.
$NaCl ; NaO, IO_5 + 12\,Aq$ Permanent. Decomposed by water, which removes chloride of sodium. (Rammelsberg.)

Chloride of Sodium with Mannite. Soluble in water. Almost insoluble in alcohol. (Riegel.)

Chloride of Sodium with Sulphuric Acid
$NaCl ; X SO_3$ (anhydrous). Instantly decomposed by moisture.

Chloride of Sodium with Urea. Deliquescent
$NaCl ; C_2H_4N_2O_2 + 2\,Aq$ Very soluble in water. Partially decomposed by absolute alcohol.
Unlike chloride of sodium, it is soluble in tolerably large quantity in ether, and alcohol.

***Bi*Chloride of Stann(*ic*)ammonium.** Permanent.
$N\left\{\begin{matrix}H_3\\Sn'\end{matrix}\right., Cl_2$ Completely soluble in cold water, but after several days, or when heated, the solution is liable to become suddenly gelatinous. (H. Rose.)

Chloride of Stann(*ic*)Amyl. Soluble in
(*Chloride of biStannAmyl.*) alcohol, and ether.
$Sn_2(C_{10}H_{11}), Cl$

Chloride of Stann(*ic*)*di*Amyl. Less soluble in alcohol, and ether, than the chloride of stann(*ous*)amyl.
$Sn_2(C_{10}H_{11})_2, Cl$

Chloride of Stann(*ic*)*tri*Amyl. Insoluble in water. Readily soluble in alcohol.
$Sn_2(C_{10}H_{11})_3, Cl$

Chloride of Stann(*ic*)*tetr*Amyl. Insoluble in water. Soluble even in dilute alcohol.
$Sn_2(C_{10}H_{11})_4, Cl$

Chloride of Stann(*ous*)Amyl. Readily soluble in alcohol, and ether.
(*Chloride of StannAmyl.*)
$Sn(C_{10}H_{11}), Cl$

Chloride of Stann(*ic*)*tri*Ethyl. Miscible in all proportions with alcohol, and ether. (Lœwig.)
(*Chloride of ⅔ StannEthyl.*)
$Sn_2(C_4H_5)_3, Cl$

Chloride of *tetra*StannEthyl. Soluble in alcohol, and ether, from both of which it is precipitated by water.

Chloride of Stann(*ous*)Ethyl. Soluble in
$Sn(C_4H_5), Cl$ water.

$2(C_4H_5Sn), Cl$ Sparingly soluble in alcohol. (Lœwig.)

$Sn_2(C_4H_5)_3. Cl ; 5(SnC_4H_5, Cl)$

$Sn_4(C_4H_5)_3, Cl$

$Sn_4(C_4H_5)_4, Cl$ Soluble in ether. (Lœwig.)

Chloride of Stann(*ous*)Methyl.
C_2H_3Sn, Cl

Chloride of Stib*di*Amyl.

Chloride of Stib*tri*Amyl. Insoluble in
$Sb\left\{(C_{10}H_{11})_3, Cl_2\right.$ water. Easily soluble in alcohol, and ether. (Berlé.)

Chloride of Stib*tri*Ethyl.

I.) $Sb\left\{(C_4H_5), Cl\right.$ Deliquescent. Very soluble in water. Soluble in chlorhydric acid, with combination. (Merck.)

II.) $Sb\left\{(C_4H_5)_3, Cl_2\right.$ Insoluble in water. Readily soluble in alcohol, and ether. (Lœwig & Schweitzer.)

Chloride of StibEthylium. More deli-
$Sb\left\{(C_4H_5)_4, Cl + 8\,Aq\right.$ quescent than chloride of calcium. Very easily soluble in water, and alcohol.

Chloride of StibMethylEthylium. Per-
$Sb\left\{\begin{matrix}(C_2H_3)\\(C_4H_5)_3\end{matrix}\right. Cl$ manent. Soluble in water. (Friedlænder.)

Chloride of StibMethylium. Very sol-
$Sb\left\{(C_2H_3)_4, Cl\right.$ uble in water; less soluble in alcohol. Insoluble in ether. (Landolt.)

Chloride of Stilbene. There are two iso-
$C_{28}H_{12}'', Cl_2$ meric modifications: —

a.) *small monoclinic crystals.* Almost insoluble in boiling alcohol. Very sparingly soluble in ether.

β.) *octagonal tables.* Readily soluble in alcohol, and still more soluble in ether. (Laurent.)

Chloride of Strontium. Permanent. De-
$SrCl + 6\,Aq$ liquesces in moist air. The anhydrous salt is soluble in 1.5 pts. of water at 15°, and in 0.8 pt. at boiling. (Dumas, *Tr.*) Soluble in 1.996 pts. of water at 15°. (Gerlach's determination, see his table of sp. grs., below.)

1 pt. of anhydrous chloride of strontium is

soluble in	2.21	pts. of water at	— 0.5°
“	2.20	“	+ 2°
“	2.07	“	8°
“	1.88	“	20°
“	1.69	“	29°
“	1.55	“	37°
“	1.39	“	47°
“	1.24	“	57°
“	1.09	“	67°
“	1.02	“	84°
“	0.99	“	93°
“	0.89	“	106°

(Kremers, *Pogg. Ann.*, **92.** 499.)

1 pt. of the anhydrous salt is

soluble in	2.27	pts. of water at	0°
“	1.88	“	20°
“	1.54	“	40°
“	1.18	“	60°
“	1.08	“	80°
“	0.98	“	100°

This new set of determinations was made with care, since their author has frequently observed a slight tendency in this salt to form supersaturated solutions. (Kremers, *Pogg. Ann.*, **103.** 66.) The hydrated salt is soluble in 0.75 pt. of cold water, and in all proportions in hot water. (Hope [?].) Ure (*Dict.*) cites from two sets of observations: —

100 pts. of water at	87.7°	dissolve	43 pts. of it.
“	15.5°	“	150 “
“	100°	“	an unlimited am't.

Soluble in 3 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.)

An aqueous solution of sp. gr. (at 15°)	Contains per cent of Sr Cl + 6 Aq.	An aqueous solution of sp. gr. (at 15°)	Contains per cent of Sr Cl + 6 Aq.
1.00907 . .	1	1.09287 . .	10
1.01813	2	1.10307	11
1.02720	3	1.11327	12
1.03626	4	1.12347	13
1.04533	5	1.13367	·14
1.05484	6	1.14387	15
1.06435	7	1.15488	16
1.07385	8	1.16588	17
1.08336 . .	9	1.17689 . .	18

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An aqueous solution of sp. gr. (at 15°)	Contains per cent of $SrCl+6Aq$.	An aqueous solution of sp. gr. (at 15°)	Contains per cent of $SrCl+6Aq$.
1.18789	19	1.28363	27
1.19890	20	1.29642	28
1.21073	21	1.30920	29
1.22255	22	1.32199	30
1.23439	23	1.33575	31
1.24622	24	1.34951	32
1.25805	25	1.36327	33
1.27085	26	1.36847	33.378*

* Mother liquor.

(Th. Gerlach, *Sp. Gew. der Salzloesungen*, 1859, p. 15.)

An aqueous solution saturated at 8° is of 1.379 sp. gr. (Anthon, *Ann. der Pharm.*, 1837, **24.** 211.)

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.0823	9.81
1.1632	20.12
1.2401	30.57
1.3114	41.04
1.3816	51.69

(Kremers, *Pogg. Ann.*, **99.** 444.)

The saturated solution boils at 114°. (Kremers, *Pogg. Ann.*, **92.** 499.)

In a solution containing for 100 pts. of water, pts. of anhydrous $SrCl$	The boiling-point is elevated.	Difference.
0.0	0°	
16.7	1	16.7
25.2	2	8.5
32.1	3	6.9
37.9	4	5.8
43.4	5	5.5
48.8	6	5.4
54.0	7	5.2
59.0	8	5.0
63.9	9	4.9
68.9	10	5.0
74.1	11	5.2
79.6	12	5.6
85.3	13	5.7
91.2	14	5.9
97.5	15	6.3
104.0	16	6.5
110.9	17	6.9
117.5 (saturated)	17.85	6.6

The point of ebullition of pure water, observed in a glass tube containing bits of metallic zinc, having been 100.4°. (Legrand, *Ann. Ch. et Phys.*, 1835, (2.) **59.** 436.) The anhydrous salt is soluble in from 111.6 to 116.4 pts. of alcohol, of 99.3%, at 14.5°, and in 262 pts. of the same alcohol, at boiling. (Fresenius, *Ann. Ch. u. Pharm.*, 1846, **59.** 127.) The hydrated salt is soluble in 6 pts. of alcohol, of 0.833 sp. gr., at 15°. (Vauquelin.) Soluble in 24 pts. of absolute alcohol at 15°, and in 19 pts. at the temperature of boiling. (Bucholz, *Beiträge*, **3.** 29. [*T.*].) Soluble in 2.5 pts. of boiling alcohol. Concentrated chlorhydric acid precipitates it from the aqueous solution. (Hope.) Less soluble in acidulated than in pure water.

CHLORIDE OF STRONTIUM & *protochloride* OF TIN.
$SrCl; SnCl + 4Aq$

CHLORIDE OF STRONTIUM & *bichloride* OF TIN.
$SrCl; SnCl_2 + 5Aq$

CHLORIDE OF STRONTIUM with *proto*CYANIDE OF MERCURY. Easily soluble in water and in dilute alcohol. (Brett.) Readily soluble in water. (Poggiale.)
$SrCl; 2HgCy + 6Aq$

CHLORIDE OF STYRACYL (or OF STYRYL). Insoluble in water. Difficultly soluble in cold, more readily soluble in hot alcohol. Easily soluble in ether. (Ramdohr.)
$C_{18}H_9Cl$

CHLORIDE OF STYRACYLAMMONIUM. Soluble in water.
$N\left\{\begin{matrix}C_{18}H_9\\H_3\end{matrix}\right. Cl$

CHLORIDE OF SUCCINYL. Decomposed by water, and alcohol. Soluble in anhydrous ether. Easily soluble in ammonia. (Gerhardt & Chiozza.)
$C_8H_4O_4'', Cl_2$

CHLORIDE OF *bi*SULPHIDE OF METHYL. *Vid.* Chloride of Sulphur with Sulphide of Methyl.

*Bi*CHLORIDE OF SULPHOBENZID. *Vid.* Chlorhydrate of *bi*ChloroSulphoBenzid.

CHLORIDE OF SULPHOBENZOYL. Insoluble in water, but is slowly decomposed thereby. Soluble in alcohol, with evolution of heat and decomposition. Soluble in ether, apparently without decomposition. Soluble, with decomposition, in an aqueous or alcoholic solution of ammonia. (Limpricht & v. Uslar, *Ann. Ch. u. Pharm.*, **102.** 250.)
(*Sulphate of biChloro Benzylene. Chloro Sulpho Benzoic Acid.*)
$C_{14}H_4S_2O_6, Cl_2$

CHLORIDE OF SULPHOPHENYL. Insoluble in water. Readily soluble in alcohol. (Gerhardt & Chiozza.)
(*Sulphite of Chloro Benzene. Phenyl Sulphurous Chloride.*)
$C_{12}H_5S_2O_4, Cl$

CHLORIDE OF SULPHOPHENYLAMIDYL. Decomposed by water, alcohol, and ether. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **53.** 310.)
$N\left\{\begin{matrix}C_{12}H_4S_2O_4''\\H_2\end{matrix}\right., Cl$

*Di*CHLORIDE OF SULPHUR. Slowly decomposed by water. Soluble in alcohol, with decomposition. (Stümcke.) Soluble in ether, with subsequent decomposition. (Dumas.) Readily miscible with bisulphide of carbon.) "Chloride of sulphur" is easily soluble in oil of turpentine, with evolution of heat.
(*ProtoChlorure de Soufre* (incorrectly).)
S_2Cl

"Chloride of sulphur" is easily soluble in caoutchin. (Himly.)

*Proto*CHLORIDE OF SULPHUR. Slowly decomposed by water; immediately decomposed by alcohol, and ether.
(Incorrectly *DeutoChlorure de Soufre.*)
SCl

Solid protoChloride of Sulphur. Decomposed by water. Readily soluble in dichloride of sulphur. (Millon.)

*Bi*CHLORIDE OF SULPHUR. Decomposed by water. (H. Rose.)

*Ter*CHLORIDE OF SULPHUR. Decomposed by water.

CHLORIDE OF SULPHUR & OF TIN. It forms a milky solution with water. Soluble, with decomposition, in dilute nitric acid.
$SnCl_2; 2SCl_2$

CHLORIDE OF SULPHUR & OF TITANIUM. Deliquescent. Decomposed by water.

CHLORIDE OF SULPHUR with SULPHIDE OF METHYL.
(*Chloride of biSulphide of Methyl.*)
$C_4H_6S_2; S_2Cl_2$

CHLORIDE OF SULPHUR with SULPHIDE OF NITROGEN.
(*Chloro Sulphate of Sulphide of Nitrogen.*)

I.) $SCl; NS_2$ } Very easily decomposed.
II.) $SCl; 2(NS_2)$ (?) }

III.) $SCl; 3(NS_2)$ Tolerably permanent. Slowly decomposed by pure water; instantly decom-
(*Chloro Sulphide of Nitrogen. Chloro Sulphate of Sulphide of Nitrogen. Sulphazotic Chloride of Nitrogen.*)

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posed by water containing a little ammonia. Very sparingly soluble in bisulphide of carbon. (Fordos & Gélis, *Ann. Ch. et Phys.*, (3.) **32.** 407.)

IV.) $S\,Cl\,;\,N\,S_3$ (*ChloroSulphide of Nitrogen.*) Soluble in water, with subsequent partial decomposition. Insoluble in alcohol, and ether. (Soubeiran.)

Chloride of Tantalum. Decomposed by $Ta\,Cl_3$ water, to chlorhydric acid and insoluble tantalic acid. Completely soluble in absolute alcohol. Decomposed, with solution, by concentrated sulphuric, and chlorhydric acids; also partially by potash-lye; but a solution of carbonate of potash does not dissolve any of it. (H. Rose.)

Chloride of TellurEthyl. Sparingly sol- $C_4\,H_5\,Te,\,Cl$ uble in water and in concentrated chlorhydric acid. (Wœhler.)

*Proto*Chloride of Tellurium.

I.) $Te\,Cl$ Hygroscopic. Decomposed by water.

II.) *basic.*

*Bi*Chloride of Tellurium.

I.) $Te\,Cl_2$ Deliquesces more rapidly than chloride of calcium. Decomposed by water. Completely soluble in boiling water. When the hot aqueous solution is allowed to cool slowly, tellurous acid crystallizes out, and a basic salt also. Soluble, without decomposition, in chlorhydric acid, and this solution can be diluted with water to a considerable extent without being precipitated. (Berzelius, *Lehrb.*, **3.** 1133.) It is decomposed by water even in the cold; but is completely dissolved by a large excess of water. (H. Rose, *Pogg. Ann.*, **83.** 150.)

II.) *basic.* (*Tellurite of biChloride of Tellurium.*) Somewhat soluble, especially in boiling water.

*Bi*Chloride of Tellurium with Chloride of *X.* *Vid.* ChloroTellurate of *X.*

Chloride of TellurMethyl. Soluble in $C_2\,H_3\,Te,\,Cl$ warm, much less soluble in cold water acidulated with nitric acid. Readily soluble in alcohol. (Wœhler & Dean, *Ann. Ch. u. Pharm.*, **93.** 235.)

Chloride of Tetryl. *Vid.* Chloride of Butyl.

Chloride of Tetrylene. *Vid.* Chloride of Butylene.

Chloride of Thionyl. Decomposed by wa- $S_2\,O_2,\,Cl_2$ ter and by alkaline solutions. (Schiff.)

Chloride of Thorium.

I.) *normal.*

a = anhydrous. Deliquescent. Soluble in wa- $Th\,Cl$ ter, with great evolution of heat. The solution is not decomposed by boiling, but chlorhydric acid is given off when it is evaporated. Perfectly soluble in alcohol.

b = hydrated. Deliquescent. Soluble in wa- $Th\,Cl + x\,Aq$ ter; less soluble in water acidulated with chlorhydric acid. Easily soluble in alcohol.

II.) *basic.*

*Proto*Chloride of Tin. (*ChloroStannous Acid.*)

I.) *normal.* $Sn\,Cl + 2\,Aq$ When freshly prepared it is readily and completely soluble, without decomposition, in cold water which has been deprived of air; even when large quantities of water are used. This solution may be boiled without undergoing decomposition, but as soon as air is admitted to it oxidation occurs and precipitation ensues. (H. Rose, *Pogg. Ann.*, **83.** 143.) Easily soluble in absolute alcohol, especially when hot. (Capitaine.) Insoluble in oil of turpentine. Soluble in chlorhydric acid.

The aqueous solution saturated at 15° is of 1.827055 sp. gr., and contains dissolved in every 100 pts. of water at least 269,836 pts. of the salt. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.) Melts in its water of crystallization at 41.6°, and the liquid may be cooled to 28.3° without becoming solid: — it boils at 121.7°. (Ordway, *Am. J. Sci.*, (2.) **27.** 15.)

II.) *basic.* *Vid.* OxyChloride of Tin.

*Bi*Chloride of Tin.

α.) Ordinary modification.

a = anhydrous. $Sn\,Cl_2$ Absorbs water from the air, and combines therewith. Soluble in water. Very soluble in absolute alcohol, with combination; water precipitates it from this solution. (Dœbereiner.) In contact with a small quantity of water it forms a solid hydrate, with more water it dissolves completely. On evaporating the aqueous solution, chlorhydric acid and then bichloride of tin pass off with the aqueous vapor as soon as the solution has become somewhat concentrated; but the solution remains clear, and the basic salt contained in it is susceptible of crystallizing, and is still soluble in water. On continuing the distillation, much bichloride of tin and chlorhydric acid are evolved, and a residue of binoxide of tin is left, On diluting the aqueous solution with much water and then boiling it, hydrated oxide of tin will be precipitated; the precipitation may be made complete by diluting with a sufficient amount of water. A solution of bichloride of tin (*α*) is not precipitated on the addition of nitric or chlorhydric acid, nor does sulphuric acid produce a precipitate, unless the solution has been largely diluted with water; it is not modified at first by phosphoric acid, but the mixture gelatinizes at the end of several days; with an aqueous solution of arsenious acid it forms a precipitate, but only after the lapse of some time. No precipitate is produced on the addition of aqueous solutions of the sulphates of potash and soda, the chlorides of potassium, sodium, and ammonium, nitrate of potash, or analogous salts. (H. Rose, *Tr.*) Readily soluble in ether, forming a compound which is easily soluble in an excess of ether, but is precipitated therefrom by water. (Kuhlmann.) Decomposed by oil of turpentine.

b = hydrated. When bichloride of tin is treated with a small quantity of water it combines therewith, a hydrate ($Sn\,Cl_2 + 2\,Aq$) being precipitated; this dissolves, however, when more water is added. Another hydrate ($Sn\,Cl_2 + 5\,Aq$) is very deliquescent and soluble in water. (Lewy, *Ann. Ch. et Phys.*, (3.) **16.** 304.) When heated, the hydrated salt melts like ice, and solidifies again on cooling. It is easily soluble in water. Alcohol decomposes it with formation of basic protochloride. (Berzelius, *Lehrb.*, **3.** 763.) The aqueous solution is decomposed on boiling, the more completely in proportion as the solution is more dilute and as it contains less free chlorhydric acid. (H. Rose, *Pogg. Ann.*, **83.** 150.) Soluble in chlorhydric acid. When the aqueous solution contains a slight excess of chlorhydric acid it remains clear and unaltered on boiling. (Berzelius, *Lehrb.*, **2.** 597; **3.** 763.) Two thirds of the acid of bichloride of tin may be abstracted, and the basic tin-salt formed still be soluble in water, but the abstraction of more acid causes gelatinization. (Ordway, *Am. J. Sci.*, (2.) **23.** 222.)

β.) Anomalous modification. (*Chloride of MetaStannic Acid.*) [Compare *bin*Oxide of Tin, *β.*] Soluble in cold water, but the solution coagulates on boiling. Strong chlorhydric acid precipitates it from the aqueous solution. (Berzelius, *Lehrb.*) On evaporating the aqueous solution it behaves quite differently from that of modif. *a*, becoming troubled on the application of heat, and only chlorhydric acid, but no bichloride of tin, being evolved. On diluting the aqueous solution with much water and then boiling, hydrated oxide of tin (*β*) will be precipitated; other circumstances being equal the oxide *β* is more readily precipitated in this case than the oxide *a*. When the solution does not contain an excess of acid, the addition of chlorhydric acid causes an abundant precipitate, though all of the salt cannot thus be removed from the solution; on decanting the supernatant acid and treating the precipitate with water it dissolves readily. Nitric acid also occasions a slight precipitate in solutions which do not contain an excess of acid, the precipitate being, as before, soluble in water. Dilute sulphuric acid produces an abundant precipitate of sulphate of tin (*β*) [*q. vid.*], even when the solution has not been previously diluted with water. Aqueous solutions of the sulphates of potash and soda produce abundant precipitates, insoluble in water, but soluble in chlorhydric acid. A solution of chloride of sodium also produces a precipitate, but solutions of the chlorides of potassium and ammonium do not; a solution of nitrate of potash gives a precipitate only after a long time. (H. Rose, *Tr.*)

*Bi*Chloride of Tin with Cyanide of Ethyl. Instantly decomposed by water, and alcohol. It cannot be recrystallized from ether. (Henke.)
$C_6H_5N, SnCl_2$

*Bi*Chloride of Tin with Cyanide of Methyl. Instantly decomposed by water, and alcohol. It cannot be recrystallized from ether. (Henke.)
$C_4H_3N, SnCl_2$

Chloride of Tin with Glycocoll. Somewhat soluble in water. (Horsford.)

*Proto*Chloride of Tin with Iodide of Tin. Decomposed by water. (Henry, *Phil. Trans.*, 1845, p. 363, [*Gm.*].)
$SnCl; SnI$

*Bi*Chloride of Tin with Iodide of Tin. (Kane.)
$SnCl_2; SnI$

*Bi*Chloride of Tin with Nitrate of Tin. Highly basic compound, readily soluble in water. (Ordway, *Am. J. Sci.*, (2.) **23.** 221.)

*Bi*Chloride of Tin with Oxalate of Ethyl. Decomposed by water. (Lewy, *Ann. Ch. et Phys.*, (3.) **16.** 311.)
$C_4H_5O, C_2O_3; SnCl_2$

*Bi*Chloride of Tin with Oxide of Ethyl. Decomposed by water. Easily soluble in ether. (Lewy, *Ann. Ch. et Phys.*, (3.) **16.** 309.)
$2\,C_4H_5O; SnCl_2$

*Proto*Chloride of Tin with OxyChloride of Phosphorus. Hygroscopic, with decomposition. Decomposed by water. (Casselmann, *Ann. Ch. u. Pharm.*, **91.** 242.)
$2\,SnCl; PO_2Cl_3$

*Bi*Chloride of Tin with Phosphuretted Hydrogen. Decomposed by water.
$PH_3; 3\,SnCl_2$

*Bi*Chloride of Tin with *bi*Sulphide of Tin. Decomposed by water. (Dumas.)
(*Chloro Sulphide of Tin.*)
$2\,SnCl_2; SnS_2$

Chloride of Titan*bi*amin. Deliquesces in moist air. Soluble in water, without decomposition. (H. Rose.)
(*Ammonio-Chloride of Titanium.*)
$N_2\left\{H_6\right. . Ti, Cl_2$

*Proto*Chloride of Titanium. (?) Unacted upon by water. Soluble, with decomposition, in ammonia-water. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **20.** 391.)

*Sesqui*Chloride of Titanium. Hygroscopic. Soluble in water, with evolution of heat. This solution decomposes after a time. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **20.** 387.)
Ti_2Cl_3

*Bi*Chloride of Titanium.

a = anhydrous. Deliquescent. Soluble in water, with evolution of much heat. If too much water be added at once the chloride is decomposed, binoxide of titanium being formed. On boiling the aqueous solution, and especially if it be acidulated with nitric acid, precipitation occurs. (Berzelius, *Lehrb.*)
$TiCl_2$

b = hydrated. Very hygroscopic. Soluble in water. (Demoly.)
$TiCl_2 + 5\,Aq$

Chloride of Titanium with Cyanhydric Acid. Deliquescent. Soluble in water, with evolution of heat, and decomposition. (Wœhler.)
$TiCl_2; HCy$

Chloride of Titanium with Cyanide of Ethyl. Instantly decomposed by water, and alcohol. It cannot be recrystallized from ether. (Henke.)
$C_6H_5N, TiCl_2$

Chloride of Titanium with Cyanide of Methyl. Instantly decomposed by water, and alcohol. It does not recrystallize from its solution in ether. (Henke.)
$C_4H_3N, TiCl_2$

Chloride of Titanium with Hydrate of Ethyl. Decomposed by water. (Demoly.)
$TiCl_2; 2\,C_4H_6O_2$

Chloride of Titanium with Oxide of Ethyl. Decomposed by water. Easily soluble in ether. (Demoly.)
$TiCl_2; 2\,C_4H_5O$

Chloride of Titanium with Phosphuretted Hydrogen. Decomposed by water, acids, and alkaline solutions. (H. Rose.)
$PH_3, HCl; 2\,TiCl_2$

Chloride of Toluene*chloré*. *Vid.* Chloride of ChloroToluene.

Chloride of Toluenyl. Insoluble in water. Readily soluble in alcohol and in ether. (Cahours.) It is identical with monochlorotoluene. (Cannizzaro.)
(*Chloride of Benzyl. Chloro-Toluol. Chloro Toluene. Chloride of Benzethyl. Benzhydrochloric Ether. ChloroBenzoenase. Hydrochlorate of Benzylene.*)
$C_{14}H_7Cl$

Chloride of Toluyl. Rapidly decomposed by water. (Cahours.)
$C_{16}H_7O_2Cl$

Chloride of *alpha*Toluyl.
$C_{16}H_7O_2, Cl$

Chloride of Trityl. *Vid.* Chloride of Propyl.

*Bi*Chloride of Tungsten. Decomposed by water. Soluble, with decomposition, in solutions of potash or ammonia. (Wœhler.)
WCl_2

*Ter*Chloride of Tungsten. Decomposed by water (Wœhler), and by absolute alcohol. (Riche.)
WCl_3

$W_2Cl_5 = WCl_2, WCl_3$ Quickly decomposed by water, and by exposure to the air.

*Proto*Chloride of Uranium.
(*Green Chloride of Uranium.*)

I.) $UrCl$ Exceedingly deliquescent. Very easily soluble in water, with evolution of heat, and apparently with decomposition. When

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the aqueous solution is evaporated to dryness much chlorhydric acid is disengaged, but the residue is still soluble in water; when evaporated in vacuo at the ordinary temperature, a deliquescent mass is obtained differing from the original chloride. (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** pp. 10, 16.) Dissolves in water with a hissing noise. (Rammelsberg.) The aqueous solution is decomposed when boiled or evaporated. (Berzelius.)

II.) *basic.* Extremely soluble in water, with

$Ur_4 Cl_3$ decomposition in the course of a few moments. (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** 20.)

*Sesqui*CHLORIDE OF URANIUM.
(*Chloride of Uranyl.*)

I.) *basic.* Quickly deliquescent. Easily soluble

$Ur_2 Cl_3 ;\ 2\, Ur_2 O_3 =$ ("$Ur_2 O_2 Cl$" of Péligot). in water. (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** 36.) Easily soluble in alcohol, and ether.

CHLORIDE OF VALERYL. Decomposed by

$C_{10} H_9 O_2, Cl$ water. (Moldenhauer.)

*Bi*CHLORIDE OF VANADIUM.

a.) *Blue modification.* Soluble in water. There

$V Cl_2$ appear to be two salts, of which the one containing most acid is soluble in alcohol.

β.) *Brown modification.* Soluble in water.

*Ter*CHLORIDE OF VANADIUM. It forms a clear

$V Cl_3$ solution when treated with much water, but is rendered turbid by a small quantity of water. Abundantly soluble, with decomposition, in alcohol.

"CHLORIDE OF VINYL." *Vid. mono*Chlor-Ethylene.

CHLORIDE OF *tetra*VINYLIUM. Very hygro-

$C_{16} H_{12} N, Cl + Aq$ scopic. Soluble in water. (Heintz & Wislicenus.)

CHLORIDE OF YTTRIUM. Deliquescent. Sol-

$Y Cl + 3\, Aq$ uble in water, with evolution of heat. (Wœhler.) When heated it melts in its water of crystallization. (Steel, in *Thomson's System of Chem.*, London, 1831, **2.** 816.)

CHLORIDE OF XANTHOCOBALT. Rather in-

$N O_2 . 5\, N H_3 . Co_2 O, Cl_2 + Aq$ soluble in cold water. Readily soluble in hot water, but the solution is partially decomposed on boiling. Insoluble in chlorhydric acid, and in solutions of the alkaline chlorides. Easily decomposed by boiling with acids, even dilute. (Gibbs & Genth, *Smithson. Contrib.*, Vol. **9.**)

CHLORIDE OF ZINC.

I.) *normal.*

a = *anhydrous.* Hygroscopic. Very soluble in

$Zn Cl$ water.

Soluble in 0.333 pt. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) The aqueous solution saturated at 12.5° contains 78.5% of it. (Hassenfratz, *Ann. de Chim.*, **28.** 291.)

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.1331	16.7
1.2714	38.8
1.3677	56.3
1.5336	92.4

(Kremers, *Pogg. Ann.*, **104.** 155.)

An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of the [cryst.] salt.	An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of the [cryst.] salt.
1.0114	2	1.2497	42
1.0228	4	1.2639	44
1.0342	6	1.2783	46
1.0458	8	1.2927	48
1.0573	10	1.3070	50
1.0687	12	1.3244	52
1.0802	14	1.3402	54
1.0966	16	1.3567	56
1.1033	18	1.3733	58
1.1150	20	1.3900	60
1.1267	22	1.4071	62
1.1382	24	1.4253	64
1.1498	26	1.4457	66
1.1614	28	1.4675	68
1.1730	30	1.4900	70
1.1864	32	1.5164	72
1.1967	34	1.5427	74
1.2106	36	1.5700	76
1.2228	38	1.5987	78
1.2360	40		

(Hassenfratz, *Ann. de Chim.*, **28.** 299.)

Abundantly soluble in hot absolute alcohol, and in ether. Soluble in 1 pt. of strong alcohol at 12.5°. (Wenzel, in his *Verwandtschaft*, p. 300 [T.].) Soluble in 0.35 pt. of absolute alcohol, to a viscid liquor, from which a compound of the salt with alcohol subsequently crystallizes out. (Graham.) Soluble at ordinary temperatures in butylic alcohol (hydrate of butyl), but the solution is decomposed on heating. (Wurtz, *Ann. Ch. et Phys.*, (3.) **42.** 138.) Very easily soluble at ordinary temperatures in caprylic alcohol (hydrate of capryl), but the solution is decomposed when heated. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 115.) Soluble in ether. (Dœbereiner.)

When one equivalent of Zn Cl, in aqueous solution, is mixed with a solution of an equivalent of sulphate of potash ($K O, S O_3$), 0.176 of it are decomposed to sulphate of zinc, which may be precipitated by adding alcohol, while 0.824 of it remain unchanged; when mixed with a solution of an equivalent of sulphate of soda ($Na O, S O_3$), 0.29 of it are decomposed as before, while 0.71 of it remain unchanged. (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.)

b = $Zn Cl + Aq$ Very soluble in water. When nearly dry it is abundantly soluble in alcohol of 36° B. (Masson.)

II.) *basic.*
(*OxyChloride of Zinc.*)

a = $Zn Cl ;\ 3\, Zn O + 2\, Aq$ Sparingly soluble in water; more readily soluble in an aqueous solution of chloride of zinc. Easily soluble in solutions of caustic ammonia and potash. (Schindler.)

b = $Zn Cl ;\ 6\, Zn O + 6\, Aq$ Insoluble in water. (Kane.)

c = $Zn Cl ;\ 9\, Zn O + 14\, Aq$ Insoluble in water. (Kane; Schindler.)

CHLORIDE OF ZINC & OF ZINCAMMONIUM.

$Zn Cl ;\ N \left\{ \begin{matrix} H_3 \\ Zn \end{matrix} \right. Cl$ Decomposed by water. (Kane.)

CHLORIDE OF ZINC with CYANIDE OF MER-

$Zn Cl ;\ 2\, Hg Cy + 6\, Aq$ CURY. Efflorescent. Soluble in water. (Poggiale.)

CHLORIDE OF ZINC with UREA. Very deli-

$Zn Cl ;\ C_2 H_4 N_2 O_2$ quescent. Extremely soluble in water, and alcohol, even

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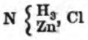
absolute. (Neubauer & Kerner, *Ann. Ch. u. Pharm.*, **101.** 340.)

CHLORIDE OF ZINC*bi*AMIN. (*Ammonio Chloride of Zinc.*) $N_2 \{ H_6 . Zn, Cl + Aq$ Partially decomposed by water. Soluble in warm, less soluble in cold ammonia-water. (Kane.)

CHLORIDE OF ZINCAMMONIUM.  $N \left\{ \begin{matrix} H_3 \\ Zn \end{matrix} \right. , Cl$ Soluble in water. (Kane.) Not completely soluble in water. Soluble in a hot aqueous solution of chloride of ammonium, separating out again as the solution cools. (Ritthausen.)

*Sesqui*CHLORIDE OF ZIRCONIUM.

I.) *normal.*

a = *anhydrous.* $Zr_2 Cl_3$ Very easily soluble in water, with evolution of heat. Abundantly soluble in alcohol.

Scarcely soluble in concentrated chlorhydric acid. (Dumas, *Tr.*, **6.** 321.) Readily soluble in chlorhydric acid. (Gmelin's *Handbook.*)

b = *hydrated.* $Zr_2 Cl_3 + 3 Aq$ Efflorescent. Readily soluble in water, and alcohol. If the aqueous solution be evaporated to dryness at 60°, half of the acid is expelled, leaving the basic salt. (Ot. Gr.) Very sparingly soluble in concentrated chlorhydric acid, being much less soluble therein than the sesquichloride of iron [or of alumina]. (Berzelius, *Lehrb.*, **2.** 186.)

II.) *basic.*

a = $Zr_2 Cl_3 ; Zr_2 O_3 + 3 Aq$

b = $2 Zr_2 Cl_3 ; Zr_2 O_3 + 24 Aq$ Efflorescent. Easily soluble in water. After having been evaporated on the water-bath it assumes a gummy condition, and is then slowly, though completely, soluble in water. When the aqueous solution is largely diluted with water, and then boiled for some time, it is decomposed, and a more basic insoluble salt separates out. (Berzelius, *Lehrb.*, **3.** 504.) Soluble in alcohol.

c = $Zr_2 Cl_3 ; 2 Zr_2 O_3$ Insoluble in water. (Hermann.)

CHLORIMASATIN. (*Imachlorisatinase.*) $C_{32} H_9 Cl_2 N_3 O_6$ Insoluble in boiling alcohol. Soluble in a solution of potash. (Laurent.)

CHLORIMESATIN. (*Imechlorisatinase.*) $C_{16} H_5 Cl N_2 O_2$ Very sparingly soluble in boiling alcohol. Almost insoluble, or insoluble, in ether. (Laurent.) Slowly decomposed by boiling water.

CHLORINATED CHLORIDE [&c.] OF *X.* *Vid.* Chloride [&c.] of Chloro *X.*

CHLORINATED OIL FROM CINNAMIC ACID. Difficultly soluble in water. Easily soluble in alcohol, from which it is precipitated by water. (Herzog.)

CHLORINDATMIT (of Erdmann). *Vid. ter*Chlor-Anilin.

CHLORINDIN. $C_{32} H_8 Cl_2 N_2 O_4$ Insoluble in water, alcohol, or chlorhydric acid. (Erdmann.) Soluble in potash-lye.

*Bi*CHLORINDIN. $C_{32} H_6 Cl_4 N_2 O_4$ Insoluble in water, alcohol, or chlorhydric acid. (Erdmann.)

CHLORINDOPTIC ACID. *Vid. ter*ChloroPhenic Acid.

CHLORINE. (*Oxymuriatic Acid.*) Cl At 15.56°, and the ordinary atmospheric pressure, 1 vol. of water takes up about 2 vols. of the gas; if the latter be diluted with air then much less is absorbed, but the quantity is not proportionate to the abstract pressure of the gas, as is the case with other of the permanent gases. Thus, at $\frac{1}{4}$ of the atmospheric pressure water will take up $\frac{2}{3}$ of its bulk of chlorine, which is more than twice the quantity it ought to take by the rule of proportion. Hence, it is evident that the absorption of this gas by water is partly of a mechanical, and partly of a chemical nature. (Dalton, in his *New System*, **2.** 297.) From 0° to 9° its solubility in water increases, but above this point rapidly diminishes, until at 100° scarcely any of the gas is dissolved. (Gay-Lussac.) Water absorbs 2 vols. of it at 15°, i. e. 1 pt. by weight is soluble in about 150 pts. of water at this temperature; but an aqueous solution of chloride of potassium absorbs $\frac{1}{3}$ less. (Berzelius.) 1 vol. of water absorbs 3.04 vols. of it at 8°. This is the maximum, the solubility decreasing rapidly as the temperature is elevated. At 50° 1 vol. of water dissolves 1.09 vols. Below 8° also the solubility diminishes rapidly, and at 0° water only dissolves about 1.5 vols. of chlorine. (Pelouze & Fremy, *Tr.*) The aqueous solution, saturated at 6°, is of 1.003 sp. gr.

The solution slowly decomposes by keeping, more rapidly when exposed to the light. (Berthollet.)

1 vol. of water, under a pressure of 0m.76 of mercury, at °C.	Dissolves of chlorine gas, — vols., reduced to 0° and 0m.76 pressure of mercury.	1 vol. of water, under a pressure of 0m.76 of mercury, at °C.	Dissolves of chlorine gas, — vols., reduced to 0° and 0m.76 pressure of mercury.
10°	2.5852	26°	1.9099
11°	2.5413	27°	1.8695
12°	2.4977	28°	1.8295
13°	2.4543	29°	1.7895
14°	2.4111	30°	1.7499
15°	2.3681	31°	1.7104
16°	2.3253	32°	1.6712
17°	2.2828	33°	1.6322
18°	2.2405	34°	1.5934
19°	2.1984	35°	1.5550
20°	2.1565	36°	1.5166
21°	2.1148	37°	1.4785
22°	2.0734	38°	1.4406
23°	2.0322	39°	1.4029
24°	1.9912	40°	1.3655
25°	1.9504		

(Schœnfeld, *Ann. Ch. u. Pharm.*, 1855, **95.** p. 9, and fig.) For the variations in the solubility of chlorine in water which occur when other gases are present, see Roscoe's experiments in *Ann. Ch. u. Pharm.*, 1855, **95.** 357.

1 volume of water at °C.	Dissolves vols. (not corrected for barometric pressure) of chlorine.
0°	1.75 @ 1.80
9°	2.70 @ 2.75
10°	2.70 @ 2.75
12°	2.50 @ 2.60
14°	2.45 @ 2.50
30°	2.00 @ 2.10
40°	1.55 @ 1.60
50°	1.15 @ 1.20
70°	0.60 @ 0.65

(Pelouze, *Ann. Ch. et Phys.*, (3.) **7.** 188; also cited by Gay-Lussac, *Ibid.*, p. 124.)

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1 vol. of water at °C.	Dissolves of chlorine — vols., reduced to 0° and 0m.76.*
0°	1.43
3°	1.52
6.5°	2.08
7°	2.17
8°	3.04
10°	3.00
17°	2.37
35°	1.61
50°	1.19
70°	0.71
100°	0.15

* The numbers in the table designate only the apparent solubility of chlorine; the true solubility may be obtained by multiplying these figures by $\frac{P}{f}$; P being the atmospheric pressure, and f the tension of aqueous vapor corresponding to each of the temperatures. Thus, the apparent solubility of chlorine at 70° being 0.71 vol., the true solubility would be $0.71 \times \frac{0m.7600}{0m.2291} = 2.855$ vol. (Gay-Lussac, *Ann. Ch. et Phys.*, (8.) 7. 124.)

A saturated aqueous solution of caustic potash absorbs chlorine with difficulty. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 370.) Insoluble in benzin. (Moride, *Ann. Ch. et Phys.*, (3.) **39.** 452.) Chloral, and iodal, absorb a small quantity of chlorine. (Dumas.) Soluble in perchlorethylene (protochloride of carbon), without change, when not exposed to sunlight. (Faraday.) Soluble in very large quantity, with decomposition, in ether.

All the metallic chlorides are soluble in water, excepting those of silver and lead, the dichlorides of copper and of mercury, and the protochlorides of gold and platinum. Many of them are soluble in alcohol, ether, volatile oils, glycerin, &c.

ChlorIodide of *X*. *Vid.* Chloride & Iodide of *X*.

ChlorIodoform. *Vid.* Iodide of *bi*Chlor-Methyl.

ChlorIridic Acid. Deliquescent. Easily soluble in water; the solution undergoing decomposition when boiled. Soluble in alcohol. (Berzelius.)
(*Bichloride of Iridium.*)
$Ir\,Cl_2$

Most of the chloriridiates are very difficultly soluble in water, though a little more soluble than the corresponding chloroplatinates. They are insoluble, or nearly so, in alcohol, though not quite so difficultly soluble as the chloroplatinates. (H. Rose, *Tr.*)

ChlorIridiate of Ammonium. Soluble in 20 pts. of cold water. (Vauquelin.) Soluble in chlorhydric acid. (Sobolewsky.) Difficultly soluble in cold, much more soluble in hot water. Insoluble in alcohol. (Berzelius.) Insoluble in a cold aqueous solution of chloride of ammonium. (Claus, *Beiträge*, p. 55.)
$N\,H_4\,Cl,\ Ir\,Cl_2$

ChlorIridiate of Potassium. Slowly soluble in cold water. Soluble in 15 pts. of boiling water, from which only ⅓ separates out on cooling. (Vauquelin.) Insoluble in alcohol, or in water saturated with chloride of calcium, chloride of potassium, or other salts. (Berzelius.)
$K\,Cl,\ Ir\,Cl_2$

ChlorIridiate and ChlorOsmiate of Potassium. Soluble in water. (Hermann.)
$3\,K\,Cl;\ 2\,Ir\,Cl_2;\ Os\,Cl_2$

ChlorIridiate and ChloroPlatinate of Potassium.
$5\,K\,Cl;\ Ir\,Cl_2;\ 4\,Pt\,Cl_2$

ChlorIridiate of Quinine.

ChlorIridiate of Sodium. Deliquescent. Easily soluble in water. (Berzelius.) Soluble in alcohol of 0.837 sp. gr.
$Na\,Cl,\ Ir\,Cl_2$

ChlorIsamic Acid. More soluble than isamic acid in alcohol, and ether. Soluble in the strong acids. (Laurent.)
$C_{32}\,H_{11}\,Cl_2\,N_3\,O_8$

ChlorIsamate of Ammonia. Soluble in alcohol.

ChlorIsamate of Silver. Ppt.

*Bi*ChlorIsamic Acid.
$C_{32}\,H_9\,Cl_4\,N_3\,O_8$

*Bi*ChlorIsamate of Ammonia. Soluble in alcohol. (Laurent.)

*Bi*ChlorIsamate of Silver. Ppt.
$C_{32}\,H_8\,Ag\,Cl_4\,N_3\,O_8$

ChlorIsamid. Insoluble in boiling water. Tolerably soluble in alcohol. Soluble in concentrated acids. (Laurent.)
(*ChlorIsamamide.*)
$C_{32}\,H_{12}\,Cl_2\,N_4\,O_6$

*Bi*ChlorIsamid. Somewhat soluble in alcohol; decomposed by boiling alcohol. Soluble in strong acids. (Laurent.)
(*biChlorisamamide.*)
$C_{32}\,H_{10}\,Cl_4\,N_4\,O_6$

ChlorIsathyde. *Vid.* ChlorIsatyde.

ChlorIsatic Acid. Not isolated.
(*ChlorIsatinasic Acid.*
$C_{16}\,H_6\,Cl\,N\,O_6$

"*b.* ChlorIsatic Acid." *Vid.* ChlorIsatydic Acid.

ChlorIsatate of Alumina. Appears to be very soluble in water.

ChlorIsatate of Baryta. Sparingly soluble in hot water. (Erdmann.)
$C_{16}\,H_5\,Ba\,Cl\,N\,O_6 + Aq\ \&\ 3\,Aq$

ChlorIsatate of Bismuth. Ppt.

ChlorIsatate of Cadmium. Ppt.

ChlorIsatate of Copper. Ppt.

ChlorIsatate *of protoxide* of Iron. Appears to be soluble in water.

ChlorIsatate *of sesquioxide* of Iron. Ppt.

ChlorIsatate of Lead. Soluble in boiling water.
$C_{16}\,H_5\,Pb\,Cl\,N\,O_6 + 2\,Aq$

ChlorIsatate of Lime. Somewhat soluble in water.

ChlorIsatate of Magnesia. Appears to be very soluble in water.

ChlorIsatate *of dinoxide* of Mercury. Ppt.

ChlorIsatate *of protoxide* of Mercury. Ppt.

ChlorIsatate of Potash. Readily soluble in water. Soluble in spirit; less so as this is more concentrated. More soluble in boiling, than in cold alcohol.
$C_{16}\,H_5\,K\,Cl\,N\,O_6$

ChlorIsatate of Silver. Soluble in boiling, less soluble in cold water.
$C_{16}\,H_5\,Ag\,Cl\,N\,O_6$

*Bi*ChlorIsatic Acid. Readily soluble in cold water.
$C_{16}\,H_5\,Cl_2\,N\,O_6$

"*b. bi*ChlorIsatic Acid." *Vid. bi*ChlorIsatydic Acid.

*Bi*ChlorIsatate of Alumina. Appears to be soluble in water.

*Bi*ChlorIsatate of Baryta. Only slightly soluble in cold water.
$C_{16}\,H_4\,Ba\,Cl_2\,N\,O_6\ \& + 2\,Aq$

*Bi*ChlorIsatate of Bismuth. Ppt.

*Bi*ChlorIsatate *of sesquioxide* of Chromium. Appears to be soluble in water.

*Bi*ChlorIsatate of Copper. Ppt.
$C_{16}\,H_4\,Cu\,Cl_2\,N\,O_6$

*Bi*ChlorIsatate *of sesquioxide* of Iron. Ppt.

***Bi*ChlorIsatate of Lead.** Ppt.

***Bi*ChlorIsatate of Magnesia.** Appears to be soluble in water.

***Bi*ChlorIsatate of Potash.** $C_{16}H_4KCl_2NO_6 + 2Aq$ Readily soluble in cold, and still more readily soluble in boiling water. Difficultly soluble in cold alcohol, much more easily soluble in boiling alcohol, Soluble in spirit, the more abundantly in proportion as it contains less alcohol. (Erdmann.)

***Bi*ChlorIsatate of Silver.** $C_{16}H_4AgCl_2NO_6$ Sparingly soluble in boiling water, from which it separates out as the solution cools.

ChlorIsatin. (*ChlorIsatinase.*) $C_{16}H_4ClNO_4$ Only slightly soluble in cold water. Soluble in 1000 pts. of water at 0°, and in more than 200 pts. at boiling. Soluble in 220 pts. of alcohol, of 0.83 sp. gr., at 14°; and more readily in boiling alcohol. (Erdmann.) Soluble in concentrated sulphuric acid, from which it is precipitated, apparently undecomposed, by water. Soluble in a cold solution of caustic potash, with subsequent decomposition; the solution is immediately decomposed on boiling.

ChlorIsatin with Argentammonium. $C_{16}H_3(NH_3Ag)ClNO_4$ Ppt., from alcohol.

ChlorIsatin with Potassium.

ChlorIsatin with Silver. Ppt.

***Bi*ChlorIsatin.** (*ChlorIsatinese.*) $C_{16}H_3Cl_2NO_4$ Rather more soluble in water, and much more soluble in alcohol than chlorisatin. Soluble in 30 pts. of alcohol of 0.83 sp. gr., at 14°. (Erdmann) Soluble in a cold aqueous solution of caustic potash.

***Bi*ChlorIsatin with Potassium.**

***Bi*ChlorIsatin with Silver.** Ppt.

ChlorIsatinase. *Vid.* ChlorIsatin.

ChlorIsatinasic Acid. *Vid.* ChlorIsatic Acid.

ChlorIsato Sulphurous Acid. Not known in the free state.

ChlorIsatoSulphite of Potash. $C_{16}H_4ClKNO_6, 2SO_2$ Only slightly soluble in cold water.

***Bi*ChlorIsato Sulphite of Potash.** $C_{16}H_4Cl_2KNO_6, 2SO_2$ Slightly soluble in cold water. (Laurent.)

ChlorIsatyde. $C_{32}H_{10}Cl_2N_2O_8$ Insoluble in cold, sparingly soluble in warm water. Soluble in boiling, less soluble in cold alcohol. Soluble in a solution of caustic potash, with decomposition, and in a solution of sulphide of potassium, apparently without decomposition.

***Bi*ChlorIsatyde.** $C_{32}H_8Cl_4N_2O_8$

ChlorIsatydic Acid. (*a. Chlorisatic Acid.*) $C_{16}H_6ClNO_4$ Soluble in boiling water; separating out again as the solution cools. (Erdmann.)

ChlorIsatydate of Baryta. Soluble in hot water; separating out again as the solution cools.

ChlorIsatydate of Copper. Soluble in hot water; separating out again as the solution cools.

ChlorIsatydate of Lead. Soluble in hot water; separating out again as the solution cools.

ChlorIsatydate of Potash. Soluble in water, and in alcohol.

***Bi*ChlorIsatydic Acid.** (*b. biChlorisatic Acid.*) $C_{32}H_{10}Cl_4N_2O_8$ Soluble in boiling water. (Erdmann.)

***Bi*ChlorIsatydate of Copper.** Soluble in boiling, less soluble in cold water.

***Bi*ChlorIsatydate of Lead.** Soluble in boiling water; separating out again on cooling.

***Bi*ChlorIsatydate of Potash.** Readily soluble in water, and alcohol.

***Bi*ChlorIsatydate of Silver.** Ppt.

ChlorIsatydase. *Vid.* ChlorIsatyde.

ChlorIsatyde. (*ChlorIsathydase.*) $C_{32}H_{10}Cl_2N_2O_8$ Insoluble in cold, very slightly soluble in hot water. Slightly soluble in boiling alcohol.

***Bi*ChlorIsatyde.** (*ChlorIsathydèse.*) $C_{32}H_8Cl_4N_2O_8$ Insoluble in cold, very slightly soluble in boiling water. Somewhat soluble in boiling, insoluble in cold alcohol. Soluble, with decomposition, in a warm solution of potash.

Chlorous Acid. ClO_3 1 volume of water absorbs 5 or 6 vols. of the gas at the ordinary temperature. Decomposed by alcohol. The aqueous solution, on exposure to sunlight, is decomposed in the course of a few hours; in diffused light this decomposition is completed only after the lapse of several months. (Millon, *Ann. Ch. et Phys.*, (3.) 7. pp. 323, 331.)

Chlorite of Ammonia. Known only in solution.

Chlorite of Baryta. BaO, ClO_3 Very soluble in water; but the solution is decomposed on evaporation, more readily than that of the strontia salt. Easily soluble in alcohol. (Millon.)

Chlorite of Lead. PbO, ClO_3 Insoluble in water (Millon, *loc. cit.*, (3.) 7. pp. 310, 328.)

Chlorite of Potash. KO, ClO_3 Deliquescent, with gradual decomposition. Soluble in water, and in spirit of 38°. Soluble in an aqueous solution of chlorous acid. (Millon, *Ibid.*, pp. 325, 332.)

Chlorite of Silver. AgO, ClO_3 Soluble in boiling, less soluble in cold water. (Millon, *Ann. Ch. et Phys.*, (3.) 7. pp. 310, 329.)

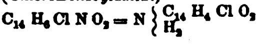
Chlorite of Soda. NaO, ClO_3 Deliquescent. Soluble in water, and in an aqueous solution of chlorous acid. (Millon, *Ibid.*, p. 326.)

Chlorite of Strontia. SrO, ClO_3 Deliquescent. Soluble in water. This solution is decomposed by slow evaporation; less readily, however, than that of the baryta salt. (Millon.)

ChlorKinhydrone. *Vid.* ChlorHydroKinone with ChloroKinone.

ChloroAuric Acid. *Vid.* ChlorAuric Acid.

ChloroBenzamid. (*ChloroBenzoylamid.*)



$C_{14}H_6ClNO_2 = N\left\{\begin{matrix}C_{14}H_4ClO_2\\H_2\end{matrix}\right.$

Sparingly soluble in cold, readily soluble in hot water. Readily soluble in alcohol. (Limpricht & v. Uslar.)

Insoluble in water. Soluble in alcohol and in ammonia-water. (Gerhardt & Drion.)

ChloroBenzene. *Vid.* Chloride of Phenyl.

***Ter*ChloroBenzene.** *Vid.* *ter*ChloroBenzin.

ChloroBenzid. *Vid.* Hydride of *ter*ChloroPhenyl.

ChloroBenzil. *Vid.* Chloride of Benzoyl with Hydride of Benzoyl.

ChloroBenzilic Acid. *Vid.* Chloride of Benzil.

ChloroBenzin. *Vid.* Hydride of ChloroPhenyl.

***Quadri*ChloroBenzinol.** *Vid.* Hydrate of *quadri*ChloroToluenyl.

ChloroBenzoic Acid. (*ChloroNiceic Acid*(of St. Evre). *ChloroMichmylic Acid.* (*Isomeric with ChloroSalylic Acid, q. vid., Chloride of Salicyl, and ChloroSalicylous Acid.*) $C_{14}H_5ClO_4 = C_{14}H_4ClO_3, HO$ More soluble in water, and alcohol, than chlorocinnamic acid. (E. Kopp, *Ann. Ch. et Phys.*, (3.) **20.** 380.) Soluble in 2840 pts. of water at 0°. (Kolbe & Lautemann, *Ann. Ch. u. Pharm.*, **115.** 187 [K.].) Readily soluble in alcohol, and ether. (Herzog.)

ChloroBenzoate of Ammonia. Readily $C_{14}H_4(NH_4)ClO_4$ soluble in water; the solution decomposing on evaporation. Soluble in alcohol. (St. Evre.)

ChloroBenzoate of Copper (Cu O). Insoluble in water.

ChloroBenzoate of Ethyl. Insoluble, or $C_{14}H_4(C_4H_5)ClO_4$ very sparingly soluble, in water. Soluble in alcohol. (St. Evre.)

ChloroBenzoate of Lead. Ppt.

ChloroBenzoate of Silver. Sparingly $C_{14}H_4AgClO_4$ soluble in water.

ChloroBenzoenase. *Vid.* Chloride of Toluenyl.

ChloroBenzoenyl. *Vid.* *Sexi*ChloroToluene.

ChloroBenzol. *Vid.* Chlorhydrate of *ter*ChloroBenzin; also Hydride of ChloroPhenyl, and Chloride of Benzol.

ChloroBenzone. *Vid.* *ter*Chloride of Benzin.

ChloroBenzoyl. *Vid.* Chloride of Benzoyl.

ChloroBromAnilin, &c. *Vid.* BromoChlorAnilin, &c.

ChloroBromide of *X*. *Vid.* Bromide & Chloride of *X*.

Chloro Butylene. (*ChlorButyren. Butyrenechloré. Chloride of Butyril. ChloroButyrase. ButyleneChloré. Tetrylene Chloré.*) C_8H_7Cl Insoluble in water. Soluble in all proportions in alcohol, and ether. (Chancel.)

ChloroButyral. *Vid.* Hydride of ChloroButyryl.

ChloroButyrase. *Vid.* ChloroButylene.

***Bi*ChloroButyric Acid.** Almost insoluble $C_8H_6Cl_2O_4 = C_8H_5Cl_2O_3, HO$ in water. Soluble in all proportions in alcohol. (Pelouze & Gélis, *Ann. Ch. et Phys.*, (3.) **10.** 448.)

***Bi*ChloroButyrate of Ammonia.** Very soluble in water. (P. & G., *loc. cit.*)

***Bi*ChloroButyrate of Ethyl.** Scarcely $C_8H_5(C_4H_5)Cl_2O_4$ soluble in water. Very soluble in alcohol, and ether. (Pelouze & Gélis, *Ann. Ch. et Phys.*, (3.) **10.** 449.)

***Bi*ChloroButyrate of Potash.** Very soluble in water. (P. & G., *loc. cit.*)

***Bi*ChloroButyrate of Silver.** Very sparingly soluble in water. (P. & G., *loc. cit.*, p. 450.)

***Bi*ChloroButyrate of Soda.** Very soluble in water. (P. & G.)

***Quadri*ChloroButyric Acid.** Insoluble in $C_8H_4Cl_4O_4$ water. Very soluble in alcohol, and ether. (Pelouze & Gélis, *Ann. Ch. et Phys.*, (3.) **10.** 449.)

***Quadri*ChloroButyrate of Ethyl.** Scarcely $C_8H_3(C_4H_5)Cl_4O_4$ at all soluble in water. Tolerably abundantly soluble in alcohol, and ether. (P. & G., *loc. cit.*)

***Quadri*ChloroButyrate of Potash.** Soluble in water.

***Quadri*ChloroButyrate of Silver.** Very sparingly soluble in water. (P. & G., *loc. cit.*, p. 450.)

ChloroButyrene. Insoluble in water. Soluble $C_{14}H_{13}Cl$ in all proportions in alcohol. (Chancel, *Ann. Ch. et Phys.*, (3.) **12.** 152.)

ChloroCaffein. Soluble in water and in $C_{16}H_9ClN_4O_4$ alcohol. (Rochleder.)

***Quadri*ChloroCamphene.** $C_{20}H_{12}Cl_4$

***Quadri*ChloroCamphor.** Insoluble in water, $C_{20}H_{12}Cl_4O_2$ with which it forms a cream-like mass. Readily soluble in alcohol, and ether. (Claus.)

***Sexi*ChloroCamphor.** Resembles quadri- $C_{20}H_{10}Cl_6O_2$ ChloroCamphor.

ChloroCaoutchin. Sparingly soluble in water. Easily soluble in alcohol, and ether. Water precipitates it from the alcoholic solution. Soluble in concentrated sulphuric and nitric acids, separating out again unchanged on cooling. (Himly.)

ChloroCaprylal. Insoluble in water. Soluble $C_{16}H_{11}Cl_5O_2$ in alcohol, and ether. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 113.)

***Quinqui*ChloroCaprylene.** Insoluble, or but (*PentaChlor Octylene.*) $C_{16}H_{11}Cl_5''$ sparingly soluble, in water. (Bouis.)

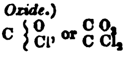
ChloroCarbethamic Acid. Not isolated.

ChloroCarbethamate of Ammonia. Very $C_{10}H_6Cl_7NO_{10}$ readily soluble in water, alcohol, and ether. (Malaguti, *Ann. Ch. et Phys.*, (3.) **16.** 39.)

ChloroCarbethamid. *Vid.* *ter*ChlorAcetamid.

ChloroCarbolic Acid. *Vid.* ChloroPhenic Acid.

ChloroCarbonic Acid. (*Chlor OxyCarbonic Acid. Phosgene Gas. Chloride of Carbonyl. Chloride of Carbonic Oxide. ChloroCarbonic Oxide.*)

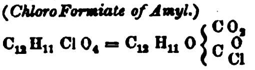


$C\left\{\begin{matrix}O\\Cl\end{matrix}\right., \text{ or } \begin{matrix}CO_2\\CCl_2\end{matrix}$

Immediately decomposed by water. Soluble, without decomposition, in 0.0833 vol. of alcohol. Soluble in chloride of sulphur (S Cl), and in dichloride of sulphur (S_2Cl). 1 vol. of terchloride of arsenic ($AsCl_3$) absorbs 10 vols. of it, but this is again evolved on the addition of water.

ChloroCarbonate of "Ammonia." Said $2NH_3, COCl$ to be a mixture of carbamid and chloride of ammonium. Soluble in acetic acid, without effervescence.

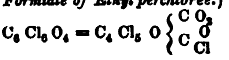
ChloroCarbonate of Amyl, or Carbonate & ChloroCarbonate of Amyl. (*ChloroFormiate of Amyl.*)



$C_{12}H_{11}ClO_4 = C_{12}H_{11}O\left\{\begin{matrix}CO_2\\C\begin{matrix}O\\Cl\end{matrix}\end{matrix}\right.$

Decomposed by an aqueous solution of ammonia. (Medlock.)

ChloroCarbonate of *per*ChlorEthyl. (*ChloroFormiate of perChlorEthyl. Formiate of Ethyl perchlorée.*)



$C_6Cl_6O_4 = C_4Cl_5O\left\{\begin{matrix}CO_2\\C\begin{matrix}O\\Cl\end{matrix}\end{matrix}\right.$

Decomposed by water and by moist air, by alcohol, wood-spirit, acids, and al-

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kalies. (Cahours, *Ann. Ch. et Phys.*, (3.) **17.** pp. 300, 302.)

ChloroCarbonate of *per*ChloroMethyl. (*ChloroFormiate of terChloroMethyl. Formiate de Methyle perchloré. PerChloroMethylic Formiate.*) $C_4 Cl_4 O_4 = C_2 Cl_3 O \left\{ \begin{matrix} C O_2 \\ C O Cl \end{matrix} \right.$ Decomposed by alcohol, by wood-spirit, and by dilute solutions of the caustic alkalies. (Cahours, *Ann. Ch. et Phys.*, (3.) **19.** 353.) Insoluble in water. Decomposed by fusel-oil (hydrate of amyl), and violently by ammonia-water. Solutions of potash, even when hot and concentrated, exert scarcely any decomposing action upon it. (Cahours.)

ChloroCarbonate of Ethyl. (*ChloroCarbonic Ether. ChloroFormic Ether. OxyChloroCarbonic Ether. Chlorovinic Formiate.*) $C_6 H_5 Cl O_4 = C_4 H_5 O \left\{ \begin{matrix} C O_2 \\ C O Cl \end{matrix} \right.$ Insoluble, or very sparingly soluble, in cold water; partially decomposed by warm water. Soluble in alcohol. Soluble in concentrated sulphuric acid, but soon decomposes on standing, and especially when heated. Violently decomposed by solution of ammonia. (Dumas.)

ChloroCarbonate of Methyl. (*OxyChloroCarbonate of Methylene. Chloromethylic Formiate.*) $C_4 H_3 Cl O_4 = C_2 H_3 O \left\{ \begin{matrix} C O_2 \\ C O Cl \end{matrix} \right.$ Insoluble, or but slightly soluble, in water. Soluble, with decomposition and great evolution of heat, in caustic ammonia. (Dumas & Péligot.)

ChloroCarbonic Ether. *Vid.* Carbonate of ChlorEthyl.

ChloroCarbonic Oxide. *Vid.* ChloroCarbonic Acid.

ChloroCarotin. (*Carotinechlorée.*) $C_{36} H_{20} Cl_4 O_2$ Insoluble in water. Tolerably easily soluble in alcohol, and ether. Very readily soluble in bisulphide of carbon. (Zeise, *Ann. Ch. et Phys.*, (3.) **20.** 127.) Easily soluble in boiling alcohol, in ether, benzin, and bisulphide of carbon. Water precipitates it from the alcoholic solution. (Husemann.)

ChloroCarvene. Insoluble in water. $C_{20} H_{12} Cl_4$? (Schweizer.)

ChloroCerotic Acid. Soluble in absolute $C_{54} H_{42} Cl_{12} O_4$ alcohol.

ChloroCerotate of Ethyl.
$C_{54} H_{41} Cl_{12} (C_4 H_5) O_4$

ChloroCerotate of Soda. Almost insoluble in water.

ChloroCerotone.
I.) $C_{54} H_{36} Cl_{18}$
II.) $C_{54} H_{33} Cl_{21}$
III.) $C_{54} H_{32} Cl_{22}$

ChloroChloric Acid. (*Euchlorine.*) $Cl_3 O_{13} = 2 Cl O_5, Cl O_3$ Soluble in water. On exposure to sunlight, the aqueous solution is decomposed in the course of a few hours, but in diffused light this decomposition is not completed until after the lapse of several months. (Millon, *Ann. Ch. et Phys.*, (3.) **7.** pp. 315, 331.)

ChloroCholesterin. Insoluble in water. $C_{52} H_{37} Cl_7 O_2$ Sparingly soluble in alcohol. Easily soluble in ether.

ChloroChromic Acid. (*Chromate of TerChloride of Chromium.*) $Cr_2 Cl_3, 2 Cr O_3$ Decomposed by water, alcohol, wood-spirit, naphtha, oil of turpentine, and olive-oil, with evolution of much heat, and, in several of the cases, production of flame. Not altered at first by liquid glacial acetic acid, but is decomposed thereby in the course of a fortnight. Neither nitric nor muriatic acid have any sensible action upon it. (T. Thomson, *Phil. Trans.*, 1827, Part I. pp. 192–195.)

***Bi*ChloroCinchonin.** (*Cinchonine bichlorée.*) $C_{40} H_{22} Cl_2 N_2 O_2$ Soluble in boiling, less soluble in cold alcohol. (Laurent, *Ann. Ch. et Phys.*, (3.) **24.** 304.)

ChloroCinnamic Acid. $C_{18} H_7 Cl O_4 = C_{18} H_6 Cl O_3, H O$ Sparingly soluble in cold, more easily soluble in hot water. Easily soluble in alcohol, and ether. (Toel.) Less soluble in water and in alcohol than chlorobenzoic acid. (E. Kopp, *Ann. Ch. et Phys.*, (3.) **20.** 380.)

ChloroCinnamate of Ammonia.
$C_{18} H_6 Cl (N H_4) O_4 + Aq$

ChloroCinnamate of Baryta. Soluble in $C_{18} H_6 Cl Ba O_4 + Aq$ boiling, less soluble in cold water.

ChloroCinnamate of *ter*ChloroStyracyl. (*ChloroStyracin.*) $C_{36} H_{13} Cl_4 O_4 = C_{18} H_6 Cl (C_{18} H_6 Cl_3) O_4$ Insoluble in water. Soluble in boiling alcohol, and ether. (Toel.)

ChloroCinnamate of Lime. Sparingly soluble in water.

ChloroCinnamate of Potash. Soluble in boiling, very sparingly soluble in cold alcohol. (Toel.)

ChloroCinnamate of Silver.
$C_{18} H_6 Cl Ag O_4$

ChloroCinnamene.
(*ChloroStyrol.*)
$C_{16} H_7 Cl''$

ChloroCinnamyl. *Vid.* Hydride of ChloroCinnamyl.

ChloroCinnose. *Vid.* Hydride of *quadri*ChloroCinnamyl.

ChloroCodein. $C_{36} H_{20} Cl N O_6 + 3 Aq$ Sparingly soluble in boiling, less soluble in cold water. Very soluble in strong alcohol, especially if it be warm. Sparingly soluble in ether. Soluble in chlorhydric acid, and in cold concentrated sulphuric acid, without decomposition; also soluble in nitric acid, the solution being decomposed when heated. Insoluble in ammonia-water.

ChloroColophene. [Insoluble? in alcohol.] $C_{40} H_{24} Cl_8$ (Deville.)

ChloroComenic Acid. $C_{12} H_3 Cl O_{10} + 8 Aq$ More readily soluble, both in cold and in hot water, than comenic acid. Readily soluble in boiling, less soluble in cold water. Very readily soluble in warm alcohol. Its metallic salts are in general more soluble than the corresponding meconates. (How.)

ChloroComenate of Ammonia.
a = *mono.* Readily soluble in water.

ChloroComenate of Baryta.
a = *mono.* Sparingly soluble in water.
b = *bi.* Insoluble in water.

ChloroComenate of Copper.
a = *mono.* Ppt.
b = *bi.* Insoluble in water.

ChloroComenate of Lime.
a = *mono.* Sparingly soluble in water.
b = *bi.* Insoluble in water.

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ChloroComenate of Magnesia.
a = *mono.* Sparingly soluble in water.
b = *bi.* Insoluble in water.

ChloroComenate of Potassium.
a = *mono.* Soluble in water.

ChloroComenate of Silver.
a = *mono.* Insoluble in cold, soluble in boiling water. $C_{12} H_2 Ag Cl O_{10}$
b = *bi, or normal.* Insoluble in boiling water. $C_{12} H Ag_2 Cl O_{10}$ Soluble in nitric acid, with decomposition, if heated. Not entirely decomposed by boiling with chlorhydric acid. (How.)

ChloroComenate of Soda.
a = *mono.* Readily soluble in water.

ChloroCreosol.
$C_{16} H_7 Cl_3 O_4$

ChloroCuminol. *Vid.* Hydrate of ChloroCumoyl; and also Chloride of Cumol($C_{20} H_{13}''$).

ChloroCumol. *Vid.* Chloride of Cumol.

ChloroCuprate of *X*. *Vid.* Chloride of Copper & of *X*.

ChloroCyanamid. (*ParaChloroCyanate of Ammonia.*) $C_4 H_4 N_5 Cl = 2 N \left\{ Cy H_2, Cy Cl \right.$ Insoluble in cold, sparingly soluble in hot water. Soluble, with decomposition, in an aqueous solution of potash. (Liebig.)

ChloroCyanAnilid. *Vid.* PhenylChloroCyanamid.

***Para*ChloroCyanate of Ammonia.** *Vid.* Chlorocyanamid.

ChloroCyAnilid. *Vid.* PhenylChloroCyanamid.

"**ChloroCyanide of Ethyl.**" $C_6 H_5 N Cl O = C_4 H_5 O, C_2 N Cl$ Slowly decomposed by cold, quickly by hot water. Soluble in wood-spirit, ether, and alcohol, the last-named solution decomposing in the course of 24 hours. Water precipitates it from the alcoholic solution. (Aimé, *Gmelin's Handbook*, 8. 492.)

"**ChloroCyanide of Formic Ether.**" $C_8 H_6 N Cl O_4$ Sparingly soluble in cold, more soluble in hot water or ammonia-water. Readily soluble in alcohol, and ether, from both of which it is precipitated by water. Soluble in warm concentrated sulphuric acid, from which it is precipitated, unchanged, by water. Insoluble in chlorhydric acid. (Stenhouse, *Gmelin's Handbook*, 8. 492.)

"**ChloroCyanic Oil.**" Insoluble in water. $C_{12} N_4 Cl_{14}$ Readily soluble in alcohol. (Sérullas.) Soluble in ether. (Bouis.)

ChloroCyanuric Ether. Soluble in absolute alcohol, from which it is precipitated on the addition of water. $C_{18} H_{11} Cl_4 N_3 O_6$ (Habich & Limpricht.)

ChloroDracyl. *Vid.* Chlorhydrate of *bi*ChloroToluene.

ChlorŒnanthic Acid. Insoluble, or very sparingly soluble, in water. $C_{28} H_{24} Cl_4 O_6$ (Malaguti.)

ChlorŒnanthate of *bi*ChlorEthyl. (*ChlorŒnanthic Ether. Œnanthic Etherchloré.*) $C_{36} H_{28} Cl_8 O_6 = C_{28} H_{22} Cl_4 . (C_4 H_3 Cl_2)_2 O_6$ Soluble in 15 @ 16 pts. of alcohol at 40°. (Malaguti.)

ChlorŒnanthol. *Vid.* Hydride of ChlorŒnanthyl.

ChlorŒnanthylene. Insoluble in water. $C_{14} H_{13} Cl''$ (Limpricht.)

ChloroEuxanthic Acid. *Vid.* ChlorEuxanthic Acid.

***Bi*ChloroDumasin.**
$C_{12} H_8 Cl_2 O_2$

ChloroFerrocyanide of *X*. *Vid.* Chloride of *X* with Ferrocyanide of *X*.

Chloroform. *Vid.* Chloride of *bi*ChloroMethyl.

ChloroFormiate of *X*. *Vid.* ChloroCarbonate of *X*.

ChloroFormic Ether. *Vid.* ChloroCarbonate of Ethyl.

***Bi*ChloroFormic Ether.** *Vid.* Formiate of *bi*ChlorEthyl.

***Per*ChloroFormic Ether.** *Vid.* *ter*ChlorAcetate of *ter*ChloroMethyl.

ChloroGinic Acid. *Vid.* CaffeoTannic Acid.

ChloroHelicin. *Vid.* ChlorHelicin.

***Bi*ChloroKinonamic Acid.** (*ChlorAnilamic Acid. ChlorAnilam. BiChloroQuinonamic Acid.*) $C_{12} H_3 Cl_2 N O_6 + 5 Aq = N \left\{ \begin{matrix} C_{12} Cl_2 O_4'' \\ H_2 \end{matrix} \right. . O, H O, + 5 Aq$ Sparingly soluble in water. (Erdmann.) Soluble in water, alcohol, and ether.

***Bi*ChloroKinonamate of Ammonia.** (*ChlorAnilammon.*) $C_{12} H_2 (N H_4) Cl_2 N O_6 + 4 Aq$ Soluble in water, especially when this is warm. (Erdmann.)

***Bi*ChloroKinonamate of Baryta.** Soluble in warm water. (Erdmann.)

***Bi*ChloroKinonamate of Copper.** Ppt.

***Bi*ChloroKinonamate of *peroxide* of Iron.** Ppt.

***Bi*ChloroKinonamate of Lead.** Ppt.

***Bi*ChloroKinonamate of Nickel.** Ppt.

***Bi*ChloroKinonamate *of dinoxide* of Mercury.** Ppt.

***Bi*ChloroKinonamate of Silver.** Soluble in warm water, in caustic ammonia, and in acetic acid. $C_{12} H_2 Ag Cl_2 N O_6$ (Erdmann.)

***Bi*ChloroKinonamid.** (*BiChloroQuinonamid. ChlorAnilamid.*) $C_{12} H_4 Cl_2 N_2 O_4 = N_2 \left\{ \begin{matrix} C_{12} Cl_2 O_4'' \\ H_4 \end{matrix} \right.$ Insoluble in water. Almost insoluble in alcohol or ether. Soluble in a dilute aqueous solution of ammonia. Soluble in monohydrated sulphuric acid. Soluble in an alcoholic solution of caustic potash. Unacted on by chlorhydric acid. (Laurent.)

***Bi*ChloroKinonic Acid.** (*BiChloroQuinonic Acid. ChlorAnilic Acid.*) $C_{12} H_2 Cl_2 O_8 + 2 Aq = C_{12} Cl_2 O_6, 2 H O + 2 Aq$ Soluble in water, and is precipitated therefrom by chlorhydric or sulphuric acid. (Erdmann.)

***Bi*ChloroKinonate of Ammonia.**

***Bi*ChloroKinonate of Baryta.** $C_{12} Cl_2 Ba_2 O_8 + 6 Aq$ Very sparingly soluble in boiling water.

***Bi*ChloroKinonate of Cobalt.**

***Bi*ChloroKinonate of Copper.**

***Bi*ChloroKinonate *of peroxide* of Iron.** Ppt.

***Bi*ChloroKinonate of Lead.** Ppt.

***Bi*ChloroKinonate of Magnesia.**

***Bi*ChloroKinonate *of dinoxide* of Mercury.** Ppt.

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*Bi*ChloroKinonate of Nickel.

*Bi*ChloroKinonate of Potash. Tolerably soluble in water, and alcohol; less soluble in a solution of caustic potash. (Erdmann.)
$C_{12} K_2 Cl_2 O_8 + 2 Aq$

*Bi*ChloroKinonate of Silver. Very sparingly soluble in water. (Erdmann.)
$C_{12} Ag_2 Cl_2 O_8$

*Bi*ChloroKinonate of Soda. Soluble in water, and alcohol.
$C_{12} Cl_2 Na_2 O_8 + 8 Aq$

ChloroKinone. Soluble in boiling, but nearly insoluble in cold water. Tolerably soluble in strong alcohol, from which it is precipitated on the addition of water. Also soluble in hot spirit of 50%, a portion of it being re-precipitated as the solution cools. Very soluble in ether. Soluble in strong acetic acid, and in hot dilute acetic acid. (Stædeler.)
(*Chloro Quinone.*)
$C_{12} H_3 Cl O_4$

*Bi*ChloroKinone. Insoluble in water. Nearly insoluble in cold, but abundantly soluble in boiling strong alcohol. Very sparingly soluble in spirit of 40%, even when this is boiling. Readily soluble in ether. Tolerably soluble in strong boiling acetic acid, from which solution it separates out on cooling. Soluble, without decomposition, in strong boiling chlorhydric acid, less soluble in the cold. Sparingly soluble in cold, abundantly soluble in hot nitric acid of 1.25 sp. gr., without decomposition. (Stædeler.) Also soluble, without decomposition, in warm concentrated sulphuric acid; and, with decomposition, in an aqueous solution of caustic potash.
(*BiChloro Quinone. Quinonebichloré.*)
$C_{12} H_2 Cl_2 O_4$

*Ter*ChloroKinone. Soluble in *cold*, but very sparingly soluble in hot water. Sparingly soluble in cold, more abundantly soluble in hot alcohol or acetic acid, being more soluble in both these liquids in proportion as they are more concentrated. Soluble in ether. Soluble in cold monohydrated sulphuric acid, from which water precipitates it unchanged. Soluble, without decomposition, in hot strong nitric acid, less soluble in cold nitric acid. (Stædeler.)
(*TriChloro Quinone. Quinone terchloré. TriChlorChinone.*)
$C_{12} H Cl_3 O_4$

*Per*ChloroKinone. Insoluble in water. Difficultly soluble in hot, and almost entirely insoluble in cold alcohol; somewhat more soluble in ether. Unacted upon by acids. Easily decomposed by alkalies. (G. Hofmann, *Ann. Ch. et Phys.*, (3.) **16.** 286.) Unacted on by concentrated chlorhydric or nitric acid, or by aqua-regia, even when boiling. (Stenhouse.) Soluble in an aqueous solution of caustic potash.
(*Quinone perchloré. Chloranil.*)
$C_{12} Cl_4 O_4$

ChlorOleic Acid.
$C_{36} H_{32} Cl_2 O_4$

ChloroMeconin. Nearly insoluble in cold, somewhat more easily soluble in boiling water. Abundantly soluble in alcohol, and ether. No more soluble in alkaline solutions than in water. Soluble in cold concentrated sulphuric acid. Soluble in nitric acid, the solution undergoing decomposition when heated. (Anderson, *J. Ch. Soc.*, **9.** 275.)
(*Chlor Opianyl. Hydride of Chlor Opianyl.*)
$C_{20} H_9 Cl O_8$

ChloroMelal.
$C_{60} H_{45.5} Cl_{14.5} O_2$

*Bi*ChloroMelAnilin. Difficultly soluble in water. Easily soluble in alcohol, and ether Soluble in alcohol. (Hofmann, *J. Ch. Soc.*, **1.** 299.)
$C_{26} H_{11} Cl_2 N_3$

*Ter*ChloroMelAnilin. Insoluble in water. Soluble in alcohol. (Hofmann.)
$C_{26} H_{10} Cl_3 N_3$

"ChloroMenthene." *Vid.* Chlorhydrate of Menthene.

*Quinqui*ChloroMenthene. Sparingly soluble in water. Easily soluble in alcohol, and wood-spirit, and still more readily in ether, and oil of turpentine. (Walter.)
$C_{20} H_{13} Cl_5$

ChloroMercuric Acid. *Vid. proto*Chloride of Mercury (Hg Cl).

ChloroMercurate of Acetosamin. Very sparingly soluble in cold, tolerably easily soluble in boiling water. Insoluble in alcohol. (Natanson.)

ChloroMercurate of Aconitin. Tolerably soluble in an aqueous solution of chloride of ammonium, and in chlorhydric acid.

ChloroMercurate of Allyl with Sulphide of Allyl & of Mercury. Insoluble in water. Difficultly soluble in alcohol, and ether.
$C_6 H_5 Cl, 2 Hg Cl; C_6 H_5 S, 2 Hg S$

ChloroMercurate of AmylStrychnine. Sparingly soluble in boiling, less soluble in cold water.

ChloroMercurate of Atropin. Somewhat soluble in water.

ChloroMercurate of AzoNaphthylamin. Readily soluble in water. (Zinin.)

ChloroMercurate of Berberin. Soluble in an aqueous solution of chloride of ammonium and in chlorhydric acid.

ChloroMercurate of Benzidin. Soluble in water, and alcohol.

ChloroMercurate of Brucin. Sparingly soluble, or insoluble, in water or strong alcohol.
$C_{46} H_{26} N_2 O_8, H Cl, 2 Hg Cl$

ChloroMercurate of *tri*CaproylAmin. Deliquescent. Easily soluble in alcohol, and ether. (Petersen, *Ann. Ch. u. Pharm.*, **102.** 317.)

ChloroMercurate of ChlorAnilin.

ChloroMercurate of Cinchonidin (of Pasteur). Difficultly soluble in cold water. (Leers, *Ann. Ch. u. Pharm.*, **82.** 157.)
$C_{40} H_{24} N_2 O_2, 2 (H Cl, Hg Cl)$

ChloroMercurate of Cinchonin. Almost insoluble in cold water, ordinary alcohol, or ether; tolerably soluble in boiling water and in warm alcohol. Easily soluble in concentrated chlorhydric acid.
$C_{40} H_{24} N_2 O_2, 2 (Hg Cl, H Cl)$

ChloroMercurate of Codein. Soluble in boiling water, and alcohol.

ChloroMercurate of Collidin. Soluble in hot, less soluble in cold water, and alcohol. (Anderson.)

ChloroMercurate of Coniin. Insoluble in water, alcohol, and ether. (Ortigosa.) [Compare Chloride of Mercury with Coniin.]

ChloroMercurate of Corydalin. Ppt.

ChloroMercurate of Cotarnin. Ppt.
$C_{26} H_{13} N O_6, H Cl, 2 Hg Cl.$

ChloroMercurate of Emetin. Sparingly soluble in water.

ChloroMercurate of Ethylamin. Solu-

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$N\left\{\begin{matrix}C_4H_5\\H_2\end{matrix}\right., HCl, HgCl$ ble in water, and alcohol. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 481.)

ChloroMercurate of *tetr*Ethylammonium.

I.) $N\left\{(C_4H_5)_4 Cl, 5 HgCl\right.$ Easily soluble in water, and in chlorhydric acid, especially when these are boiling.

II.) $N\left\{(C_4H_5)_4 Cl, HgCl\right.$ Soluble in water, and alcohol. (Sonnenschein.)

ChloroMercurate of EthylAnilin.

ChloroMercurate of EthylConiin.

ChloroMercurate of *di*EthylConiin. Ppt.

ChloroMercurate of EthylNicotin. Soluble in boiling, sparingly soluble in cold water. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **87.** 8.)

$N\left(C_{10}(C_4H_5)H_6'''\right), HCl, 8 HgCl$

ChloroMercurate of EthylStrychnine. Somewhat soluble in boiling, less soluble in cold water.

ChloroMercurate of Guanin.

$C_{10}H_5N_5O_2, HCl, HgCl + Aq$

ChloroMercurate of Harmalin. Sparingly soluble in water.

ChloroMercurate of Harmin.

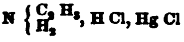
ChloroMercurate of Iodide of *tetra*Ethylammonium. Easily soluble in water and in chlorhydric acid, especially on boiling. (Hofmann.) Soluble in warm alcohol. (Sonnenschein.)

$N(C_4H_5)_4 I, 5 HgCl$

ChloroMercurate of MelAnilin. Soluble in water acidulated with chlorhydric acid. (Hofmann.)

ChloroMercurate of Mercury. *Vid.* OxyChloride of Mercury.

ChloroMercurate of Methylamin. Soluble in water. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 459.)

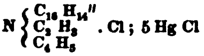


$N\left\{\begin{matrix}C_2H_3\\H_2\end{matrix}\right., HCl, HgCl$

ChloroMercurate of MethylCinchonin.

ChloroMercurate of MethylEthylConiin.

I.)



$N\left\{\begin{matrix}C_{16}H_{14}''\\C_2H_3\\C_4H_5\end{matrix}\right. . Cl; 5 HgCl$

II.) $N C_{22}H_{22} Cl; 6 HgCl$ Tolerably easily soluble in water, alcohol, and ether. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **89.** 141.)

ChloroMercurate of MethylNicotin. Somewhat soluble in boiling, less soluble in cold water. (Stahlschmidt, *Ann. Ch. u. Pharm.*, **90.** 225.)

$N\left(C_{10}H_7(C_2H_3)\right) Cl, 4 HgCl$

ChloroMercurate of Morphin. Very sparingly soluble in cold water, alcohol, or ether; more soluble in boiling alcohol. Very readily soluble in chlorhydric acid.

$C_{34}H_{19}NO_6, HCl, 4 HgCl$

ChloroMercurate of Naphthylamin. Difficultly soluble in cold, completely soluble in boiling alcohol. (Zinin.)

ChloroMercurate of Narcotin. Soluble in alcohol acidulated with chlorhydric acid.

$C_{46}H_{25}NO_{14}, HCl, HgCl$ (?)

ChloroMercurate of Nicotin. Soluble in boiling water. [Compare Chloride of Mercury with Nicotin.]

$C_{20}H_{14}N_2, HCl, 8 HgCl$

ChloroMercurate of *ter*NitrAmarin. Ppt.

ChloroMercurate of NitroHarmalin.

ChloroMercurate of NitroHarmin.

ChloroMercurate of *tri*Phenylamin. Decomposed by water.

ChloroMercurate of PhenylUrea.

ChloroMercurate of Picolin. Permanent. Soluble in water. (Unverdorben.) [Compare Chloride of Mercury with Picolin.]

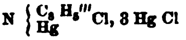
ChloroMercurate of Piperin. Insoluble in water. Sparingly soluble in cold, more soluble in boiling alcohol. Sparingly soluble in concentrated chlorhydric acid.

$C_{68}H_{38}N_2O_{12}, HCl, 2 HgCl$

ChloroMercurate of PurpureoCobalt. Tolerably soluble in hot, less soluble in cold water. (Claudet, *Phil. Mag.*, (4.) **2.** 258.)

$5 NH_3 . Co_2Cl_3, 6 HgCl$

ChloroMercurate of Pyrrol. Insoluble in water. Sparingly soluble in cold, more soluble in boiling alcohol; but this solution is attended with partial decomposition.



$N\left\{\begin{matrix}C_8H_5'''\\Hg\end{matrix}\right. Cl, 8 HgCl$

ChloroMercurate of Quinine. Very sparingly soluble in water, cold alcohol, and ether.

$C_{40}H_{24}N_2O_4, 2 (HCl, HgCl)$

ChloroMercurate of Retinin. Sparingly soluble in warm water; much more soluble in alcohol. Readily soluble in cold dilute chlorhydric acid.

ChloroMercurate of Spartein. Almost insoluble in water, and alcohol. Readily soluble in water acidulated with chlorhydric acid. Soluble, without decomposition, in warm, less soluble in cold, chlorhydric acid. (Stenhouse.)

$N\left\{C_{15}H_{13}''', HCl, HgCl\right.$

ChloroMercurate of StibEthylium.

$a = Sb(C_4H_5)_4 Cl, 8 HgCl$ Soluble in water, and alcohol. Insoluble in ether. (Lœwig.)

$b = 2 Sb(C_4H_5)_4 Cl, 8 HgCl$ Difficultly soluble in water. (Lœwig.)

ChloroMercurate of Strychnine. Difficultly soluble in water. Easily soluble in spirit, especially if it is hot. (Abel & Nicholson, *J. Ch. Soc.*, **2.** 259.)

$C_{42}H_{22}N_2O_4, HCl, 2 HgCl$

ChloroMercurate of Thebain.

ChloroMercurate of Theobromin. Sparingly soluble in water, and alcohol.

ChloroMercurate of *tetra*Vinylium. Very sparingly soluble in boiling, less soluble in cold water. (Heintz & Wislicenus.)

ChloroMercurate of XanthoCobalt. Insoluble in cold, difficultly soluble, without decomposition, in hot water. (Gibbs & Genth, *Smithson. Contrib.*, Vol. **9.**)

$NO_2 . 5 NH_3 . Co_2O, Cl_2 ; 4 HgCl + 2 Aq$

ChloroMesitate of Methylene. Permanent. Insoluble in water. Very soluble in alcohol, and ether. (Bouis, *Ann. Ch. et Phys.*, (3.) **21.** 114.)

$C_{10}H_{10}Cl_2O_4$

***Ter*ChloroMesitylene.** Insoluble in water. Soluble in alcohol and in boiling ether. (Kane.)

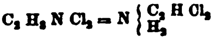
(*Chloride of Pteleyl. Hydride of terChloroMesityl.*)

$C_{18}H_9Cl_3$

ChloroMetAldehyde. Insoluble in water.

$C_8H_7ClO_4$

***Bi*ChloroMethylamin.**



$C_2H_3NCl_2 = N\left\{\begin{matrix}C_2HCl_2\\H_2\end{matrix}\right.$

ChloroMethylene (?). Insoluble in water. Soluble in alcohol, and ether. (Laurent.)
(*ChlorMethylase.*)
$C_2 H Cl$

ChloroMethylicAcetate. *Vid.* Acetate of ChloroMethyl.

*Per*ChloroMethylic Acetate. *Vid.* *ter*ChlorAcetate of *ter*ChloroMethyl.

ChloroMethylic Formiate. *Vid.* ChloroCarbonate of Methyl.

*Per*ChloroMethylic Formiate. *Vid.* *per*ChloroFormiate of *per*ChloroMethyl.

ChloroMethylic Oxalate. *Vid.* Oxalate of ChloroMethyl.

ChloroMethylSelenious Acid. Permanent. Easily soluble in water, and alcohol. (Wœhler & Dean, *Ann. Ch. u. Pharm.*, 97. 7.)
$C_2 H_3 Se_2 Cl O_4 + Aq$

ChloroMethylSulphurous Acid. Soluble in water, and alcohol. All of its salts are soluble in water.
(*ChloroSulphoMethylic Acid. Acide Sulfoformique chloré. ChloroMethyl di ThionicAcid. Sulphite of ChloroMethyl. Acide Metholique Chlorosulfuré.*)
$C_2 H_2 \left.\begin{matrix} Cl O \\ H O \end{matrix}\right\} S_2 O_4$

ChloroMethylSulphite of Ammonia. Deliquescent. Soluble in water.

ChloroMethylSulphite of Baryta. Soluble in water.

ChloroMethylSulphite of Lead.
I.) *normal.* Very soluble in water.
$C_2 H_2 Cl Pb O_2, S_2 O_4$
II.) *basic.* Soluble in water.

ChloroMethylSulphite of Potash. Soluble in water and in hot spirit. Insoluble in absolute alcohol.
$C_2 H_2 Cl K O_2, S_2 O_4$

ChloroMethylSulphite of Silver. Deliquescent. Soluble in water. (Kolbe.)

ChloroMethylSulphite of Soda. Deliquescent. Soluble in water and in hot, strong alcohol.

*Bi*ChloroMethylSulphurous Acid. Deliquesces in moist air. Soluble in alcohol, and ether. Its salts are soluble in water, and also, for the most part, in alcohol.
(*BiChloroSulphosoMethylic Acid.*)
$C_2 H Cl_2 \left.\begin{matrix} O \\ H O \end{matrix}\right\} S_2 O_4$

*Bi*ChloroMethylSulphite of Ammonia. Permanent. Soluble in water.

*Bi*ChloroMethylSulphite of Potash. Permanent. Soluble in water. Soluble in boiling alcohol; but insoluble in cold absolute alcohol.
$C_2 H K Cl_2 O_2, S_2 O_4$

*Bi*ChloroMethylSulphite of Silver. Soluble in water. (Kolbe.)
$C_2 H Ag Cl_2 O_2, S_2 O_4$

*Bi*ChloroMethylSulphite of Zinc. Soluble in water.

*Ter*ChloroMethylSulphurous Acid. Deliquescent. Soluble in water. Unacted on by boiling nitric or chromic acids or by aqua-regia. Its salts are soluble in water, and also, to a certain extent, in alcohol.
(*TerChloroSulphosoMethylic Acid.*)
$C_2 H Cl_3 O_2, S_2 O_4 + 2 Aq$

*Ter*ChloroMethylSulphite of Ammonia. Permanent. Soluble in water.

*Ter*ChloroMethylSulphite of Baryta. Soluble in water and in boiling absolute alcohol. (Kolbe.)
$C_2 Cl_3 Ba O_2, S_2 O_4 + Aq$

*Ter*ChloroMethylSulphite of Copper. Permanent. Soluble in water. (Kolbe; Laurent.)
$C_2 Cl_3 Cu O_2, S_2 O_4 + 5 Aq$

*Ter*ChloroMethylSulphite of Lead.
I.) *normal.* Soluble in water.
II.) *basic.* Soluble in water.

*Ter*ChloroMethylSulphite of Potash. Efflorescent. Soluble in water, and alcohol.
$C_2 Cl_3 K S_2 O_6 + 2 Aq$

*Ter*ChloroMethylSulphite of Silver. Soluble in water.
$C_2 Cl_3 Ag O_2, S_2 O_4 + 2 Aq$

*Ter*ChloroMethylSulphite of Soda. Very efflorescent. Much more soluble in water than the potash-salt.

"ChloroMethylSulphurous Chloride" (of Gerhardt). *Vid.* Sulphite of Chloride of ChloroMethyl.

ChloroMichmyl. Very sparingly soluble in water. Readily soluble in alcohol. (Scharling.)

ChloroMichmylic Acid. *Vid.* ChloroBenzoic Acid.

ChloroNaphthalic Acid. *Vid.* ChlorOxyNaphthalic Acid.

ChloroNaphthalin. Insoluble in water. Soluble in all proportions in ether. Easily soluble in alcohol.
(*Chlonaphtase. ChloroNaphthalid. Naphthaline Chloré.*)
$C_{20} H_7 Cl$

*Bi*ChloroNaphthalin. [Has at least seven isomeric modifications.]
(*Chlonaphtèse. BiChloroPhthalin.*)
$C_{20} H_6 Cl_2$

I.) *Modif.* (*a*).

II.) *Modif.* (*c*). Insoluble in water. Very soluble in ether. Somewhat less soluble in alcohol.

III.) *Modif.* (*a d*). Insoluble in water. Very soluble in ether, and alcohol.
(*Parachloronaphthalese.*)

IV.) *Modif.* (*e*). Very soluble in ether, and alcohol; more soluble in alcohol than No. III.

V.) *Modif.* (*f*). Very soluble in alcohol, and ether. Soluble in warm fuming sulphuric acid, and the solution is not precipitated by water.

VI.) *Modif.* (*x*). Soluble in ether, and in a mixture of alcohol and ether.

VII.) *Modif.* (*y*). Is the least soluble in alcohol, and ether, of all the modifications of bichloronaphthalin.

*Ter*ChloroNaphthalin. [Has seven modifications.]
(*Chlonaphtise.*)
$C_{20} H_5 Cl_3$

I.) *Modif.* (*a*). Insoluble in water. Extremely soluble in ether, which dissolves more than its own weight of it at the ordinary temperature. Difficultly soluble in boiling alcohol. Alcohol precipitates it from the ethereal solution. (Laurent.)

II.) *Modif.* (*a c*). Very soluble in ether. More soluble in alcohol than modif. (*a*).

III.) *Modif.* (*c*). Soluble in alcohol, and ether.

IV.) *Modif.* (*g*). Very soluble in ether; somewhat less soluble in alcohol.

V.) *Modif.* (*d*). Very soluble in ether; much less soluble in alcohol.

VI.) *Modif.* (*a d*). Tolerably soluble in ether, though less soluble therein than the other modifications. Very sparingly soluble in alcohol. [Readily soluble in alcohol (in Gm.).]

VII.) *Modif.* (*a e*). Less soluble in ether than (*a*), but more soluble than (*a*) in alcohol.

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*Quadri*ChloroNaphthalin. [Has four modifications.]
(*Chlonaphtose.*)
$C_{20} H_4 Cl_4$

I.) *Modif.* (*a*). Is 4 or 5 times less soluble in ether than modif. (*a*) of terchloronaphthalin. Sparingly soluble in boiling alcohol.

II.) *Modif.* (*b*). Very sparingly soluble in ether.

III.) *Modif.* (*e*). Only very slightly soluble in boiling alcohol, and not much more soluble in warm ether. Its solubility is considerably increased by the presence of a brown oil, which is liable to contaminate it. Almost insoluble in rock-oil at the ordinary temperature, but dissolves therein readily on boiling. (Laurent.)
(*Parachloronaphtalose.*)

IV.) *Modif.* (*k*). Very sparingly soluble in boiling alcohol or ether. Sparingly soluble in cold, but very soluble in boiling petroleum.

*Sexi*ChloroNaphthalin. Scarcely at all soluble in alcohol. Soluble in about 20 pts. of ether. Very soluble in oil of petroleum. (Laurent.)
(*Chlonaphtalase.*)
$C_{20} H_2 Cl_6$

*Per*ChloroNaphthalin. Very sparingly soluble in boiling alcohol or ether. Easily soluble in naphtha.
(*Chlonaptalise.*)
$C_{20} Cl_8$

ChloroNicric Acid. *Vid.* ChloroBenzoic Acid.

ChloroNiceamid. *Vid.* ChloroBenzene.

ChloroNicene.
(*Nicène monochlore.*)
$C_{20} H_{10} Cl_2$

ChloroNicine. Sparingly soluble in water. Soluble in ether. (St. Evre.)
$C_{20} H_{12} Cl_2 N_2$

ChloroNitroBenzoic Acid. *Vid.* NitroChloroBenzoic Acid.

ChloroNitroBenzoyl. *Vid.* Chloride of NitroBenzoyl.

*Bi*ChloroNitroGlycocoll.

$$C_4 H_3 N_2 Cl_2 O_8 = N \left\{ \begin{matrix} C_2 H O_2 \\ C_2 Cl_2 (N O_4) \\ H \end{matrix} \right. . O_2$$

ChloroNitroHarmin, or ChloroNitroHarmidin. Sparingly soluble in cold, more readily soluble in boiling water. Sparingly soluble in ether. Easily soluble in boiling coal-oil, and naphtha. (Fritzsche.)
$C_{20} H_{10} Cl (N O_4) N_2 O_2 + 4 Aq$

*Bi*ChloroNitroPhenic Acid. Sparingly soluble in water. Tolerably readily soluble in boiling, less soluble in cold alcohol. Tolerably readily soluble in ether. (Laurent & Delbos, *Ann. Ch. et Phys.*, (3.) **19**. 380.)
(*Nitro biChloro Carbolic Acid.*)
(*Nitro biChloro Phenic Acid.*)
$C_{12} H_3 Cl_2 N O_6 = C_{12} H_3 Cl_2 (N O_4) O_2$

*Bi*ChloroNitroPhenate of Ammonia. Soluble in water.
$C_{12} H_2 (N H_4) Cl_2 (N O_4) O_2$

*Bi*ChloroNitroPhenate of Potash. Soluble in water.
$C_{12} H_2 K Cl_2 (N O_4) O_2$

ChloroOctylene. *Vid.* ChloroCaprylene.

ChloroPalladic Acid. *Vid. bi*Chloride of Palladium. The metallic chloropalladiates are generally very soluble in water, and are soluble in alcohol also. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17**. 264.)

ChloroPalladiate of Ammonium. Very sparingly soluble in cold, decomposed by boiling water. (Berzelius.)
$N H_4 Cl, Pd Cl_2$

ChloroPalladiate of Barium. Permanent. Soluble in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17**. 264.)

ChloroPalladiate of Cadmium. Permanent. Soluble in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17**. pp. 264, 265.)

ChloroPalladiate of Caffein.

ChloroPalladiate of Calcium. Deliquescent. Soluble in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17**. 264.)

ChloroPalladiate of ChlorAnilin. Ppt.

ChloroPalladiate of Magnesium. Deliquescent. Soluble in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17**. 264.)

ChloroPalladiate of Manganese. Permanent. Soluble in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17**. 264.)

ChloroPalladiate of *tri*Methylamin.

ChloroPalladiate of Nickel. Permanent, at least in dry air. Soluble in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17**. pp. 264, 265.)

ChloroPalladiate of Potassium. Difficultly soluble, with partial decomposition, in cold water. Soluble, with decomposition, when boiled with water in an open vessel, but when heated with water in a closed vessel it dissolves at 100°, separating out again unchanged when the solution is cooled. Insoluble in alcohol; but is decomposed when boiled therewith. Insoluble in water which contains in solution chloride of ammonium, chloride of potassium, or chloride of sodium. Very sparingly soluble, without decomposition, in dilute chlorhydric acid. (Berzelius.)
$K Cl, Pd Cl_2$

ChloroPalladiate of Sodium. Appears to be very soluble in water, and to be very easily decomposed thereby. (Berzelius, *Lehrb.*, **3**. 963.)

ChloroPalladiate of Toluidin. Ppt.

ChloroPalladiate of Zinc. Quickly deliquesces. Soluble in water, and alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17**. 264, 265.)

ChloroPalladous Acid. *Vid. proto*Chloride of Palladium.

ChloroPalladite of Ammonium. Easily soluble in water. Insoluble in strong alcohol. (Wollaston.) Slightly soluble in spirit. (Fischer.) Soluble in an aqueous solution of chloride of ammonium. (Claus, *Beiträge*, p. 56.)
$N H_4 Cl, Pd Cl + Aq$

ChloroPalladite of Anilin.

ChloroPalladite of Barium. Easily soluble in water, and alcohol. (Bonsdorff.)

ChloroPalladite of Cadmium. Permanent. Soluble in water, and alcohol.

ChloroPalladite of Calcium. Deliquescent. Soluble in water, and alcohol. (Bonsdorff.)

ChloroPalladite of Codeine. Ppt. Decomposed by boiling with water.

ChloroPalladite of Cumidin. Soluble in water, and alcohol. (Nicholson, *J. Ch. Soc.*, **1**. 9.)

ChloroPalladite of Ethylamin.

I.) 

$N \left\{ \begin{matrix} H_2 \\ C_4 H_5 \end{matrix} \right. H Cl, Pd Cl$ Soluble in water. (Reckenschuss.)

II.) $2 N C_4 H_7 ; 2 Pd Cl$? Soluble in ethylamin.

III.) $2 N C_4 H_7 ; Pd Cl$?

IV.) $N C_4 H_7, N H_3 Pd Cl$?

ChloroPalladite of EthylNicotin. Soluble in water, and alcohol. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **87**. 8.)

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ChloroPalladite of Magnesium. Deliquesces in moist air. Soluble in water, and alcohol. (Bonsdorff.)

ChloroPalladite of Manganese. Permanent. Soluble in water, and alcohol.

ChloroPalladite of MethylNicotin. Soluble in water, and alcohol. (Stahlschmidt, *Ann. Ch. u. Pharm.*, **90.** 225.)

ChloroPalladite of Nickel. Permanent in dry air. Soluble in water, and alcohol.

ChloroPalladite of Potassium. Tolerably easily soluble in water, and much more readily in hot than in cold. Insoluble in alcohol. (Wollaston.) Tolerably soluble in spirit of 0.84 sp. gr., but very sparingly soluble in absolute alcohol; on boiling the alcoholic solution decomposition ensues, metallic palladium being precipitated. Soluble in ammonia-water. (Berzelius.) Soluble in a cold saturated solution of chloride of potassium. (W. Gibbs, *Am. J. Sci.*, (2.) **31.** 70.)

$K Cl, Pd Cl$

ChloroPalladite of Quinolein. Sparingly soluble in water. (Williams.)

$C_{18} H_7 N, H Cl, Pd Cl$

ChloroPalladite of Sodium. Deliquescent. Easily soluble in water, and alcohol. (Berzelius.)

$Na Cl, Pd Cl$

ChloroPalladite of Strychnine. More readily soluble in hot than in cold water, and alcohol. (Abel & Nicholson, *J. Ch. Soc.*, **2.** 257.)

$C_{42} H_{22} N_2 O_4, H Cl, Pd Cl$

ChloroPalladite of Zinc. Very deliquescent. Soluble in water, and alcohol.

ChloroPalmiticAcid.

$C_{32} H_{28} Cl_4 O_4$

*Bi*ChloroParaNaphthalin. *Vid.* ChlorAnthracenese.

*Bi*ChloroPhenic Acid. Insoluble in water. Readily soluble in alcohol, and ether. (Laurent.)

(*ChloroPhenesic Acid. ChloroSpirolic Acid. BiChloroCarbolic Acid.*)

$C_{12} H_4 Cl_2 O_2 = C_{12} H_3 Cl_2 O, H O$

*Bi*ChloroPhenate of Ammonia. Difficultly soluble in water. (Laurent.)

*Ter*ChloroPhenic Acid. Insoluble in water. (Laurent.) Almost insoluble in water at ordinary temperatures, and scarcely more soluble in boiling water. (Piria, *Ann. Ch. et Phys.*, (3.) **14.** 271.) Soluble in all proportions in alcohol, and ether; also soluble in wood-spirit. (Laurent.) Very soluble in alcohol, ether, and the fatty and volatile oils. (Piria, *loc. cit.*) Readily soluble in warm concentrated sulphuric acid, separating out on cooling. (Laurent.) Soluble in aqueous solutions of potash, and ammonia. (Piria, *loc. cit.*)

(*ChloroPhenisic Acid. TerChloroCarbolic Acid. ChloroSpirolic Acid. ChlorIndoptic Acid. ChlorPhenisic Acid.*)

$C_{12} H_3 Cl_3 O_2 = C_{12} H_2 Cl_3 O, H O$

*Ter*ChloroPhenate of Ammonia. Very sparingly soluble in cold, very easily soluble in hot water. Easily soluble in water containing alcohol. (Laurent.)

$C_{12} H_2 (N H_4) Cl_3 O_2$

*Ter*ChloroPhenate of Baryta. Sparingly soluble in water.

$C_{12} H_2 Ba Cl_3 O_2$

*Ter*ChloroPhenate of Cobalt. Ppt.

*Ter*ChloroPhenate of Copper. Ppt. Soluble in hot, less soluble in cold alcohol. (Erdmann.)

*Ter*ChloroPhenate *of protoxide* of Iron. Ppt.

*Ter*ChloroPhenate *of sesquioxide* of Iron. Ppt.

*Ter*ChloroPhenate of Lead. Ppt.

*Ter*ChloroPhenate of Lime. Sparingly soluble in water.

*Ter*ChloroPhenate *of dinoxide* of Mercury. Ppt.

*Ter*ChloroPhenate *of protoxide* of Mercury. Ppt.

*Ter*ChloroPhenate of Nickel. Ppt.

*Ter*ChloroPhenate of Potash. Very easily soluble in water. (Erdmann.)

*Ter*ChloroPhenate of Silver. Ppt.

$C_{12} H_2 Ag Cl_3 O_2$

*Ter*ChloroPhenate of Soda. Very easily soluble in water. (Laurent.)

*Quinqui*ChloroPhenic Acid. Sparingly soluble, or insoluble, in water. Soluble in alcohol and in naphtha.

(*ChloroPhenusic Acid. ChlorIndoptic Acid chloré.*)

$C_{12} H Cl_5 O_2 = C_{12} Cl_5 O, H O$

*Quinqui*ChloroPhenate of Ammonia. Very sparingly soluble in water. (Laurent.)

*Quinqui*ChloroPhenate of Baryta. Ppt.

*Quinqui*ChloroPhenate of Cobalt. Ppt.

*Quinqui*ChloroPhenate of Copper(Cu O). Ppt.

*Quinqui*ChloroPhenate *of protoxide* of Iron. Ppt.

*Quinqui*ChloroPhenate *of sesquioxide* of Iron. Ppt.

*Quinqui*ChloroPhenate of Lead. Ppt.

*Quinqui*Chloro Phenate *of dinoxide* of Mercury. Ppt.

*Quinqui*ChloroPhenate *of protoxide* of Mercury. Ppt.

*Quinqui*ChloroPhenate of Nickel. Ppt.

*Quinqui*ChloroPhenate of Potash. Sparingly soluble in a boiling solution of caustic potash.

*Quinqui*ChloroPhenate of Silver. Ppt.

$C_{12} Ag Cl_5 O_2$

ChloroPhenesic Acid. *Vid. bi*ChloroPhenic Acid.

ChloroPhenisic Acid. *Vid. ter*ChloroPhenic Acid.

ChloroPhenusic Acid. *Vid. quinqui*ChloroPhenic Acid.

ChloroPhenise. *Vid. ter*ChloroBenzin.

ChloroPhenyl. *Vid.* Chloride of Phenyl.

ChloroPhenylamin. *Vid.* ChlorAnilin.

ChloroPhenylBenzoylamid. Difficultly soluble in boiling, less soluble in cold alcohol.

(*BenzoChloranilid.*)

$C_{26} H_{10} Cl N O_2 = N \left\{ \begin{matrix} C_{14} H_5 O_2 \\ C_{12} H_4 Cl \\ H \end{matrix} \right.$

ChloroPhenylImesatin. Insoluble in water. Readily soluble in boiling, slightly soluble in cold alcohol. (Engelhardt.)

$C_{28} H_9 Cl N_2 O_2$

ChloroPhenylSulphurous Acid.

(*ChloroSulphoBenzolic Acid. Sulphate of ChloroBenzene. Sulphate of PhenylicChloride.*)

$C_{12} H_5 Cl S_2 O_6 = C_{12} H_5 Cl O_2, S_2 O_4$

ChloroPhenylSulphite of Lime. Soluble in water. (Hutchings, *J. Ch. Soc.*, **10.** 101.)

$C_{12} H_4 Ca Cl O_2, S_2 O_4$

ChloroPhloretic Acid. Insoluble in water. Soluble in alcohol, and ether. (Hlasiwetz.)

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ChloroPhosphate of *X*. *Vid.* Chloride of *X* with Phosphate of *X*.

ChloroPhosphamid. Decomposed by water.
$P Cl_3 N_2 H_4$ (?) (Gerhardt, *Ann. Ch. et Phys.*, (3.) **18.** 190.)

ChloroPhosphide of Nitrogen.
$N_2 P_3 Cl_6$
Entirely insoluble in water, but is slowly decomposed when in contact therewith. Easily soluble in alcohol, ether, oil of turpentine, bisulphide of carbon, chloroform, benzin, and in other hydrocarbons. When dissolved in ordinary alcohol or ether, the solution gradually but completely decomposes on standing; the solution in absolute alcohol, however, or that in anhydrous ether, may be preserved unchanged for a long time if kept in well-stopped bottles, — the decomposition occurring in the cases first mentioned seeming to depend upon the water which is present. Soluble in oxychloride of phosphorus. Insoluble in sulphuric, chlorhydric, or nitric acids, or in an aqueous solution of potash. Decomposed by an alcoholic solution of potash. (Gladstone, *J. Ch. Soc.*, **3.** pp. 138, 354, 357.)

ChloroPhosphite of *X*. *Vid.* Chloride of *X* with Phosphite of *X*.

***Bi*ChloroPhthalic Acid.** Soluble in alcohol.
$C_{16} H_4 Cl_2 O_8$

***Bi*ChloroPhthalate of Potash.** (Strecker, *J. Ch. Soc.*, **3.** 252.)
$C_{16} H_2 K_2 Cl_2 O_8$

***Ter*ChloroPhthalic Acid** (Anhydrous). Very sparingly soluble in water.
$C_{16} H Cl_3 O_6 = \left. C_{16} H Cl_3 O_4{}'' . \right\} O_2$

***Ter*ChloroPhthalic Acid.** Very* soluble in boiling water, in alcohol, ether, and alkaline solutions.
(*ChloroPhthalisic Acid.*)
$C_{16} H_2 Cl_3 O_8 = C_{16} H Cl_3 O_6, 2 HO$

***Ter*ChloroPhthalate of Ammonia.**

***Ter*ChloroPhthalate of Silver.**

ChloroPhyll. Permanent. Insoluble in boiling water. Easily soluble in alcohol, less soluble in ether. Soluble in concentrated acids, and alkalies.
(*Chromule.*)
$C_{18} H_9 N O_8$?

ChloroPhyll with Lime. Insoluble in water or alcohol.

ChlorOpianyl. *Vid.* ChloroMeconin.

***Ter*ChloroPicolin.**
$N \left\} C_{12} H_4 Cl_3{}''' \right.$

ChloroPicrin. *Vid.* Chloride of *per*ChloroNitroMethyl.

ChloroPicryl. *Vid.* Chloride of *ter*NitroPhenyl.

ChloroPlatinic Acid. *Vid.* *bi*Chloride of Platinum.

ChloroPlatinate of Acediamin. Readily soluble in water; less soluble in alcohol, and scarcely at all soluble in a mixture of alcohol and ether. (Strecker, *Ann. Ch. u. Pharm.*, **103.** 328.)
$C_4 H_6 N_2, H Cl, Pt Cl_2$

ChloroPlatinate of Acetonin. Soluble in water, and in boiling alcohol acidulated with chlorhydric acid. Insoluble in ether. (Stædeler.)
$C_{18} H_{18} N_2, H Cl, Pt Cl_2$

ChloroPlatinate of Acetosamin [Acetoylamin]. Somewhat sparingly soluble in cold, readily soluble in boiling water. Almost insoluble in alcohol, and ether. (Natanson, *Ann. Ch. u. Pharm.*, **98.** 296.)
(*ChloroPlatinate of Acetylamin.*)
$C_4 H_5 N, H Cl, Pt Cl_2$

ChloroPlatinate of *tetra*Acetosammonium [Acetoylammonium].
$N \left\} (C_4 H_3)_4 Cl, Pt Cl_2 + 2 Aq \right.$

ChloroPlatinate of Aconitin.

ChloroPlatinate of Agrostemmin. Ppt., from alcohol.

ChloroPlatinate of Alanin. Soluble in water, alcohol, and a mixture of alcohol and ether.
$2 C_6 H_7 N O_4, H Cl, Pt Cl_2$

ChloroPlatinate of Allyl with Sulphide of Allyl & of Platinum. Nearly insoluble in water. After having once separated out it is also very sparingly soluble in alcohol, and ether. Unacted upon by chlorhydric acid, or alkaline solutions. (Wertheim.)
$C_6 H_5 Cl, Pt Cl_2 ; 3 (C_6 H_5 S, Pt S_2)$

ChloroPlatinate of Allylamin. Soluble in water.
$C_6 H_7 N, H Cl, Pt Cl_2$

ChloroPlatinate of *tri*Allylamin.
$C_{18} H_{15} N, H Cl, Pt Cl_2$

ChloroPlatinate of *tetr*Allylammonium. Soluble in water.
$C_{24} H_{20} N Cl, Pt Cl_2$

ChloroPlatinate of Aluminum. Deliquescent. Soluble in water. (Salm-Horstmar.)

ChloroPlatinate of Amarin. Somewhat soluble in boiling alcohol.
$C_{42} H_{18} N_2, H Cl, Pt Cl_2$

ChloroPlatinate of AmidoBenzoic Acid. *Vid.* ChloroPlatinate of Benzamic Acid.

ChloroPlatinate of *bi*AmidoBenzoic Acid. Soluble in water, alcohol, and ether. (Voit.)
$C_{14} H_8 N_2 O_4, 2 H Cl, Pt Cl_2$

ChloroPlatinate of AmidoSulphoBenzid. Insoluble in cold, soluble, with partial decomposition, in hot water. Easily soluble in cold alcohol. (Gericke, *Ann. Ch. u. Pharm.*, **100.** 213.)
$C_{24} H_9 (N H_2) S_2 O_4, H Cl, Pt Cl_2$

ChloroPlatinate of *bi*AmidoSulphoBenzid. Comports itself towards solvents in the same manner as the (preceding) mono-amido compound.
$C_{24} H_8 (N H_2)_2 S_2 O_4, 2 H Cl, Pt Cl_2$

ChloroPlatinate of Ammonium. Difficultly soluble in cold, more easily soluble in hot water. (Fresenius, *loc. inf. cit.*) Soluble in 150 pts. of cold, and 80 pts. of boiling water. (Fischer. ?) At 15° @ 20° it is soluble in 26535 pts. of alcohol of 97.5%, in 1406 pts. of alcohol of 76%, and in 665 pts. of 55% alcohol. If free chlorhydric acid be present, the salt is soluble in 672 pts. of alcohol, of 76%, at 15° @ 20°. Very slightly soluble in cold, abundantly soluble in boiling ammonia-water. (Fresenius, *Ann. Ch. u. Pharm.*, 1846, **59.** 118.) By a concentrated solution of chloride of ammonium this salt is almost completely precipitated from its aqueous solution. (Bœttger.) Soluble in an aqueous solution of chloride of ammonium. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 99.) Soluble in an aqueous solution of normal succinate of ammonia. (Dœpping.) It is less soluble in an aqueous solution of bichloride of platinum than in pure water. (Rogojski, *Ann. Ch. et Phys.*, (3.) **41.** 452.) Soluble in an aqueous solution of protochloride of tin. (Fischer.) Exceedingly easily soluble, with decomposition, in a warm aqueous solution of sulphocyanide of potassium. (Claus,
$N H_4 Cl, Pt Cl_2$

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Beiträge, p. 40.) Insoluble in cold chlorhydric acid. Soluble in hot chlorhydric, sulphuric, or nitric acids, separating out again on cooling. (Fischer.)

ChloroPlatinate of AmmoniumChlor- (*BiChlorhydro Chloroplatinate of diplatinamin.*) Platin(*ous*)Ammonium. Readily soluble in hot water. Insoluble, or but sparingly soluble, in alcohol. (Gerhardt.)
$N_2 H_5 Pt Cl, Cl, Pt Cl_2 = N\left\{\begin{matrix} H_2 \\ Pt\,Cl \\ N\,H_4 \end{matrix}\right. . Cl, Pt Cl_2$

ChloroPlatinate of Amylamin. Tolerably readily soluble in water, especially if this be hot; less soluble in dilute spirit. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 494.)
$C_{10} H_{13} N, H Cl, Pt Cl_2$

ChloroPlatinate of *di*Amylamin. Tolerably soluble in water. (Hofmann.)
$C_{20} H_{23} N, H Cl, Pt Cl_2$

ChloroPlatinate of *tri*Amylamin. Ppt.
$C_{30} H_{33} N, H Cl, Pt Cl_2$

ChloroPlatinate of *tetr*Amylammonium. Ppt.
$N \left\{ (C_{10} H_{11})_4 Cl, Pt Cl_2 \right.$

ChloroPlatinate of AmylAnilin. Ppt.
$C_{22} H_{19} N, H Cl, Pt Cl_2$

ChloroPlatinate of *di*AmylAnilin. Soluble in alcohol.
$C_{32} H_{27} N, H Cl, Pt Cl_2$

ChloroPlatinate of AmylNicotin. Ppt.
$N C_{10} H_7 (C_{10} H_{11}) Cl, Pt Cl_2$

ChloroPlatinate of AmylPiperidin. Soluble in weak alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 100.)
$N C_{20} H_{21}, H Cl, Pt Cl_2$

ChloroPlatinate of AmylQuinolein. Sparingly soluble in water. Insoluble in a mixture of alcohol and ether. (Gr. Williams.)
$N \left\{\begin{matrix} C_{18} H_7''' \\ C_{10} H_{11} \end{matrix}\right. . Cl, Pt Cl_2$

ChloroPlatinate of AmylStrychnine.

ChloroPlatinate of Anilin. Sparingly soluble in water, and alcohol. (Zinin.) The aqueous solution is easily decomposed by boiling. (Anderson.) Insoluble in pure ether, and almost insoluble in a mixture of alcohol and ether. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 152.) Tolerably easily soluble in water, less soluble in alcohol. Insoluble in absolute ether. (Hofmann.)
$C_{12} H_7 N, H Cl, Pt Cl_2$

ChloroPlatinate of Animin. Sparingly soluble in water. (Unverdorben.)

ChloroPlatinate of Anisamate of Ethyl. Easily soluble in alcohol when this is gently heated. Completely insoluble in ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 349.)
$N \left\{\begin{matrix} C_{16} H_7 O_4 \\ C_4 H_5 \\ H \end{matrix}\right. . O_2, H Cl, Pt Cl_2$

ChloroPlatinate of Anisamate of Methyl. Easily soluble in alcohol, especially when this is warm. (Cahours, *Ibid.*, p. 351.)
$N \left\{\begin{matrix} C_{16} H_7 O_4 \\ C_2 H_3 \\ H \end{matrix}\right. . O_2, H Cl, Pt Cl_2$

ChloroPlatinate of Anisamic Acid. Tolerably easily soluble in warm water, and alcohol. (Cahours, *Ibid.*, p. 343.)
$N \left\{\begin{matrix} C_{16} H_7 O_4 \\ H_2 \end{matrix}\right\} O_2, H Cl, Pt Cl_2$

ChloroPlatinate of Anisin. Sparingly soluble in alcohol. (Bertagnini, *Ann. Ch. u. Pharm.*, **88.** 129.)
$C_{48} H_{24} N_2 O_6, H Cl, Pt Cl_2$

ChloroPlatinate of Aricin. Very sparingly soluble in water. Tolerably soluble in alcohol.
$C_{46} H_{26} N_2 O_8, H Cl, Pt Cl_2$

ChloroPlatinate of ArsenEthylium. Very difficultly soluble in cold, but somewhat soluble in boiling water. Insoluble in dilute, soluble, with decomposition, in warm concentrated chlorhydric acid.
$(C_4 H_5)_4 As Cl, Pt Cl_2$

ChloroPlatinate of ArsenMethylEthylium. Soluble in boiling, less soluble in cold spirit.
$As \left\{\begin{matrix} (C_2 H_3)_2 \\ (C_4 H_5)_2 \end{matrix}\right. . Cl, Pt Cl_2$

ChloroPlatinate of Atropin. Readily soluble in chlorhydric acid. Also soluble in water.

ChloroPlatinate of AzoNaphthylamin. Sparingly soluble in water. (Zinin.)
$N_2 \left\{\begin{matrix} C_{20} H_6'' \\ H_4 \end{matrix}\right. , 2 H Cl, 2 Pt Cl_2$

ChloroPlatinate of Barium. Permanent. Soluble in water. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 251.)
$Ba Cl, Pt Cl_2 + 4 Aq$

ChloroPlatinate of Bebirin. Insoluble in water. Almost insoluble in chlorhydric acid. (v. Planta, *Phil. Mag.*, 1851, (4.) **1.** pp. 117, 116.)
$C_{36} H_{21} N O_6, H Cl, Pt Cl_2$

ChloroPlatinate of Benzamate of Ethyl. Readily soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 329.)
$N \left\{\begin{matrix} C_{14} H_5 O_2 \\ C_4 H_5 \\ H \end{matrix}\right. . O_2, H Cl, Pt Cl_2$

ChloroPlatinate of Benzamic Acid. Tolerably easily soluble in alcohol. Also soluble in warm chlorhydric acid. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** pp. 324, 325.)
$N \left\{\begin{matrix} C_{14} H_5 O_2 \\ H_2 \end{matrix}\right. . O_2, H Cl, Pt Cl_2$

ChloroPlatinate of Benzidin. Sparingly soluble in water; is decomposed when boiled therewith, or with spirit. Almost insoluble in alcohol or ether.
$C_{24} H_{12} N_2, 2 (H Cl, Pt Cl_2)$

ChloroPlatinate of Berberin. Almost insoluble in water.
$C_{42} H_{18} N O_{10}, H Cl, Pt Cl_2$

ChloroPlatinate of *bi*BromAllylamin. Nearly insoluble in absolute alcohol.
$C_{12} H_9 Br_2 N, H Cl, Pt Cl_2$

ChloroPlatinate of BromAnilin. Ppt. Somewhat soluble in water, and alcohol.
$C_{12} H_6 Br N, H Cl, Pt Cl_2$

ChloroPlatinate of *bi*BromAnilin. Ppt.

ChloroPlatinate of BromoCinchonin.
$C_{40} H_{23} Br N_2 O_2, 2 (H Cl, Pt Cl_2)$

ChloroPlatinate of *sesqui*BromoCinchonin. Ppt.
$C_{80} H_{45} Br_3 N_4 O_4, 4 (H Cl, Pt Cl_2)$

ChloroPlatinate of BromoCodein. Insoluble in water or alcohol. (Anderson.)
$C_{36} H_{20} Br N O_6, H Cl, Pt Cl_2$

ChloroPlatinate of *ter*BromoCodein. Soluble in water, and alcohol. (Anderson.)
$C_{36} H_{18} Br_3 N O_6, H Cl, Pt Cl_2$

ChloroPlatinate of *bi*BromoMelAnilin. Insoluble in water. Scarcely at all soluble in ether; somewhat more soluble in alcohol. (Hofmann, *J. Ch. Soc.*, **1.** 301.)
$C_{26} H_{11} Br_2 N_3, H Cl, Pt Cl_2$

ChloroPlatinate of *ter*BromoMelAnilin. (?) Somewhat soluble in boiling, less solu-

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ble in cold alcohol. (Hofmann, *J. Ch. Soc.*, **1.** 302.)

ChloroPlatinate of Brucin. Scarcely at all soluble in water; it is, however, decomposed by continued boiling therewith. (Anderson.)
$C_{46} H_{26} N_2 O_8, H Cl, Pt Cl_2$

ChloroPlatinate of Butylamin. Soluble in water, and alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **42.** 167.)
(*Chloro Platinate of Tetrylamin. Chloro Platinate of Butyliaque.*)
$N \left\{ \begin{matrix} C_8 H_9 \\ H_2 \end{matrix} \right., H Cl, Pt Cl_2$

ChloroPlatinate of Cacodyl. Soluble in water, with decomposition.
$C_4 H_6 As Pt Cl_3 = (C_2 H_3)_2 As Cl, Pt Cl_2$

ChloroPlatinate of Cacothelin. Sparingly soluble in water, and in mixed alcohol and ether. (Strecker, *Ann. Ch. u. Pharm.*, **91.** 92.)
$C_{40} H_{22} N_4 O_{18}, H Cl, Pt Cl_2$

ChloroPlatinate of Cadmium. Resembles the zinc salt, *q. v.* (v. Bonsdorff, *Pogg. Ann.*, **17.** 259.)
$Cd Cl, Pt Cl_2 + 6 Aq$

ChloroPlatinate of Caffein. Permanent. Sparingly soluble in water, alcohol, and ether. (Nicholson.)
$C_{16} H_{10} N_4 O_4, H Cl, Pt Cl_2$

ChloroPlatinate of Calcium. Deliquescent. Soluble in aqueous solutions of chloride of calcium, and bichloride of platinum.
$Ca Cl, Pt Cl_2 + 8 Aq$

ChloroPlatinate of *tri*Caproylamin. Easily soluble in ordinary alcohol; less readily soluble in water. Very sparingly soluble in absolute alcohol. Insoluble in ether. (Petersen & Gœssmann, *Ann. Ch. u. Pharm.*, **101.** 312.) Tolerably easily soluble in hot water. Soluble in ordinary alcohol, but difficultly soluble in absolute alcohol. When pure it is almost insoluble in ether. (Petersen, *Ann. Ch. u. Pharm.*, **102.** 316.)
(*Chloro Platinate of tri Hexylamin.*)
$N (C_{12} H_{13})_3, H Cl, Pt Cl_2$

ChloroPlatinate of Caprylamin. *Vid.* ChloroPlatinate of Octylamin.

ChloroPlatinate of Carmindin. Exceedingly soluble in water and in spirit. Ether precipitates it from the alcoholic solution. (Williams, *J. Ch. Soc.*, **7.** 103.)

ChloroPlatinate of Cesium. Less soluble than chloroplatinate of potassium in water.
$Cs Cl, Pt Cl_2$

By experiment: —

100 pts. of water at	0°	dissolve	0.021	pt. of it.
"	11°	"	0.072	"
"	40°	"	0.118	"
"	68°	"	0.234	"
"	100°	"	0.382	"

From these results the following table was obtained by interpolation:

100 pts. of water at	0°	dissolve	0.024	pt. of it.
"	10°	"	0.050	"
"	20°	"	0.079	"
"	30°	"	0.110	"
"	40°	"	0.142	"
"	50°	"	0.177	"
"	60°	"	0.213	"
"	70°	"	0.251	"
"	80°	"	0.291	"
"	90°	"	0.332	"
"	100°	"	0.377	"

(Kirchhoff & Bunsen, *Pogg. Ann.*, 1861, **113.** pp. 371, 373, and fig.)

ChloroPlatinate of Cetyl. Insoluble in water. Sparingly soluble in alcohol.
$C_{32} H_{33} N, H Cl, Pt Cl_2$

ChloroPlatinate of *tri*Cetylamin. Insoluble in water. Scarcely at all soluble in alcohol.

ChloroPlatinate of CetylAnilin. Insoluble in water. Soluble in alcohol.
$C_{44} H_{39} N, H Cl, Pt Cl_2$

ChloroPlatinate of *di*CetylAnilin. Easily soluble in warm alcohol, and ether.
$C_{76} H_{71} N, H Cl, Pt Cl_2$

ChloroPlatinate of Chelidonin. Ppt.
$C_{40} H_{19} N_3 O_6, H Cl, Pt Cl_2$

ChloroPlatinate of ChlorAnilin. Only sparingly soluble in cold, but rather easily soluble in boiling water. Sparingly soluble in alcohol, and ether. (Hofmann.)
$N C_{12} H_6 Cl, H Cl, Pt Cl_2$

ChloroPlatinate of *bi*ChloroCinchonin. Ppt.
$C_{40} H_{22} Cl_2 N_2 O_2, 2 (H Cl, Pt Cl_2) + 2 Aq$

ChloroPlatinate of ChloroCodein. Scarcely at all soluble in water. (Anderson, *Ann. Ch. u. Pharm.*, 1851, **77.** 370.)
$C_{36} H_{20} Cl N O_6, H Cl, Pt Cl_2$

ChloroPlatinate of *bi*ChloroMelanilin. Insoluble, or nearly insoluble, in ether. (Hofmann, *J. Ch. Soc.*, **1.** 299.)
$C_{26} H_{11} Cl_2 N_3, H Cl, Pt Cl_2$

ChloroPlatinate of ChloroNicine. Soluble in water. Insoluble, or but sparingly soluble, in ether. (St. Evre.)
$C_{20} H_{12} Cl_2 N_2, 2 (H Cl, Pt Cl_2)$

ChloroPlatinate of ChloroNitroHarmin. Soluble in alcohol.
$C_{26} H_{10} Cl (N O_4) N_2 O_2, H Cl, Pt Cl_2$

I.) ChloroPlatinate of Cinchonidin (of Wittstein). Rather hygroscopic.
$N_2 \left\{ C_{36} H_{20} O_2^{vi}, 2 H Cl, 2 Pt Cl_2 \right.$

II.) ChloroPlatinate of Cinchonidin (of Pasteur). Ppt. May be washed with acidulated water. (Leers, *loc. cit.*)
$N_2 \left\{ C_{40} H_{24} O_2^{vi}, H Cl, Pt Cl_2 + 4 Aq \right.$

ChloroPlatinate of Cinchonin. Sparingly soluble in boiling water. Rather easily soluble in chlorhydric acid.
$C_{40} H_{24} N_2 O_2, 2 (H Cl, Pt Cl_2) + 2 Aq$

Sparingly soluble in hot water, alcohol, or ether; more readily soluble in an aqueous solution of bichloride of platinum. (A. Erdmann.)

ChloroPlatinate of Cobalt. Resembles the zinc salt, *q. v.* (v. Bonsdorff, *Pogg. Ann.*, **17.** 260.)
$Co Cl, Pt Cl_2 + 6 Aq$

ChloroPlatinate of Codein. Sparingly soluble in cold, more soluble in boiling water, with partial decomposition.
$C_{36} H_{21} N O_6, H Cl, Pt Cl_2 + 4 Aq$

ChloroPlatinate of Collidin. Readily soluble in water. Insoluble in alcohol or ether.
$C_{16} H_{11} N, H Cl, Pt Cl_2$

ChloroPlatinate of Conhydrin. Insoluble, or but sparingly soluble in ether, or a mixture of alcohol and ether. Soluble in alcohol. (Th. Wertheim.)
$C_{16} H_{17} N O_2, H Cl, Pt Cl_2$

ChloroPlatinate of Coniin. Sparingly soluble in cold water, alcohol, or ether. Very readily soluble in boiling alcohol. (Blyth, *J. Ch. Soc.*, **1.** 354.) Soluble in water, alcohol, and ether. (Ortigosa.)
$C_{16} H_{15} N, H Cl, Pt Cl_2$

ChloroPlatinate of Copper. Deliquescent. $Cu\,Cl, Pt\,Cl_2 + 6\,Aq$ (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 260.)

ChloroPlatinate of Cotarnin. Very sparingly soluble in water. $C_{26}H_{13}NO_6, H\,Cl, Pt\,Cl_2$

ChloroPlatinate of Cotarnin & of Narcotin. (*ChloroPlatinate of Narcogenin.*) (Gerhardt.) $N\left\{\begin{matrix}C_{26}H_{15}O_6\\C_{20}H_9O_2\\H\end{matrix}\right. . H\,Cl, Pt\,Cl_2;\ N\left\{C_{26}H_{13}O_6{}''', H\,Cl, Pt\,Cl_2\right.$

ChloroPlatinate of Creatinin. Tolerably easily soluble in water; less soluble in alcohol.

ChloroPlatinate of Cryptidin. $N\,C_{22}H_{11}, H\,Cl, Pt\,Cl_2$ Very sparingly soluble in cold, more soluble in boiling water. May be washed with ether or alcohol. (Gr. Williams.)

ChloroPlatinate of Cumaramin. $C_{18}H_7NO_4, H\,Cl, Pt\,Cl_2$ Insoluble in water.

ChloroPlatinate of Cumidin. $C_{18}H_{13}N, H\,Cl, Pt\,Cl_2$ Very sparingly soluble in cold water; decomposed when boiled with water. Extremely soluble in alcohol, and ether, but after a short time separates from these solutions as an oil. (Nicholson, *J. Ch. Soc.*, **1.** 8.)

ChloroPlatinate of Cuminamic Acid. $N\left\{\begin{matrix}C_{20}H_{11}O_2\\H_2\end{matrix}\right\}O_2, H\,Cl, Pt\,Cl_2$ Soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 336.)

ChloroPlatinate of CyanAnilin. $N\left\{\begin{matrix}C_4H_5\\H_2\end{matrix}\right. . C_2N, H\,Cl, Pt\,Cl_2$ Soluble in water, and alcohol, the solution undergoing decomposition when evaporated. Insoluble in ether. (Hofmann, *J. Ch. Soc.*, **1.** 167.)

ChloroPlatinate of Cyanethin. $C_{18}H_{15}N_3, H\,Cl, Pt\,Cl_2$ Difficultly soluble in water. Soluble in alcohol, the solution undergoing decomposition when boiled. Also soluble in a mixture of alcohol and ether. (Frankland & Kolbe, *J. Ch. Soc.*, **1.** 73.)

ChloroPlatinate of CyanoPhenyl*di*Phenyl*bi*amin. Very easily soluble in chlorhydric acid.

ChloroPlatinate of Cyanothelin.

ChloroPlatinate of CyanoToluenyl*bi*ammonium. Insoluble in water or alcohol.

ChloroPlatinate of Cymidin. $C_{20}H_{15}N, H\,Cl, Pt\,Cl_2$ Sparingly soluble in water; more soluble in alcohol, and still more soluble in ether. (Barlow, *Ann. Ch. u. Pharm.*, **98.** 249.)

ChloroPlatinate of Cystin. Extremely easily soluble in water. Soluble in absolute alcohol. Insoluble in ether; but ether does not precipitate it completely from the alcoholic solution. (Berzelius, in his *Jahresbericht*, 1848, **27.** 631.)

ChloroPlatinate of Emetin. Sparingly soluble in water.

ChloroPlatinate of Ethyl. *Vid.* Ethyl-ChloroPlatinic Acid.

ChloroPlatinate of Ethylamin. $N\left\{\begin{matrix}C_4H_5\\H_2\end{matrix}\right., H\,Cl, Pt\,Cl_2$ Soluble in boiling, less soluble in cold water. Insoluble in alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 481.)

ChloroPlatinate of *di*Ethylamin. $N\left\{\begin{matrix}(C_4H_5)_2\\H\end{matrix}\right., H\,Cl, Pt\,Cl_2$ Very soluble in water. (Hofmann.)

ChloroPlatinate of *tri*Ethylamin. $N\left\{(C_4H_5)_3, H\,Cl, Pt\,Cl_2\right.$ Very soluble in water. (Hofmann.)

ChloroPlatinate of *tetra*Ethylammonium. $N(C_4H_5)_4, Cl, Pt\,Cl_2$ Slightly soluble in boiling water; less soluble in alcohol. Insoluble in ether. (Hofmann.)

ChloroPlatinate of *di*EthylAmylamin. $N\left\{\begin{matrix}C_{10}H_{11}\\(C_4H_5)_2\end{matrix}\right., H\,Cl, Pt\,Cl_2$

ChloroPlatinate of *tri*EthylAmylammonium. $N\left\{\begin{matrix}(C_4H_5)_3\\C_{10}H_{11}\end{matrix}\right. . Cl, Pt\,Cl_2$ More soluble in boiling than in cold water. As a precipitate it does not fall very readily, but when once formed it is difficultly soluble.

ChloroPlatinate of EthylAmylAnilin. $N\left\{\begin{matrix}C_4H_5\\C_{10}H_{11}\\C_{12}H_5\end{matrix}\right., H\,Cl, Pt\,Cl_2$

ChloroPlatinate of *tri*EthylAmylPhosphonium. $P\left\{\begin{matrix}(C_4H_5)_3\\C_{10}H_{11}\end{matrix}\right. . Cl, Pt\,Cl_2$ Tolerably soluble in water. Insoluble in alcohol or ether.

ChloroPlatinate of EthylAnilin. $N\,C_{12}H_6(C_4H_5), H\,Cl, Pt\,Cl_2$ Exceedingly easily soluble in water, and alcohol; less soluble in a mixture of alcohol and ether. (Hofmann.)

ChloroPlatinate of *di*EthylAnilin. $N\,C_{12}H_5(C_4H_5)_2, H\,Cl, Pt\,Cl_2$ Not quite as soluble in water or alcohol as the corresponding salt of mono-ethylanilin. (Hofmann.)

ChloroPlatinate of EthylBromAnilin.

ChloroPlatinate of EthylBrucin. $C_{46}H_{25}(C_4H_5)N_2O_8, H\,Cl, Pt\,Cl_2$ Soluble in boiling, less soluble in cold water. (Gunning.)

ChloroPlatinate of EthylChlorAnilin. Soluble in water.

ChloroPlatinate of *di*EthylChlorAnilin. $N\,C_{20}H_{14}Cl, H\,Cl, Pt\,Cl_2$ Sparingly soluble, or insoluble, in water.

ChloroPlatinate of EthylCodein. $C_{40}H_{25}NO_6, H\,Cl, Pt\,Cl_2 + Aq$ Insoluble in cold, soluble, apparently with decomposition, in hot water. (How, *J. Ch. Soc.*, **6.** 136.)

ChloroPlatinate of EthylCollidin. $C_{20}H_{15}N, H\,Cl, Pt\,Cl_2$ Sparingly soluble in water. (Anderson.)

ChloroPlatinate of EthylConiin. $C_{20}H_{19}N, H\,Cl, Pt\,Cl_2$ Before crystallizing it is easily soluble in water, and alcohol; but when crystals have once formed they are somewhat sparingly soluble in alcohol. Ether precipitates it from the alcoholic solution. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **89.** pp. 134, 139.)

ChloroPlatinate of *di*EthylConiin. $N\,C_{16}H_{14}(C_4H_5)_2, Cl, Pt\,Cl_2$ Soluble in water. Sparingly soluble in alcohol. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **89.** 146.)

ChloroPlatinate of Ethyl*di*Cyan*bi*amin. Scarcely at all soluble in water. Easily soluble in boiling alcohol.

ChloroPlatinate of EthylCyanAnilin. Very soluble, like the cyananilin salt. (Hofmann.)

ChloroPlatinate of Ethyl*di*Ethylene*di*Phenyl*bi*ammonium. $N_2\left\{\begin{matrix}C_4H_5\\(C_4H_4{}'')_2\\(C_{12}H_5)_2\end{matrix}\right. . Cl, Pt\,Cl_2$

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ChloroPlatinate of *di*EthyleneDiPhenyl*bi*amin. $N_2 \left\{ \begin{matrix} (C_4 H_4'')_2 \\ (C_{12} H_5)_2 \end{matrix} \right., 2 H Cl, 2 Pt Cl_2$

ChloroPlatinate of EthylLepidin. Ppt. $N \left\{ \begin{matrix} C_{20} H_9''' \\ C_4 H_5 \end{matrix} \right. . Cl, Pt Cl_2$

ChloroPlatinate of EthylNicotin. $N \left\{ \begin{matrix} C_{10} H_7''' \\ C_4 H_5 \end{matrix} \right. Cl, Pt Cl_2$ Soluble in hot, less soluble in cold water. Almost insoluble in alcohol, even when this is boiling. Insoluble in ether. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **87.** 6.)

ChloroPlatinate of EthylNitrAnilin. $N C_{12} H_5 (N O_4) (C_4 H_5), H Cl, Pt Cl_2$ Sparingly soluble, or insoluble, in cold water.

ChloroPlatinate of Ethyl*tri*Phenylammonium (or of "Ethyl*bi*Cinnamylamin"). $C_{40} H_{20} N Cl, Pt Cl_2$ Somewhat soluble in water. When boiled with a quantity of water insufficient for its solution, it melts to a resin. (Gœssmann.)

ChloroPlatinate of *tri*EthylPhenylammonium. $C_{36} H_{20} N Cl, Pt Cl_2$ Scarcely at all soluble in water. Insoluble in alcohol, and ether.

ChloroPlatinate of *tri*EthylPhosphin. $P \left\{ (C_4 H_5)_3 \right., H Cl, Pt Cl_2$ Difficultly soluble in cold water. Insoluble in alcohol or ether. (Hofmann & Cahours.)

ChloroPlatinate of *tetra*EthylPhosphonium. $P (C_4 H_5)_4 Cl, Pt Cl_2$ Difficultly soluble in boiling water. Insoluble in alcohol or ether.

ChloroPlatinate of EthylPicolin. $N \left\{ \begin{matrix} C_{12} H_7''' \\ C_4 H_5 \end{matrix} \right. Cl, Pt Cl_2$ Readily soluble in water, the solution being decomposed by ebullition. (Anderson.)

ChloroPlatinate of EthylPiperidin. $N C_{14} H_{15}, H Cl, Pt Cl_2$ Sparingly soluble in water, though more soluble in hot than in cold. Soluble in spirit. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 97.)

ChloroPlatinate of *di*EthylPiperylammonium. $N C_{10} H_{10} (C_4 H_5)_2 Cl, Pt Cl_2$ Sparingly soluble in hot, less soluble in cold water. (Cahours, *Ann. Ch. et Phys.*, (3) **38.** 98.)

ChloroPlatinate of EthylPyridin. $N C_{14} H_{10} Cl, Pt Cl_2$ Sparingly soluble in cold water. The solution is very slowly decomposed by ebullition. Insoluble in a mixture of alcohol and ether.

ChloroPlatinate of EthylQuinine. $C_{40} H_{24} N_2 O_4 (C_4 H_5) Cl, Pt Cl_2$ Soluble in boiling, less soluble in cold water. (Strecker, *Ann. Ch. u. Pharm.*, **91.** 168.)

ChloroPlatinate of EthylQuinolein. $C_{22} H_{11} N, H Cl, Pt Cl_2$ Sparingly soluble in water. (Gr. Williams.)

ChloroPlatinate of EthylSinamin. Ppt. $C_{12} H_{10} N_2, H Cl, Pt Cl_2$

ChloroPlatinate of EthylStrychnine. $C_{42} H_{21} (C_4 H_5) N_2 O_4, H Cl, Pt Cl_2$ Soluble in boiling, less solnble in cold water.

ChloroPlatinate of EthylThioSinamin. $C_{12} H_{12} N_2 S_2, H Cl, Pt Cl_2$ Permanent. Sparingly soluble in water and in alcohol. (Hinterberger.)

ChloroPlatinate of EthylToluenylamin (or of EthylToluidin. $N C_{18} N_{13}, H Cl, Pt Cl_2$ Soluble in water. This solution is liable to undergo decomposition. Very soluble in alcohol; less soluble in ether. (Morley & Abel, *J. Ch. Soc.*, **7.** 70.)

ChloroPlatinate of *di*EthylToluenylamin.

ChloroPlatinate of *tri*EthylToluenylamin. $N \left\{ \begin{matrix} (C_4 H_5)_3 \\ C_{14} H_7 \end{matrix} \right\} Cl, Pt Cl_2$ Nearly insoluble in cold, readily soluble in hot water. (Morley & Abel, *J. Ch. Soc.*, **7.** 75.)

ChloroPlatinate of Formicyl*di*Phenyl*bi*amin.

ChloroPlatinate of Fucusin. $C_{30} H_{12} N_2 O_6, H Cl, Pt Cl_2$

ChloroPlatinate of Furfurin. Soluble in alcohol. $N_2 \left\{ (C_{10} H_4 O_2'')_3 \right., H Cl, Pt Cl_2$

ChloroPlatinate of Glyceramin. $C_6 H_9 N O_4, H Cl, Pt Cl_2$ Somewhat soluble in alcohol. Very sparingly soluble, or insoluble, in mixed alcohol and ether. (Berthelot & De Luca.)

ChloroPlatinate of Glycocoll.

I.) Of the *mono*Chlorhydrate.

II.) Of the *di*Chlorhydrate.
$2 (C_4 H_5 N O_4), H Cl, Pt Cl_2$

ChloroPlatinate of Guanin. $C_{10} H_5 N_5 O_2, H Cl, 2 Pt Cl_2 + 4 Aq$ As insoluble as chloroplatinate of ammonium in cold water, but freely soluble in hot water. Soluble, without decomposition, in aqueous solutions of caustic, and carbonated, potash and soda.

ChloroPlatinate of Hexylamin. *Vid.* ChloroPlatinate of Caproylamin.

ChloroPlatinate of Harmalin. $C_{26} H_{14} N_2 O_2, H Cl, Pt Cl_2$

ChloroPlatinate of Harmin. $C_{26} H_{12} N_2 O_2, H Cl, Pt Cl_2$

ChloroPlatinate of IodAnilin. Ppt. $N C_{12} H_6 I, H Cl, Pt Cl_2$ Insoluble in ether. (Hofmann, *J. Ch. Soc.*, **1.** 278.)

ChloroPlatinate of *bin*IodoCodein. Ppt. $N \left\{ \begin{matrix} C_{36} H_{18} I_2 O_6'' \\ H \end{matrix} \right. . H Cl, Pt Cl_2 + Aq$

ChloroPlatinate of *bin*IodoMelanilin. $C_{26} H_{11} I_2 N_3, H Cl, Pt Cl_2$ Resembles the corresponding bromo and chloromelanilin compounds. (Hofmann, *J. Ch. Soc.*, **1.** 304.)

ChloroPlatinate *of protochloride* of Iron. $Fe Cl, Pt Cl_2 + 6 Aq$ Quickly decomposes in the air. Soluble in water. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 258.)

ChloroPlatinate of Jervin.

ChloroPlatinate of Lepidin. Ppt. $N \left\{ C_{20} H_9''' \right., H Cl, Pt Cl_2$

ChloroPlatinate of Lithium. Soluble in water, and spirit. Difficultly soluble, or insoluble, in strong alcohol.

ChloroPlatinate of Lophin. $C_{42} H_{16} N_2, H Cl, Pt Cl_2$ Easily soluble in alcohol, being more soluble in this menstruum than any other compound of lophin. (Gœssmann & Atkinson.)

ChloroPlatinate of LuteoCobalt. (*ChloroPlatinate of diCobaltinamin.*) $6 N H_3 . Co_2 Cl_3, 3 Pt Cl_2 + 6 Aq \ \& \ 21 Aq$ Very slightly soluble in cold, somewhat more soluble in boiling water. (Gibbs & Genth,

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Smithson. Contrib., Vol. **9.**) Tolerably soluble in warm, less soluble in a cold aqueous solution of bichloride of platinum. (Rogojski, *Ann. Ch. et Phys.*, (3.) **41.** pp. 451, 452.)

ChloroPlatinate of Lutidin. Readily soluble in cold, and still more soluble in hot water. Sparingly soluble, or insoluble, in alcohol or ether. Readily soluble in chlorhydric acid.
$N \left\{ C_{14} H_9''', H\,Cl, Pt\,Cl_2 \right.$

ChloroPlatinate of Magnesium.
$a = Mg\,Cl, Pt\,Cl_2 + 2\,Aq$ Absorbs water from the air and forms the 6 Aq salt. Combines with water with evolution of heat, and then dissolves. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 255.)
$b = Mg\,Cl, Pt\,Cl_2 + 6\,Aq$ Permanent. Easily soluble in water. (*Ibid.*)

ChloroPlatinate of Manganese.
$Mn\,Cl, Pt\,Cl_2 + 6\,Aq$

ChloroPlatinate of MelAnilin. Slightly soluble in boiling water; less soluble in alcohol; and still less soluble in ether. (Hofmann, *J. Ch. Soc.*, **1.** 295.)
$C_{26} H_{13} N_3, H\,Cl, Pt\,Cl_2$

ChloroPlatinate of Menaphthalamin. Insoluble in water or alcohol.

ChloroPlatinate of Mesityl. *Vid.* AceChlorPlatin.

ChloroPlatinate of *tri*MethylAcetos-[Acetoyl]ammonium. Very easily soluble in water. Very sparingly soluble in ether.
$N \left\{ \begin{array}{l} (C_2 H_3)_3 \\ C_4 H_3 \end{array} \right. . Cl, Pt\,Cl_2$

ChloroPlatinate of Methylamin. Soluble in boiling, sparingly soluble in cold water. Insoluble in alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 457.)
$N \left\{ \begin{array}{l} C_2 H_3 \\ H_2 \end{array} \right. , H\,Cl, Pt\,Cl_2$

ChloroPlatinate of *di*Methylamin. Somewhat difficultly soluble in water; still less soluble in alcohol, and ether. (Petersen, *Ann. Ch. u. Pharm.*, **102.** 323.)
$N \left\{ \begin{array}{l} (C_2 H_{32}) \\ H \end{array} \right. , H\,Cl, Pt\,Cl_2$

ChloroPlatinate of *tri*Methylamin.
$N\,(C_2 H_3)_3, H\,Cl, Pt\,Cl_2$

ChloroPlatinate of *tetra*Methylammonium. Slightly more soluble than the corresponding ethyl compound.
$N\,(C_2 H_3)_4\,Cl, Pt\,Cl_2$

ChloroPlatinate of MethylAmylAnilin. Ppt.
$C_{24} H_{19} N, H\,Cl, Pt\,Cl_2$

ChloroPlatinate of MethylAnilin. Exceedingly easily soluble in water. Sparingly soluble in dilute chlorhydric acid, or alcohol.
$C_{14} H_7 N, H\,Cl, Pt\,Cl_2$

ChloroPlatinate of *tri*MethylAmylPhosphonium. Very soluble in boiling water; somewhat less soluble in cold water.
$P \left\{ \begin{array}{l} (C_{10} H_{11}) \\ (C_2 H_3)_3 \end{array} \right. . Cl, Pt\,Cl_2$

ChloroPlatinate of *tri*MethylBromEthylammonium. Difficultly soluble in cold, easily soluble in hot water.
$N \left\{ \begin{array}{l} (C_2 H_3)_3 \\ C_4 H_4 Br \end{array} \right. . Cl, Pt\,Cl_2$

ChloroPlatinate of MethylCinchonin.
$C_{40} H_{24} N_2 O_2 (C_2 H_3), 2\,H\,Cl, 2\,Pt\,Cl_2$

ChloroPlatinate of *di*Methyl*di*Ethylammonium. Tolerably easily soluble in water. Difficultly soluble in alcohol, and ether.
$N \left\{ \begin{array}{l} (C_2 H_3)_2 \\ (C_4 H_5)_2 \end{array} \right. . Cl, Pt\,Cl_2$

ChloroPlatinate of Methyl*tri*Ethylammonium. Ppt.
$N \left\{ \begin{array}{l} C_2 H_3 \\ (C_4 H_5)_3 \end{array} \right. . Cl, Pt\,Cl_2$

ChloroPlatinate of MethylEthylAmylamin. Very soluble in water. (Hofmann.)
$N \left\{ \begin{array}{l} C_2 H_3 \\ C_4 H_5 \\ C_{10} H_{11} \end{array} \right. , H\,Cl, Pt\,Cl_2$

ChloroPlatinate of Methyl*di*EthylAmylammonium.
$N \left\{ \begin{array}{l} (C_2 H_3) \\ (C_4 H_5)_2 \\ (C_{10} H_{11}) \end{array} \right. . Cl, Pt\,Cl_2$

ChloroPlatinate of MethylEthylAmylPhenylammonium. Ppt.
$C_{26} H_{24} N\,Cl, Pt\,Cl_2$

ChloroPlatinate of MethylEthylAnilin. Very easily soluble in water.

ChloroPlatinate of MethylEthylConiin. Sparingly soluble in cold, more soluble in boiling water. Insoluble in alcohol, and ether. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **89.** 139.)
$N\,C_{16} H_{14} (C_2 H_3) (C_4 H_5)\,Cl, Pt\,Cl_2$

ChloroPlatinate of Methyl*tri*EthylPhosphonium. Soluble in boiling, less soluble in cold water. Insoluble in alcohol or ether.
$P \left\{ \begin{array}{l} (C_4 H_5) \\ C_2 H_3 \end{array} \right. . Cl, Pt\,Cl_2$

ChloroPlatinate of *tri*MethylEthylPhosphonium. Tolerably soluble in water. Insoluble in alcohol or ether.
$P \left\{ \begin{array}{l} (C_4 H_5) \\ (C_2 H_3)_3 \end{array} \right. . Cl, Pt\,Cl_2$

ChloroPlatinate of Methyl*di*Ethylene*di*Phenyl*bi*ammonium. Ppt.
$N_2 \left\{ \begin{array}{l} C_2 H_3 \\ (C_4 H_4'')_2 \\ (C_{12} H_5)_2 \end{array} \right. . Cl, Pt\,Cl_2$

ChloroPlatinate of MethylLutidin.
$C_{16} H_{12} N\,Cl, Pt\,Cl_2$

ChloroPlatinate of MethylNicotin. Soluble in boiling, very sparingly soluble in cold water. Insoluble in alcohol. (Stahlschmidt, *Ann. Ch. u. Pharm.*, **90.** 225.)
$N \left\{ \begin{array}{l} C_{10} H_7''' \\ C_2 H_3 \end{array} \right. . Cl, Pt\,Cl_2$

ChloroPlatinate of MethylNitroPhenidin. Somewhat soluble in hot water, from which it separates as the solution cools. (Cahours.)
$C_{14} H_8 (N\,O_4)\,N\,O_2, H\,Cl, Pt\,Cl_2$

ChloroPlatinate of MethylPhenidin. Soluble in boiling, less soluble in cold alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 341.)
$C_{14} H_9 N\,O_2, H\,Cl, Pt\,Cl_2$

ChloroPlatinate of *tri*MethylPhosphin.
$P \left\{ (C_2 H_3)_3, H\,Cl, Pt\,Cl_2 \right.$

ChloroPlatinate of *tetra*MethylPhosphonium. Soluble in boiling water.

ChloroPlatinate of MethylPiperidin. Soluble in water; more soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 93.)
$C_{12} H_{13} N, H\,Cl, Pt\,Cl_2$

ChloroPlatinate of MethylQuinolein. Sparingly soluble in water. (Gr. Williams.)
$N\,C_{20} H_9, H\,Cl, Pt\,Cl_2$

ChloroPlatinate of MethylUramin.
$C_4 H_7 N_3, H\,Cl, Pt\,Cl_2$

ChloroPlatinate of Metoluidin. Insoluble in water and in alcohol. (Wilson, *J. Ch. Soc.*, **3.** 156.)
$C_{30} H_{17} N_3, H\,Cl, Pt\,Cl_2$

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ChloroPlatinate of Morphine. Some-
$C_{34} H_{19} N O_6, H Cl, Pt Cl_2$ what soluble in warm water.

ChloroPlatinate of Naphthylamin. Sparingly soluble in water. Still less soluble in alcohol, and ether. (Zinin.)

ChloroPlatinate of Narcein. Ppt.
$C_{46} H_{29} N O_{18}, H Cl, Pt Cl_2$

ChloroPlatinate of Narcotin. Sparingly
$C_{46} H_{25} N O_{14}, H Cl, Pt Cl_2$ soluble in hot water; the solution undergoing decomposition when boiled for some time. (Anderson.)

ChloroPlatinate of Nickel. Resembles
$Ni Cl, Pt Cl_2 + 6 Aq$ the zinc salt, *q. v.* (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 260.)

ChloroPlatinate of Nicotin. Sparingly
$N_2 \left\{ (C_{10} H_7^{\prime\prime\prime})_2, 2 (H Cl, Pt Cl_2) \right.$ soluble in cold water. (Ortigosa.) Soluble in boiling water, and very soluble in a slight excess of nicotin. (Barral, *Ann. Ch. et Phys.*, (3.) **7.** 154.) Entirely insoluble in alcohol or ether. Easily soluble in warm dilute chlorhydric acid. (Ortigosa.) Somewhat soluble in nitric acid.

ChloroPlatinate of NiNaphthylamin.
$C_{20} H_8 N_2 O_4, H Cl, Pt Cl_2$ Rather soluble.

ChloroPlatinate of ***ter*****NitrAmarin.** Insoluble in alcohol.

ChloroPlatinate of (*α*)NitrAnilin. Very
$C_{12} H_6 (N O_4) N, H Cl, Pt Cl_2$ readily soluble in water, and alcohol. Insoluble, or very sparingly soluble, in ether. (Muspratt & Hofmann.)

ChloroPlatinate of (*β*)NitrAnilin.

I.) *normal.* Soluble in water, alcohol, and
$C_{12} H_6 (N O_4) N, H Cl, Pt Cl_2$ ether, especially when in presence of chlorhydric acid. Much more soluble in alcohol than in water. The aqueous, but not the alcoholic, solution is decomposed by evaporation. Decomposed by washing with mixed alcohol and ether. (Arppe, *Ann. Ch. u. Pharm.*, **93.** 363.)

II.) *bi.* Somewhat soluble in water. Less sol-
$C_{12} H_6 (N O_4) N, H Cl, 2 Pt Cl_2$ uble than the normal salt in alcohol, and ether. Partially soluble in alkaline liquors. (Arppe, *Ann. Ch. u. Pharm.*, **93.** 363.)

ChloroPlatinate of NitroCodein. In-
$C_{36} H_{20} (N O_4) N O_6, H Cl, Pt Cl_2 + 4 Aq$ soluble in water or alcohol. (Anderson.)

ChloroPlatinate of NitroCumidin.

ChloroPlatinate of NitroHarmalin. Ppt.
$C_{26} H_{13} (N O_4) N_2 O_2, H Cl, Pt Cl_2$

ChloroPlatinate of NitroHarmin. Sparingly soluble in water.

ChloroPlatinate of ***bi*****NitroMelAnilin.**
$C_{26} H_{11} N_5 O_8, H Cl, Pt Cl_2$ Insoluble in water or alcohol. Only slightly soluble in ether. (Hofmann, *J. Ch. Soc.*, 1849, **1.** 307.)

ChloroPlatinate of NitroMesidin. In-
$C_{18} H_{12} N_2 O_4, H Cl, Pt Cl_2$ soluble in water. Soluble in alcohol. (Maule, *J. Ch. Soc.*, **2.** 119.)

ChloroPlatinate of NitroPapaverin.
$C_{40} H_{20} (N O_4) N O_8, H Cl, Pt Cl_2$ Ppt.

ChloroPlatinate of Octylamin. Some-
(*ChloroPlatinate of Caprylamin.*)
$C_{16} H_{19} N, H Cl, Pt Cl_2$ what soluble in cold, much more soluble in hot water. Tolerably soluble in alcohol. Very easily soluble in ether. (Squire, *J. Ch. Soc.*, **7.** 109.) Much less soluble in water than the chlor-aurate. Very soluble in alcohol, and ether; less soluble in water. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 142.)

ChloroPlatinate of Olanin (of Unverdorben). Readily soluble in water, and alcohol. Insoluble in ether.

ChloroPlatinate of Papaverin. Insol-
$C_{40} H_{21} N O_8, H Cl, Pt Cl_2$ uble in water or alcohol.

ChloroPlatinate of ParaNicine. Scarcely
$C_{20} H_{13} N, H Cl, Pt Cl_2$ at all soluble in ether. (St. Evre [*Ger.*].)

ChloroPlatinate of Pellutein. Ppt.

ChloroPlatinate of Pelosin. Ppt.
$C_{36} H_{21} N O_6, H Cl, Pt Cl_2$

ChloroPlatinate of Petinin. Easily sol-
$C_8 H_{11} N, H Cl, Pt Cl_2$ uble in water. Also soluble in alcohol.

ChloroPlatinate of ***di*****Phenin.**
$C_{24} H_{12} N_4, 2 (H Cl, Pt Cl_2)$

ChloroPlatinate of PhenylAcetosamin.
(*ChloroPlatinate of Acetoylamin.*)
$C_{16} H_9 N, H Cl, Pt Cl_2$ Tolerably soluble in boiling, less soluble in cold water. (Natanson.)

ChloroPlatinate of ***tri*****Phenylamin.** Per-
$N \left\{ (C_{12} H_5)_3, H Cl, Pt Cl_2 \right.$ manent. Easily soluble in water and in alcohol of 80%; less soluble in stronger alcohol. Insoluble, or sparingly soluble, in ether. (Gœssmann.)

ChloroPlatinate of ***tri*****PhenylEthylammonium.**
$C_{40} H_{20} N Cl, Pt Cl_2$ Somewhat soluble in hot, less soluble in cold water. (Gœssmann.)

ChloroPlatinate of PhenylSulphoCarbamid.
$N_2 \left\{ \begin{matrix} C_2 S_2^{\prime\prime} \\ C_{12} H_5, H Cl, Pt Cl_2 \\ H_3 \end{matrix} \right.$

ChloroPlatinate of PhenylUrea. Solu-
$C_{14} H_8 N_2 O_2, HCl, Pt Cl_2$ ble in warm, less soluble in cold water.

ChloroPlatinate of ***di*****PhenylUrea.** Ppt.
$C_2 H_2 (C_{12} H_5)_2 N_2 O_2, 2 H Cl, 2 Pt Cl_2$ Somewhat soluble in water.

ChloroPlatinate of Phtalidin. Ppt. Easily decomposed.

ChloroPlatinate of Picolin. Much more
$N \left\{ C_{12} H_7^{\prime\prime\prime}, H Cl, Pt Cl_2 \right.$ soluble in water than the corresponding salt of anilin.

Soluble in 4 pts. of water (Unverdorben); in about 4 pts. of boiling water. Readily soluble in alcohol. (Anderson.)

ChloroPlatinate of Piperidin. Very sol-
$C_{10} H_{11} N, H Cl, Pt Cl_2$ uble in water; less soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 82.)

ChloroPlatinate of Piperin. Very spar-
$C_{68} H_{38} N_2 O_{12}, H Cl, Pt Cl_2$ ingly soluble in water. It appears to undergo partial decomposition when treated with much water. Tolerably soluble in boiling, less soluble in cold alcohol.

ChloroPlatinate of Platin(*ous*)*bi*Amin.
(*ChloroPlatinate of diPlatosamine.*)

I.) *mono.* Sparingly soluble in water. (Reiset,
$N_2 \left\{ H_6 . Pt' Cl, Pt Cl_2 \right.$ *Ann. Ch. et Phys.*, (3.) **11.** 429.)

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II.) *di.* Ppt. (Reiset, *loc. cit.*)

$2\,(N_2 \{ H_6 . Pt'\,Cl),\ Pt\,Cl_2$

ChloroPlatinate of Potassium. Permanent. Difficultly soluble in cold, more easily soluble in hot water. Scarcely at all soluble in absolute alcohol; difficultly soluble in dilute spirit. (Fresenius, *Quant.*, p. 120.) Soluble in 200 pts. of water. (Wittstein's *Handw.*)

$K\,Cl,\ Pt\,Cl_2$

By experiment: —

100 pts. of water at	0.0°	dissolve	0.724	pt. of it.
"	6.8°	"	0.873	"
"	13.8°	"	0.927	"
"	46.5°	"	1.776	"
"	71.0°	"	3.018	"
"	100.0°	"	5.199	"

From these results the following table was obtained by interpolation: —

100 pts. of water at	0°	dissolve	0.74	pt. of it.
"	10°	"	0.90	"
"	20°	"	1.12	"
"	30°	"	1.41	"
"	40°	"	1.76	"
"	50°	"	2.17	"
"	60°	"	2.64	"
"	70°	"	3.19	"
"	80°	"	3.79	"
"	90°	"	4.45	"
"	100°	"	5.18	"

(Kirchhoff & Bunsen, *Pogg. Ann.*, 1861, **113.** 372, and fig.)

At 15° @ 20° it is soluble in 12083 pts. of alcohol of 97.5%, in 3775 pts. of alcohol of 76%, and in 1053 pts. of alcohol of 55%; and if a small amount of free chlorhydric acid is present it dissolves in 1835 pts. of alcohol, of 76%, at 15° @ 20°. (Fresenius, *Ann. Ch. u. Pharm.*, **59.** 117.)

Unacted upon by cold concentrated sulphuric acid. (Lassaigne, *Ann. Ch. et Phys.*, 1832, (2.) **51.** 126.) But sparingly soluble in cold, more easily soluble in hot dilute acids. Soluble in a solution of caustic potash; it does not separate therefrom when the saturated solution is cooled. (H. Rose.) Soluble in an aqueous solution of caustic potash, especially when this is hot, though difficultly in any case; if the boiling is continued, hydrate of platinum separates. (Claus, *Beiträge*, p. 35.) Very easily soluble in a warm aqueous solution of hyposulphite of soda mixed with a little free soda. (Himly.) Soluble in an aqueous solution of normal succinate of ammonia (Dœpping); in an aqueous solution of chloride of ammonium. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 99.) Insoluble in a strong cold aqueous solution of chloride of potassium. (W. Gibbs, *Am. J. Sci.*, (2.) **31.** 70.) Insoluble in aqueous solutions of the alkaline carbonates and bicarbonates, even when these are hot. (H. Rose, *Tr.*)

ChloroPlatinate of Propylamin. Soluble in cold water. Sparingly soluble in alcohol or ether. (Anderson.) Readily soluble in boiling, less soluble in cold water. (Berthelot & De Luca.)

(*ChloroPlatinate of Tritylamine.*)

$N \left\{ \begin{matrix} C_6\,H_7 \\ H_2 \end{matrix} \right. ,\ H\,Cl,\ Pt\,Cl_2$

ChloroPlatinate of PurpureoCobalt. Much less soluble than the chloride, and may be washed with water. (Claudet, *Phil. Mag.*, (4.) **2.** 257.) Nearly insoluble in cold, very difficultly soluble in hot water. (Gibbs & Genth, *Smithson. Contrib.*, Vol. **9.** p. 28 of the Memoir.)

$5\,N\,H_3 . Co_2\,Cl_3,\ 2\,Pt\,Cl_2$

ChloroPlatinate of Pyridin. Readily soluble in boiling water, but is decomposed by continuous boiling; less soluble in alcohol. Insoluble in ether.

$N \{ C_{10}\,H_5''',\ H\,Cl,\ Pt\,Cl_2$

ChloroPlatinate of Quinidin.

$N_2 \{ C_{40}\,H_{24}\,O_4,\ 2\,H\,Cl,\ 2\,Pt\,Cl_2 + 4\,Aq$

ChloroPlatinate of Quinine. Soluble in 1500 pts. of cold, and 120 pts. of boiling water, and in 2000 pts. of boiling alcohol.

$C_{40}\,H_{24}\,N_2\,O_4,\ 2\,(H\,Cl,\ Pt\,Cl_2) + 2\,Aq$

ChloroPlatinate of Quinolein. Soluble in 893 pts. of water at 15.5°. (Williams.) Sparingly soluble in cold water, in alcohol, or ether. A mixture of alcohol and ether is well adapted for washing the salt. Sparingly soluble in chlorhydric acid. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 173.)

(*ChloroPlatinate of Leukol. ChloroPlatinate of Chinolin.*)

$C_{18}\,H_7\,N,\ H\,Cl,\ Pt\,Cl_2$

ChloroPlatinate of Retinin. Tolerably soluble in cold, readily soluble in hot water. Soluble in alcohol.

$C_8\,H_{11}\,N,\ H\,Cl,\ Pt\,Cl_2$

ChloroPlatinate of Rubidium. Much less soluble than chloroplatinate of potassium in water. Completely insoluble in alcohol.

$Rb\,Cl,\ Pt\,Cl_2$

By experiment: —

100 pts. of water dissolve	0.193	pt. of it at	0.0°
"	0.135	"	13.5°
"	0.195	"	48°
"	0.263	"	60°
"	0.641	"	100°

From these results the following table was obtained by interpolation: —

100 pts. of water at	0°	dissolve	0.184	pt. of it.
"	10°	"	0.154	"
"	20°	"	0.141	"
"	30°	"	0.145	"
"	40°	"	0.166	"
"	50°	"	0.203	"
"	60°	"	0.258	"
"	70°	"	0.329	"
"	80°	"	0.417	"
"	90°	"	0.521	"
"	100°	"	0.634	"

(Kirchhoff & Bunsen, *Pogg. Ann.*, 1861, **113.** pp. 352, 373, and fig.)

ChloroPlatinate of Sanguinarin.

ChloroPlatinate of Sarcin. Readily soluble in hot, sparingly soluble in cold water. (Strecker.)

$C_{10}\,H_4\,N_4\,O_2,\ H\,Cl,\ Pt\,Cl_2$

ChloroPlatinate of Sarcosin. Insoluble in alcohol or ether.

$N \{ C_6\,H_7\,O_4,\ H\,Cl,\ Pt\,Cl_2 + 2\,Aq$

ChloroPlatinate of Silver.

I.) *basic.* Ppt.

ChloroPlatinate of Sinamin.

$C_8\,H_6\,N_2,\ 2\,(H\,Cl,\ Pt\,Cl_2)$

ChloroPlatinate of Sinapin. Ppt.

ChloroPlatinate of Sincalin. Soluble in water. (v. Babo & Hirschbrunn.)

$C_{10}\,H_{13}\,N\,O_2,\ H\,Cl,\ Pt\,Cl_2$

ChloroPlatinate of Sodium. Easily soluble in water, and alcohol. (Mussin-Puschkin.) Soluble in alcohol of 0.837 sp. gr. (Berzelius, *Lehrb.*, **2.** 492.) Soluble in an aqueous solution of chloride of sodium.

$Na\,Cl,\ Pt\,Cl_2 + 6\,Aq$

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ChloroPlatinate of Spartein. Insoluble in cold water or alcohol, but is decomposed when boiled therewith. Soluble, without alteration, in warm, less soluble in cold chlorhydric acid. (Stenhouse.)
$N \left\{ C_{16} H_{13}''' \right., H Cl, Pt Cl_2 + 2 Aq$

ChloroPlatinate of StibEthylium. Tolerably easily soluble in water, and alcohol. (Lœwig.)
$2 (C_4 H_5)_4 Sb Cl, 3 Pt Cl_2$

ChloroPlatinate of StibMethylium. Sparingly soluble in cold water, entirely soluble in boiling water. Insoluble in alcohol or ether. Sparingly soluble in solutions of the alkalies; more soluble in chlorhydric acid. It is the least soluble of any of the compounds of stibmethylium. (Landolt.)
$Sb (C_2 H_3)_4 Cl, Pt Cl_2$

ChloroPlatinate of Strontium. Permanent. Exceedingly easily soluble in water. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 252.)
$Sr Cl, Pt Cl_2 + 8 Aq$

ChloroPlatinate of Strychnine. Almost insoluble in water or in ether. Difficultly soluble in weak boiling alcohol. Soluble, with decomposition, in nitric acid. (Abel & Nicholson, *J. Ch. Soc.*, **2.** 254.)
$C_{42} H_{22} N_2 O_4, H Cl, Pt Cl_2$

ChloroPlatinate of Tetrylamin. *Vid.* ChloroPlatinate of Butylamin.

ChloroPlatinate of Thebain. Sparingly soluble in boiling water, apparently with partial decomposition.
$C_{38} H_{21} N O_6, H Cl, Pt Cl_2 + 2 Aq$

ChloroPlatinate of Theobromin. Efflorescent.
$C_{14} H_8 N_4 O_4, H Cl, Pt Cl_2$

ChloroPlatinate of ThiAcetonin. Ppt.

ChloroPlatinate of ThioSinamin. Ppt.
$C_8 H_8 N_2 S_2, H Cl, Pt Cl_2$

ChloroPlatinate of ThioSinEthylamin.

ChloroPlatinate of Toluamic Acid. Soluble in boiling alcohol acidulated with chlorhydric acid. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 333.)
$C_{16} H_9 N O_6, H Cl, Pt Cl_2$

ChloroPlatinate of Toluenylamin (or of Toluidin.) Insoluble in alcohol or ether. (Muspratt & Hofmann.)
$C_{14} H_9 N, H Cl, Pt Cl_2$

ChloroPlatinate of *tri*Toluenylamin.
$N \left\{ (C_{14} H_7)_3 \right., H Cl, Pt Cl_2$

ChloroPlatinate of Tritylamin. *Vid.* ChloroPlatinate of Propylamin.

ChloroPlatinate of Veratrin. Sparingly soluble in water.

ChloroPlatinate of *tetra*Vinylium. Ppt.
$(C_4 H_3)_4 N Cl, Pt Cl_2$

ChloroPlatinate of XanthoCobalt. Difficultly soluble in water, either hot or cold. Soluble in hot dilute chlorhydric acid.
$N O_2 . 5 N H_3 . C O_2 O, Cl_2 ; 2 Pt Cl_2 + 2 Aq$

ChloroPlatinate of Xylidin. Soluble in water; being more readily soluble than the corresponding salt of cumidin. (Church.)
$C_{16} H_{11} N, H Cl, Pt Cl_2$

ChloroPlatinate of Zinc. Permanent. Soluble in water. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 259.) Deliquesces in moist air. Easily soluble in water, and alcohol. (Huenefeld.)
$Zn Cl, Pt Cl_2 + 6 Aq$

ChloroPlatinous Acid. *Vid. proto*Chloride of Platinum.

ChloroPlatinite of Ammonium. Easily soluble in water. (Vauquelin, Magnus.) Excessively easily soluble in water. Insoluble in alcohol. (Peyrone, *Ann. Ch. et Phys.*, (3.) **16.** pp. 462, 463.)
$N H_4 Cl, Pt Cl$

ChloroPlatinite of Anilin. [Several compounds.]

ChloroPlatinite of *di*EthylPlatin(*ous*) *bi*amin. Insoluble in water. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 485.)
$C_8 H_{14} N_2 Pt_2 Cl_2 = N_2 \left\{ \begin{matrix} (C_4 H_5)_2 \\ H_3 \\ Pt' \end{matrix} \right. H Cl, Pt Cl$

ChloroPlatinite of *di*MethylPlatin(*ous*) *bi*amin. Insoluble in water. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 462.)
$C_4 H_{10} N_2 Pt_2 Cl_2 = N_2 \left\{ \begin{matrix} (C_2 H_3)_2 \\ H_3 \\ Pt' \end{matrix} \right. H Cl, Pt Cl$

ChloroPlatinite of Nicotin.

I.) *Orange-colored salt.* Insoluble in cold, soluble in boiling water. Insoluble in alcohol or ether. Soluble in nicotin, and in chlorhydric acid without decomposition; also soluble in nitric acid. (Raewsky, *Ann. Ch. et Phys.*, (3.) **25.** 332.)
$C_{20} H_{14} N_2, 2 (Pt Cl, 2 H Cl)$

II.) *Red salt.* Sparingly soluble in cold, more easily soluble in warm water. Insoluble in alcohol or ether. Soluble in cold chlorhydric and nitric acids, also in warm nitric acid. (Raewsky, *Ibid.*, p. 335.)
$C_{20} H_{14} N_2, 2 (Pt Cl, H Cl)$

ChloroPlatinite of *di*Platosamine. *Vid.* Chloride of Platin(*ous*)*bi*amin & of Platinum.

ChloroPlatinite of Potassium. Tolerably easily soluble in water. Insoluble in alcohol. (Magnus.)
$K Cl, Pt Cl$

ChloroPlatinite of Sodium. Easily soluble in water, and alcohol. (Magnus.)
$Na Cl, Pt Cl$

ChloroPlatinite of Tin.

I.) (*Containing less Sn Cl than No. II.*) (*Olive-green compound.*) Deliquescent. Soluble in a small quantity of water, but this solution is decomposed on being diluted with much water. (Kane.)

II.) (*Containing more Sn Cl than No. I.*) (*Red compound.*) Soluble in a small quantity of water, but the solution decomposes when diluted. (Kane.)

ChloroPlatinite of Zinc. Sparingly soluble in cold, more easily soluble in hot water. Insoluble in alcohol. (Huenefeld.)
$Zn Cl, Pt Cl$

ChloroPropionic Acid. Easily soluble in water.
$C_6 H_5 Cl O_4 = C_6 H_4 Cl O_3, H O$

ChloroPropionate of Ethyl.
$C_6 H_4 Cl (C_4 H_5) O_4$

ChloroPropionate of Silver. Tolerably easily soluble in water, the solution undergoing decomposition when boiled or evaporated. It is much more soluble than propionate of silver. (Ulrich.)
$C_6 H_4 Cl Ag O_4$

*Ter*ChloroPropionic Acid. *Vid.* ChloroSuccic Acid.

ChloroPropylene.
$C_6 H_5 Cl$

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_Bi_ChloroPropylene.
$C_6H_4Cl_2$

_Ter_ChloroPropylene.
$C_6H_3Cl_3$

_Quadri_ChloroPropylene.
$C_6H_2Cl_4$

_Quinqui_ChloroPropylene.
C_6HCl_5

ChloroPyroCitryl. Decomposed by water, $C_{10}H_4O_4Cl_2$ and alcohol. (Gerhardt & Chiozza.)

ChloroPyroMucate of Ethyl. *Vid.* PyroMucate of Ethyl with Chlorine.

ChloroPyroMucyl. *Vid.* Chloride of PyroMucyl.

ChloroQuinonamic Acid. *Vid.* ChloroKinonamic Acid.

ChloroQuinonamid. *Vid.* ChloroKinonamid.

ChloroQuinone. *Vid.* ChloroKinone.

_Bi_ChloroQuinonic Acid. *Vid.* *bi*ChloroKinonic Acid.

ChlorOrceid. *Vid.* ChlorOrcin.

ChlorOrcein. Insoluble in water. Soluble "$C_8H_{10}NO_8Cl_2$" in alcohol, ether, and ammonia-water. Soluble, with more or less decomposition, in a solution of potash. (Kane.)

_Ter_ChlorOrcin. Soluble in boiling, less sol- $C_{14}H_5Cl_3O_4 = \left.\begin{matrix}C_{14}H_3Cl_3''\\H_2\end{matrix}\right\}O_4$ uble in cold water. Soluble in alcohol and in aqueous solutions of the caustic alkalies. (Schunk.)

_Ter_ChlorOrcin with Baryta. Insoluble in water. (Schunk.)

ChloroRhodiate of _X_. *Vid.* Chloride of *X* & of Rhodium.

ChloroRutheniate of Ammonium. Insolu- $NH_4Cl, RuCl_2$ (?) ble in a cold aqueous solution of chloride of ammonium. (Claus, *Beiträge*, pp. 55, 56.)

ChloroRutheniate of Potassium. Easily $KCl, RuCl_2$ soluble in water. Insoluble in alcohol of 70%. Very sparingly soluble in a concentrated aqueous solution of chloride of ammonium. The concentrated aqueous solution is only partially precipitated on the addition of alcohol. (Claus, in *Gm.*) Insoluble in a cold saturated aqueous solution of chloride of potassium. (W. Gibbs, *Am. J. Sci.*, (2.) **31.** 70.)

ChloroSalhydramid. *Vid.* Hydride of ChlorAzoSalicyl.

ChloroSalicin. Soluble in water, and alco- $C_{26}H_{17}ClO_{14} + 4\,Aq$ hol. Insoluble in ether. Soluble in concentrated sulphuric acid. Decomposed by warm dilute acids. (Piria, *Ann. Ch. et Phys.*, (3.) **14.** 276.)

_Bi_ChloroSalicin. Sparingly soluble in boil- $C_{26}H_{16}Cl_2O_{14} + 2\,Aq$ ing, but scarcely at all soluble in cold water. Tolerably soluble in alcohol. Almost insoluble in ether. Much more soluble (without decomposition) in dilute alkaline solutions than in pure water. Decomposed by hot chlorhydric acid. (Piria, *Ann. Ch. et Phys.*, (3.) **14.** 278.)

_Ter_ChloroSalicin. Almost entirely insolu- $C_{26}H_{15}Cl_3O_{14} + 2\,Aq$ ble in cold, and very sparingly soluble in boiling water. Its best solvent is weak alcohol. (Piria, *Ibid.*, p. 281.)

ChloroSalicyl. *Vid.* Chloride of Salicyl; and also ChloroSalicylous Acid.

ChloroSalicylic Acid. Sparingly soluble $C_{14}H_5ClO_6$ in cold water. Soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **13.** 108.) Insoluble in water. Easily soluble in alcohol, and ether. Also soluble in alkaline solutions, with combination. (Piria.)

ChloroSalicylate of Potash. Soluble in water. (Cahours, *loc. cit.*)

_Bi_ChloroSalicylic Acid. Sparingly solu- $C_{14}H_4Cl_2O_6$ ble in boiling, less soluble in cold water. Very easily soluble in 80% alcohol; still more soluble in ether. Soluble in concentrated sulphuric acid, when this is gently heated, from which solution it is deposited on cooling. Soluble in boiling nitric acid. (Cahours, *Ann. Ch. et Phys.*, (3.) **13.** 109.)

_Bi_ChloroSalicylate of Ammonia. Sparingly soluble in water. (Cahours, *loc. cit.*)

_Bi_ChloroSalicylate of Ethyl. *Vid.* Ethyl*bi*ChloroSalicylic Acid.

_Bi_ChloroSalicylate of Methyl. *Vid.* Methyl*bi*ChloroSalicylic Acid.

_Bi_ChloroSalicylate of Lead. Insoluble in water.

_Bi_ChloroSalicylate of Potash. Soluble $C_{14}H_3KCl_2O_6$ in boiling, less soluble in cold water; more soluble in water containing alcohol. Easily soluble in boiling water which has been mixed with ⅓ of its volume of alcohol of 36%; from this solution it separates on cooling. (Cahours, *Ann. Ch. et Phys.*, (3.) **13.** pp. 108, 110.)

_Bi_ChloroSalicylate of Silver. Insoluble in water.

ChloroSalicylide of _X_. *Vid.* ChloroSalicylite of *X*.

ChloroSalicylimid. *Vid.* Hydride of ChlorAzoSalicyl.

ChloroSalicylous Acid or Hydride of ChloroSalicyl. (*Chloride of Salicyl* (improperly). *Chlor Salicyl. Chloride of Spiroyl* (improperly). *Chlor Spiroyl*). $C_{14}H_5ClO_4$ Insoluble in water. Readily soluble in alcohol, and ether. Soluble in alkaline solutions, and in cold concentrated sulphuric acid, from which it is precipitated unchanged by water. The alkaline chlorosalicylites are less soluble in water (than the salicylites? Gmelin). (Pagenstecher, Lœwig.)

ChloroSalicylite of Ammonia. Soluble in water.

ChloroSalicylite of Baryta.
$C_{14}H_4BaClO_4$

ChloroSalicylite of Copper. Ppt.

ChloroSalicylite of Lead. Ppt.

ChloroSalicylite of Potash. Soluble in water. Insoluble in alcohol. (Piria.)

_Bi_ChloroSalicylous Acid or Hydride of $C_{14}H_4Cl_2O_4$ _bi_ChloroSalicyl. Sparingly soluble in water. Readily soluble in alcohol, and ether. (Lœwig & Weidmann.)

_Bi_ChloroSalicylate of Baryta. Sparingly soluble in water.

ChloroSaligenin. Soluble in water, alcohol, $C_{14}H_7ClO_4$ and ether. (Piria, *Ann. Ch. et Phys.*, (3.) **14.** 284.)

_Bi_ChloroSaligenin. Scarcely soluble in wa- $C_{14}H_6Cl_2O_4$ ter at ordinary temperatures. (Piria, *Ibid.*, p. 280.)

_Ter_ChloroSaligenin.
$C_{14}H_5Cl_3O_4$

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ChloroSalylic Acid. Abundantly soluble in boiling, sparingly soluble in cold water. (Chiozza, *Ann. Ch. et Phys.*, (3.) **36**. 105.) Soluble in 881 pts. of water at 0°. (Kolbe & Lautemann, *Ann. Ch. u. Pharm.*, **115**. 187 [*K.*].) Readily soluble in alcohol, and ether. (Limpricht & v. Uslar.)

(*ChloroBenzoic Acid*(of Chiozza & Limpricht). *Isomeric with ChloroBenzoic Acid, Chloride of Salicyl, and ChloroSalicylous Acid.*)
$C_{14}H_5ClO_4 = C_{14}H_4ClO_3, HO$

ChloroSalylate of Ammonia. Soluble in water.

ChloroSalylate of Baryta. Very readily soluble in warm, less soluble in cold water. Tolerably soluble in warm alcohol. (Chiozza, *Ann. Ch. et Phys.*, (3.) **36**. 106.)
$C_{14}H_4BaClO_4 + 3Aq$

ChloroSalylate of Lime. Easily soluble in water. (Limpricht & v. Uslar.)
$C_{14}H_4CaClO_4 + 3Aq$

ChloroSalylate of Potash. Very soluble in water. (Limpricht & v. Uslar.)

ChloroSalylate of Silver. Somewhat soluble in water.
$C_{14}H_4AgClO_4$

ChloroSalylate of Soda. Very soluble in water. (Limpricht & v. Uslar.)

ChlorosAmid. *Vid.* Hydride of ChlorAzoSalicyl.

ChloroSassafras-Oil. Insoluble in water. (St. Evre.)
$C_{20}HCl_9O_4 = \left.\begin{matrix}C_{20}Cl_9O_2\\H\end{matrix}\right\}O_2$

ChloroSebacic Acid.
$C_{20}H_{17}ClO_8$

***Bi*ChloroSebacic Acid.**
$C_{20}H_{16}Cl_2O_8$

ChlorOsmiate of Potassium. Soluble in water, especially if this be hot. Insoluble in alcohol, or in aqueous saline solutions, but alcohol does not precipitate it completely from the saturated aqueous solution. (Berzelius.) Less soluble in an aqueous solution of caustic potash than in pure water and is not at once decomposed thereby. (Claus, *Beiträge*, p. 28.)
$KCl, OsCl_2$

ChloroStannate of *X*. *Vid.* Chloride of *X* & of Tin.

ChloroStearic Acid. Soluble in alcohol.
(*ChloroBassic Acid.*)
$C_{36}H_{26}Cl_{10}O_4$

ChloroStearate of Baryta. Insoluble in alcohol.

ChloroStearate of Lead. Insoluble in alcohol.

ChloroStearate of Potash. Almost insoluble in cold water. Easily soluble in alcohol. (Hardwick, *J. Ch. Soc.*, **2**. 237.)

ChloroStilbene. Soluble in alcohol, and ether.
(*ChloStilbase.*)
$C_{28}H_{11}Cl$

ChloroStrychnine. Insoluble, or very sparingly soluble, in water. Soluble in dilute chlorhydric acid. (Laurent, *Ann. Ch. et Phys.*, (3.) **24**. 313.)
$C_{42}H_{21}ClN_2O_4$

***Ter*ChloroStrychnine.** Almost insoluble in water. Readily soluble in alcohol, and ether. More soluble in acids than in water.
$C_{42}H_{19}Cl_3N_2O_4$

ChloroStyracin. *Vid.* ChloroCinnamate of *ter*ChloroStyracyl.

ChloroStyrol. *Vid.* ChloroCinnamene; and Chloride of Cinnamene.

ChloroSuccic Acid. Soluble in water, absolute alcohol, and ether. (Malaguti, *Ann. Ch. et Phys.*, (3.) **16**. 68.)
(*TriChloroPropionic Acid. Metacetic Acid biChloré.*)
$C_6HCl_3O_4$? ($C_6H_2Cl_3O_3$ of Malaguti.)

ChloroSuccate of Ammonia. Soluble in water.

ChloroSuccate of Silver. Sparingly soluble in water.
$C_6AgCl_3O_4$

ChloroSuccid.
$C_6Cl_4O_3$

ChloroSuccilamid. Very sparingly soluble in cold, readily soluble in boiling water. Very readily soluble in alcohol, and ether. (Malaguti, *Ann. Ch. et Phys.*, (3.) **16**. pp. 77, 79.)
$C_4H_2NCl_2O$

ChloroSuccilic Acid. Not isolated.

ChloroSuccilate of Baryta. Appears to be soluble in water.

ChloroSuccilate of Copper. Sparingly soluble in water.

ChloroSuccilate of Lead. Sparingly soluble in water.

ChloroSuccilate of Lime. Appears to be soluble in water.

ChloroSuccilate of Magnesia. Appears to be soluble in water.

ChloroSuccilate of Manganese. Appears to be soluble in water.

• **ChloroSuccilate *of protoxide* of Mercury.** Sparingly soluble in water.

ChloroSuccilate of Potash. Soluble in water and in alcohol.

ChloroSuccilate of Silver. Sparingly soluble in water.

ChloroSuccilate of Zinc. Appears to be soluble in water. (Malaguti, *Ann. Ch. et Phys.*, (3.) **16**. pp. 78, 79.)

ChloroSuccinic Acid.
$C_8HCl_3O_4 = C_8Cl_3O_3, HO$

ChloroSuccinate of Ammonia. Soluble in water.

ChloroSuccinate of Silver. Somewhat soluble in water.
$C_8Cl_3AgO_4$

***Quadri*ChloroSuccinic Acid.**
(*BiChlor Oxalic Acid.*)
$C_8H_2Cl_4O_8$

***Quadri*ChloroSuccinate of *per*ChlorEthyl.** Insoluble in cold, soluble, with decomposition, in hot alcohol. (Malaguti, *Ann. Ch. et Phys.*, (3.) **16**. 67.) Soluble in alcohol, and ether, especially when these are heated, with alteration. (Cahours, *Ibid.*, (3.) **9**. 209.)
(*Succinate of Ethylperchloré.*)
$C_{16}Cl_{14}O_8 = C_8Cl_4(C_4Cl_5)_2O_8$

***Quadri*ChloroSuccinate of Potash.**
$C_8K_2Cl_4O_8$

ChloroSuccinimid. Almost insoluble in water. Very readily soluble in alcohol, and ether. Soluble, with combination, in ammonia-water. (Malaguti, *Ann. Ch. et Phys.*, (3.) **16**. 74.)
(*ChloroSuccinylamid. ChlorAzoSuccic Acid.*)
$C_8HCl_4NO_4 = N\left\{\begin{matrix}C_8Cl_4O_4''\\H\end{matrix}\right.$

With Ammonia, Baryta, Magnesia, Manganese, and Zinc, it forms compounds which appear to be soluble in water.

With Copper, Lime, Mercury, and Silver, } its compounds are precipitates.

$\left(=N\left\{\begin{matrix}C_8Cl_4O_4''\\ Ag\end{matrix}\right.\right)$,

ChloroSulphuric Acid. *Vid.* *bi*Sulphate of
$SClO_3$ or $SCl_3, 2SO_3$ *ter*Chloride of Sulphur.

ChloroSulphate of *X*. *Vid.* Chloride of *X* with Sulphate of *X*.

ChloroSulphate of Acetyl. *Vid.* ChlorAcetylSulphurous Acid.

ChloroSulphate of Ethyl. *Vid.* ChlorEthylSulphurous Acid.

ChloroSulphate of Methyl. *Vid.* ChloroMethylSulphurous Acid.

ChloroSulphate of Phenyl. *Vid.* ChloroSulphoBenzolic Acid.

ChloroSulphate of Sulphide of Nitrogen. *Vid.* Chloride of Sulphur with *bi*Sulphide of Nitrogen.

ChloroSulphide of Antimony. Absorbs
$SbCl_3S_3$ water from the air, with decomposition. It is immediately decomposed by water, or chlorhydric acid. (Cloez, *Ann. Ch. et Phys.*, (3.) **30.** 375.)

ChloroSulphide of Carbon. Insoluble in
$CSCl$ water.

ChloroSulphide of Lead.

ChloroSulphide of Nitrogen. *Vid.* Chloride of Sulphur with *bi*Sulphide of Nitrogen.

ChloroSulphide of Phosphorus.

I.) $PS_{10}Cl_3$ Very slowly decomposed by water.

II.) PS_2Cl_3 Decomposed by water, especially if this be hot.

III.) PS_4Cl_6 Immediately decomposed by water, and still more readily by alkaline solutions. Also decomposed by alcohol, ether, and oil of turpentine. It is miscible with bisulphide of carbon. (Gladstone.)

ChloroSulphide of Silicon. Decomposed
$SiCl_2S$ by water. (I. Pierre.)

*Bi*ChloroSulphoBenzid. Insoluble in wa-
$C_{24}H_8Cl_2S_2O_4$ ter, or dilute acids, or in dilute aqueous solutions of the caustic and carbonated alkalies. Soluble in alcohol, and ether. (Gericke, *Ann. Ch. u. Pharm.*, **100.** 214.)

ChloroSulphoBenzolic Acid. *Vid.* ChloroPhenylSulphurous Acid.

ChloroSulphoBenzoic Acid. *Vid.* Chloride of SulphoBenzoyl.

ChloroSulphoNaphthalic Acid. Easily
(*Sulphite of monoChloroNaphtoyl.*)
$C_{20}H_7ClS_2O_6$ soluble in water, and alcohol. (Zinin.) The salts of chlorosulphonaphthalic acid are chiefly soluble. (Zinin.) They are less soluble in water than those of sulphonaphthalic acid, but more soluble than those of sulpho-ter-(or quadri-)chloronaphthalic acid. (Laurent, *Chemical Method*, p. 250.)

ChloroSulphoNaphthalate of Ammonia. Very soluble in water. (Zinin.)

ChloroSulphoNaphthalate of Baryta.
$C_{20}H_6ClBaS_2O_6$ Difficultly soluble in water. (Zinin.)

ChloroSulphoNaphthalate of Copper (Cu_2O). Ppt.

ChloroSulphoNaphthalate of Copper (CuO). Readily soluble in water. (Zinin.)

ChloroSulphoNaphthalate of Iron(FeO). Sparingly soluble in water.

ChloroSulphoNaphthalate of Lead. Almost insoluble in water. (Zinin.)

ChloroSulphoNaphthalate of Potash.
$C_{20}H_6ClKS_2O_6$ Sparingly soluble in water, and alcohol. (Zinin.)

ChloroSulphoNaphthalate of Silver. Slightly soluble in water. (Zinin.)

*Bi*ChloroSulphoNaphthalic Acid. Very
$C_{20}H_6Cl_2S_2O_6$ easily soluble in water.

*Bi*ChloroSulphoNaphthalate of Ammonia. Exceedingly soluble in water. (Zinin.)

*Bi*ChloroSulphoNaphthalate of Baryta.
$C_{20}H_5Cl_2BaS_2O_6$ Difficultly soluble in water. (Zinin.)

*Bi*ChloroSulphoNaphthalate of Potash. Sparingly soluble in water. (Zinin.)

*Bi*ChloroSulphoNaphthalate of Silver.
$C_{20}H_5Cl_2AgS_2O_6$ Less soluble than the potash-salt in water.

*Ter*ChloroSulphoNaphthalic Acid. Very
$C_{20}H_5Cl_3S_2O_6$ sparingly soluble in cold, somewhat soluble in boiling water. Soluble in boiling alcohol, from which it crystallizes on cooling. The salts of terchlorosulphonaphthalic acid are still less soluble than those of monochlorosulphonaphthalic acid, but they are more soluble than those of quadrichlorosulphonaphthalic acid. (Laurent, *Chemical Method*, p. 251.)

*Ter*ChloroSulphoNaphthalate of Ammonia. Very soluble in water and in ammonia-water.

*Ter*ChloroSulphoNaphthalate of Baryta.
$C_{20}H_4Cl_3BaS_2O_6$ Soluble in 300 @ 400 pts. of boiling water. (Laurent.)

*Ter*ChloroSulphoNapthalate of Cupr(*ic*)
$C_{20}H_4Cl_3(N_2\}H_6.Cu)S_2O_6+4Aq$ *bi*amin. Soluble in hot, less soluble in cold ammonia-water. (Laurent.)

*Ter*ChloroSulphoNaphthalate of Lead. Ppt.

*Ter*ChloroSulphoNaphthalate of Lime. Ppt.

*Ter*ChloroSulphoNaphthalate of Magnesia. Ppt.

*Ter*ChloroSulphoNaphthalate of Nickel. Ppt.

*Ter*ChloroSulphoNaphthalate of Potash. Almost insoluble in cold, very soluble in boiling water. Very sparingly soluble in boiling alcohol. (Laurent.)

*Ter*ChloroSulphoNaphthalate of Soda. Ppt.

*Quadri*ChloroSulphoNaphthalic Acid.
$C_{20}H_4Cl_4S_2O_6$ The salts of quadrichlorosulphonaphthalic acid are scarcely at all soluble in water, being less soluble than those of any of the other chlorosulphonaphthalic acids. (Laurent, *Method, loc. cit.*)

*Quadri*ChloroSulphoNaphthalate of Baryta. Appears to be insoluble in water, and soluble in alcohol.

*Quadri*ChloroSulphoNaphthalate of Pot-
$C_{20}H_3KCl_4S_2O_6$ ash. Almost insoluble in cold, and only slightly soluble in boil-

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ing water. Very soluble in boiling, less soluble in cold alcohol. (Laurent.)

Chloro(or Chlorinated)SulphosoMethylic Acid. *Vid.* ChloroMethylSulphurous Acid.

ChloroSulphoVinic Ether. *Vid.* Oxide of ChloroSulphEthyl.

ChloroTelluric Acid. *Vid.* *bi*Chloride of Tellurium.

ChloroTellurate of Ammonium. Soluble, without decomposition, in a small quantity of water, but is decomposed by much water, and by absolute alcohol. (Berzelius.)

ChloroTellurate of Potassium. Deliquescent. Decomposed by water and by absolute alcohol.

ChloroTellurite of Ammonium. Decomposed by water.

*Bi*ChloroTerebene.
$C_{20} H_{14} Cl_2$

*Quadri*ChloroTerebene.
$C_{20} H_{12} Cl_4$

*Ter*ChloroThymic Acid. (*Hydrate of terChloroThymyl. Thymoltrichloré.*) $C_{20} H_{11} Cl_3 O_2 = C_{20} H_{10} Cl_3 O, H O$ Insoluble in water. Sparingly soluble in alcohol; more easily soluble in ether. (Lallemand.)

*Quinqui*ChloroThymic Acid. (*Thymolquintichloré.*) $C_{20} H_9 Cl_5 O_2 = C_{20} H_8 Cl_5 O, H O$ Insoluble in water. Soluble in alcohol, and ether. (Lallemand.)

*Quinqui*ChloroThymate of Ammonia. Tolerably easily soluble in boiling, less soluble in cold water.

*Quinqui*ChloroThymate of Potash. Soluble in water.

*Ter*ChloroToluenic Acid. (*TerChloroBenzinol. Toluenoltrichloré.*) $C_{14} H_5 Cl_3 O_3$ Insoluble in water. Soluble in alcohol, and ether. Soluble in aqueous solutions of potash and ammonia, with combination.

*Ter*ChloroToluenate of Ammonia. Tolerably soluble in boiling, less soluble in cold water.

*Ter*ChloroToluenate of Baryta. Somewhat, though sparingly, soluble in water.

*Ter*ChloroToluenate of Copper.
“ *of protoxide* of Iron.
“ *of sesquioxide* of Iron.
“ of Lead. } Ppts.

*Ter*ChloroToluenate of Lime. Somewhat, though sparingly, soluble in water.

*Ter*ChloroToluenate *of protoxide* of Mercury.
“ *of binoxide* of Platinum. } Ppts.

*Ter*ChloroToluenate of Potash. Soluble in water.

*Ter*ChloroToluenate of Silver.
“ of Zinc. } Ppts. (Lallemand, *Ann. Ch. et Phys.*, (3.) **49.** 161.)

ChloroToluene. Indentical with Chloride of Toluenyl, *q. v.* (Cannizzaro.)

*Sexi*ChloroToluene. *Vid.* Hydride of ChloroToluenyl.

*Ter*ChloroToluenol. *Vid.* *ter*ChloroToluenic Acid.

*Quadri*ChloroToluenol. *Vid.* Hydrate of *quadri*ChloroToluenyl.

ChloroToluol. *Vid.* Chloride of Toluenyl; and Hydride of ChloroToluenyl.

*Bi*ChloroTurpentine Oil.
$C_{20} H_{14} Cl_2$

*Quadri*ChloroTurpentine Oil.
$C_{20} H_{12} Cl_4$

*Ter*ChloroValeric Acid. (*ChloroValerisic Acid.*) $C_{10} H_7 Cl_3 O_4$ Somewhat soluble in water; combining therewith to form a heavy liquor. Soluble in alcohol, and ether. Soluble in cold aqueons solutions of the alkalies. (Dumas & Stas.)

*Quadri*ChloroValeric Acid. (*ChloroValerosic Acid.*) $C_{10} H_6 Cl_4 O_4 + 2 Aq$ Tolerably soluble in water. Soluble in alcohol, and ether. Its alkaline salts are readily soluble in water, the others are sparingly soluble, or insoluble, therein.

*Quadri*ChloroValerate of Silver. $C_{10} H_5 Ag Cl_4 O_4$ Sparingly soluble in water. Easily soluble in nitric acid. (Dumas & Stas.)

ChloroValerianic Acid. *Vid.* ChloroValeric Acid.

ChloroValerisic Acid. *Vid.* *ter*ChloroValeric Acid.

ChloroValerosic Acid. *Vid.* *quadri*ChloroValeric Acid.

*Bi*ChloroVinic Acetate. *Vid.* Acetate of *bi*ChlorEthyl.

*Ter*ChloroVinic Acetate. *Vid.* Acetate of *ter*ChlorEthyl; and *ter*ChlorAcetate of Ethyl.

*Sexi*ChloroVinic Acetate. *Vid.* ChlorAcetate of *per*ChlorEthyl.

*Septi*ChloroVinic Acetate. *Vid.* *bi*ChlorAcetate of *per*ChlorEthyl.

*Per*ChloroVinic Acetate. *Vid.* *ter*ChlorAcetate of *per*ChlorEthyl.

ChloroVinic Formiate. *Vid.* ChloroCarbonate of Ethyl.

*Bi*ChloroVinic Formiate. *Vid.* Formiate of *bi*ChlorEthyl.

*Per*ChloroVinic Formiate. *Vid.* *ter*ChlorAcetate of *ter*ChloroMethyl.

*Per*ChloroVinic Oxalate. *Vid.* Oxalate of *per*ChlorEthyl.

*Bi*ChlorOxalic Acid. *Vid.* *quadri*ChloroSuccinic Acid.

ChlorOxalic Ether. *Vid.* Oxalate of *per*ChlorEthyl.

*Per*ChlorOxaloMethylic Ether. *Vid.* *per*ChlorOxalate of *per*ChloroMethyl.

ChlorOxaloVinic Acid. *Vid.* *quinqui*ChlorEthylOxalic Acid.

ChlorOxamethan. *Vid.* Oxamate of *per*ChlorEthyl.

ChlorOxethamid. *Vid.* Oxamate of *per*ChlorEthyl.

ChlorOxethide. *Vid.* *per*ChlorEthylOxalic Acid(Anhydrous).

ChlorOxethose. (*Oxide of terChlorAcetoyl.*) $C_8 Cl_6 O_2 = \left.\begin{matrix} C_4 Cl_3 \\ C_4 Cl_3 \end{matrix}\right\} O_2$ Decomposes when exposed to the air. Insoluble in, and unacted upon by, water. Soluble in alcohol, and ether. Unacted upon by alkalics, or by

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common nitric acid; decomposed by hot fuming nitric acid. (Malaguti, *Ann. Ch. et Phys.*, (3.) **16.** 20.)

ChlorOxetic Acid. *Vid.* *per*ChlorOxalic Acid.

ChlorOxide of Phosphorus. $P(Cl_3O_2)$ Soluble in water, with decomposition. (Wurtz, *Ann. Ch. et Phys.*, (3.) **20.** 478.) Soluble in bisulphide of carbon. (Pebal.)

ChlorOxyCarbonic Acid. *Vid.* ChloroCarbonic Acid.

***Hexa*ChlorOxylon.** $C_{16}H_4Cl_4O_4$ Insoluble in water. Very sparingly soluble in cold alcohol. Soluble in about 171 pts. of boiling alcohol of 0.82 sp. gr. Very soluble in ether. Soluble in boiling acetic acid; also in warm nitric acid.

***Penta*ChlorOxylon.** $C_{16}H_5Cl_3O_4$ Insoluble in water. Soluble in boiling spirit. Very soluble in ether.

ChlorOxyNaphthalic Acid. (*ChloroNaphtisic Acid. ChloroNaphtalic Acid.*) $C_{20}H_5ClO_6$ Insoluble in water. Difficultly soluble in boiling alcohol, and ether. Soluble in concentrated sulphuric acid, from which it is precipitated on the addition of water. (Laurent.) Almost insoluble in water, even when this is acidulated. More soluble, though still somewhat sparingly soluble, in alcohol, and ether. Soluble, without decomposition, in concentrated sulphuric acid. Soluble, with combination, in solutions of the alkalies. (Strecker, *J. Ch. Soc.*, **3.** 250.) Its salts are generally sparingly soluble, or insoluble, in water. (Laurent.)

ChlorOxyNaphthalate of Alumina.

ChlorOxyNaphthalate of Ammonia. $C_{20}H_4(NH_4)ClO_6$ Soluble in [less than 30 pts. of] water. (Laurent, Strecker.)

ChlorOxyNaphthalate of Baryta. $C_{20}H_4BaClO_6$ Ppt.

ChlorOxyNaphthalate of Cadmium. Ppt.

" **of Cobalt.** Ppt.

" **of Copper.** Ppt.

" **of Iron.** Ppt.

" **of Lead.** Ppt.

" **of Lime.** Ppt.

" **of Mercury.** Ppt.

ChlorOxyNaphthalate of Potash $C_{20}H_4KClO_6 + Aq$ Soluble in water, and alcohol.

ChlorOxyNaphthalate of Silver. Ppt.

" **of Strontia.** Ppt.

***Per*ChlorOxyNaphthalic Acid.** (*PerChloroNaphthalic Acid. Chlor OxeNaphtalesic Acid.*) $C_{20}HCl_5O_6$ Soluble in alcohol, and ether.

***Per*ChlorOxyNaphthalate of Ammonia.** Insoluble in water; or rather, extremely sparingly soluble in boiling water. Sparingly soluble in alcohol.

***Per*ChlorOxyNaphthalate of Potash.** Insoluble in water, or rather, extremely sparingly soluble in boiling water. Sparingly soluble in alcohol.

ChlorQuinone. *Vid.* ChloroKinone.

Chlorrubin. $C_{12}H_4O_8, 2HO$ Soluble in aqueous solutions of the caustic alkalies. (Schwarz.)

"**Chloryl**"(of Laurent). *Vid.* Acetate of *ter*ChloroMethyl.

ChloStilbase. *Vid.* ChloroStilbene.

Cholacrol. $C_{16}H_{10}(NO_4)_4O_{10}$ Sparingly soluble in water. Readily soluble in alcohol, and ether. Unacted upon by acids or alkalies.

Cholalic Acid. (*Cholic Acid*(of Demarçay).) $C_{48}H_{40}O_{10} = C_{48}H_{39}O_9, HO$ Efflorescent. Soluble in 4000 pts. of cold, and in 750 pts. of boiling water. 1000 pts. of alcohol, of 70%, dissolve 48 pts. of the dry acid; it is very soluble in boiling alcohol. Soluble in 27 pts. of ether. Soluble in sulphuric acid. Decomposed by boiling chlorhydric, and nitric acids.

The cholalates are all soluble in alcohol, but only the alkaline salts, the baryta salt, and to a certain extent the lime salt, are soluble in water.

Cholalate of Ammonia. Soluble in water, and alcohol; less soluble in ether than in alcohol. Loses ammonia when its solutions are evaporated.

Cholalate of Baryta. $C_{48}H_{39}BaO_{10}$ Soluble in 30 pts. of cold, and in 23 pts. of boiling water. More easily soluble in alcohol.

Cholalate of Copper. Ppt.

Cholalate of Lead. Sparingly soluble in water. Soluble in alcohol and in acetic acid.

Cholalate of Lime. $C_{48}H_{39}CaO_{10}$ Very sparingly soluble in cold, more soluble in hot water. Soluble in alcohol, and, less easily, in ether.

Cholalate of Manganese.

Cholalate *of dinoxide* of Mercury. Somewhat soluble in boiling water.

Cholalate *of protoxide* of Mercury. Somewhat soluble in boiling water.

Cholalate of Potash. $C_{48}H_{39}KO_{10}$ Easily soluble in water, and alcohol; less soluble in ether. Insoluble in a solution of caustic potash.

Cholalate of Silver. Somewhat soluble, with gradual decomposition, in boiling water, less soluble in cold water. Easily soluble in alcohol.

Cholalate of Soda. Soluble in water, and alcohol; less soluble in ether.

Cholanic Acid. Sparingly soluble in water; more easily soluble in alcohol. Sparingly soluble in ether. (Berzelius.)

"**Cholic Acid**"(of Demarçay). *Vid.* Cholalic Acid.

Cholic Acid. (*Glycocholic Acid.*) $C_{52}H_{43}NO_{12} = N\left\{\begin{matrix}C_{48}H_{39}O_8\\ C_2O_2''\\ C_2H_3\end{matrix}\right. .O, HO$ Soluble in 300 pts. of cold, and in 120 pts. of hot water; less soluble in ether. Very abundantly soluble in alcohol, cold concentrated sulphuric acid, chlorhydric and acetic acids, and in aqueous solutions of the alkalies and alkaline earths. When boiled for a long time with water it is converted into an insoluble modification (*paracholic acid*), but this dissolves in alcohol and is thus re-converted into cholic acid. 1000 pts. of cold water dissolve 3.3 pts., and 1000 pts. of boiling water 8.3 pts. of it. Easily soluble in alcohol. Very sparingly soluble in ether. Soluble in acetic acid. Easily soluble in cold chlorhydric acid, and in cold concentrated sulphuric acid.

The cholates of the alkalies and alkaline earths are readily soluble in water, those of the heavy metals, excepting silver, are insoluble in water. All the cholates are soluble in alcohol.

Cholate of Ammonia. Readily soluble in

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$C_{52}H_{42}(NH_4)NO_{12}$ water; on boiling the aqueous solution ammonia is evolved. Soluble in alcohol, from which it gradually separates after ether has been added.

Cholate of Baryta. $C_{52}H_{42}BaNO_{12}$ Soluble in water; less soluble in alcohol.

Cholate of Copper. Ppt.

Cholate *of sesquioxide* of Iron. Readily soluble in alcohol.

Cholate of Lead.

I.) *normal.* $C_{52}H_{42}PbNO_{12}$ Slightly soluble in water. Rather easily soluble in alcohol.

II.) *basic.* Somewhat soluble in an aqueous solution of acetate of lead, and in alcohol.

Cholate of Lime. Soluble in water, and alcohol.

Cholate of Magnesia. Soluble in water, and alcohol.

Cholate of Potash. Soluble in water, and alcohol. Insoluble in ether.

Cholate of Silver. Somewhat soluble in boiling water and in alcohol.

Cholate of Soda. (*Bilin*(of Berzelius).) $C_{52}H_{42}NaNO_{12}$ Very readily soluble in water, and spirit; less soluble in absolute alcohol. 1000 pts. of alcohol dissolve 39 pts. of it at 15°. (Gerhardt's *Tr.*) Soluble in 2.56 pts. of spirit at 15°. It separates from the alcoholic solution on the addition of ether. (Lehmann's *Physiolog. Chem.*, London, 1851, 1. 224.)

Cholate of Strontia. Soluble in water, and alcohol.

Choleic Acid. *Vid.* TauroCholic Acid.

Cholephyrrin. (Reddish-yellow coloring matter of bile.) Sparingly soluble in water, and alcohol; more easily soluble in alkaline solutions. (Berzelius.)

"**Cholesteric Acid**"(of Pelletier & Caventou). Is denied by Redtenbacher.

Cholesteric Acid. $C_{16}H_{10}O_{10} = C_{16}H_8O_8, 2HO$ Hygroscopic. Easily soluble in water, alcohol, and acids. (Redtenbacher.) Its alkaline and earthy salts are soluble in water; the metallic salts are precipitates.

Cholesterate of Lime. $C_{16}H_8Ca_2O_{10}$ Readily soluble in cold water, from which solution it is precipitated on *boiling*. It is also precipitated on the addition of alcohol. (Gundelach & Strecker.)

Cholesterate of Silver. $C_{16}H_8Ag_2O_{10}$ Soluble in boiling, less soluble in a cold aqueous solution of nitrate of ammonia. (Gundelach & Strecker.)

Cholesterilin. [There are 3 modifications.]
$C_{52}H_{42}''$

Modif. (α.) Insoluble in water. Scarcely at all soluble in alcohol. Very sparingly soluble in ether. Readily soluble in warm oil of turpentine.

Modif. (β.) Insoluble in water or alcohol. Tolerably soluble in warm ether, from which it is precipitated by alcohol.

Modif. (γ.) Insoluble in water. Slightly soluble in alcohol. Readily soluble in ether, from which solution alcohol precipitates it. (Zwenger.)

Cholesterin. $C_{52}H_{44}O_2 + 2Aq$ Insoluble in water. Sparingly soluble in cold ordinary alcohol; soluble in 9 pts. of boiling alcohol of 0. 84 sp. gr.; it is, however, much more soluble in boiling absolute alcohol. 100 pts. of boiling alcohol, of 0.816 sp. gr., dissolve 18 pts., and 100 pts. of 0.840, 11.24 of it, the greater part is deposited again from the alcoholic solution as it cools. (Chevreul, in [T.].) Soluble in 3.7 pts. of ether at 15°, and in 2.2 pts. of boiling ether. Readily soluble in boiling, less soluble in cold wood-spirit. Sparingly soluble in oil of turpentine.

Soluble in creosote. (Reichenbach.) Readily soluble in lignone.

Slightly soluble in soap-water, and more freely in the fatty oils, and taurocholic acid. (Lehmann.) Unacted on by boiling caustic potash.

Cholesterone. [There are 2 modifications.]
$C_{52}H_{42}''$

Modif. (α.) Insoluble in water. Very soluble in alcohol, ether, and the volatile and fatty oils.

Modif. (β.) Scarcely at all soluble in alcohol. Sparingly soluble in ether. (Zwenger.)

Cholestrophan. *Vid.* Parabanate of Methyl.

Choloidanic Acid. $C_{32}H_{24}O_{14}$ Almost insoluble in cold, sparingly soluble in boiling water. Easily soluble in alcohol. Soluble, without alteration, in warm chlorhydric and nitric acids. Its alkaline and earthy salts are difficultly soluble in water, the salts of the metals proper are insoluble in water or nearly so. (Redtenbacher.)

Choloidic Acid. $C_{48}H_{38}O_8 + Aq$ Insoluble in water. Readily soluble in alcohol. Very sparingly soluble in ether.

Its alkaline salts are soluble in water, and alcohol, but are insoluble in ether; those of the other metals are soluble in alcohol, but insoluble in water.

Choloidate of Ammonia. Soluble in water, and alcohol. Insoluble in ether.

Choloidate of Baryta. $C_{48}H_{37}BaO_8 + 2Aq$ Insoluble in water. Soluble in alcohol.

Choloidate of Copper. Insoluble in water. Soluble in alcohol.

Choloidate of Lead. Soluble in boiling alcohol.

Choloidate of Potash. Soluble in water, and alcohol. Insoluble in ether.

Choloidate of Silver. Ppt.
$C_{48}H_{37}AgO_8$

Choloidate of Soda. Soluble in water, and alcohol. Insoluble in ether.

Cholonic Acid. $C_{52}H_{41}NO_{10}$ Insoluble in water. Soluble in alcohol. Scarcely at all soluble in ether.

Cholonate of Ammonia. Soluble in water. Insoluble in an aqueous solution of chloride of ammonium, and in many other saline solutions.

Cholonate of Baryta. Insoluble in water.

Cholonate of Potash. Soluble in water. Insoluble in an aqueous solution of chloride of ammonium, and in many other saline solutions. Soluble in alcohol. Insoluble in ether.

Cholonate of Soda. $C_{52}H_{40}NaNO_{10}$ Soluble in water, and alcohol. Insoluble in ether.

Chondrin. $C_{48}H_{40}N_6O_{20}$? Swells up in cold water, without dissolving. Entirely soluble in boiling water, but is decomposed by long-continued ebullition. Insoluble in alcohol or ether. Soluble in aqueous solutions of acetate of potash, acetate of soda, and chloride of sodium. Easily soluble in solutions of the caustic alkalies, the solution undergoing decomposition

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when boiled. Soluble in concentrated sulphuric acid. Its alkaline solution is precipitated by most acids, the precipitate thus formed being soluble in chlorhydric, sulphuric, nitric, phosphoric, phosphorous, chloric, and iodic acids; and insoluble in sulphurous, pyrophosphoric, fluorhydric, carbonic, arsenic, acetic, tartaric, oxalic, citric, lactic, succinic, &c., acids.

CHROMIC ACID. Deliquescent. Very soluble

CrO_3

in water. Soluble in cold alcohol, the solution undergoing decomposition when exposed to the light or heated. Soluble in ether. (Unverdorben.) When exposed to the rays of direct sunlight, the aqueous solution of chromic acid gradually undergoes decomposition to a slight extent, chromate of chromium being deposited and oxygen evolved. (Berzelius, *Lehrb.*, **2.** 324.) Sparingly soluble in a cold aqueous solution of bisulphate of potash. (Fritzsche.) Abundantly soluble in sulphuric acid of 1.85 sp. gr., but if this solution be diluted with water until the sp. gr. is reduced to 1.55, much of the chromic acid will separate out; if more water be added the chromic acid again dissolves. (Schrœtter.) Less soluble in bihydrated sulphuric acid than in that of any other strength. (Bolley.) Only a few of its salts are soluble in water; they are all soluble, however, in nitric acid.

CHROMATE OF ALUMINA.

I.) *normal.* Insoluble in water. Easily soluble

$Al_2O_3, CrO_3 + 7\,Aq\,(?)$

in an aqueous solution of alum. Insoluble in an aqueous solution of chloride of ammonium. Soluble in acetic acid and in ammonia-water. (Fairrie, *J. Ch. Soc.*, **4.** 301.) Insoluble as such in water; but is readily decomposed by water, chromic acid being abstracted, and indefinite basic compounds formed. Soluble in alkaline solutions and in acids. Decomposed, with removal of chromic acid, by aqueous solutions of many salts. (Storer & Eliot, *Proc. Amer. Acad.*, 1860, **5.** 214.)

CHROMATE OF AMMONIA.

I.) *mono.* Permanent. Very soluble in water.

NH_4O, CrO_3

Readily soluble, without decomposition, in water. Alcohol precipitates it from the aqueous solution. (Malaguti & Sarzeau, *Ann. Ch. et Phys.*, (3.) **9.** 457.)

II.) *bi.* Permanent. Less soluble in water than

$NH_4O, 2\,CrO_3$

carbonate of ammonia.

III.) $5\,NH_4O, 4\,CrO_3$ Permanent. (Pohl.)

IV.) $NH_4O, 6\,CrO_3 + 10\,Aq$ Very efflorescent. (Rammelsberg.)

CHROMATE OF AMMONIA & OF COPPER.

I.) *mono.*

$NH_4O, CrO_3;\ CuO, CrO_3$

II.) *basic.* Soluble in water. (Malaguti & Sarzeau, *Ann. Ch. et Phys.*, (3.) **9.** 435.)

CHROMATE OF AMMONIA & OF MAGNESIA.

$NH_4O, CrO_3;\ MgO, CrO_3 + 6\,Aq$

Soluble in water. (Berzelius's *Lehrb.*, **3.** 459.)

CHROMATE OF AMMONIA & OF POTASH. Loses

$NH_4O, CrO_3;\ KO, CrO_3$

ammonia in the air.

CHROMATE OF AMMONIA & OF ZINC.

I.) *basic.* Soluble in water. (Malaguti & Sarzeau, *Ann. Ch. et Phys.*, (3.) **9.** 444.)

CHROMATE OF AMMONIA, OF ZINC, & OF ZINC-AMMONIUM.

$NH_4O, CrO_3;\ ZnO, CrO_3;\ N\left\{\begin{matrix}H_3\\Zn\end{matrix}\right.O, CrO_3 + 8\,Aq$

Soluble in ammonia-water. Insoluble in alcohol. Decomposed by water.

***Bi*CHROMATE OF AMYLSTRYCHNINE.** Soluble

$C_{42}H_{21}(C_{10}H_{11})N_2O_4, 2\,HO, 2\,CrO_3$

in boiling water.

CHROMATE OF ANTIMONY (SbO_3). Ppt. Soluble in a chlorhydric acid solution of terchloride of antimony. (Thomson.)

CHROMATE OF ARGENT*bi*AMIN. Soluble in

(Ammonio Chromate of Zinc.)

$N_2\left\{H_6 \cdot AgO, CrO_3\right.$

warm, less soluble in cold ammonia-water. Decomposed by an aqueous solution of caustic potash, with formation of fulminating silver. (Mitscherlich.)

CHROMATE OF BARYTA.

I.) *normal.* Insoluble in water. (Berzelius,

BaO, CrO_3

Lehrb.) Very slightly soluble in water, and even insoluble when other salts are present in solution. (Dumas, *Tr.*) Easily soluble in acids, even when these are dilute. (T. Thomson, *Phil. Trans.*, 1827, Part I. p. 196.) It is not precipitated from solutions containing citrate of soda. (Spiller.) Readily soluble in nitric, chlorhydric, and chromic acids. Insoluble in solutions of the alkalies and in acetic acid.

Somewhat more easily decomposed by solutions of the alkaline carbonates than sulphate of baryta. (H. Rose.)

II.) *bi.* Decomposed by water, with precipita-

$BaO, 2\,CrO_3 + 2\,Aq$

tion of the normal salt. Soluble in an aqueous solution of chromic acid. (Bahr.)

***Bi*CHROMATE OF BERBERIN.** Sparingly solu-

$C_{42}H_{19}NO_{10}, 2\,CrO_3$

ble in water. Readily soluble in dilute chlorhydric and sulphuric acids.

CHROMATE OF BISMUTH. Insoluble in water,

$BiO_3, 3\,CrO_3$

even if some free chromic acid be present. Easily soluble in chlorhydric and nitric acids. (Lœwe, cited by Fresenius, *Quant.*, p. 150.) Very slightly soluble in water. (Moser.)

100 pts. of	dissolve pts. of it.
Water	0.00008
Acetic Acid	0.00021
Nitric Acid of 1.03 sp. gr. .	0.00024
Potash solution of 1.33 sp. gr.	0.00016

(Pearson, *Phil. Mag.*, (4.) **11.** 206.)

Fresenius (*Quant. Anal.*, 1858, p. 255) remarks, that Pearson's statement that chromate of bismuth is nearly insoluble in dilute nitric acid is erroneous, since this is true only when chromate of potash is present in sufficient quantity.

Far less soluble in a hot solution of caustic soda than chromate of lead. (Storer.) Is not precipitated from solutions containing citrate of soda. (Spiller.)

When one equivalent of BaO, CrO_3 is boiled with an equivalent of KO, CO_2 in aqueous solution .2072 of it may be decomposed, and when boiled with an equivalent of NaO, CO_2 .24 of it may be decomposed. While, on the other hand, when an equivalent of BaO, CO_2 is boiled with one of KO, CrO_3 .79 of it may be decomposed, and with an equivalent of NaO, CrO_3 .76 of it may be decomposed. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** pp. 336, 348.)

CHROMATE OF CADMIUM.

I.) *mono.* Not absolutely insoluble in water.

$CdO, CrO_3 + 5\,Aq$

(Thomson in his *System of Chem.*, London, 1831, **2.** 624.)

II.) *acid.* Soluble in water. Cannot be crystallized. (Berzelius, *Lehrb.*)

III.) $2\,CdO, 3\,CrO_3$ Soluble in water. (Mala-

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guti & Sarzeau, *Ann. Ch. et Phys.*, (3.) **9.** pp. 447, 460.)

IV.) $5\,CdO, 2\,CrO_3 + 8\,Aq$ Exceedingly sparingly soluble in water. Very slowly soluble, with combination, in ammonia-water. (Malaguti & Sarzeau, *Ibid.*, p. 447.)

CHROMATE OF CADMIUM*bi*AMIN. (*Ammonio Chromate of Cadmium.*) $N_2 \left\} H_6 \right. . CdO, CrO_3 + 3\,Aq$. Decomposed by water. Insoluble in alcohol or ether. Soluble in ammonia-water. (Malaguti & Sarzeau, *Ann. Ch. et Phys.*, (3.) **9.** 449.)

CHROMATE *of protoxide* OF CERIUM.

I.) *mono.* CeO, CrO_3 Insoluble in water. (Berzelius, *Lehrb.*)

II.) *bi.* Easily soluble in water. (*Ibid.*)

"CHROMATE OF CHLORIDE OF AMMONIUM." $NH_4Cl, 2\,CrO_3$ Much more soluble in water than the corresponding potash compound.

"CHROMATE OF CHLORIDE OF CALCIUM." $CaCl, 2\,CrO_3$ Deliquescent.

CHROMATE OF *ter*CHLORIDE OF CHROMIUM. *Vid.* ChloroChromic Acid.

CHROMATE OF CHLORIDE OF MAGNESIUM. $MgCl, 2\,CrO_3$ Deliquescent. (Pelouze.)

CHROMATE OF CHLORIDE OF POTASSIUM. $KCl, 2\,CrO_3$ Permanent. Decomposed by pure water. Soluble, without decomposition, in water acidulated with chlorhydric acid. (Pelouze.)

CHROMATE OF CHLORIDE OF SODIUM. $NaCl, 2\,CrO_3$ Deliquescent. In other respects, it behaves like the potassium-salt. (Pelouze.)

CHROMATE OF CHROMIUM.
(*Binoxide of Chromium. Brown Oxide of Chromium.*)

I.) Cr_2O_3, CrO_3 Insoluble as such in water, but is gradually decomposed by water, which abstracts chromic acid. Also decomposed by alkaline, and by many saline solutions. Soluble in dilute nitric acid, and in the acids generally; readily if the precipitate is recent, but with difficulty after it has been dried at a somewhat elevated temperature. (T. Thomson, *Phil. Trans.*, 1827, Part I. p. 186; Maus, *Pogg. Ann.*, **9.** 127; Storer & Eliot, *Proc. Amer. Acad.*, 1860, **5.** 192.)

II.) ? Several basic compounds, which had been described as definite salts, have been shown by Storer & Eliot (*loc. cit.*) to be mere mixtures. In solubility they resemble the normal salt, excepting the fact that water removes the chromic acid from them more slowly in proportion as they are more basic. The so-called "neutral" and "acid" salts have not been obtained.

III.) *acid.* Not isolated. Soluble in water.

CHROMATE OF CHROMIUM & OF MANGANESE. $8\,Mn_2O_3, Cr_2O_3 . 8\,CrO_3 + 6\,Aq$ [Same as the $2\,MnO, CrO_3 + 2\,Aq$ of Warington & Reinsch. (Fairrie, *J. Ch. Soc.*, **4.** 300.)] Soluble, with decomposition, in chlorhydric acid, also in dilute sulphuric and nitric acids. (Warington.) Sparingly soluble in water. (Reinsch.)

CHROMATE OF CINCHONIN. Decomposed by boiling water, and alcohol. (Elderhorst.)

CHROMATE OF COBALT.

I.) *mono.* $CoO, CrO_3 + 2\,Aq$ Ppt. [T.]

II.) *bi.* Soluble in water. Cannot be crystallized. (Berzelius, *Lehrb.*)

III.) *basic.* $8\,CoO, CrO_3 + 4\,Aq$ Ppt. Decomposes, with oxidation, when washed with water. Decomposed, with partial solution, by ammonia-water. (Malaguti & Sarzeau, *Ann. Ch. et Phys.*, **97.** (3.) **9.** 453.)

CHROMATE OF CODEIN.

CHROMATE OF COPPER.

I.) *mono.* $CuO, CrO_3 + 2\,Aq$ Ppt. Somewhat soluble in water. (Thomson.)

The "normal Chromate of Copper" of Kopp proved to be a basic sulphate of copper.

II.) *basic.* $4\,CuO, CrO_3 + 5\,Aq$ (Malaguti & Sarzeau). $8\,CuO, CrO_3 + 2\,Aq$ (Persoz). Insoluble in water. (Persoz, *Ann. Ch. et Phys.*, (3.) **25.** 281.) Insoluble in water. Soluble, with combination, in ammonia-water. (Malaguti & Sarzeau, *Ann. Ch. et Phys.*, (3.) **9.** 434.) Easily soluble in ammonia-water, and in dilute nitric acid. Decomposed by solutions of the alkalies.

*Bi*CHROMATE OF COPPER. $CuO, 2\,CrO_3 + 2\,Aq$ Deliquescent. Easily soluble in water. The aqueous solution is partially decomposed by boiling. Soluble in alcohol, and in ammonia-water. (Drœge, *Ann. Ch. u. Pharm.*, **101.** 40.) The aqueous solution is decomposed by evaporation. (Malaguti & Sarzeau, *Ann. Ch. et Phys.*, (3.) **9.** 456.)

CHROMATE OF COPPER & OF LEAD. $2\,PbO, CuO, 2\,CrO_3$ Soluble in nitric acid.

CHROMATE OF COPPER & OF POTASH.

I.) $8\,CuO, 2\,CrO_3 ; KO, CrO_3 + 8\,Aq$ Almost entirely insoluble in water. Soluble in aqueous solutions of caustic and carbonated ammonia. (A. Knop.)

II.) $KO, 4\,CuO, 4\,CrO_3 + Aq$ Decomposed by boiling water. (Gerhardt.)

*Bi*CHROMATE OF ETHYLSTRYCHNINE. $C_{42}H_{21}(C_4H_5)N_2O_4, 2\,HO, 2\,CrO_3 + 2\,Aq$ Readily soluble in boiling, less soluble in cold water.

CHROMATE OF GLUCINA.

I.) *mono.* Gl_2O_3, CrO_3 Insoluble in water. (Berzelius's *Lehrb.*, **3.** 496.)

II.) *with excess of acid.* Soluble in water. (John.)

CHROMATE OF GLUCINA with SULPHATE OF GLUCINA. (John.)

CHROMATE OF GLYCOCOLL & OF POTASH. Soluble in water; less soluble in alcohol. (Horsford.)

CHROMATE OF HARMALIN.

I.) *mono.* Very sparingly soluble in water.

II.) *bi.*
$C_{26}H_{14}N_2O_2, HO, 2\,CrO_3$

CHROMATE OF HARMIN.

I.) *mono.*

II.) *bi.*
$C_{26}H_{12}N_2O_2, HO, 2\,CrO_3$

CHROMATE *of sesquioxide* OF IRON. Fe_2O_3, CrO_3 Insoluble as such in water, but is decomposed, with abstraction of chromic acid, by water, indefinite basic compounds being formed. Also decomposed by saline solutions. Easily soluble in acids. (Storer & Eliot, *Proc. Amer. Acad.*, 1860, **5.** 216; compare T. Thomson, *Phil. Trans.*, 1827, Part I. p. 218.) Soluble in chromic acid. When the chromic acid solution is evaporated to dryness the residue obtained is soluble in water. (Maus.)

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Chromate of Lead. PbO, CrO_3 Permanent. Insoluble in water or in acetic acid. Scarcely at all soluble in dilute nitric acid. Easily soluble in potash lye. Easily decomposed by hot concentrated chlorhydric acid. (Fresenius, *Quant.*, p. 158.) Readily and completely soluble in a solution of caustic potash. (Berzelius, *Lehrb.*; Pearson.) Soluble in a solution of caustic potash. (Vauquelin.) Insoluble in an aqueous solution of chloride of ammonium. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.) Soluble in a solution of bichromate of potash. As good as insoluble in a dilute solution of acetate and nitrate of ammonia, slightly acidulated with acetic acid.

Soluble to a bright yellow solution even in dilute sulphuric acid. (Storer.) Soluble, with decomposition, in hot sulphuric and chlorhydric acids.

Only slightly soluble in acids. (Dumas, *Tr.*) It is precipitated from nitrate of lead in presence of 70,000 pts. of water. (Harting.) It is not precipitated from solutions which contain citrate of soda. (Spiller.)

[The statements of several of the text-books of analysis (*e. g.* H. Rose's *Traité*, I. 132), to the effect that chromate of lead is "insoluble" in dilute nitric acid, being manifestly erroneous, I suggested, in 1859, to Dr. F. H. Brown, at that time assistant in Harvard College Laboratory, the propriety of a few experiments upon this point. In carrying out these tests Dr. Brown mixed together solutions of weighed (equivalent) portions of bichromate of potash and acetate of lead, and then added nitric acid of known strength by small portions to the precipitate formed until this was completely dissolved; the mixture being meanwhile constantly agitated. The experiments were all made at the ordinary temperature of the air. The amount of acid used was determined by measuring off an excess of it before the experiment, and subtracting therefrom the amount which remained after the precipitate had been dissolved.

1.512 grms. of $KO, 2\,CrO_3$ in 50 c.c. of water being mixed with 3.8 grms. of $C_4H_3PbO_4$ in 50 c.c. of water, 1650 c.c. of nitric acid of 1.120 sp. gr. were required to dissolve the resulting 3.28 grms. of PbO, CrO_3. Hence, in round numbers, 1 pt. of PbO, CrO_3 dissolves in about 560 pts. of nitric acid of 1.12 sp. gr.

1.512 grms. of $KO, 2\,CrO_3$ in 30 c. c. of water being mixed with 3.8 grms. of $C_4H_3PbO_4$ in 30 c.c. of water, 400 c.c. of nitric acid of 1.225 sp. gr. were required to dissolve the 3.28 grms. of PbO, CrO_3. Hence, in round numbers, 1 pt. of PbO, CrO_3 dissolves in about 150 pts. of nitric acid of 1.225 sp. gr.

1.512 pts. of $KO, 2\,CrO_3$ in 50 c. c. of water being mixed with 3.8 grms. of $C_4H_3PbO_4$, also in 50 c. c. of water, 330 c. c. of nitric acid of 1.265 sp. gr. were required to dissolve the resulting 3.28 grms. of PbO, CrO_3. Hence, in round numbers, 1 pt. of PbO, CrO_3 dissolves in 130 pts. of nitric acid of 1.265 sp. gr.

1.512 grms. of $KO, 2\,CrO_3$ in 50 c.c. of water being mixed with 3.8 grms. of $C_4H_3PbO_4$ in 50 c.c. of water, 190 c.c. of nitric acid of 1.395 sp. gr. were required to dissolve the resulting 3.28 grms. of PbO, CrO_3. Hence, in round numbers, 1 pt. of PbO, CrO_3 dissolves in about 80 pts. of nitric acid of 1.395 sp. gr. F. H. S.]

II.) *Di*CHROMATE OF LEAD. $2\,PbO, CrO_3$ Insoluble in water. When digested in nitric acid, one equivalent of oxide of lead is removed, monochromate of lead being formed. (T. Thomson, *Phil. Trans.*, 1827, Part I. p. 221.) Less soluble in water than the monochromate. Soluble in potash-lye.

III.) *sesqui.* $3\,PbO, 2\,CrO_3$

***Bi*Chromate of Lepidin.** $C_{20}H_9N, 2\,(CrO_3, HO)$ Soluble in warm water.

Chromate of Lime.

I.) *mono.* $CaO, CrO_3 + 2\,Aq$ Easily soluble in water. Insoluble in alcohol.

II.) *basic.*

III.) *bi.* $CaO, 2\,CrO_3 + 3\,Aq$ Deliquescent. Soluble in chromic acid. (Bahr.) Very easily soluble in water. (Jacquelain, *Ann. Ch. et Phys.*, (3.) **21.** 481.)

Chromate of Lime & of Potash.

I.) $KO, CrO_3; CaO, CrO_3 + 2\,Aq$ Easily soluble in water (Schweizer); even after ignition. (Duncan.)

II.) $3\,(KO, CrO_3); 7\,(CaO, CrO_3) + 5\,Aq$ After ignition, this compound is insoluble in water, but is soluble before having been ignited. (Duncan.)

Chromate of Lithia. LiO, CrO_3 Readily soluble in water. (C. G. Gmelin.)

Chromate of LuteoCobalt. $6\,NH_3 . Co_2O_3, 3\,CrO_3 + 5\,Aq$ Soluble in hot water.

Chromate of Magnesia. $MgO, CrO_3 + 7\,Aq$ Readily soluble in water. (Vauquelin.)

Chromate of Magnesia & of Potash. $MgO, CrO_3; KO, CrO_3 + 2\,Aq$ Permanent. Tolerably easily soluble in water. (T. Thomson, *Phil. Trans.*, 1827, p. 224.) 100 pts. of water dissolve 26.7 pts. of it. Insoluble in alcohol. (Anthon, *Berzelius's Lehrb.*, **3.** 459.)

"*Di*CHROMATE OF MANGANESE." *Vid.* Chromate of Chromium and of Manganese.

***Mono*Chromate of Manganese.** Soluble in water.

Chromate *of dinoxide* of Mercury.

I.) *mono.* Hg_2O, CrO_3 Insoluble in water. Soluble in hot dilute nitric acid, from which it separates out again as the solution cools. (Darby, *J. Ch. Soc.*, **1.** 24.) Insoluble in water. Soluble in nitric acid, which converts it into chromate of protoxide of mercury. (Berzelius, *Lehrb.*, **3.** 891.)

II.) *basic.* $4\,Hg_2O, 3\,CrO_3$ Very sparingly soluble in cold, more freely soluble, with partial decomposition, in boiling water. (H. Rose.) Slightly soluble in aqueous solutions of chloride of ammonium and nitrate of ammonia. (Brett.) Slightly soluble in nitric acid. (Hayes.) Decomposed by chlorhydric acid.

Chromate *of protoxide* of Mercury.

I.) *mono.* HgO, CrO_3 Soluble in an aqueous solution of nitrate of protoxide of mercury, and, more easily, in a solution of protochloride of mercury. (Gmelin.) Partially soluble in water. Soluble in acids. (Vauquelin.) Soluble in warm aqueous solutions of chloride of ammonium and nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.)

II.) *basic.* $3\,HgO, CrO_3$ Sparingly soluble in water. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 364.)

III.) *tetra.* $4\,HgO, CrO_3$ Sparingly soluble in water. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 364.)

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Chromate *of binoxide* **of Molybdenum.**

I.) *normal.* Soluble in water.
$MoO_2, 2 CrO_3$

II.) *acid.* Soluble in water.

III.) *basic.* Insoluble in water.

Chromate of Molybdic Acid. Soluble in water.

Chromate of Nickel.

I.) *mono.* Ppt. (Thomson.) Deliquescent. Soluble, without decomposition, in cold alcohol. (Dumas, *Tr.*)
$NiO, CrO_3 + 4 Aq$

II.) *tetra.* Insoluble [or very sparingly soluble] in water. Decomposed and partially dissolved by ammonia-water. (Malaguti & Sarzeau, *Ann. Ch. et Phys.*, (3.) **9.** 450.)
$4 NiO, CrO_3 + 6 Aq$

III.) *bi.* Soluble in water. (Malaguti & Sarzeau, *Ibid.*, pp. 450, 461.)
$NiO, 2 CrO_3$

Chromate of Nickel*ter***amin.** (*Ammonio-Chromate of Nickel.*) Decomposed by water. Insoluble in alcohol or ether. Very sparingly soluble in water which contains ammonia. (Malaguti & Sarzeau, *Ann. Ch. et Phys.*, (3.) **9.** 451.)
$N_3 \left\{ H_9 \right. . NiO, CrO_3 + 4 Aq$

*Bi***Chromate of NitroHarmalin.** Very sparingly soluble in cold, but readily soluble in boiling water or alcohol.

Chromate of NitroHarmin.

I.) *mono.*

II.) *bi.*

Chromate of Pelosin.
$C_{36} H_{21} N O_6, CrO_3 + 2 Aq$

Chromate of Platin(*ous*)*bi***amin.**

I.) *mono.* Soluble in water, and in an aqueous solution of caustic potash.
$N_2 \left\{ H_6 \right. . Pt' O, CrO_3$

II.) *bi.* Sparingly soluble in cold, more readily soluble in hot water. Insoluble in alcohol. Soluble in an aqueous solution of caustic potash. (Buckton, *J. Ch. Soc.*, **5.** 220.)
$N_2 \left\{ H_6 \right. . Pt' O, 2 CrO_3$

Chromate of PlatinoPyridin. Ppt.
$C_{10} H_5 Pt N, HO, CrO_3$

Chromate *of binoxide* **of Platinum.** Ppt.

Chromate of *di***Platosamin.** *Vid.* Chromate of Platin(*ous*)*bi*amin.

Chromate of Potash. Permanent. More soluble in water than the bichromate.
KO, CrO_3

Soluble in 2.07 pts. of water at 15.5°
" 1.75 " 17.5°
" 1.67 " 100°
(Thomson.)

100 pts. of water at 15.5° dissolve 48.368 pts. of it. Soluble in all proportions in boiling water. [T.] Soluble in 1.6 pts. of water at 19.5°; or, 100 pts. of water at 19.5° dissolve 62.3 pts. of it; or, the aqueous solution saturated at 19.5° contains 38.4% of it, and is of 1.3787 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.) Soluble in 2 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) The aqueous solution saturated at 15° is of 1.303257 sp. gr. and contains dissolved in every 100 pts. of water at least 43.857 pts. of the salt. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.) The sp. gr. of a solution saturated at 8° = 1.368. (Anthon, *Ann. der Pharm.*, 1837, **24.** 210.) The saturated aqueous solution boils at 107°. (Kremers, *Pogg. Ann.*, **99.** 43.)

An aqueous solution of sp. gr., at 19.5° (sp. gr. of water at 19.5° = 1),	Contains Per Cent of KO, CrO_3	Contains Pts. of KO, CrO_3 dissolved in 100 pts. of water.
1.0886	10.566	11.84
1.1669	19.094	23.60
1.2463	26.959	36.91
1.3222	33.854	51.18
1.4256	42.409	73.64

(Kremers, *Pogg. Ann.*, **95.** 120. The second column is from Gerlach's *Sp. Gew. der Salzlæsungen*, p. 34.)

An aqueous solution of sp. gr. (at 19.5°)	Contains (by experiment) per cent of KO, CrO_3
1.0349	4.27
1.0703	8.54
1.1087	12.81
1.1476	17.09
1.2333	25.63
1.3787	38.44

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 338.) From these results Schiff calculates the following table by means of the formula: $D = 1 + 0.008\,p + 0.00003324\,p^2 + 0.0000004048\,p^3$; in which D = the sp. gr. of the solution, and p the percentage of substance in the solution.

An aqueous solution of sp. gr. (at 19.5°)	Contains per cent of KO, CrO_3	An aqueous solution of sp. gr. (at 19.5°)	Contains per cent of KO, CrO_3
1.0080	1	1.1864	21
1.0161	2	1.1964	22
1.0243	3	1.2066	23
1.0325	4	1.2169	24
1.0408	5	1.2274	25
1.0492	6	1.2379	26
1.0576	7	1.2485	27
1.0663	8	1.2592	28
1.0750	9	1.2700	29
1.0837	10	1.2808	30
1.0925	11	1.2921	31
1.1014	12	1.3035	32
1.1104	13	1.3151	33
1.1195	14	1.3268	34
1.1287	15	1.3386	35
1.1380	16	1.3505	36
1.1474	17	1.3625	37
1.1570	18	1.3746	38
1.1667	19	1.3868	39
1.1765	20	1.3991	40

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 74.)

When dissolved in 2 pts. of water, the temperature of the latter falls about 10°.

in 2 pts. of water the solution = 1.28 sp. gr.
" 3 " 1.21 "
" 4 " 1.18 "
" 5 " 1.15 "
" 6 " 1.12 "
" 7 " 1.11 "
" 8 " 1.10 "
(Moser.)

Insoluble in alcohol.

Scarcely at all soluble in alcohol. (Dumas, *Tr.*)

*Bi***Chromate of Potash.** Permanent. Soluble in water with slight reduction of temperature. Less soluble in water than the monochromate. Soluble in 9.6 pts. of water at 17.2° (Thomson); in 10 pts. of water at 18.7°, the saturated solution containing 9.09% of it. (Moser.)
$KO, 2 CrO_3$

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Soluble in	20.14	pts. of water at	0°
"	11.81	"	10°
"	7.65	"	20°
"	3.43	"	40°
"	1.98	"	60°
"	1.37	"	80°
"	0.98	"	100°

(Kremers, *Pogg. Ann.*, **92.** 499.)

100 pts. of water at 17.2° dissolve 10.44 pts. of it. (T.) The aqueous solution saturated at 15° is of 1.061805 sp. gr., and contains dissolved in every 100 pts. of water at least 9.126 pts. of the salt. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.) It is liable to form supersaturated solutions. (Ogden.)

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts of water.
1.0405	6.08
1.0848	13.10

(Kremers, *Pogg. Ann.*, **95.** 120.)

The aqueous solution saturated at 8° is of 1.065 sp. gr. (Anthon, *Ann. der Pharm.*, 1837, **24.** 210.) Insoluble in alcohol. The saturated aqueous solution boils at 104. (Kremers, *Pogg. Ann.*, **92.** 499.)

*Ter*CHROMATE OF POTASH. $K^{\circ}O, 3\,CrO_3$ Easily soluble in water, and alcohol. The alcoholic solution soon undergoes decomposition. (Rothe.)

CHROMATE OF POTASH & OF SODA.

I.) $KO, CrO_3; NaO, CrO_3$ Soluble in water. (T. Thomson, *Phil. Trans.*, 1827, Part I. p. 223.)

II.) $2\,(KO, CrO_3); NaO, CrO_3$ Soluble in hot, less soluble in cold water. (H. Rose.)

CHROMATE OF POTASH & OF ZINC. Slightly soluble in cold water; but when treated with boiling water a portion (probably as a basic salt) separates out in an insoluble condition. (Wœhler.)

CHROMATE OF POTASH with CYANIDE OF MERCURY. $2\,(KO, CrO_3); 3\,HgCy + Aq$ Permanent. Soluble in water, especially when this is hot. (Caillot.) Readily soluble in water. (Darby, *J. Ch. Soc.*, **1.** 23.)

*Bi*CHROMATE OF POTASH with GLYCOCOLL. Soluble in water; less soluble in alcohol. (Horsford, *Am. J. Sci.*, (2.) **4.** 69.)

CHROMATE OF POTASH with SULPHATE OF COPPER. $KO, CrO_3; CuO, SO_3$ Decomposed by water. (Persoz, *Ann. Ch. et Phys.*, (3.) **25.** 282.)

CHROMATE OF POTASH with SULPHATE OF POTASH. $KO, CrO_3; 6\,(KO, SO_3)$ Very soluble in water. (Thomson, in his *System of Chem.*, London, 1831, **2.** 802.) Easily soluble in water, either hot or cold, though somewhat less readily in the latter. (Boutron-Chalard.)

*Bi*CHROMATE OF POTASH with SULPHATE OF POTASH. $KO, 2\,CrO_3; KO, SO_3$ Easily soluble in cold water. (Reinsch.)

CHROMATE OF POTASH with SULPHATE OF SODA. Soluble in hot, less soluble in cold water. (H. Rose.)

*Bi*CHROMATE OF QUINOLEIN. $C_{18}H_7N, HO, 2\,CrO_3$ Soluble in boiling water, from which it separates as the solution cools. (Gr. Williams.)

CHROMATE OF SILVER.

I.) *mono.* AgO, CrO_3 Insoluble in water. Soluble in an aqueous solution of monochromate of potash, in acids, and in ammonia-water. (Fischer.)

When an equivalent of AgO, CrO_3 is boiled with an equivalent of NaO, CO_2, in aqueous solution, $\frac{85}{100}$ of it may be decomposed. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 336.) It is not precipitated from solutions which contain citrate of soda. (Spiller.)

II.) *bi.* $AgO, 2\,CrO_3$ Insoluble in water. Somewhat soluble in dilute nitric acid. (T. Thomson, *Phil. Trans.*, 1827, Part I. p. 222.) Sparingly soluble in water. Decomposed by boiling water. Easily soluble in ammonia-water and in nitric acid. (Warington.)

*Bi*CHROMATE OF SILVER with CYANIDE OF MERCURY. $AgO, 2\,CrO_3; 2\,HgCy$ Scarcely at all soluble in cold, more readily soluble in hot water. Soluble in hot nitric acid, from which it separates as the solution cools. (Darby, *J. Ch. Soc.*, **1.** 24.)

CHROMATE OF SODA. Efflorescent. (Brooke.) $NaO, CrO_3 + 10\,Aq$ Permanent. (Moser.) Deliquescent. (Kopp.) Very readily soluble in water. (John, Moser.) Sparingly soluble in alcohol. (John, Moser.)

*Bi*CHROMATE OF SODA. $NaO, 2\,CrO_3$ More soluble than the monochromate. (Moser.) More soluble than bichromate of potash. (Dumas, *Tr.*) Very easily soluble in water. (Berzelius, *Lehrb.*)

CHROMATE OF SOLANIN.

CHROMATE OF STRONTIA. SrO, CrO_3 Slightly soluble in water. Insoluble in alcohol. Readily soluble in chlorhydric, nitric, and chromic acids.

CHROMATE OF STRYCHNINE. $C_{42}H_{22}N_2O_4, CrO_3, HO$ Sparingly soluble in boiling, less soluble in cold water. Sparingly soluble in alcohol. (Abel & Nicholson, *J. Ch. Soc.*, **2.** 252.)

CHROMATE OF THIACETONIN. Ppt.

CHROMATE OF THORIA. ThO, CrO_3 Insoluble in water. Soluble in chromic acid. (Berzelius.)

CHROMATE *of protoxide* OF TIN. Soluble in dilute acids.

CHROMATE *of binoxide* OF TIN. $SnO_2, 2\,CrO_3$ Insoluble in water.

CHROMATE *of protoxide* OF URANIUM. Soluble in an aqueous solution of protochloride of uranium. (Rammelsberg.)

CHROMATE *of sesquioxide* OF URANIUM.

I.) *mono.* Ur_2O_3, CrO_3 Soluble in water. (John.)

II.) *acid.* Mostly soluble in water. (John.)

CHROMATE OF VANADIUM. Partially soluble in water. (Berzelius.)

CHROMATE OF YTTRIA.

I.) *mono.* YO, CrO_3 Deliquescent. Readily soluble in water. (John.)

II.) *basic.* Sparingly soluble in water.

CHROMATE OF ZINC.

I.) *mono.* $ZnO, CrO_3, + 7\,Aq$ Easily soluble in water. (Kopp.)

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II.) *tetra.* Insoluble in water. Soluble in hot chromic acid. Slowly soluble, with combination, in ammonia-water. (Malaguti & Sarzeau, *Ann. Ch. et Phys.*, (3.) **9.** pp. 441, 458.)
$Zn O, Cr O_3 + 5 Aq$

III.) *acid.* Known only in solution. (M. & S., *loc. cit.*, p. 458.)
$2 Zn O, 3 Cr O_3$

CHROMATE OF ZINC*bi*AMIN. Efflorescent. Decomposed by water. Insoluble in alcohol, though slightly altered thereby. Insoluble in ether. Soluble in ammonia. (Malaguti & Sarzeau, *Ann. Ch. et Phys.*, (3.) **9.** 444.)
(*Ammonio-Chromate of Zinc.*)
$N_2 \left\{ H_6 \cdot Zn O, Cr O_3 + 5 Aq \right.$

CHROMICYANHYDRIC ACID. Soluble in water. (Bœckmann.)
(*HydroChromidCyanic Acid.*)
$3 H Cy, Cr_2 Cy_3$

CHROMICYANIDE OF AMMONIUM. Soluble in water.

CHROMICYANIDE OF COBALT. Ppt.

CHROMICYANIDE OF IRON. Ppt.
$3 Fe Cy, Cr_2 Cy_3$ (?)

CHROMICYANIDE OF LEAD. Ppt.

CHROMICYANIDE OF POTASSIUM. Easily soluble in water. Insoluble in alcohol. (Berzelius.) Not decomposed by dilute acids. (Bœckmann.)
$3 K Cy, Cr_2 Cy_3$

CHROMICYANIDE OF SILVER. Ppt.
$3 Ag Cy, Cr_2 Cy_3$

CHROMICYANIDE OF ZINC. Ppt.

CHROMIDE OF MANGANESE. Insoluble in chlorhydric or nitric acid. It dissolves only after long boiling in aqua-regia. (Bachmann.)

CHROMITE OF AMMONIA.

CHROMITE *of protoxide* OF IRON. Gives up traces of iron to boiling acids.
(*Chrom Iron Ore.*)
$Fe O, Cr_2 O_3$

CHROMITE *of sesquioxide* OF IRON. Partially soluble in nitric acid. (Vauquelin.)

CHROMITE OF LIME. Insoluble in water, or in an aqueous solution of sugar. Insoluble in solutions of caustic potash or ammonia. Very slowly decomposed by an aqueous solution of carbonic acid, and by solutions of the alkaline carbonates. (Pelouze, *Ann. Ch. et Phys.*, (3.) **33.** 9.)
$2 Ca O, Cr_2 O_3$

CHROMITE OF MAGNESIA. Insoluble in acids or alkaline solutions. (Schweizer.)
$Mg O, Cr_2 O_3$

CHROMITE OF MANGANESE. Entirely insoluble in acids. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **33.** 44.)
$Mn O, Cr_2 O_3$

CHROMITE OF POTASH. Insoluble in cold water. (Berthier.) Soluble in cold alkaline liquors, the solution undergoing decomposition when boiled.
$(K O)x, Cr_2 O_3$

CHROMITE OF SODA. Readily soluble in cold alkaline liquors, the solution undergoing decomposition when boiled.
$(Na O)x, Cr_2 O_3$

CHROMITE OF ZINC. Entirely unacted on by acids. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **33.** 46.)
$Zn O, Cr_2 O_3$

CHROMIUM. There are two allotropic modifications of metallic chromium.
Cr

Modif. α. Soluble in chlorhydric and nitric acids.

Modif. β. Not readily acted upon by other bodies. Neither dissolved nor oxidized by aqua-regia. Soluble in fluorhydric acid. (Berzelius, *Lehrb.*, **2.** pp. 312, 313.)

CHRYIODAMID. Insoluble in water, or ammonia-water. (Mulder.)
$C_{28} H_6 N_3 O_{13}$

CHRYIODAMID with AMMONIA. Insoluble in pure water.
$C_{28} H_{10} N_4 O_{13}$

CHRYIODIN. Partially soluble in ammonia-water. Soluble in a dilute solution of caustic potash. (Mulder.)
$C_{56} H_3 N_3 O_{28}$

CHRYIODIDE OF AMMONIA. Insoluble in water. Soluble in dilute ammonia-water. (Mulder.)
$C_{28} H_{10} N O_{13}$ (?)

CHRYSAMINAMID. *Vid.* Chrysammid.

CHRYSAMMIC ACID. Very sparingly soluble in cold, somewhat more soluble in boiling water. (Mulder.) Soluble in 800 pts. of cold, and in less hot water. (Liebig.) More readily soluble in alcohol, and ether, than in water. (Schunck.) More soluble in dilute acids, and in saline solutions, than in water. (Mulder.) Easily soluble in boiling nitric acid, without decomposition, also soluble in the other mineral acids. Decomposed by boiling concentrated sulphuric acid, also by boiling caustic potash.
(*Aloetic Acid, q. v. Artificial Bitter of Aloes. PolyChromatic Acid.*)
$C_{14} H_2 N_2 O_{12} = C_{14} H (N O_4)_2 O_3, H O$

Most of its salts are very sparingly soluble, or insoluble, in water; they are more soluble in solutions of the metallic acetates.

CHRYSAMMATE OF AMMONIA. Easily decomposed.

CHRYSAMMATE OF BARYTA. Insoluble in water. (Schunck, Mulder.)
$C_{14} H Ba (N O_4)_2 O_4 + 2 Aq$

CHRYSAMMATE OF CADMIUM. Soluble in water. (Mulder.)

CHRYSAMMATE OF CHROMIUM. Sparingly soluble in water.

CHRYSAMMATE OF COBALT. Sparingly soluble in water.

CHRYSAMMATE OF COPPER. Sparingly soluble in cold, more soluble in boiling water. (Schunck.)
$C_{14} H Cu (N O_4)_2 O_4 + 4 Aq$

CHRYSAMMATE OF GOLD. Soluble in hot, but nearly insoluble in cold water. (Mulder.)

CHRYSAMMATE *of protoxide* OF IRON. Tolerably soluble in water.

CHRYSAMMATE *of sesquioxide* OF IRON. Tolerably soluble in water.

CHRYSAMMATE OF LEAD.

I.) *normal.* Insoluble in water. (Mulder.)
$C_{14} H Pb (N O_4)_2 O_4$

II.) *basic.* Ppt.
$C_{14} H Pb (N O_4)_2 O_4 ; Pb O, H O$

CHRYSAMMATE OF LIME. Insoluble in water.
$C_{14} H Ca (N O_4)_2 O_4 + 6 Aq$

CHRYSAMMATE OF MAGNESIA. Tolerably soluble in hot water.
$C_{14} H Mg (N O_4)_2 O_4 + 6 Aq$

CHRYSAMMATE OF MANGANESE. Tolerably easily soluble in water. (Mulder.)
$C_{14} H Mn (N O_4)_2 O_4 + 5 Aq$

CHRYSAMMATE *of dinoxide* OF MERCURY. Sparingly soluble in water.

CHRYSAMMATE OF NICKEL. Sparingly soluble in water.

CHRYSAMMATE OF PLATINUM. Insoluble in water.

CHRYSAMMATE OF POTASH. Soluble in 1250 pts. of cold water. Easily soluble in boiling water. (Schunck.)
$C_{14} H K (N O_4)_2 O_4 + 3 Aq$

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Chrysammate of Silver. Not entirely insoluble in boiling water. (Schunck.) Insoluble in water. (Mulder.)

Chrysammate of Soda. Has the same solubility as the potash-salt. (Mulder.)
$C_{14}H\,Na\,(N\,O_4)_2\,O_4 + 8\,Aq$

Chrysammate of Strontia. Sparingly soluble in water. (Mulder.)

Chrysammate of Zinc. Very sparingly soluble in water. (Mulder.)

Chrysammidic Acid. Soluble in water, from which solution it is precipitated on the addition of strong acids. Decomposed by boiling with concentrated sulphuric or nitric acid. Also decomposed by alkaline solutions. (Schunk.)
(*AmidoChrysammic Acid. Chrysammidinic Acid.*)
$C_{14}H_5N_3O_{12} = N\left\{\begin{matrix}C_{14}H\,(N\,O_4)_2\,O_2\\H_2\end{matrix}\right. \cdot H\,O, H\,O$

Chrysammidate of Baryta. Ppt.
$C_{14}H_4\,Ba\,(N\,O_4)_2\,N\,O_4$

Chrysammidate of Potash. Soluble in boiling, very sparingly soluble in cold water.

Chrysammid. Readily soluble in water, and still more readily in alcohol, and ether. Soluble in concentrated sulphuric acid, from which water precipitates a portion of it. (Schunk.)
(*Chrysamminamid.*)
$C_{14}H_3N_3O_{10} = N\left\{\begin{matrix}C_{14}H\,(N\,O_4)_2\,O_2\\H_2\end{matrix}\right.$

Chrysammid with **Baryta.** Soluble in water.

Chrysammid with **Copper.** Soluble in water.

Chrysammid with **Lead.** Nearly insoluble in water. (Mulder.)

Chrysammid with **Lime.**
" **Manganese.**
" **Silver.**
" **Soda.**
" **Zinc.**
} Soluble in water.

Chrysanilic Acid. Very sparingly soluble in water. Readily soluble in alcohol, and ether. Soluble in alkaline solutions, but is easily decomposed by an excess of alkali. Decomposed by boiling with dilute mineral acids. (Fritsche.)
$C_{26}H_{11}N_3O_6$ (?)

Chrysanilate of Ammonia. Soluble in alcohol.

Chrysanilate of Lead. Ppt.
$C_{26}H_{10}\,Pb\,N_3O_6$ (?)

Chrysanilate of Potash. Easily soluble in water.

Chrysanilate of Zinc. Ppt.

ChrysAnisic Acid. Not sensibly soluble in cold, sparingly soluble in boiling water. Scarcely at all soluble in cold, tolerably readily soluble in boiling alcohol. Soluble in ether, especially when this is hot. Easily soluble, with combination, in dilute ammonia-water. (Cahours, *Ann. Ch. et Phys.*, (3.) **27.** 456.)
[Isomeric with Phenate of *ter*NitroMethyl.]
$C_{14}H_5\,(N\,O_4)_3\,O_2 = C_{14}H_4N_3O_{13}, H\,O$

ChrysAnisate of Ammonia. Soluble in water.
$C_{14}H_4\,(N\,H_4)\,(N\,O_4)_3\,O_2$

ChrysAnisate of Cobalt. Ppt.

ChrysAnisate of Copper. Ppt.

ChrysAnisate of Ethyl. Insoluble in water. Soluble in boiling alcohol. Soluble in boiling, much less soluble in cold ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **27.** 459.)
$C_{14}H_4\,(C_4H_5)\,(N\,O_4)_3\,O_2$

ChrysAnisate *of peroxide* **of Iron.** Ppt.

ChrysAnisate of Lead. Ppt.

ChrysAnisate *of protoxide* **of Mercury.** Ppt.

ChrysAnisate of Potash. Very easily soluble in water. (Cahours, *loc. cit.*, p. 456.)

ChrysAnisate of Silver. Insoluble, or very sparingly soluble in water. (Cahours.)
$C_{14}H_4\,Ag\,(N\,O_4)_3\,O_2$

ChrysAnisate of Zinc. Ppt.

Chrysatric Acid. Soluble in water, and in dilute acids, but is precipitated by concentrated acids. Its alkaline and alkaline-earthy salts are soluble in water.
(*AleoResinic Acid* of Schunck.)

Chrysatrate of Baryta. Insoluble, or very sparingly soluble in water. (Schunck.)
$C_{12}H_4\,Ba\,N_2O_{10}$

Chrysatrate of Lead. Ppt.
$4\,Pb\,O, C_{24}H_6N_3O_{15}$

Chrysatrate of Silver. Insoluble in water.

Chrysene. Insoluble in water, or alcohol. Scarcely at all soluble in ether. Soluble in boiling, less soluble in cold oil of turpentine, and naphtha.
$C_{12}H_4''$

Chrysindamid.
$C_{28}H_9N_5O_{18}$

Chrysindin with **Ammonia.** Insoluble in water.
$C_{28}H_8N_5O_{18}$

Chrysolepic Acid. *Vid.* Picric Acid.

Chrysophanic Acid. Sparingly soluble in cold water. Soluble in alcohol, and ether, especially when these liquids are warm. Soluble, without decomposition, in concentrated sulphuric acid, from which solution it is precipitated on the addition of water. Soluble in cold, decomposed by boiling nitric acid. Soluble, with combination, in solutions of the caustic alkalies.
(*Parietinic Acid. Rhein. Rheinic Acid. Rheic Acid. Rhabarbin. Rhabarbic Acid. Rhubarbin. Rhubarbaric Acid. Rheumin. Rhaponticin. Rumicin. Chrysophane.*)
$C_{20}H_8O_6$

Sparingly soluble in alcohol; less soluble in dilute alcohol. Soluble in 1125 pts. of alcohol of 86% at 30°, and in 224 pts. of this alcohol at boiling. Readily soluble in glacial acetic acid, amyl-alcohol, oil of turpentine, coal tar naphtha, and especially in benzin or the light oils of Burmese naphtha. Soluble, with feeble combination, in solutions of the caustic alkalies. (De la Rue & Mueller, *J. Ch. Soc.*, **10.** 298.)

Chrysophane. *Vid.* Chrysophanic Acid.

Chrysoretin. Sparingly soluble in water. Easily soluble in alcohol, and ether. Also soluble in alkaline solutions. (Bley.)

Chrysorhamnin. Very sparingly soluble in cold, decomposed by boiling water. Soluble in alcohol; the solution is partially decomposed when evaporated. Abundantly soluble in ether. Soluble, with partial decomposition, in solutions of the alkalies. (Kane, *Proc. Roy. Irish Acad.*, **2.** 223.)
(*Rhamnin.*)
$C_{23}H_{11}O_{11}$

Chrysorhamnin with **Oxide of Lead.**
I.) $C_{23}H_{11}O_{11}; 2\,Pb\,O$
II) $C_{23}H_{11}O_{11}; 3\,Pb\,O$
} Ppts.

Chysammid. *Vid.* Chrysammid.

Cicutin (from *Cicuta virosa*).

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Cimifugin. Soluble in alcohol. (Parrish's *Pharm.*, p. 192.)
(*Macrotin.*) (Resinoid from black snake-root.)

Cinacrol. Permanent. Sparingly soluble in water. Soluble in alcohol, ether, and acetic acid; in any quantity in aqueous solutions of the caustic alkalies and alkaline earths, the carbonated alkalies, and ammonia-water. (Hirzel.)
$C_{26} H_{18} O_4$

Cinchonicin. Nearly insoluble in water. Very soluble in ordinary and in absolute alcohol.
$C_{40} H_{24} N_2 O_2$

Cinchonidin.

I.) *Cinchonidin*(of Wittstein.) [From *China pseudo-regia.*] More difficultly soluble in alcohol, and ether, than the cinchonidin of Pasteur (No. 2). Soluble in about 3287 pts. of cold, and in 596 pts. of boiling water; in 88 pts. of cold alcohol of 0.833 sp. gr.; and in 19 pts. of the same alcohol at boiling; in 398 pts. of cold ether of 0.74. Soluble, without change, in concentrated sulphuric, chlorhydric, and nitric acids. (Wittstein.)
$C_{36} H_{20} N_2 O_2 = N_2 \left\{ C_{36} H_{20} O_2{}^{\text{vi}} \right.$

II.) *Cinchonidin*(of Pasteur & Gerhardt.) Soluble in 2580 pts. of water at 17°, and in 1858 pts. at 100°; and in 12 pts. of alcohol, of 0.835 sp. gr., at 17°. (Leers *Ann. Ch. u. Pharm.*, 1852, **82.** pp. 149, 150.)
Chinidin(of Winckler, Leers, and Stahlschmidt.) (*Isomeric with Cinchonin.*)
$C_{40} H_{24} N_2 O_2 = N_2 \left\{ C_{40} H_{24} O_2{}^{\text{vi}} \right.$

100 pts. of ether, of 0.728 sp. gr. dissolve 0.7 pts. of it at 17°. (Leers, *loc. cit.*) More soluble in ether than cinchonin, but less so than quinine.

Its salts are generally more easily soluble in water than those of quinine. They are very easily soluble in spirit, but are almost completely insoluble in ether. (Leers, *loc. cit.*, p. 152.)

Very sparingly soluble in water. Almost as readily soluble as hydrate of quinine in cold alcohol of 80%; soluble in all proportions in boiling alcohol of 80%. Less soluble than quinine in ether, 100 pts. of the latter dissolving 0.69 pt. of it, or 1 pt. in 144.5 of ether. Slowly soluble, with combination, in dilute acids. Readily soluble in sulphuric acid of 1.84 sp. gr., and nitric acid of 1.23 sp. gr. (Winckler, from *Buchn. Rep.*, (2.) **49.** 1, in *Pharm. Central-B.*, 1848, **19.** 309.) Soluble in 45 pts. of cold, and 3.7 pts. of boiling absolute alcohol; in 105 pts. of cold alcohol of 90%, and in 158 pts. of cold ether. (Bussy & Guibourt, *Journ. de Pharm. et Chim.*, 1852, (3.) **22.** pp. 414, 412, 409 *note.*)

Cinchonin. Permanent. Insoluble in cold, very sparingly soluble in boiling water.
(*Huanokin.*)
$C_{40} H_{24} N_2 O_2 = N_2 \left\{ C_{40} H_{24} O_2{}^{\text{vi}} \right.$

Soluble in 7000 pts. of cold, and in 2500 pts. of boiling water. (Duflos.)

W. Schwabe distinguishes two modifications of cinchonin: the ordinary α and another designated as β; according to him, 1 pt. of α dissolves in 2500 pts. of hot water, while β is scarcely at all soluble therein, both being insoluble in cold water. (*Kopp & Will's J. B. für* 1860, p. 363.) Insoluble, or nearly insoluble, in water. Soluble in 400 pts. of alcohol, of 80%, at 17°, and in 110 pts. at the temperature of boiling; in 600 pts. of ether at 17°, and in 470 pts. at the temperature of boiling. (A. Erdmann, *Ann. Ch. u. Pharm.*, **100.** 345.) Soluble in 33.3 pts. of strong alcohol. It is more soluble in alcohol in proportion as this is strong and hot; but is much less soluble than quinine in this menstruum. (Duflos.) Soluble in 115.78 pts. of alcohol of 90% at about 15°, and in 126.5 pts. of absolute alcohol at about 15°. (Bussy & Guibourt, *Journ. de Pharm. et Chim.*, 1852, (3.) **22.** 413.) 1 pt. of α is soluble in 30 pts. of hot alcohol, while 1 pt. of β is soluble in 43 pts. of hot, and in 1.73 pts. of cold alcohol. β is also soluble in 378 pts. of ether, while α is insoluble therein. (W. Schwabe, *Kopp & Will's J. B. für* 1860, p. 363.)

Sparingly soluble in neutral solvents. Only traces of it being dissolved by water or by ether. Soluble in about 176 pts. of alcohol at ordinary temperatures. Readily soluble at the ordinary temperature, with combination, in alcohol or water acidulated with chlorhydric or nitric acid. (Bouchardat, *Ann. Ch. et Phys.*, (3.) **9.** pp. 233–236.) Soluble in 830 pts. of ether at 15°. (Bussy & Guibourt, *Journ. de Pharm. et Chim.*, 1852 (3.) **22.** 409 *note.*) Almost insoluble in ether. Sparingly soluble in chloroform, and the fatty and essential oils.

100 pts. of chloroform dissolve 2.5 pts. of it. (Schlimpert, *Kopp & Will's J. B. für* 1859, p. 405.) 100 pts. of chloroform dissolve 4 31 pts. of it. (Michael Pettenkofer, *Kopp & Will's J. B. für* 1858, p. 363.) α is soluble in 40 pts. of chloroform, while β is soluble in 268 pts. (W. Schwabe, *Kopp & Will's J. B. für* 1860, p. 363.) 100 pts. of olive-oil dissolve 1 pt. of it. (Pettenkofer, *loc. cit.*) Insoluble in benzin. (Mansfield, *J. Ch. Soc.*, **1.** 262.) Slowly and difficultly soluble in an aqueous solution of carbonic acid. (Langlois, *Ann. Ch. et Phys.*, (3.) **41.** 89.) Sparingly soluble in aqueous solutions of caustic lime, potash, and ammonia; also in solutions of chloride of calcium, chloride of potassium, chloride of ammonium, carbonate of potash, and carbonate of soda; but is insoluble in solutions of caustic soda, or of chloride of sodium. (Calvert.) Easily soluble in dilute acids. Its salts are generally more soluble in water, and alcohol, than those of quinine, but are insoluble, or very difficultly soluble, in ether.

"**Cinchovatin.**" } *Vid.* Aricin.
"**Cinchovin.**" }

Cinebene. Insoluble in water. Readily soluble in alcohol, and ether. (Hirzel.)
$C_{20} H_{16}$

Cinephane. Soluble in chloroform. Insoluble in alcohol or ether. (Hirzel.)
$C_{20} H_8$

Cinephene. Insoluble in water. Sparingly soluble in cold alcohol. Easily soluble in hot alcohol, ether, and volatile oils. (Hirzel.)
$C_{20} H_{16}$, or $C_{40} H_{32}$

Cinephone. Insoluble in water, alcohol, or aqueous solutions of the caustic alkalies. Readily soluble in chloroform, ether, and wormseed-oil. (Hirzel.)
$C_{20} H_{12}$

CinHydramid. *Vid.* CinnamylHydramid.

Cinnamic Acid(Anhydrous). Insoluble in water. It is acidified by boiling with water. Sparingly soluble in boiling, but almost insoluble in cold alcohol. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 303.)
(*Cinnamic Anhydride. Cinnamate of Cinnamyl. Cinnamic Cinnamate.*)
$C_{36} H_{14} O_6 = \left. \begin{matrix} C_{18} H_7 O_2 \\ C_{18} H_7 O_2 \end{matrix} \right\} O_2$

Cinnamic Acid. Very sparingly soluble in cold, easily soluble in boiling water. Less soluble than benzoic acid in water.
(*Cinnamylic Acid. Zimmtsæure.*)
$C_{18} H_8 O_4 = C_{18} H_7 O_3, H O$

Readily soluble in alcohol, from which it is precipitated by water. (Dumas & Peligot.) Soluble in 4.3 pts. of absolute alcohol at 20°. (Mitscherlich.) Very easily soluble in ether. (Herzog.)

The alkaline cinnamates are readily soluble in water; those of the alkaline earths are sparingly

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soluble, while the rest are insoluble in water. Those cinnamates which are difficultly soluble in water dissolve more readily in water which contains nitrates or chlorides in solution.

Cinnamate of Alumina. Sparingly soluble in cold, easily soluble in hot water. (Herzog.)

Cinnamate of Ammonia.

I.) *normal.* Permanent. Sparingly soluble in cold, easily soluble in hot water. On boiling the aqueous solution a less soluble acid salt is formed. (Herzog.)

$C_{18}H_7(NH_4)O_4 + Aq$

II.) *acid.* Less soluble in water than the normal salt.

Cinnamate of Antimony & of Potash.

Cinnamate of Baryta. Readily soluble in boiling, difficultly soluble in cold water. (Herzog.)

$C_{18}H_7BaO_4 + 2Aq$

Cinnamate of Bismuth. Ppt.

Cinnamate of Cadmium. Insoluble in water. Sparingly soluble in hot ordinary alcohol. (Schiff.)

$C_{18}H_7CdO_4 + 2Aq$

Cinnamate of Cobalt. Rather difficultly soluble. Soluble in alcohol.

Cinnamate of Copper. Sparingly soluble in cold water. Decomposed by boiling water, an acid and a basic salt being formed. (Herzog.)

Cinnamate of Ethyl. Permanent. Scarcely at all soluble in water. Readily soluble in ether and in alcohol; even in weak spirit. (Herzog.)

(*Cinnamic Ether.*)
$C_{18}H_7(C_4H_5)O_4$

Cinnamate *of protoxide* **of Iron.** Sparingly soluble in water.

Cinnamate *of sesquioxide* **of Iron.** Sparingly soluble in water. (Herzog.)

Cinnamate of Glucina. Sparingly soluble in cold, easily soluble in hot water. (Herzog.)

Cinnamate of Lead. Very sparingly soluble in water. Insoluble in alcohol. (Herzog.)

$C_{18}H_7PbO_4$

Cinnamate of Lime. Sparingly soluble in cold, very soluble in boiling water. Less easily soluble in water than benzoate of lime. (E. Kopp.)

$C_{18}H_7CaO_4 + 2Aq$

Cinnamate of Magnesia. Soluble in water, and alcohol.

Cinnamate of Manganese. Difficultly soluble in cold, slowly soluble in hot water. (Herzog.)

Cinnamate *of dinoxide* **of Mercury.** Sparingly soluble in water. (Herzog.)

Cinnamate *of protoxide* **of Mercury.** Ppt.

Cinnamate of Methyl. Insoluble, or but sparingly soluble, in water. (E. Kopp.)

$C_{18}H_7(C_2H_3)O_4$

Cinnamate of Nickel. Insoluble in water. Easily soluble in alcohol. (Herzog.)

Cinnamate of Potash.

I.) *normal.* Permanent. Easily soluble in hot water; more soluble in water than the acid salt. (Herzog.) Very soluble in water, though less soluble than the corresponding benzoate. (H. Deville.) Tolerably soluble in alcohol.

$C_{18}H_7KO_4 + Aq$

II.) *acid.* Very sparingly soluble in water.

Cinnamate of Silver. Is the least soluble in water of any of the cinnamates. Insoluble in pure water, but soluble when in presence of small quantities of soluble salts. (Herzog.) Somewhat soluble in water. (Mulder.)

$C_{18}H_7AgO_4$

Cinnamate of Soda. Soluble in water.

$C_{18}H_7NaO_4 + Aq$

Cinnamate of Strontia. Soluble in hot, difficultly soluble in cold water. (Herzog.)

Cinnamate of Styracyl(or **of Styracin**). Completely insoluble in cold water. Somewhat sparingly soluble in cold, but readily soluble in hot alcohol. Only sparingly soluble in alcohol of 33°, but tolerably easily soluble in alcohol of 40°. (Lepage.) Soluble in 21 [22?] pts. of cold alcohol of 0.825 sp. gr., and in 3 pts. of the same alcohol at the temperature of boiling. (Simon.) Only sparingly soluble in cold alcohol of 90° (Tr.); the hot saturated alcoholic solution deposits it on cooling. (Scharling.) The alcoholic solution becomes milky on the addition of water. (Lepage.) Styracin does not combine directly with acids, but is rendered more soluble by them; thus, the solution of 1 pt. of it in 8 pts. of boiling alcohol, which becomes turbid on cooling, clears up again immediately on the addition of sulphuric, glacial acetic, or cinnamic acids. (Simon.) Soluble in 3 pts. of ether. (Simon.) Soluble in a mixture of alcohol and ether. Insoluble in aqueous solutions of caustic potash, soda, or ammonia (Lepage); or of carbonate of potash.

(*Meta Cinnamein*(of Fremy). *Styracin. Cinnamyl-Styrol. Cinnamyl-Styrone.*)
$C_{36}H_{16}O_4 = C_{18}H_7(C_{18}H_9)O_4$

Cinnamate *of binoxide* **of Tin.** Insoluble in water.

Cinnamate of Toluenyl. Scarcely at all soluble in water. Easily soluble in alcohol, even when this is cold, and in ether. Also soluble in bisulphide of carbon, and naphtha. It sometimes occurs in an amorphous modification, which is only soluble in boiling spirit.

(*Cinnamein. Balsam of Peru. MetaCinnamein*(of Scharling).)
$C_{32}H_{14}O_4 = C_{18}H_7(C_{14}H_7)O_4$

Cinnamate *of sesquioxide* **of Uranium.** Sparingly soluble in boiling water.

Cinnamate of Zinc. Tolerably easily soluble in water. (Herzog.)

Cinnamene. Insoluble in water. Easily soluble in alcohol, ether, essential oils, and bisulphide of carbon.

(*Cinnamomime. Cinnamol.*) ["Cinnamene is probably identical with Styrol." (Gmelin's *Handbook*, 13. 1.)]
$C_{16}H_8$''

Cinnamein. *Vid.* Cinnamate of Toluenyl.

Cinnamid. Soluble in boiling water.

(*Cinnamylamid.*)
$C_{18}H_9NO_2 = N\left\{\begin{matrix}C_{18}H_7O_2\\H_2\end{matrix}\right.$

Cinnamol. *Vid.* Cinnamene.

Cinnamyl. Not isolated.

$C_{18}H_7O_2$

***Bi*Cinnamylamin.** *Vid.* *tri*Phenylamin.

CinnamylHydramid. Permanent. Insoluble in water. Soluble in alcohol, and ether. More soluble in a hot mixture of alcohol and ether than in the cold.

(*Cinnhydramid. Hydride of Azocinnamyl. Hydrocinnamid. TriCinnamoylbiamin.*)
$C_{54}H_{24}N_2 = N_2\left\{\begin{matrix}(C_{18}H_7)_3\\H_3\end{matrix}\right.$

CinnAnilid. *Vid.* PhenylCinnamylamid.

CinnHydramid. *Vid.* CinnamylHydramid.

CinNitrAnisamid. Sparingly soluble in cold

(*Cinnitranisidid. Cinnanisidide nitrique.*) tolerably soluble in boiling alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **27.** 452.)
$C_{32}H_{14}N_2O_8 = N\left\{\begin{matrix}C_{18}H_7O_2\\C_{14}H_6(NO_4)O_2\\H\end{matrix}\right.$

Cissampelin. *Vid.* Pelosin.

CissoTannic Acid. Easily soluble in water, and alcohol. Ether only dissolves traces of it. The aqueous solution undergoes decomposition when left to itself.
(Red coloring matter of the autumn leaves of *Vitis* (*cissus*) *hederacea*, and of strawberries.)
$C_{20}H_{12}O_{16}$

CissoTannate of Lead. Ppt. (Wittstein, in his *Handw.*)
$C_{20}H_{11}PbO_{16} + Aq$

Citracartic Acid. *Vid.* Mesaconic Acid.

Citraconamic Acid.
$C_{10}H_7NO_6 = N\left\{\begin{matrix}C_{10}H_4O_4''\\H_2\end{matrix}\right. .O, HO$

*Bi*Citraconamate of Ammonia. Readily soluble in water, and alcohol. (Crasso.)

Citraconamate of Baryta. Soluble in water, from which alcohol precipitates it.

Citraconamate of Lead.

Citraconamate of Silver.

Citraconamid. *Vid.* Citraconamic Acid.

Citraconanil. *Vid.* PhenylCitraconimid.

Citraconanilic Acid. *Vid.* PhenylCitraconamic Acid.

Citraconic Acid(Anhydrous). Hygroscopic. Slowly acidified by water.
$C_{10}H_4O_6 = C_{10}H_4O_4''\}O_2$

Citraconic Acid. Deliquescent. Soluble in 3 pts. of water at 10° (Lassaigne); in 0.42 pt. of water at 15° (Baup); in 8 pts. at 10° (in Gerhardt's *Tr.*) Easily soluble in alcohol (Lassaigne), and ether.
(*Pyrocitric Acid*(of Robiquet). *Citribic Acid.*)
$C_{10}H_6O_8 = C_{10}H_4O_6, 2HO$

Citraconate of Ammonia.
I.) *acid.*
$C_{10}H_5(NH_4)O_8$

Citraconate of Baryta.
I.) *normal.* Sparingly soluble in cold, readily soluble in boiling water. Soluble in 150 pts. of cold, and in 50 pts. of hot water. (Lassaigne.)
$C_{10}H_4Ba_2O_8 + 5Aq$
II.) *acid.* Soluble in water.
$C_{10}H_5BaO_8 + Aq$

Citraconate of Cobalt.
I.) *normal.*

Citraconate of Ethyl.
I.) *normal.* Scarcely at all soluble in water, but is decomposed by prolonged contact therewith. Miscible in all proportions with alcohol, and ether. (Malaguti.) Soluble, without decomposition, in cold concentrated sulphuric acid.
$C_{10}H_4(C_4H_5)_2O_8$

Citraconate of Lead.
I.) *normal.* Sparingly soluble in cold, readily soluble in hot water. (Crasso.)
$C_{10}H_4Pb_2O_8 + \left\{\begin{matrix}2Aq\\ \& \\4Aq\end{matrix}\right.$
II.) *acid.*
$C_{10}H_5PbO_8$
III.) *basic.* Almost insoluble in water. (Crasso.)
$C_{10}H_4Pb_2O_8, 2PbO$

Citraconate of Lime.
I.) *normal.* Soluble in 28 pts. of water. (Lassaigne.)
II.) *acid.* Permanent.
$C_{10}H_5CaO_8 + 3Aq$

Citraconate of Magnesia. Very soluble in water. (Crasso.)

Citraconate of Manganese.

Citraconate *of dinoxide* of Mercury. Difficultly soluble in water.

Citraconate of Nickel.
I.) *normal.* Easily soluble in water.
II.) *acid.* Soluble in water.

Citraconate of Potash.
I.) *normal.* Readily soluble in water. (Crasso.) [Lassaigne describes a salt crystallizing in needles, which is permanent and soluble in 4 pts. of water.]
$C_{10}H_4K_2O_8$
II.) *acid.* Readily soluble in water. (Crasso.)
$C_{10}H_5KO_8$
III.) *peracid.*

Citraconate of Silver.
I.) *normal.* Soluble in boiling, less soluble in cold water. Soluble in ammonia-water; after drying this solution the residue is very soluble in water.
$C_{10}H_4Ag_2O_8 + 2Aq$
II.) *acid.* Much more soluble in water than the normal salt. (Gottlieb.)
$C_{10}H_5AgO_8$

Citraconate of Soda.
I.) *normal.* } Extremely soluble in water. (Crasso.)
II.) *acid.* }

Citraconate of Strontia.
I.) *normal.* Soluble in water.
$C_{10}H_4Sr_2O_8$
II.) *acid.*
$C_{10}H_5SrO_8 + 3Aq$

Citraconate *of protoxide* of Tin. Insoluble in water.

CitraconAzoPhenylimid. *Vid.* NitrAzoPhenylCitraconamid.

Citraconic Anhydride. *Vid.* Citraconic Acid(Anhydrous).

Citraconimid. Insoluble in cold, sparingly soluble in boiling water. Very sparingly soluble in alcohol. Soluble, with decomposition, in boiling ammonia-water. (Gottlieb.)
(*Citraconylamid.*)
$C_{10}H_5NO_4 = N\left\{\begin{matrix}C_{10}H_4O_4''\\H\end{matrix}\right.$

Citraco*bi*NitrAnil. *Vid. bi*NitroPhenylCitraconimid.

Citraco*bi*NitrAnilic Acid. *Vid. bi*NitroPhenylCitraconamic Acid.

Citracon*di*NitrAnil. *Vid. bi*NitroPhenylCitraconimid.

CitraconIodanil. *Vid.* IodoPhenylCitraconimid.

CitracoNitrAzoPhenylimid. *Vid.* NitrAzoPhenylCitraconamid.

Citramic Acid. Not isolated.
$C_{12}H_7NO_{10}$

Citramid. Sparingly soluble in water.
(*Citryl teramid.*)
$C_{12}H_{11}N_3O_8 = N_3\left\{\begin{matrix}C_{12}H_5O_8'''\\H_6\end{matrix}\right.$

CitrAnilic Acid. *Vid.* PhenylCitramic Acid.

CitrAnilimid. *Vid.* PhenylCitrimid.

Citric Acid. Permanent. Deliquesces in moist air. 1 pt. of the 2 Aq. salt is soluble in 0.513 pt. of water at 15°. (Gerlach's determination, see his table of
$C_{12}H_8O_{14} = C_{12}H_5O_{11}, 3HO \& + Aq \& 2Aq$

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sp. grs., below.) Soluble in 0.75 pt. of cold, and in 0.5 pt. of hot water (Vauquelin); in 1.143 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) The saturated cold solution, therefore, contains 57.14% of it, and the saturated boiling solution 66.66%; or 100 pts. of water at 15.5° dissolve 133 pts., and at 100°, 200 pts. of it. The aqueous solution gradually decomposes on standing. Citric acid exhibits a remarkable tendency to form supersaturated solutions, when its hot aqueous solution is cooled. (Gerlach, *loc. cit.*, p. 26, note.)

Percentage of Crystallized Citric Acid ($C_{12}H_5O_{11}$, $3HO + 2Aq$) *in Aqueous Solutions, at* 15°.

Sp. Gr.	Per Cent.	Sp. Gr.	Per Cent.
1.0037	1	1.1467	35
1.0074	2	1.1515	36
1.0111	3	1.1564	37
1.0149	4	1.1612	38
1.0186	5	1.1661	39
1.0227	6	1.17093	40
1.0268	7	1.1756	41
1.0309	8	1.1814	42
1.0350	9	1.1851	43
1.03916	10	1.1899	44
1.0431	11	1.1947	45
1.0470	12	1.1998	46
1.0509	13	1.2050	47
1.0549	14	1.2103	48
1.0588	15	1.2153	49
1.0632	16	1.22041	50
1.0675	17	1.2257	51
1.0718	18	1.2307	52
1.0762	19	1.2359	53
1.08052	20	1.2410	54
1.0848	21	1.2462	55
1.0889	22	1.2514	56
1.0930	23	1.2572	57
1.0972	24	1.2627	58
1.1014	25	1.2683	59
1.1060	26	1.27382	60
1.1106	27	1.2794	61
1.1152	28	1.2849	62
1.1198	29	1.2904	63
1.12439	30	1.2960	64
1.1288	31	1.3015	65
1.1333	32	1.3071	66
1.1378	33	1.30763	66.1*
1.1422	34		

(Th. Gerlach, *Sp. Gew. der Salzlœsungen*, 1859, pp. 26, 27.)

* Mother liquor.

An aqueous solution of sp. gr. (at 12°)	Contains (by experiment) per cent of the crystallised acid, $C_{12}H_8O_{14} + 2Aq$
1.0150	4
1.0306	8
1.0470	12
1.0634	16
1.0979	24
1.1540	36

From these results Schiff deduces the formula: $D = 1 + 0.003721\,p + 0.00001534\,p^2$, in which D = the sp. gr. of the solution, and p the percentage of substance in the solution, by means of which Ott has calculated the following table.

Sp. gr. (at 12°)	Per cent of $C_{12}H_8O_{14} + 2Aq$	Per cent of $C_{12}H_8O_{14}$
1.0037	1	0.914
1.0075	2	1.829
1.0113	3	2.743
1.0151	4	3.657
1.0190	5	4.571
1.0229	6	5.486
1.0268	7	6.400
1.0307	8	7.314
1.0347	9	8.229
1.0387	10	9.143
1.0428	11	10.057
1.0469	12	10.972
1.0511	13	11.886
1.0550	14	12.800
1.0593	15	13.714
1.0635	16	14.629
1.0677	17	15.543
1.0719	18	16.457
1.0762	19	17.372
1.0805	20	18.286
1.0849	21	19.200
1.0893	22	20.115
1.0937	23	21.029
1.0981	24	21.943
1.1026	25	22.857
1.1071	26	23.772
1.1116	27	24.686
1.1162	28	25.600
1.1208	29	26.515
1.1254	30	27.429
1.1301	31	28.343
1.1348	32	29.258
1.1395	33	30.172
1.1442	34	31.086
1.1490	35	32.000
1.1538	36	32.915
1.1586	37	33.829
1.1635	38	34.743
1.1684	39	35.658
1.1733	40	36.572
1.1783	41	37.486
1.1833	42	38.401
1.1883	43	39.315
1.1934	44	40.229
1.1985	45	41.143
1.2036	46	42.058
1.2088	47	42.972
1.2140	48	43.886
1.2192	49	44.801
1.2244	50	4.5715

(H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 190.)

An aqueous solution of sp. gr.	Contains per cent of crystal. citric acid.	An aqueous solution of sp. gr.	Contains per cent of crystal. citric acid.
1.30	60.32	1.14	30.46
1.28	56.80	1.12	26.72
1.26	53.17	1.10	22.63
1.24	49.42	1.08	18.40
1.22	45.33	1.06	14.06
1.20	41.72	1.04	9.56
1.18	38.16	1.02	4.87
1.16	34.49		

(Richter.)

An aqueous solution containing 25% of crystallized citric acid boils at 101.8°; one of 50% boils at 105.8°. (Gerlach's *Sp. Gew. der Salzlœsungen*, p. 111.)

Soluble in 1.15 pts. of alcohol, of 80% at 15°; or 100 pts. of alcohol of 80% dissolve 87 pts. of it at 15°; or, the solution in alcohol of 80%, saturated at 15° contains 46.5% of it, and is of 1.059

sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113**. 191.) Readily soluble in alcohol, more in hot than in cold, but not so readily as in water. Readily and abundantly soluble in ether. (Wackenroder.) Insoluble in ether. (Berzelius's *Lehrb.*, **4**. 136.) Melts at 150°, and is then soluble in anhydrous ether, from which solution crystals separate after the lapse of several hours, but these crystals are completely insoluble in ether, being unaltered citric acid. (Robiquet.) Soluble in wood-spirit. (St. Evre.) Abundantly soluble in boiling creosote, the solution solidifying on cooling. (Reichenbach.) Soluble in glycerin. Insoluble in caoutchin, but is decomposed when boiled with it. (Himly.)

The normal (terbasic) citrates of the alkalies, and some others, are soluble in water; these solutions are liable to change on keeping. Many of the citrates insoluble in water are soluble in aqueous solutions of the alkaline citrates.

CITRATE OF ALUMINA.

I.) *di*, or *tri?* Insoluble in water.

II.) *mono*. Very soluble in water. (Richter.)

CITRATE OF AMMONIA.

I.) *tri*. Very soluble in water. Soluble in boiling, less soluble in cold alcohol. (Heldt.)
$C_{12}H_5(NH_4)_3O_{14}$

II.) *di*. Deliquescent. Easily soluble in water. Soluble in boiling, less soluble in cold alcohol.
$C_{12}H_6(NH_4)_2O_{14}$

III.) *mono*. Soluble in water.
$C_{12}H_7(NH_4)O_{14}$

IV.) Compound of Nos. II. & III.
$\left.\begin{matrix}C_{12}H_7(NH_4)O_{14}\\C_{12}H_6(NH_4)_2O_{14}\end{matrix}\right\}$

CITRATE OF AMMONIA & *of sesquioxide* OF IRON. Hygroscopic. Easily soluble in water. Nearly insoluble in alcohol. (Haidlen.) Insoluble in strong alcohol; but tolerably soluble in 40% alcohol. (Wittstein.)
$C_{72}H_{66}N_5Fe_8O_{101} = \left.\begin{matrix}C_{12}H_5O_8'''\\(NH_4)_3\end{matrix}\right\}O_6;\ \left.\begin{matrix}C_{12}H_5O_8'''\\H\,.\,(NH_4)_2\end{matrix}\right\}O_6;\ \left.\begin{matrix}(C_{12}H_5O_8''')_4\\(Fe_2''')_4\end{matrix}\right\}O_{24} + 17\ Aq$

CITRATE OF AMMONIA & OF LEAD. Soluble in water. (Berzelius.)

CITRATE OF AMMONIA & *of dinoxide* OF MERCURY. Insoluble in water. Soluble in acetic acid. (Harff.)

CITRATE OF AMMONIA & *of protoxide* OF MERCURY.

I.) *normal*. Deliquescent. Soluble in water, with separation of a portion of basic salt. Soluble in nitric acid. (Burckhardt.)

II.) *basic*. Insoluble in water. Readily soluble in chlorhydric and nitric acids, in ammonia-water, and in aqueous solutions of nitrate of ammonia, and citrate of ammonia. (Burckhardt.)

CITRATE OF AMMONIA & OF POTASH. Very deliquescent.
$C_{12}H_5K_3O_{14}, C_{12}H_6(NH_4)_2O_{14}$

CITRATE OF AMMONIA & OF SODA.

CITRATE OF AMMONIUMCHLORPLATIN(*ous*)-AMMONIUM. (*Gros's Citrate.*) Somewhat soluble in water. (Gros, *Ann. der Pharm.*, 1838, **27**. 256.)

CITRATE OF AMYL. *Vid.* AmylCitric Acid.

CITRATE OF ANILIN.

I.) *acid*. Easily soluble in alcohol, and still more readily in water. (Pebal.)
$C_{12}H_7(N\left\{C_{12}H_7\,.\,H\right)O_{14}$

CITRATE OF ANTIMONY & OF POTASH. Soluble in water. (Thaulow.)
$C_{12}H_5K_3O_{14}, C_{12}H_5Sb'''O_{14} + 5\ Aq$

CITRATE OF ANTIMONY & OF SILVER. Insoluble in water.
$C_{12}H_3Ag_2Sb'''O_{14} + 2\ Aq$

CITRATE OF ARGENTAMMONIUM & OF SILVER.
$C_{12}H_5\left(N\left\{\begin{matrix}H_3\\Ag\end{matrix}\right.\right)Ag_2O_{14} + 3\ Aq$

CITRATE OF BARYTA.

I.) *tri*. When precipitated in the cold, it dissolves in water; but when it has been precipitated from a hot solution, it is nearly or quite insoluble in water. (Liebig.) Very sparingly soluble in water; readily soluble in citric acid. (Scheele.) Easily soluble in dilute acids.
$C_{12}H_5Ba_3O_4 + 7\ Aq$

Soluble in a cold solution of citrate of soda. (Heldt, Spiller.)

II.) $\frac{5}{2}$ *basic*. Insoluble in alcohol.
$C_{12}H_5Ba_3O_4, C_{12}H_6Ba_2O_{14} + 7\ Aq$

III.) *mono?* Readily soluble in water. Soluble in ammonia-water.

CITRATE OF CADMIUM. Nearly insoluble in water. (Stromeyer.)

CITRATE OF CAFFEIN. Soluble in water. (Audry.) Does not exist. (Geuther.)

CITRATE OF CERIUM. Insoluble in water. Soluble in citric acid. (Berzelius.)

CITRATE *of protoxide* OF CHROMIUM. Slowly soluble in cold, more quickly soluble in a hot aqueous solution of normal citrate of soda. (Moberg.)

CITRATE *of sesquioxide* OF CHROMIUM. Soluble in water. (Brandenburg.)

CITRATE OF CHROMIUM & OF POTASH.
$C_{12}H_5KCr_2O_{14} + 4\ Aq$

CITRATE OF CINCHONIDIN (of Pasteur). Difficultly soluble in water. (Leers, *Ann. Ch. u. Pharm.*, **82**. 160.)

CITRATE OF COBALT.

I.) *tri*. Readily soluble in water. Insoluble in alcohol. (Heldt.)
$C_{12}H_5Co_3O_{14} + 14\ Aq$

II.) *di*. Soluble in water. (Heldt.)

III.) *mono*. Soluble in water. (Heldt.)

CITRATE OF COBALT & OF SODA. Soluble in water.

CITRATE OF COPPER.

I.) *basic*. Soluble in ammonia-water, from which it is precipitated by alcohol. (Heldt.)
$C_{12}H_5Cu_3O_{14}, CuO, HO + 3\ Aq$

CITRATE OF ETHYL.

I.) *tri*. Sparingly soluble in water; the aqueous solution gradually decomposes on standing, — more quickly if heated. Readily soluble in alcohol, even in dilute, and in ether. Soluble in cold concentrated sulphuric acid and in concentrated chlorhydric acid, from both of which solutions it is precipitated unchanged on the addition of water. It is also soluble in nitric acid, but water does not cause it to separate from this solution. (Malaguti.)
$C_{12}H_5(C_4H_5)_3O_{14}$

CITRATE OF GLUCINA. Soluble in water. (Vauquelin.)

CITRATE OF GLYCERYL.

I.) *normal*. Insoluble in water, alcohol, or ether. A small quantity of it dissolves after long-continued boiling with water. Slowly soluble in warm concentrated chlorhydric acid. Immediately solu-
$C_{18}H_{10}O_{14} = C_{12}H_5(C_6H_5''')O_{14}$
(*Citrin. Citromonoglycerin.*)

ble, with decomposition, in concentrated sulphuric acid. Gradually soluble in a cold aqueous solution of caustic potash. (v. Bemmelen.)

II.) *basic*. Resembles the normal salt.
$C_{24}H_{18}O_{20} = C_{12}H_5(C_6H_5''')O_{14}; C_6H_5O_3, 3HO$
(*Citro bi Glycerin.*)

Citrate *of protoxide* of Iron. Deliquescent. Soluble in water. (Béral.) Abundantly, but very slowly, soluble in water. (W. Procter, in *Mohr, Redwood & Procter's Pract. Pharm.*, p. 468.) Alcohol precipitates it from the aqueous solution. (Heldt.) Soluble in an aqueous solution of sugar. (Parrish's *Pharm.*, p. 516.)

Citrate *of sesquioxide* of Iron.

I.) *normal*. Tolerably permanent. Very readily soluble in hot water, and is retained in solution when the liquor has become cold, but is only sparingly soluble in cold water when treated therewith directly. (Mohr, Redwood & Procter's *Pharmacy*, p. 242.) Slightly soluble in cold, readily soluble in boiling water. It is more readily soluble in water when freshly prepared than when old, being in the latter case only slowly and imperfectly soluble. (Parrish's *Pharm.*, pp. 514, 515.) Easily soluble in water. (Vauquelin.) Alcohol precipitates it from the aqueous solution. (Heldt.) Insoluble in alcohol of 90%; but is sparingly soluble in alcohol of from 20 @ 40%. (Wittstein.) Soluble in aqueous solutions of the alkaline citrates. (H. Rose.)
$C_{12}H_5Fe_2'''O_{14} + 3Aq$

II.) *basic*. Almost completely soluble in water. (Wittstein.)
$6Fe_2O_3; 5C_{12}H_5O_{11} + 16Aq,$
i. e. $5(C_{12}H_5Fe_2'''O_{14}); Fe_2O_3 + 16Aq$

Citrate *of protoxide & of sesquioxide* of Iron.
$2C_{12}H_5Fe_3O_{14}; 3C_{12}H_5Fe_2'''O_{14}; C_{12}H_8O_{14} + 15Aq.$

Citrate *of sesquioxide* of Iron & of Magnesia. Soluble in water. (Parrish's *Pharm.*, p. 516.)

Citrate of Iron(Fe_2O_3)& of Quinine. Soluble in water. (Squibb, *Parrish's Pharm.*, p. 402.)
[Of variable composition]

Citrate of Iron(Fe_2O_3)& of Soda. Deliquescent. Soluble in water. (Heldt.)

Citrate of Iron(Fe_2O_3)& of Strychnine. Soluble in water. (Parrish's *Pharm.*, p. 515.)

Citrate of Iron(Fe_2O_3)& of Zinc. Very soluble in water. (Parrish's *Pharm.*, p. 515.)

Citrate of Lead.

I.) *tri*. Insoluble in alcohol. (Berzelius.) Very soluble in an aqueous solution of citrate of ammonia; also soluble in a solution of tri-citrate of soda and in hot solutions of chloride of ammonium, nitrate of ammonia, and succinate of ammonia; incompletely soluble in a solution of carbonate of ammonia. (Wittstein.) Readily soluble in nitric acid and in ammonia-water. (Berzelius.) Soluble in nitric acid. (Persoz, *Chim. Moléc.*, p. 354 *note.*)
$C_{12}H_5Pb_3O_{14}$

II.) *di*. Soluble in water. (Heldt.) Decomposed by water. (Berzelius.) Soluble in ammonia-water. (Berzelius.)
$C_{12}H_6Pb_2O_{14} + 2Aq$

III.) $\frac{5}{2}$ *basic*. Insoluble in water. (Heldt.)
$C_{12}H_5Pb_3O_{14}, C_{12}H_6Pb_2O_{14} + Aq$

IV.) *tetra*.
$C_{12}H_5Pb_3O_{14}, PbO, HO$

V.) *penta*. Insoluble in water. (Heldt.)
$C_{12}H_5Pb_3O_{14}, 2PbO + 8Aq$

VI.) *hexa*. Insoluble in water. (Heldt.)
$C_{12}H_5Pb_3O_{14}, 3PbO + Aq$

Citrate of Lead & of Soda.

Citrate of Lime.

I.) *tri*. Less soluble in *boiling* than in *cold* water; the aqueous solution being precipitated on boiling, — the precipitate dissolves, for the most part, when the solution becomes cold. (Heldt.) When prepared by precipitation from cold solutions it is soluble in cold water, but when prepared by precipitation from hot solutions it is insoluble or nearly insoluble. (Liebig.) Soluble in cold aqueous solutions of chloride of calcium and of tri-citrate of soda. (Berzelius.) Easily soluble in acetic acid, and in the mineral acids, from which it is not precipitated on the addition of ammonia; it is precipitated, however, from these solutions on boiling them. Easily soluble in warm citric acid.
$C_{12}H_5Ca_3O_{14} + Aq \;\&\; 4Aq$

Citrate of lime is only sparingly precipitated when a neutral aqueous solution of hyposulphite of lime is mixed with citrate of alumina, a portion of each of these salts remaining undecomposed in the solution. (Herschel, *Edin. Phil. Journ.*, 1819, 1. 22.)

II.) *di*. Partially decomposed by water. Soluble in citric acid. Insoluble in spirit.
$C_{12}H_6Ca_2O_{14} + 2Aq$

III.) *mono*. Soluble in citric acid.

Citrate of Lime & of Methyl. *Vid.* MethylCitrate of Lime.

Citrate of Lime & of Silver. Insoluble, or very sparingly soluble in water. (Chodnew.)
$C_{12}H_5Ag_2CaO_{14}, CaO$

Citrate of Lime & of Soda. Soluble in water, from which it is not precipitated by boiling the solution. (Spiller.)

Citrate of Lithia. Soluble in water.
$C_{12}H_5Li_3O_{14}$

Citrate of Magnesia.

I.) *tri*. Soluble in water, from which alcohol precipitates it.
$C_{12}H_5Mg_3O_{14} + 14Aq$

When citric acid is saturated with carbonate of magnesia, and the solution evaporated to a paste, it solidifies on cooling to a sort of glass, which is still very easily soluble in water. But this soon loses a portion of its water and becomes porcelaneous, and is now difficultly soluble in water. This sparingly soluble modification has the composition $C_{12}H_5Mg_3O_{14} + 11Aq.$, and requires 75 pts. of cold water and 28 pts. of boiling water for its solution. When heated to 100°, this salt loses 3 equivs. of water, and after this requires 92 pts. of water to dissolve it. (Wittstein.)

II.) *di*.

Citrate of Manganese.

I.) *di*. Insoluble in water. Sparingly soluble in acetic acid, and readily soluble in chlorhydric acid. (Heldt.) Soluble in an aqueous solution of di-citrate of soda.
$C_{12}H_6Mn_2O_{14} + 2Aq$

Citrate of Manganese & of Soda.

Citrate *of dinoxide* of Mercury. Insoluble in water; decomposed by boiling water, a subsalt being formed. Soluble in citric and acetic acids; also soluble in concentrated sulphuric acid. (Burckhardt.) Readily soluble in nitric acid. (Scheele.)

Citrate *of protoxide* of Mercury. Sparingly soluble in boiling water.

Decomposed by water. Soluble in 1300 pts. of alcohol, and in 1000 pts. of ether. Soluble in a warm aqueous solution of citrate of ammonia. Easily soluble in nitric, acetic, and citric acids;

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also soluble in a warm aqueous solution of citrate of soda. (Burckhardt.)

CITRATE OF METHYL.

I.) *normal.*

$C_{18}H_{14}O_{14} = C_{12}H_5(C_2H_3)_3O_{14}$

II.) *di.* *Vid.* *di*MethylCitric Acid.

$C_{12}H_6(C_2H_3)_2O_{14}$

III.) *mono.* *Vid.* MethylCitric Acid.

$C_{12}H_7(C_2H_3)O_{14}$

CITRATE OF NICKEL.

I.) *tri.* Soluble in water, from which alcohol $C_{12}H_5Ni_3O_{14} + 14\,Aq$ precipitates it. (Heldt.)

II.) *di.* Soluble in water. (Heldt.)

III.) *mono.* Soluble in water. (Heldt.)

CITRATE OF PALLADIUM. Ppt.

CITRATE OF POTASH.

I.) *tri.* Very deliquescent. Soluble in water. [*Ordinary Citrate of the apothecaries.*] (Heldt.) Soluble in 2 pts. of water. (Parrish's *Pharm.*, p. 449.) $C_{12}H_5K_3O_{14} + 2\,Aq$ Insoluble in absolute, but soluble in hydrated alcohol. (Heldt.)

II.) *di.* Soluble in water. Insoluble in absolute, $C_{12}H_6K_2O_{14}$ soluble in hydrated alcohol. (Heldt.)

III.) *mono.* Permanent. Soluble in water. $C_{12}H_7KO_{14} + 4\,Aq$ Sparingly soluble in boiling, less soluble in cold alcohol. (Heldt.) Melts in its water of crystallization at 100°.

CITRATE OF POTASH & OF SODA. Permanent.

$\left.\begin{matrix}C_{12}H_5Na_3O_{14}\\C_{12}H_5K_3O_{14}\end{matrix}\right\} + 11\,Aq$ Soluble in water.

CITRATE OF QUININE. Soluble in 820 pts. of $C_{12}H_6\left(N_2\left\{C_{40}H_{24}O_4{}^{vi}\,.\,H\right.\right)_2O_{14} + 10\,Aq$ cold, and 30 pts. of boiling water; in 44 pts. of cold, and 3 pts. of boiling alcohol of 0.833. (Wittstein.)

CITRATE *of dinoxide* OF SILVER. Slowly soluble in water. (Wœhler.)

$C_{12}H_5Ag_6O_{14} + Aq$

CITRATE *of protoxide* OF SILVER.

I.) *tri.* Somewhat soluble in boiling, nearly $C_{12}H_5Ag_3O_{14} + Aq$ insoluble in cold water. (Liebig.) Soluble in ammonia-water.

It is not precipitated from solutions which contain citrate of soda. (Spiller.)

CITRATE OF SODA.

I.) *tri.* Very slowly soluble in water. The $C_{12}H_5Na_3O_{14} + 4\,Aq$ & $11\,Aq$ crystals containing 11 equivalents of water are soluble in 1.75 pts. of water. (Vauquelin.) Sparingly soluble in alcohol. (Heldt.)

II.) *di.* Permanent. Soluble in water, and in $C_{12}H_6Na_2O_{14} + 2\,Aq$ boiling alcohol. (Berzelius.)

III.) *mono.* Difficultly soluble in water. Slight- $C_{12}H_7NaO_{14} + 2\,Aq$ ly soluble in boiling alcohol.

CITRATE OF SODA & OF YTTRIA. Readily soluble in water. (Berzelius.)

CITRATE OF SODA & OF ZINC. Permanent.

CITRATE OF SODA with TARTRATE OF SODA. Soluble in water.

CITRATE OF SOLANIN. Soluble in water.

CITRATE OF STRONTIA.

I.) *tri.* Sparingly soluble in water. Soluble $C_{12}H_5Sr_3O_{14} + 5\,Aq$ in warm citric acid. Partially soluble in acetic acid. Easily soluble in dilute mineral acids.

II.) *di.* Permanent. Soluble in citric acid. $C_{12}H_6Sr_2O_{14} + 2\,Aq$ Insoluble in alcohol. (Heldt.)

CITRATE *of binoxide* OF TELLURIUM. Easily soluble in water. (Berzelius.)

CITRATE OF THORIA.

I.) *tri.* Insoluble in water. Readily soluble in alcohol. Soluble in ammonia-water; the residue left on evaporating this solution is soluble in water. (Berzelius.)

II.) *acid.* Soluble in water, and in ammonia-water.

CITRATE OF TITANIUM(TiO_2). Soluble in water.

CITRATE *of sesquioxide* OF URANIUM. Slightly soluble in water. (Richter.)

CITRATE OF UREA.

$C_2H_4N_2O_2, 2\,HO, C_{12}H_5O_{11}$

CITRATE OF VANADIUM. Slowly soluble in cold water. Soluble in ammonia-water. (Berzelius.)

CITRATE OF YTTRIA.

I.) *tri.* Soluble in ammonia-water; the residue left on evaporating this solution is soluble in water. Soluble in aqueous solutions of the yttrium salts; also in a solution of citrate of soda, and in citric acid. (Berlin.)

CITRATE OF ZINC.

I.) *tri.* Soluble in 100 pts. of cold water, and $C_{12}H_5Zn_3O_{14} + 2\,Aq$ in less hot water. (Vauquelin.) Soluble in an aqueous solution of tri-citrate of potash.

II.) $\frac{5}{2}$ *basic.* Soluble in an aqueous solution of $C_{12}H_5Zn_3O_{14}, C_{12}H_6Zn_2O_{14} + 2\,Aq$ di-citrate of soda.

CITRATE OF ZIRCONIA. Soluble in water. (Berzelius.)

CITRENE. Insoluble in water. Warm alcohol (*Citronyl.*) $C_{20}H_{16}$ dissolves traces of it, which separate out as a jelly when the solution becomes cold. Somewhat soluble in acidulated water. Soluble in ether, and in essential and fatty oils.

CITRIBIC ACID (of Baup). *Vid.* Citraconic Acid.

CITRICIC ACID. *Vid.* Itaconic Acid.

CITRIDIC ACID. *Vid.* Aconitic Acid.

CITRILENE.

(*Citryl*) (of Blanchet & Sell).

CITRIMID.

$C_{12}H_8N_2O_8$

CITRO*bi*AMIC ACID.

$C_{12}H_{10}N_2O_{10}$

CITRIN. *Vid.* Citrate of Glyceryl.

CITRO*bi*ANIL. *Vid.* PhenylCitrimid.

CITRO*bi*ANILIC ACID. *Vid.* PhenylCitrobiamic Acid.

CITROGLYCERIN. *Vid.* Citrate of Glyceryl.

*Mono*CITROMANNITAN. Insoluble in cold water, alcohol, or ether. Decomposed by $C_{24}H_{16}O_{18}$ long-continued boiling with water or alcohol, and by alkaline solutions. (v. Bemmelen.)

*Bi*CITROMANNITAN. Dissolves in water only $C_{36}H_{30}O_{30}$ after long-continued boiling. Easily decomposed by alkaline solutions.

CITRO*bi*METHYLIC ACID. *Vid.* *di*MethylCitric Acid.

CITRONYL. *Vid.* Citrene.

"CITRYL" (of Blanchet & Sell). *Vid.* Citrilene.

CITRYL. Not isolated.

$C_{12}H_5O_8{}'''$

CLEMATIDIN (from the root of *Aristolochia Cle-*

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$C_9 H_5 O_6$ *matitis.*) Soluble in 200 pts. of cold, and in 50 pts. of boiling water. Easily soluble in alcohol. Insoluble in ether. More soluble in saline solutions than in pure water. (Walz.)

Cnicin. Scarcely at all soluble in cold, much (*Centaurin.*) $C_{40} H_{26} O_{14}$ more soluble in boiling water. Easily soluble in alcohol, and wood-spirit. Almost insoluble in ether.

Cobalt. Permanent. Unacted upon by water. Co Slowly dissolved by chlorhydric acid; more readily if it be in powder, and in proportion as the acid is more concentrated and hotter. Slowly soluble in warm dilute sulphuric acid. Also soluble in concentrated sulphuric acid. Quickly soluble in nitric acid.

Cobaltic Acid.

Cobaltate of Potash. Insoluble in water. $K O, 3 Co_3 O_5 + 2 Aq$ & $3 Aq$ Easily soluble in concentrated acids. Unacted upon by dilute chlorhydric acid. (Schwarzenberg, *Ann. Ch. u. Pharm.*, **97.** 214.)

CobaltiCyanhydric Acid. Deliquescent. $C_6 H_3 N_3, C_6 N_3 Co_2 = 3 H Cy, Co_2 Cy_3 + Aq$ Very easily soluble in water, the solution suffering scarcely any decomposition when boiled. Soluble in alcohol. Insoluble in ether. Soluble in chlorhydric acid, without being decomposed, even on boiling. Scarcely at all soluble in strong, more soluble in weak nitric acid. Decomposed by strong boiling nitric acid or aqua-regia. Insoluble in concentrated, somewhat soluble in dilute sulphuric acid.

Cobalticyanide of Ammonium. Very soluble in water. $3 N H_4, C_{12} H_6 Co_2 + Aq = 3 N H_4 Cy, Co_2 Cy_3$ Sparingly soluble in alcohol.

Cobalticyanide of Barium. Effloresces in $3 Ba Cy, Co_2 Cy_3$ warm air. Very readily soluble in water. Insoluble in alcohol. (Zwenger.)

Cobalticyanide of Cadmium. Ppt. Soluble in an aqueous solution of cobalticyanide of potassium, and in acids. (Rammelsberg.)

Cobalticyanide of Cobalt. Insoluble in $3 Co Cy, Co_2 Cy_3 + 12 Aq$ water and in acids. Partially soluble in ammonia-water.

Cobalticyanide of Copper. Insoluble in $3 Cu Cy, Co_2 Cy_3 + 7 Aq$ water, and in acids. Soluble in ammonia-water. (Zwenger.)

Cobalticyanide of Iron. Ppt.
$3 Fe Cy, Co_2 Cy_3$

Cobalticyanide of Lead. Very readily sol- $3 Pb Cy, Co_2 Cy_3 + 4 Aq$ uble in water. Insoluble in alcohol. (Zwenger.)

Cobalticyanide of LuteoCobalt. Insolu- $6 N H_3 . Co_2 Cy_3, Co_2 Cy_3 + Aq$ ble in cold, readily decomposed by boiling water. (Gibbs & Genth, *Smithson. Contrib.*, Vol. **9.**)

Cobalticyanide of Manganese & of Zinc. Ppt.

Cobalticyanide of Mercury(Hg_2). Ppt.

Cobalticyanide of Nickel. Insoluble in $C_6 N_3 Ni_3, C_6 N_3 Co_2 = 3 Ni Cy, Co_2 Cy_3$ water and in acids. Soluble in ammonia-water. Decomposed by a solution of caustic potash. (Zwenger.) Unacted upon by boiling chlorhydric acid.

Cobalticyanide of Potassium. Sparingly $C_6 N_3 K_3, C_6 N_3 Co_2 = 3 K Cy, Co_2 Cy_3$ soluble in water. From the concentrated aqueous solution cobalticyanhydric acid is precipitated on the addition of an excess of sulphuric or nitric acid. Insoluble in alcohol.

Cobalticyanide of RoseoCobalt. Insol- $5 N H_3 . Co_2 Cy_3, Co_2 Cy_3 + 3 Aq$ uble in cold, readily decomposed by hot water. (Gibbs & Genth, *Smithson. Contrib.*, Vol. **9.**)

Cobalticyanide of Silver. Insoluble in $3 Ag Cy, Co_2 Cy_3$ water and in acids. Easily soluble in ammonia-water. (Zwenger.)

Cobalticyanide of Sodium. Very soluble $C_6 N_3 Na_3, C_6 N_3 Co_2 = 3 Na Cy, Co_2 Cy_3$ in boiling water. Insoluble in alcohol. (Zwenger.)

Cobalticyanide *of protoxide* of Tin. Ppt.

*Di*Cobaltinamin. *Vid.* LuteoCobalt.

Cobaltous Acid. *Vid.* *sesqui*Oxide of Co- $Co_2 O_3$ balt.

Cobaltite of Cobalt. *Vid.* Oxide of Co- $(Co O)x, Co_2 O_3$ balt.

Cobaltite of Magnesia. Insoluble in water, ammonia-water, or a solution of carbonate of ammonia. Easily soluble in an aqueous solution of chloride of ammonium, from which it may be precipitated again by caustic potash. (Berzelius.)

Cobaltite of Soda. Soluble in an aqueous solution of caustic soda, but a precipitate is formed when this solution is diluted with water.

Coccinonic Acid.

Coccinonate of Ammonia. Soluble in an aqueous solution of carbonate of ammonia.

Coccinonate of Potash. Sparingly soluble in water. Insoluble in an aqueous solution of carbonate of ammonia.

Coccognic Acid(from *Daphne Gnidium*). Soluble in water, and alcohol. (Gœbel.)

Cocculin. *Vid.* Picrotoxin.

Cochineal(coloring matter of). *Vid.* Carminie Acid.

Cocinic Acid. Insoluble in water. Easily (*Caco Stearic Acid.*) $C_{26} H_{26} O_4$ soluble in alcohol of 36°, and in ether. (Saint-Evre, *Ann. Ch. et Phys.*, (3.) **21.** 444.) The normal alkaline cocinates are soluble, the other cocinates, even the acid salts of the alkalies, are insoluble in water. The normal and acid salts of the alkalies are soluble in alcohol.

Cocinate of Baryta. Soluble in boiling $C_{26} H_{25} Ba O_4$ alcohol.

Cocinate of Ethyl. Insoluble in water.
$C_{26} H_{25} (C_4 H_5) O_4$

Cocinate of Glycerin. *Vid.* Cocinin.

Cocinate of Lead. Insoluble in alcohol or ether.

Cocinate of Lime.

Cocinate of Silver. Sparingly soluble in $C_{26} H_{25} Ag O_4$ alcohol. Soluble in ether.

Cocinate of Soda. Soluble in absolute al- $C_{26} H_{25} Na O_4$ cohol. (Saint-Evre, *Ann. Ch. et Phys.*, (3.) **20.** 98, & **21.** 446.)

Cocin. *Vid.* Cocinin.
(*Stearoptene of Cocoa-nut oil.*)

Cocinin. Insoluble in water. Very sparingly

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(*Coco Stearin. Cocinate of Glycerin.*) $C_{84} H_{80} O_{12} = C_{78} H_{75} (C_6 H_5''') O_{12}$ soluble in cold spirit of 75%; but much more soluble in boiling than in cold. 100 pts. of absolute alcohol dissolve 2.4 pts. of it at 20°, and 8 pts. at 44°. Readily soluble in anhydrous ether; but in ordinary ether only 80 pts. of it dissolve at 18°.

Cocinone. $C_{30} H_{30} O_2$ Soluble in absolute alcohol. Readily soluble in ether.

Codein. $C_{36} H_{21} N O_6 + 2 Aq = N \left\{ \begin{matrix} C_{36} H_{20} O_6'' \\ H \end{matrix} \right. + 2 Aq$ Soluble in 100 pts. of cold, and in 50 pts. of hot water. (Wittstein's *Handw.*)

100 pts. of water at
15° dissolve 1.26 pts. of it.
43° " 3.7 "
boiling " 5.9 "

It is much more soluble than morphin.

Soluble in 80 pts. of cold, and 87 pts. of boiling water; the saturated cold solution containing 1.25% of it, and the saturated boiling solution 5.5%. (Mohr, Redwood, & Procter's *Pharmacy*.) Readily soluble in alcohol and in ordinary ether; much less soluble in anhydrous ether. It is soluble in ammonia-water, but no more so than in pure water. Very sparingly soluble in a concentrated solution of caustic potash. Soluble, without change, in concentrated sulphuric acid. Easily soluble, with combination, in acids.

II.) *"amorphous"* or *"modified" [by sulphuric acid] codein.* Insoluble in water. Easily soluble in alcohol, from which it is precipitated by ether. Easily soluble in acids, forming amorphous salts.

Colchicein. $C_{35} H_{23} N O_{11}$ Permanent. Almost insoluble in cold, somewhat more soluble in boiling water. Soluble in alcohol, ether, wood-spirit, and chloroform. Soluble in acetic acid, and in concentrated nitric, chlorhydric, and sulphuric acids; also soluble in aqueous solutions of caustic potash and ammonia. (Oberlin, *Ann. Ch. et Phys.*, (3.) **50.** 111.)

Colchicin. Hygroscopic. Very soluble in water, alcohol, and ether. (Oberlin, *Ann. Ch. et Phys.*, (3.) **50.** 110.) Easily soluble in water, and alcohol; less soluble in absolute ether. Soluble in concentrated sulphuric acid. (Parrish's *Pharm.*, p. 414.) Easily soluble in chloroform. Its salts are mostly permanent, and easily soluble in water, and alcohol. (Oberlin.)

Colletiin (from *Colletia spinosa*). Insoluble in cold, difficultly soluble in boiling water. Easily soluble in alcohol. Insoluble in ether. (Reuss.)

Collidin. $N \left\{ C_{16} H_{11}''' \right.$ Insoluble in water; but itself dissolves a small quantity of water. Readily soluble in alcohol, ether, and the fatty and essential oils. Readily soluble, with combination, in dilute acids.

Its salts are generally deliquescent and soluble in water, and alcohol, but insoluble in ether. (Anderson.)

Colocynthein. $C_{44} H_{32} O_{13}$ Insoluble in water. Soluble in absolute ether. (Walz.)

Colocynthin. $C_{56} H_{42} O_{23}$ Soluble in water, alcohol, and ether. Soluble in alkaline solutions and dilute acids.

Colocynthinin. Insoluble in water and in cold alcohol. Soluble in hot alcohol and in ether. (Parrish's *Pharm.*, p. 422.)

Colophene(from Camphor). Insoluble in water, or in weak alcohol. Soluble in strong alcohol, in ether, oil of turpentine, rock-oil, and camphin. (Claus.)

Colophene(of Deville).
$C_{40} H_{32}$

Colophilene.
$C_{40} H_{32}$

Colopholic Acid(of Unverdorben). (The least soluble in alcohol of the resins which compose colophany or rosin.) Only slightly soluble in alcohol of 67%, more easily soluble in presence of pinic acid.

Coloring Matters. Many of them are soluble in alcohol acidulated with sulphuric acid (Heller); in creosote (Reichenbach); in benzin, and in concentrated acetic acid.

In general those coloring matters which are soluble in water are less soluble in solutions of chloride of sodium and of salts generally. (Robinet, cited in *Schweigger's Journ. für Ch. u. Phys.*, 1825, **45.** 240.)

Columbic Acid. (*Colombic Acid.*) $C_{42} H_{22} O_{12}$ Almost insoluble in water. Readily soluble in alcohol. Sparingly soluble in cold ether; more readily soluble in acetic acid. Soluble, without alteration in concentrated sulphuric acid, and is not altered by cold nitric acid.

Columbate of Copper. Appears to be soluble in alcohol.

Columbate of Lead. Ppt., in alcohol.

Columbate of Lime.

Columbate of Potash. Soluble in water.

Columbin. (*Colombin.*) $C_{42} H_{22} O_{14}$ Sparingly soluble in cold water, alcohol, ether, or essential oils; and still more sparingly soluble in a solution of potash. Soluble in 30 @ 40 pts. of boiling alcohol of 0.835 sp. gr. Soluble in 40 or 50 pts. of acetic acid of 1.04 sp. gr. Soluble in concentrated sulphuric acid, in which solution the addition of water occasions a precipitate.

Comenamic Acid. $C_{12} H_5 N O_8 + 4 Aq = N \left\{ \begin{matrix} C_{12} H_2 O_6'' \\ H_3 \end{matrix} \right. . O_2 + 4 Aq$ Effloresces in dry air. Very sparingly soluble in cold water. Soluble in boiling spirit, but scarcely at all soluble in absolute alcohol. Readily soluble in chlorhydric and other strong mineral acids; also in alkaline solutions. (How.)

Comenamate of Ammonia. $C_{12} H_4 (N H_4) N O_8$ Soluble in boiling, nearly insoluble in cold water; more soluble in ammonia-water.

Comenamate of Baryta.

I.) *mono.* $C_{12} H_4 Ba N O_8 + 2 Aq$ Sparingly soluble in cold, more soluble in boiling water.

II.) *di.* $C_{12} H_3 Ba_2 N O_8 + 2 Aq$ Insoluble in boiling water. (How.)

Comenamate of Copper. Ppt.

Comenamate of Ethyl. $C_{12} H_4 (C_4 H_5) N O_8$ Sparingly soluble in cold, readily soluble in hot water, and mineral acids. Sparingly soluble in absolute alcohol. (How.)

Comenamate of Lead. Insoluble in water.

Comenamate of Lime.

I.) *mono.*

II.) *di.*

Comenamate of Potash.

Comenamate of Silver. Partially decomposed by boiling water. (How.)

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Comenamate of Soda.

Comenic Acid. Permanent. Soluble in something more than 16 pts. of boiling water; much less soluble in cold water. (Robiquet.) Sparingly soluble in hydrated, insoluble in absolute, alcohol. (How.) Decomposed by dilute nitric acid. The salts of comenic acid are difficultly soluble, or insoluble, in water.

(*Komenic Acid. Parameconic Acid. Metameconic Acid. Anhydrous Meconic Acid.*)

$C_{12}H_4O_{10} = C_{12}H_2O_8, 2\,HO$

Comenate of Ammonia.

I.) *normal.*

II.) *mono.* Easily soluble in boiling water; much less soluble than the soda salt in cold water. More soluble in water than meconic acid. Sparingly soluble in alcohol. (How.)

$C_{12}H_3(NH_4)O_{10} + 3\,Aq$

Comenate of Baryta.

I.) *normal.* Insoluble in boiling water, by which, however, it is partially converted into a sub-salt. (How.)

$C_{12}H_2Ba_2O_{10} + 10\,Aq$

II.) *mono.* Readily soluble in boiling water.

$C_{12}H_3BaO_{10} + 6\,Aq$

Comenate of Copper.

I.) *normal.* Insoluble in water.

$C_{12}H_2Cu_2O_{10} + 2\,Aq$

Comenate of Ethyl. *Vid.* EthylComenic Acid.

Comenate *of sesquioxide* **of Iron.** Slowly soluble both in cold and in boiling water. (Stenhouse.)

$Fe_2O_3, 2\,C_{12}H_4O_{10} + 3\,Aq$

Comenate of Lead.

I.) *normal.* Insoluble in water. Soluble in comenic, but insoluble in acetic acid. (Stenhouse.)

$C_{12}H_2Pb_2O_{10} + 2\,Aq$

Comenate of Lime.

I.) *normal.* Insoluble in cold water, but is decomposed, with formation of a basic salt, when boiled with water. (How.)

$C_{12}H_2Ca_2O_{10} + 2\,Aq$ & $11\,Aq$ & $5\,Aq$

II.) *mono.* Readily soluble in boiling, less soluble in cold water. (How.)

$C_{12}H_3CaO_{10} + 7\,Aq$

III.) -*basic.* Insoluble in water.

Comenate of Magnesia.

I.) *normal.* Insoluble in boiling water. (How.)

$C_{12}H_2Mg_2O_{10} + 3\,Aq$ & $8\,Aq$

II.) *mono.* Readily soluble in hot water. (How.) Much more soluble in water than the normal comenates of baryta, and lime.

$C_{12}H_3MgO_{10} + 2\,Aq$

Comenate of Potash.

I.) *normal.* Sparingly soluble in water; less soluble in water than the monobasic salt. (Robiquet.)

II.) *mono.* Soluble in boiling, less soluble in cold water. (How.)

$C_{12}H_3KO_{10}$

Comenate of Silver.

I.) *normal.* Insoluble in water.

$C_{12}H_2Ag_2O_{10}$

II.) *mono.* Insoluble in water.

$C_{12}H_3AgO_{10}$

Comenate of Soda.

I.) *mono.* Readily soluble in water. More soluble in water than the comenates of ammonia or of potash. (How.)

$C_{12}H_3NaO_{10}$

Comenate of Strontia.

I.) *normal.}*
II.) *mono.* } More soluble than the comenates of baryta.

ComenoVinic Acid. *Vid.* EthylComenic Acid.

Conchiolin. Insoluble even in boiling water. Insoluble in alcohol or ether. Unacted upon by weak acids. Very slowly dissolved by concentrated acids or by alkaline solutions. (Fremy, *Ann. Ch. et Phys.*, (3.) **43.** 96.)

Conhydrin. Tolerably readily soluble in water. Soluble in alcohol, and ether. (Th. Wertheim.)

$C_{16}H_{17}NO_2 = N\left\{\begin{matrix} C_{16}H_{15}O_2'' \\ H \end{matrix}\right.$

Coniin. Slightly soluble in water. (Charland & Henry.) The solution in 100 pts. of *cold* water becomes turbid when *heated*, and clear again on cooling. (Geiger.) At ordinary temperatures coniin takes up one third part of its weight of water, and at a low degree of cold one part of water, whereby it becomes more fluid. If this solution be heated it becomes turbid, owing to the separation of water. (Geiger.) Very readily soluble in alcohol. 1 pt. of coniin in 4 pts. of alcohol mixes with water in every proportion. A solution of 1 pt. of coniin in 1 pt. of absolute alcohol mixes with 1 pt. of water, but if more water be added, the liquid becomes permanently turbid.

(*Cinicin. Cicutin.*)

$C_{16}H_{15}N = N\left\{\begin{matrix} H \\ C_{16}H_{14}'' \end{matrix}\right.$

Quite soluble in alcohol, ether, acetone, and oils. Sparingly soluble in bisulphide of carbon. (Blyth, *J. Ch. Soc.*, **1.** 349.) Slightly soluble in bisulphide of carbon. (Berzelius.) Miscible in all proportions with alcohol, ether, and the fatty and essential oils. (Geiger.)

Its salts are mostly soluble in water, and alcohol, as well as in a mixture of alcohol and ether, but they are insoluble in pure ether.

Convolvulic Acid. Very hygroscopic. Soluble in all proportions in water, and alcohol. Insoluble in ether. Decomposed by boiling with chlorhydric or sulphuric acid.

(*Rhodeoretic Acid.*)

$C_{62}H_{53}O_{35} = \left.\begin{matrix} C_{36}H_{31}''' \\ (C_{12}H_9O_8)_3 \end{matrix}\right\} O_6 + 5\,Aq$

Convolvulate of Baryta.

I.) *mono.* Easily soluble in water, and alcohol.

$C_{62}H_{52}BaO_{35}$

II.) *di.* Readily soluble in water, and alcohol.

$C_{62}H_{51}Ba_2O_{35}$

Convolvulate of Lead.

$C_{62}H_{50}Pb_3O_{35}$

Convolvulate of Lime. Soluble in water.

I.) $C_{62}H_{51}Ca_2O_{35}$

Convolvulate of Potash.

I.) *mono.*

$C_{62}H_{52}KO_{35}$

II.) *acid.* Readily soluble in water. Sparingly soluble in alcohol.

$C_{62}H_{52}KO_{35}, C_{62}H_{53}O_{35}$

Convolvulin. Scarcely at all soluble in water. Easily soluble in alcohol, and in acetic acid. Insoluble in ether. Easily soluble, with decomposition in warm, less readily soluble in cold aqueous solutions of caustic ammonia, potash, soda, and baryta. Very slowly soluble in cold dilute nitric acid, the solution undergoing decomposition when heated; it is also decomposed by cold concentrated nitric acid. Soluble in concentrated sulphuric acid, with subsequent decomposition.

(*Jalapin. = ß resin of Jalap. Rhodeoretin. Glucosid of Convolvulinolic Acid.*)

$C_{62}H_{50}O_{32} = \left.\begin{matrix} C_{36}H_{31}''' \\ (C_{12}H_9O_8)_3 \end{matrix}\right\} O_6 + 2\,Aq$

Convolvulinol. Soluble in alcohol, and ether.

$C_{26}H_{25}O_7 = \left.\begin{matrix} C_{26}H_{21}''' \\ H_3 \end{matrix}\right\} O_6 + Aq$

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Convolvulinolic Acid. Very sparingly soluble in pure water; more readily soluble in acidulated water. Readily soluble in alcohol; less soluble in ether.
(*Rhodeo Retinolic Acid. Rhodeo Retinol.*)


$C_{26}H_{24}O_6 = \left.\begin{matrix} C_{26}H_{21}''' \\ H_3 \end{matrix}\right\} O_6$

Its compounds with the alkalies are readily soluble in water, and alcohol; those of the alkaline earths are sparingly soluble in water, and alcohol; while the salts of copper, lead, and silver are insoluble in water, and very sparingly soluble in alcohol.

Convolvulinolate of Ammonia. Soluble in water.

Convolvulinolate of Baryta. Sparingly soluble in cold, more soluble in boiling water. Soluble in alcohol. It is more soluble in all solvents than jalapate of baryta.
$C_{26}H_{23}BaO_6$

Convolvulinolate of Copper. Insoluble in water. Scarcely soluble in alcohol.
$C_{26}H_{23}CuO_6 + Aq$

Convolvulinolate of Lead. Ppt.
$C_{26}H_{23}PbO_6$

Convolvulinolate of Silver. Insoluble in water. Very sparingly soluble in alcohol.

Copaibi. See under **Resins.**

Copaivic Acid. See Resins of Copaiba, under **Resins.**

Copal. See under **Resins.**

Copper. Unacted upon by water at any temperature. When out of contact with the air, it is unacted upon by dilute, and scarcely at all attacked by boiling concentrated chlorhydric acid; but when exposed to the air, chlorhydric acid dissolves a little of it; on the other hand, concentrated iodhydric acid quickly dissolves it, though when dilute it has no action upon it. Soluble in concentrated, but only slowly or even not at all attacked by very dilute sulphuric acid. Readily soluble in nitric acid.
Cu

The oxidation and solution of copper by nitric acid depends upon the state of concentration of the latter, upon its temperature, upon the presence of binoxide of nitrogen, and upon the solubility of the products which may be formed. *Pure* dilute nitric acid has no action upon copper in the cold; but nitric acid contaminated with nitrous acid corrodes it at once: — thus, pure nitric acid of 1.07 sp. gr. or less, does not attack copper at 20°; but if a current of binoxide of nitrogen is passed into the acid, or better, if a few drops of a concentrated solution of nitrite of potash be added to it, an action commences at once, and when once commenced persists during several hours, provided the quantity of acid and of metal are sufficient; when the action flags, it may be renewed by a new addition of nitrite. By more concentrated nitric acid copper is attacked, excepting at low temperatures like those produced by a mixture of ice and chloride of sodium, but the temperatures at which the action commences vary with the concentration of the acid; thus an acid of 1.217 sp. gr. begins to act at —10°, and acid of 1.108 sp. gr. at —2°. Nitric acid of 1.512 sp. gr. attacks copper violently at 20°, but the action soon ceases on account of a crust of nitrate of copper which is formed upon the metal. This crust does not form with acids of 1.419 sp. gr. and less. (Millon, *Ann. Ch. et Phys.*, (3.) **6.** pp. 95 - 98.) Soluble in a warm concentrated aqueous solution of iodide of potassium. (H. Rose, *Tr.*) When finely divided it dissolves readily in a hot solution of perchloride of iron. When in contact with the air it is soon oxidized by acids, alkaline solutions, especially those of ammonia, and fatty bodies.

Copper & Silver(alloys). Soluble in nitric acid, but a mixture of nitric and sulphuric acid dissolves very little copper, so long as there is any silver present to be dissolved. (Grove.)

Cornin(from *Cornus florida*). Easily soluble in water, and alcohol. Difficultly soluble in ether. (Geiger.)

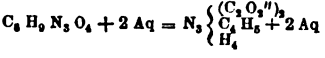
Corydalin. Almost insoluble in cold, more soluble in hot water. Readily soluble in alcohol, especially in absolute alcohol. Readily soluble in ether, and in dilute acids. More soluble in solutions of the caustic alkalies than in pure water. Its salts are soluble in water.
$C_{68}H_{44}NO_{21}$(?)

Cotarnin. Sparingly soluble in cold, somewhat more soluble in boiling water. Soluble in alcohol. Easily soluble in ether, and in ammonia-water. Scarcely at all soluble in an aqueous solution of caustic potash. Decomposed by nitric acid. Its salts are in general very soluble in water.
$C_{26}H_{13}NO_6 + 2\,Aq$

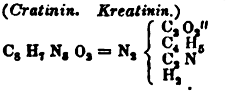
Coumarin, &c. *Vid.* Cumarin.

Cratinin. *Vid.* Creatinin.

Creatin. Soluble in 83 pts. of water at 18°. (Chevreul.) Soluble in 74.4 pts. of water at 18°, and very soluble in boiling water. (Liebig.) The saturated boiling solution solidifies on cooling. Soluble in 2000 pts. of alcohol of 0.81 sp. gr., at 15° (Chevreul); in 9410 pts. of cold absolute alcohol; more soluble in spirit. (Liebig.) Nearly or quite insoluble in ether. (Heintz.) Soluble, without alteration, in cold alkaline liquors, even baryta-water, and in feeble acids. Decomposed by strong acids.
(*Kreatin.*)


$C_8H_9N_3O_4 + 2\,Aq = N_3\left\{\begin{matrix} (C_2O_2'')_2 \\ C_4H_5 + 2\,Aq \\ H_4 \end{matrix}\right.$

Creatinin. Much more soluble than creatin in water, and alcohol. 1000 pts. of water dissolve 87 pts. of creatinin, *i. e.* it is soluble in 11.5 pts. of water, at 16°. It is much more soluble in boiling water. (Liebig.) 1000 pts. of alcohol dissolve 9.8 pts. of it at 16°. Soluble in 102 pts. of absolute alcohol at 16°; much more abundantly soluble in hot alcohol. (Liebig.) Slightly soluble in ether.
(*Cratinin. Kreatinin.*)


$C_8H_7N_3O_2 = N_3\left\{\begin{matrix} C_2O_2'' \\ C_4H_5 \\ C_2N \\ H_2 \end{matrix}\right.$

The salts of creatinin are soluble in water.

Crenic Acid. Very easily soluble in water, and spirit. Soluble in absolute alcohol. The normal and acid crenates of the alkalies are soluble in water, but insoluble in absolute alcohol. The crenate of protoxide of iron is soluble in water, but the salt of sesquioxide of iron is insoluble. The copper and lead salts are insoluble in water. The silver salt is soluble in ammonia-water. (Berzelius.)
$C_{24}H_{12}O_{16}$(?)

Creosol. Scarcely at all soluble in water. Easily soluble in alcohol, ether, glacial acetic acid, and in alkaline lyes.
(*Oil from Creosote.*)
$C_{16}H_{10}O_4 = C_{16}H_9O_3, HO$

Creosolate of Baryta.
$C_{16}H_9BaO_4 + 3\,Aq$

Creosolate of Benzoyl.
$C_{16}H_9(C_{14}H_5O_2)O_4$

Creosolate of Ethyl.
$C_{16}H_9(C_4H_5)O_4$

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Creosolate of Potash.

I.) *normal.* Soluble in water, alcohol, and ether.
$C_{16}H_9KO_4 + 4\,Aq$

II.) *acid.* Soluble in spirit, and ether.
$C_{16}H_9KO_4;\ C_{16}H_{10}O_4 + 2\,Aq$

Creosote. (*Kreosote.*) Sparingly soluble in water. Miscible in all proportions with alcohol, ether, bisulphide of carbon, naphtha, eupion, acetic ether, and acetic acid of 1.07 sp. gr. It is only partially soluble in ordinary acetic acid. (Gorup-Besanez.) When pure, it is entirely soluble in ordinary acetic acid. (Vœlckel.) Soluble in sulphuric acid, with combination. No more soluble in dilute chlorhydric acid than in water. Soluble in 80 pts. of cold, and 24 pts. of hot water.

Soluble in 80 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 75.) Creosote dissolves, especially when warm, phosphorus, sulphur, selenium; oxalic, tartaric, citric, boracic, and stearic acids; the fats, resins, and coloring matters (as cochineal, dragon's-blood, santal-red, santal-yellow, orchil, madder-red, and saffron). When warm, it dissolves indigo. When hot, it dissolves many salts, which separate out again as the solution cools; for example, many acetates and chlorides.

Cresotic Acid. (*Kresotinsæure.*) $C_{16}H_8O_6 = C_{16}H_7O_5, HO$ Somewhat more difficultly soluble in cold water than salicylic acid. Readily soluble in hot water. Easily soluble in alcohol, and ether. (Kolbe's *Lehrb.*, **2.** 349.)

Cresylic Alcohol. *Vid.* Hydrate of Cresyl.

Crocic Acid. *Vid.* Safranin.

Croconic Acid. $C_{10}H_2O_{10} = C_{10}O_8, 2\,HO$ Soluble in water. (L. Gmelin.) Easily soluble in alcohol, and ether. Its alkaline salts are all soluble in water. All of its salts are soluble, with decomposition, in nitric acid. (L. Gmelin.) Some of them are also soluble in alcohol, and ether. (Heller.)

Croconate of Alumina. Easily soluble in water, and alcohol. (Heller.)

Croconate of Ammonia. Soluble in water, and alcohol. (Heller.)
$C_{10}(NH_4)_2O_{10} + 4\,Aq$

Croconate of Antimony. Soluble in a chlorhydric acid solution of chloride of antimony. (L. Gmelin.)

Croconate of Baryta. Insoluble in hot water. (L. Gmelin.) Insoluble in alcohol or ether. (Heller.) Sparingly soluble in hot chlorhydric acid. (L. Gmelin.)

Croconate of Bismuth. Insoluble in water, or alcohol. (Heller.) Soluble in a solution of nitrate of bismuth. (L. Gmelin.)

Croconate of Cadmium. Soluble in water, and alcohol. (Heller.)

Croconate of Cerium. Ppt.

Croconate of Cobalt. Soluble in water, and alcohol. (Heller.)

Croconate of Copper. $C_{10}Cu_2O_{10} + 6\,Aq$ Very sparingly soluble in cold, more soluble in boiling water. Soluble in alcohol. Soluble in solutions of caustic potash and ammonia. (L. Gmelin.)

Croconate of Glucina. Easily soluble in water, and alcohol. (Heller.)

Croconate *of protoxide* **of Iron.** Soluble in water, and alcohol. (Heller.)

Croconate *of sesquioxide* **of Iron.** Soluble in water, and alcohol. (Heller.)

Croconate of Lead. Insoluble in water or alcohol. (Heller.) Soluble, with decomposition, in nitric acid. (L. Gmelin.)

Croconate of Lime. Slightly soluble in water, and alcohol. (Heller, L. Gmelin.)

Croconate of Lithia. Soluble in water, and alcohol. (Heller.)

Croconate of Magnesia. Soluble in water. (Heller.)

Croconate of Manganese.

Croconate *of dinoxide* **of Mercury.** $C_{10}Hg_4O_{10}$ Insoluble in water. Soluble in nitric acid. (L. Gmelin.)

Croconate *of protoxide* **of Mercury.** Ppt.
$C_{10}Hg_2O_{10}$

Croconate of Morphine.

Croconate of Nickel. Soluble in water, and alcohol. (Heller.)

Croconate of Potash.

I.) *normal.* $C_{10}K_2O_{10} + 4\,Aq$ Tolerably soluble in cold, much more readily soluble in hot water. Insoluble in absolute, and very sparingly soluble in hydrated alcohol. Insoluble in ether. (L. Gmelin.)

II.) *acid.* $C_{10}HKO_{10}, C_{10}K_2O_{10} + 4\,Aq$ Sparingly soluble in water. (L. Gmelin.)

Croconate of Silver. $C_{10}Ag_2O_{10}$ Sparingly soluble in water. (Heller.)

Croconate of Soda. Very sparingly soluble in water. Slightly soluble in alcohol. (Heller.)

Croconate of Strontia. Easily soluble in water, and alcohol. (Heller.)

Croconate of Strychnine.

Croconate *of protoxide* **of Tin.** Sparingly soluble in water. (Heller.)

Croconate of Uranium. Easily soluble in water, and alcohol. (Heller.)

Croconate of Yttria. Easily soluble in water. (Berlin.)

Croconate of Zinc. Soluble in water, and alcohol.

Croconate of Zirconia. Soluble in water, and alcohol.

Crotonic Acid. $C_8H_6O_4 = C_8H_5O_3, HO$ Easily soluble in water, but only sparingly soluble in saturated saline solutions, as of chloride of sodium. Soluble in alcohol, and ether. The alkaline croconates are easily soluble in water.

Crotonate of Baryta. Easily soluble in water, and alcohol.

Crotonate *of sesquioxide* **of Iron.** Ppt.

Crotonate of Lead. Appears to be insoluble in water.

Crotonate of Magnesia. Very sparingly soluble in water.

Crotonate of Mercury. Appears to be insoluble in water.

Crotonate of Potash. Deliquescent. Easily soluble in water. Difficultly soluble in alcohol of 0.85 sp. gr.

Crotonate of Silver. $C_8H_5AgO_4$ Somewhat soluble in hot, less soluble in cold water.

Crotonate of Soda. Deliquescent. Easily soluble in water.

Crotonin (from *Croton tiglium*). Almost insoluble in water. Easily soluble in hot alcohol. (Brandes.)

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Crotonol. Insoluble, or but sparingly soluble in water. Soluble in absolute alcohol and in ether. (Th. Schlippe.)
$C_{18}H_{14}O_4$

Cryptidin.
$C_{22}H_{11}N = N\left\{ C_{22}H_{11}'''\right.$

Crystallin. *Vid.* Anilin. Also Globulin.

Cubebene. Compare Oil of Cubebs.
(*Cubebenæl.*)
$C_{30}H_{24}''$

Cubebin. Sparingly soluble in cold water. 100 pts. of absolute alcohol dissolve 1.31 pts. of it at 12°. [100 pts. of] alcohol of 0.82° dissolve 0.70 pt. of it [at 12°]; it is much more soluble in hot alcohol. 100 pts. of ether dissolve 3.75 pts. of it at 12°; more soluble in hot ether. Soluble in acetic acid, and in the fatty and essential oils.
$C_{34}H_{16}O_{10}$

CumAnilid. *Vid.* PhenylCuminamid.

Cumaramin. Very sparingly soluble in cold, easily soluble in boiling water. More readily soluble in a saturated aqueous solution of acetate of iron than in cold water. Easily soluble in boiling alcohol; the saturated solution coagulating on cooling. Almost insoluble in ether. (Frappoli & Chiozza, *Ann. Ch. u. Pharm.*, **95.** 254.)
(*Coumaramin. Cumaramid.*)
$C_{18}H_7NO_4 = N\left\{\begin{matrix} C_{18}H_5O_4 \\ H_2 \end{matrix}\right.$

Cumaric Acid. Soluble in boiling water, from which it separates on cooling. (Bleibtreu; Delalande, *Ann. Ch. et Phys.*, (3.) **6.** 346.) Easily soluble in alcohol, and ether. (Bleibtreu.)
(*Coumaric Acid.*)
$C_{18}H_8O_6 = C_{18}H_7O_5, HO$

Cumarate of Ammonia. Soluble in water.
$C_{18}H_7(NH_4)O_6$

Cumarate of Baryta. Soluble in water.

Cumarate of Lead. Ppt. Somewhat soluble in water. (Bleibtreu.)
$C_{18}H_7PbO_6$

Cumarate of Silver. Ppt.
$C_{18}H_7AgO_6$

Cumarin. Scarcely at all soluble in cold, tolerably readily soluble in boiling water. Soluble in alcohol of 36°. Soluble in dilute acids, without alteration, even on boiling. Concentrated chlorhydric acid, whether hot or cold, has no action upon it. Concentrated sulphuric acid decomposes it immediately. Monohydrated nitric acid combines with it in the cold, but on boiling decomposes it. Unacted upon by ammonia-water. Soluble, without decomposition, in an aqueous solution of caustic potash, when this is gently heated, but is decomposed on boiling therewith. (Delalande, *Ann. Ch. et Phys.*, (3.) **6.** 344.)
(*Coumarin.*)
$C_{18}H_6O_4$

A solution of 1 pt. of cumarin in 45 pts. of boiling water becomes milky on cooling; a solution of 1 pt. of cumarin in 200 pts. of water remains clear at 25°; but when slowly cooled to 15° it deposits crystals; a solution of 1 pt. of cumarin in 400 pts. of water remains unchanged, even in the cold. (Buchner.) Soluble in weak acids, even boiling; but is decomposed by concentrated acids. (Buchner.) Readily soluble in strong alcohol, and in the fatty oils which occur with it in the tonka bean. (Buchner.) Readily soluble in fatty and in essential oils. (Boullay & Charlard.) Sparingly (Leroy), abundantly (Guillemette) soluble in concentrated sulphuric acid, from which water precipitates it. Much more readily soluble in acetic acid (Buchner), and in tartaric acid (Guillemette), than in water. Soluble in concentrated, or in warm dilute, phosphoric acid. (Guillemette.) Insoluble in cold ammonia-water. (Guillemette.) Easily soluble in a cold aqueous solution of caustic potash, but is decomposed when boiled therewith. (Buchner.)

Cumene. Insoluble in water. (Gerhardt & Cahours.) Readily soluble in alcohol, ether, wood-spirit, and the essential oils. It combines [? mixes] with oils, fats, and most of the resins. (Pelletier & Walter.) Soluble in naphtha.
(*Cumol. Retinyl. Hydride of Cumenyl.*)
(Isomeric with Mesitylene.)
$C_{18}H_{12} = C_{18}H_{11}, H$

Cumenyl. Not isolated.
Cumyl(of Kolbe).
$C_{18}H_{11}$

CumenylSulphurous Acid. Known only in aqueous solution. (Gerhardt & Cahours.)
(*Sulphocumenic Acid. Sulphocumolic Acid.*)
$C_{18}H_{12}S_2O_6 = C_{18}H_{11}O, HO, S_2O_4$

CumenylSulphite of Baryta. Readily soluble in water, especially when this is hot. Soluble in alcohol (even in absolute) and in ether.
$C_{18}H_{11}BaS_2O_6$

CumEugenyl. *Vid.* CuminEugenic Acid.

Cumicyl. Not isolated.
Cymyl(of Kolbe).
$C_{20}H_{13}$

Cumicylamin. *Vid.* Cymidin.

Cumidin. Very sparingly soluble in water. Very soluble in alcohol, ether, wood-spirit, bisulphide of carbon, and the fatty oils. Soluble in concentrated nitric acid, in which solution water occasions a precipitate. Its salts are soluble in water, and still more soluble in alcohol; they are partially decomposed by boiling water. (Nicholson, *J. Ch. Soc.*, **1.** 4.)
(*Cumin. Cumenylamin.*)
$C_{18}H_{13}N = N\left\{\begin{matrix} C_{18}H_{11} \\ H_2 \end{matrix}\right.$

Cumin Alcohol. *Vid.* Hydrate of Cumicyl.

Cuminamic Acid. Sparingly soluble in cold, much more soluble in boiling water. Still more soluble in alcohol, and ether. Combines both with acids and bases. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 334.)
(*Amido Cuminic Acid.*)
$C_{20}H_{13}NO_4 = N\left\{\begin{matrix} C_{20}H_{11}O_2 \\ H_2 \end{matrix}\right. . O_2$

Cuminamate of Ethyl. Soluble in alcohol, from which it is precipitated on the addition of water. Soluble in chlorhydric, bromhydric, nitric, and sulphuric acids, forming compounds which are easily soluble. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 339.)
$C_{20}H_{12}(C_4H_5)NO_4$

Cuminamid. Insoluble in cold, but soluble in hot water. Soluble in all proportions in alcohol, and ether, whether hot or cold. (F. Field.) Insoluble in cold (Field), very sparingly soluble in boiling ammonia-water. (Gerhardt.)
(*Cumylamid.*)
$C_{20}H_{13}NO_2 = N\left\{\begin{matrix} C_{20}H_{11}O_2 \\ H_2 \end{matrix}\right.$

CuminAnilid. *Vid.* PhenylCuminamid.

Cuminic Acid(Anhydrous). Acidified by exposure to moist air. Soluble in ether. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 305.)
$C_{40}H_{22}O_6 = \left.\begin{matrix} C_{20}H_{11}O_2 \\ C_{20}H_{11}O_2 \end{matrix}\right\} O_2$

Cuminic Acid. Almost insoluble in cold, somewhat more soluble in boiling water. Easily soluble in alcohol, and ether, and in water acidulated with nitric acid. Soluble in concentrated sulphuric acid. Soluble in all proportions in warm glacial acetic acid. The alkaline cuminates and those of the alkaline earths are soluble in
$C_{20}H_{12}O_4 = C_{20}H_{11}O_3, HO$

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water; those of the metals are sparingly soluble or insoluble.

Cuminate of Ammonia.

Cuminate of Baryta. Soluble in water. $C_{20}H_{11}BaO_4$ Easily soluble in alcohol, and ether.

Cuminate of Copper. Insoluble in water.

Cuminate of Ethyl. Insoluble in water. (*Cuminic Ether.*) $C_{24}H_{16}O_4 = C_{20}H_{11}(C_4H_5)O_4$ Miscible in all proportions with alcohol, and ether. (Gerhardt & Cahours.)

Cuminate of Lead. Insoluble in water.

Cuminate of Lime. Tolerably soluble in water.

Cuminate of MethylSalicyl. Insoluble in water. $C_{36}H_{18}O_8 = C_{20}H_{11}[C_{14}H_4(C_2H_3)O_2]O_6$. Sparingly soluble in cold, more soluble in hot alcohol. Very soluble in ether. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **45.** 95.)

Cuminate of Phenyl. Insoluble in water. $C_{32}H_{16}O_4 = C_{20}H_{11}(C_{12}H_5)O_4$ Easily soluble in alcohol, and ether.

Cuminate of Potash. Deliquescent. Easily soluble in water.

Cuminate of Silver. Ppt. $C_{20}H_{11}AgO_4$

CuminEugenic Acid(Anhydrous). Insoluble in water. Soluble in boiling alcohol. Decomposed by strong sulphuric acid, and by potash lye. Unacted upon by boiling chlorhydric acid. (Cahours.) (*CumEugenyl.*) $C_{40}H_{22}O_6 = \left.\begin{matrix}C_{20}H_{11}O_2\\C_{20}H_{11}O_2\end{matrix}\right\}O_2$

Cuminic Alcohol. *Vid.* Hydrate of Cumicyl.

Cuminic Benzoate. *Vid.* BenzoCuminic Acid.

CuminŒnanthylic Acid(Anhydrous). $C_{34}H_{24}O_6 = \left.\begin{matrix}C_{14}H_{13}O_2\\C_{20}H_{11}O_2\end{matrix}\right\}O_2$

Cuminol. *Vid.* Hydride of Cumyl.

CuminoNitryl. *Vid.* Cyanide of Cuminyl.

Cuminuric Acid. Soluble in alcohol, especially when this is warm. Decomposed by boiling with chlorhydric acid. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 356.) $C_{24}H_{15}NO_6$

Cumol. *Vid.* Cumene.

Cumonitril. *Vid.* Cyanide of Cumenyl.

CumoSalicyl. Insoluble in cold, sparingly soluble in boiling water; more soluble in alcohol, especially if this be warm; and still more readily in ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **52.** 198.) $C_{34}H_{16}O_6$

Cumoyl. Not isolated. $C_{20}H_{11}$

"Cumyl"(of Kolbe). *Vid.* Cumenyl. $C_{18}H_{11}$

Cumyl. Very sparingly soluble in cold, tolerably soluble in boiling alcohol. (Chiozza, *Ann. Ch. et Phys.*, (3.) **39.** 220.) (*Cumylide of Cumyl.*) $C_{40}H_{22}O_4 = \left.\begin{matrix}C_{20}H_{11}O_2\\C_{20}H_{11}O_2\end{matrix}\right\}$

CumylBenzoylSulphoPhenylamid. Scarcely at all soluble in water. More readily soluble in alcohol than salicylbenzamic acid. Sparingly soluble in cold, more soluble in boiling ether. Difficultly soluble in ammonia-water. (Gerhardt & Chiozza.) (*SulphoPhenylBenzoyl Cuminamid.*) $C_{46}H_{21}NS_2O_8 = N\left\{\begin{matrix}C_{20}H_{11}O_2\\C_{14}H_5O_2\\C_{12}H_5S_2O_4\end{matrix}\right.$

Cumylide of Potassium. (*Cuminol potassée.*) $C_{20}H_{11}KO_2$

CumylSalicylamid. *Vid.* SalicylCumylamic Acid.

CumylSulphoPhenylamid. Insoluble in boiling water. Easily soluble in boiling ammoniacal water. Tolerably soluble in cold, very soluble in warm alcohol. $C_{32}H_{17}NS_2O_6 = N\left\{\begin{matrix}C_{20}H_{11}O_2\\C_{12}H_5S_2O_4\\H\end{matrix}\right.$

CumylSulphoPhenylArgentamid. Almost insoluble in boiling water; but easily soluble in ammonia-water. $C_{32}H_{16}AgNS_2O_6 = N\left\{\begin{matrix}C_{20}H_{11}O_2\\C_{12}H_5S_2O_4\\Ag\end{matrix}\right.$

CumylSulphoPhenylArgent*bi*amid. Very sparingly soluble in boiling water; more readily soluble in alcohol. (Gerhardt & Chiozza.) $C_{32}H_{19}AgN_2S_2O_6 = N_2\left\{\begin{matrix}C_{20}H_{11}O_2\\C_{12}H_5S_2O_4\\Ag\\H_3\end{matrix}\right.$

*Tri*Cupr(*ic*)amin. Slowly soluble in chlorhydric acid. Insoluble in a mixed aqueous solution of caustic and carbonated ammonia. (Berzelius, *Lehrb.*) (*Nitride of Copper.*) $N\left\{Cu_3\right.$

CuproCyanide of *X*. *Vid. di*Cyanide of Copper and of *X*.

Curarin. Deliquescent. Soluble in all proportions in water, and alcohol. Insoluble in ether or oil of turpentine.

Curcumin. Insoluble, or but slightly soluble, in water. Readily soluble in alcohol, ether, and oils. Soluble in concentrated acetic acid. Soluble in concentrated sulphuric, chlorhydric, and phosphoric acids; on the addition of water a precipitate is produced in these solutions. Soluble in solutions of the caustic alkalies. (*Curcumic Acid.*) $C_9H_6O_2$

Cusconin. *Vid.* Aricin.

Cusparin(from *Cusparia febrifuga*). Sparingly soluble in water. Tolerably easily soluble in alcohol. Insoluble in ether or essential oils. Easily soluble in acids. (Saladin.) Soluble in 200 pts. of water. Soluble in acids, and in alkaline solutions. (Parrish's *Pharm.*, p. 421.) (*Angusturin. Galipein.*)

Cyamelid. Insoluble either in hot or in cold water; but when boiled with water for some time it is converted into a hydrate which is sparingly soluble in hot water. Insoluble in alcohol, ether, or weak boiling chlorhydric, or nitric acid, or in aqua-regia. Tolerably readily soluble in solutions of the alkalies, and ammonia. (Liebig.) (*Carbonylamid. Insoluble Cyanuric Acid.*) $C_2HNO_2 = N\left\{\begin{matrix}C_2O_2''\\H\end{matrix}\right.$

Cyameluric Acid. Very difficultly soluble in cold, more soluble in boiling water. Soluble in 420 pts. of water at 17°. (Henneberg.) $C_{12}H_3N_7O_6 = N\left\{Cy_3;\ 3\,HO,\ 3\,CyO\right.$

Cyamelurate of Ammonia. Efflorescent. Very soluble in water.

Cyamelurate of Baryta. Very difficultly soluble in water. $C_{12}Ba_3N_7O_6 + Aq$

Cyamelurate of Copper. Ppt. Soluble in ammonia-water.

Cyamelurate *of sesquioxide* of Iron. Ppt.

Cyamelurate of Magnesia. Insoluble in water. Soluble in an aqueous solution of chloride of ammonium.

Cyamelurate of Potash.

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I.) *normal.* Very easily soluble in boiling water. $C_{12}K_3N_7O_6 + 6\,Aq$ Soluble in 7.4 pts. of water at 18°, and 1 @ 2 pts. of boiling water. (Henneberg.) Insoluble in alcohol. On the addition of acetic or nitric acid to the aqueous solution scales of the acid salt are precipitated. (Liebig.)

II.) *acid.* Sparingly soluble in water. Somewhat more soluble in water than cyameluric acid. $C_{12}KH_2N_7O_6 + 4\,Aq$

Cyamelurate of Silver. Insoluble in water. Sparingly soluble in weak nitric acid. $C_{12}Ag_3N_7O_6 + 2\,Aq$

Cyamelurate of Soda. Very soluble in water.

Cyanamid. Easily soluble in water; but on evaporating the aqueous solution an insoluble modification, probably melamin, is formed. Soluble, without decomposition, in alcohol, and ether. $C_2H_2N_2 = N\left\{\begin{matrix}Cy\\H_2\end{matrix}\right.$

***Di*Cyanamid.** (*Mellone* of Gerhardt & others.) Insoluble in water, alcohol, ether, cold dilute acids, or alkaline solutions. $C_4HN_3 = N\left\{\begin{matrix}Cy_2\\H\end{matrix}\right.$

***Tri*Cyanamid.** (*Mellone* of Liebig.) Insoluble in water, alcohol, ether, cold dilute acids, or alkaline solutions. (Liebig.) $C_6N_4 = N\left\{Cy_3\right.$

CyanAmyl. *Vid.* Cyanide of Amyl.

CyanAmylamin. (*CyanAmylamid.*) Soluble in ether. (Cahours & Cloez.) $C_{12}H_{12}N_2 = N\left\{\begin{matrix}C_{10}H_{11}\\C_2N\\H\end{matrix}\right.$

Cyan*di*Amylamin. $C_{22}H_{22}N_2 = N\left\{\begin{matrix}(C_{10}H_{11})_2\\C_2N\end{matrix}\right.$

CyanAnilid. (*Cyanilid. PhenylCyanamid.*) Insoluble in water. Readily soluble in alcohol, and ether. (Cahours & Cloez.) $C_{14}H_6N_2 = N\left\{\begin{matrix}C_2N\\C_{12}H_5\\H\end{matrix}\right.$

CyanAnilin. (*Cyanilin. Cyanide of Anilin.*) Completely insoluble in water. Nearly insoluble in cold, sparingly soluble in boiling alcohol; from which solution it separates out as soon as the temperature has fallen a few degrees below the boiling-point. It is not any more soluble in ether, wood-spirit, bisulphide of carbon, benzin, or the fatty or essential oils, than in alcohol. Soluble in cold concentrated sulphuric acid, the solution undergoing decomposition when heated. Very easily soluble in dilute chlorhydric acid, also soluble in dilute sulphuric and other acids, with combination. (Hofmann, *J. Ch. Soc.*, **1.** pp. 160, 163.) $C_{14}H_7N_2 = N\left\{\begin{matrix}C_{12}H_5\\H_2\end{matrix}\right. . C_2N$

Cyanic Acid. Very soluble in water; but the aqueous solution soon undergoes decomposition. Soluble in alcohol. $C_2HNO_2 = CyO, HO$

Cyanate of Allyl. (*Acrylic Cyanate.*) Readily soluble, with decomposition, in water, ammonia-water, and other alkaline solutions. $C_8H_5NO_2 = C_2(C_6H_5)NO_2$

Cyanate of Ammonia. Very soluble in water; the aqueous solution soon undergoes decomposition, — immediately if it be boiled, with formation of urea, with which it is isomeric. $C_2H_4N_2O_2 = NH_4O, CyO$

Cyanate of Amyl. Soluble, with decomposition, in ammonia-water. $C_{10}H_{11}O, CyO$

Cyanate of Anilin (abnormal). *Vid.* PhenylCarbamid.

Cyanate of Baryta. Soluble in water, the solution undergoing decomposition when evaporated. Alcohol precipitates it from the aqueous solution. (Berzelius, *Lehrb.*) BaO, CyO

Cyanate of Copper. Ppt.

Cyanate of Ethyl. Instantly decomposed by water. Slowly decomposed by alcohol at 100°. Soluble, with decomposition, in ammonia-water. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **42.** 47.) [Compare Allophanate of Ethyl.) $C_2N(C_4H_5)O_2 = C_4H_5O, CyO$

Cyanate of EthylPiperidin. (*EthylPiperyl Urea.*) Soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 86.) $C_{12}H_{11}(C_4H_5)N_2O_2 = N\left\{\begin{matrix}C_{10}H_{10}{}''\\C_4H_5\end{matrix}\right. .HO, CyO$

Cyanate *of protoxide* **of Iron.** Very instable.

Cyanate of Lead. Sparingly soluble in boiling water. (Wœhler.) Insoluble, or but sparingly soluble, in alcohol. PbO, CyO

Cyanate of Lime. Soluble in water.

Cyanate *of dinoxide* **of Mercury.** Ppt.

Cyanate of Methyl. Decomposed by water. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **42.** 61.) $C_2N(C_2H_3)O_2$

Cyanate of MethylPiperidin. (*MethylPiperyl Urea.*) Easily soluble in boiling alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 85.) $C_2N[C_{10}H_{11}(C_2H_3)N]O_2$

Cyanate of Naphthyl. *Vid.* NaphtoylCarbamid.

Cyanate of Phenyl. (*PhenylCarbimid. Carbanile. AniloCyanic Acid.*) Decomposed by water; especially when heated therewith. Soluble, with evolution of heat and apparent combination, in alcohol, wood-spirit, fusel-oil, and carbolic acid; the resulting compounds are insoluble in water, but are soluble in all proportions in alcohol, and ether. Decomposed by acids and by alkaline solutions. (Hofmann, *J. Ch. Soc.*, **2.** 316.) $C_2N(C_{12}H_5)O_2$

Cyanate of Piperidin. (*Piperyl Urea. Piperidic Urea.*) Soluble in water and in strong alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 84.) $C_2N(C_{10}H_{12}N)O_2$

Cyanate of Potash. Readily soluble in water. (Wœhler.) Very easily soluble in water, but the solution soon undergoes decomposition on standing, and at once, if it be heated. If the concentrated solution is treated with acetic acid or with a dilute mineral acid, cyanurate of potash separates out. As good as insoluble in absolute alcohol. (Berzelius, *Lehrb.*) Insoluble in absolute alcohol. Sparingly soluble in cold, more easily soluble in hot spirit. Alcohol of 82% is best suited to dissolve it, for it is very difficultly soluble in stronger alcohol, and undergoes decomposition when boiled with weaker spirit. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **42.** 44.) C_2NKO_2

Cyanate of Silver. Insoluble in cold, sparingly soluble in boiling water. Readily soluble in ammonia-water. Readily soluble, with decomposition, in dilute nitric acid. Decomposed by a solution of cyanide of potassium. (Wœhler.) C_2NAgO_2

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CYANATE OF SODA.

CYANATE OF YTTRIA. Insoluble in water or alcohol. (Berlin.)

CYANAURIC ACID. *Vid. ter*Cyanide of Gold.
(*AuroCyanic Acid.*)
$Au\ Cy_3$

CYANAURATE OF AMMONIUM. Very readily
$N H_4 Cy, Au\ Cy_3 + 2\ Aq$ soluble in water, and alcohol. As good as insoluble in ether. (Himly, *Ann. Ch. u. Pharm.*, 1842, **42.** 344.)

CYANAURATE OF POTASSIUM. Efflorescent.
$K Cy, Au\ Cy_3 + Aq$ Soluble in water. Insoluble in absolute alcohol. (Himly, *Ann. Ch. u. Pharm.*, **42.** pp. 340, 341.)

CYANAURATE OF SILVER. Completely insol-
$Ag\ Cy, Au\ Cy_3$ uble in water. Soluble in ammonia-water. Insoluble in nitric acid. (Himly, *Ann. Ch. u. Pharm.*, **42.** pp. 337, 341.)

CYANETHIN. Very slightly soluble in cold,
$C_{18} H_{15} N_3$ tolerably soluble in boiling water. Soluble in almost all proportions in alcohol. Very easily soluble in acids, forming salts which are all soluble in water, and alcohol. (Kolbe & Frankland, *J. Ch. Soc.*, **1.** 71.)

CYANETHOLIN. Insoluble in water. Soluble
$C_6 H_5 N O_2 = N \left\{ \begin{matrix} C_2 O_2'' \\ C_4 H_5 \end{matrix} \right.$ in all proportions in alcohol, and ether. Soluble in most acids, with combination. (Cloez.)

CYANETHYLAMID. *Vid.* EthylCyanamin.

CYANETHYLANILIN. *Vid.* EthylCyanAnilin.

CYANHYDRAMYLIC ETHER. *Vid.* Cyanid of Amyl.

CYANHYDRIC ACID. Mixes in all proportions
(*HydroCyanic Acid.*)
$C_2 H N = H Cy$ with water. Also with alcohol, wood-spirit, ether, volatile oils, and a few other organic compounds. Soluble in oil of copaiba. (Gerber.) Abundantly soluble in caoutchin. (Himly.)

An aqueous solution of sp. gr.	Contains	
	Per cent of H Cy.	Per cent of acid of 0.957 sp. gr.
0.9570	16.0	100
0.9768	10.6	66.6
0.9815	9.1	57.0
0.9840	8.0	50.0
0.9870	7.3	44.4
0 9890	6.4	40.0
0.9900	5.8	36.4
0.9914	5.3	33.3
0.9923	5.0	30.0
0.9930	4.6	28.6
0.9940	4.0	25.0
0.9945	3.6	22.2
0.9952	3.2	20.0
0.9958	3.0	18.2
0.9964	2.7	16.6
0.9967	2.5	15.4
0.9970	2.3	14.3
0.9973	2.1	13.3
0.9974	2.0	12.5
0.9975	1.77	11.8
0.9978	1.68	10.5
0.9979	1.60	10.0

(Ure, *Quar. J. Sci.*, **13.** 321; *Schw. J.*, **36.** 282 [*Gm.*].)

According to Trautwein, a solution of 0.982 sp. gr. at 12.5° contains 10.53% of anhydrous cyanhydric acid.

CYANHYDRATE OF BENZIL. Unacted upon by
$C_{28} H_{10} O_4, 2\ C_2 H N$ boiling water, solutions of salts, or concentrated chlorhydric acid. Easily soluble in boiling alcohol, and ether. (Zinin.) Decomposed by warm ammonia-water, and nitric acid.

CYANHYDRATE OF BRUCIN with CYANIDE OF IRON.
$2(N_2 \left\{ C_{46} H_{26} O_8^{vi}, H\ Cy); Fe\ Cy + 2\ Aq \right.$

CYANHYDRATE OF BUTYRENE. *Vid.* Cyanide of Butyl.

CYANHYDRATE OF CHLORIDE OF ANTIMONY.
$Sb\ Cl_5, 3\ H\ Cy$ Deliquescent. Decomposed by water. (Klein.)

CYANHYDRATE OF CHLORIDE OF CYANOGEN.
$2\ Cy\ Cl, H\ Cy$ Somewhat soluble in water. Decomposed by much water.

CYANHYDRATE OF *sesqui*CHLORIDE OF IRON.
$Fe_2 Cl_3, 2\ H\ Cy$ Deliquescent. (Klein.)

CYANHYDRATE OF *bi*CHLORIDE OF TIN. De-
$Sn\ Cl_2, H\ Cy$? composes in moist air; also decomposed by water, with evolution of heat. (Klein.)

CYANHYDRATE OF *bi*CHLORIDE OF TITANIUM.
$Ti\ Cl_2, H\ Cy$ Soluble in water, with evolution of heat. If but little water be used cyanhydric acid is evolved. (Wœhler.)

CYANHYDRATE OF *di*CYANNAPHTYL*bi*AMIN.
(*DiCyanNaphtylamin.*)
$C_{46} H_{17} N_5 = N_2 \left\{ \begin{matrix} (C_{20} H_7 (C_2 N))_2'' \\ H_2 \end{matrix} \right\}, H\ C_2 N$ Insoluble in water. Tolerably easily soluble in alcohol, and ether.

CYANHYDRATE OF CYANOCODEIN. Soluble in
(*biCyanide of Codein.*)
$N \left\{ \begin{matrix} C_{36} H_{20} O_6'' \\ C_2 N \end{matrix} \right., H\ C_2 N$ absolute alcohol, and in a mixture of alcohol and ether. Also soluble in dilute alcohol, but with decomposition.

CYANHYDRATE OF HARMALIN. Permanent.
(*HydroCyanHarmalin.*)
$C_{26} H_{14} N_2 O_2, H\ Cy$ Decomposed by boiling with water or alcohol. Soluble in warm alcohol. Soluble in most acids; but almost insoluble in acetic acid. (Fritzsche.)

CYANHYDRATE OF HYDRIDE OF BENZOYL.
$C_{14} H_6 O_2, H\ Cy$ Very sparingly soluble in water. Readily soluble in alcohol, and ether. (Vœlkel, *Pogg. Ann.*, **62.** 444 [K.].)

CYANHYDRATE OF METHYLENE. *Vid.* Cyanide of Methyl.

CYANHYDRATE OF NITRAZOPHENYLAMIN with *proto*CHLORIDE OF PLATINUM.
$2 (C_{12} H_7 (N O_4) N_2, H\ Cy, Pt\ Cy) + 5\ Aq$ Soluble in water, with partial decomposition.

CYANHYDRATE OF NITRAZOPHENYLAMIN with *proto* CYANIDE OF PLATINUM.
$2 (N_2 \left\{ \begin{matrix} C_{12} H_3 (N O_4)'' \\ H_4 \end{matrix} \right\} H\ Cy; Pt\ Cy) + 5\ Aq$

CYANHYDRATE OF NITROHARMALIN. Perma-
$C_{26} H_{13} (N O_4) N_2 O_2, H\ Cy$ nent. Decomposed by boiling with water; also decomposed by ammonia-water, and by an aqueous solution of potash. Soluble in concentrated sulphuric acid.

CYANHYDRATE OF NITROHARMIN with *proto*CYANIDE OF MERCURY.

CYANHYDRATE OF PLATOSAMIN. *Vid.* Cyanide of Platin(*ous*)ammonium.

CYANHYDRATE OF SOLANIN. Soluble in water.

"**CYANIC ETHER**" (formerly). *Vid.* Allophanate of Ethyl.

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Cyanic Ether. *Vid.* Cyanate of Ethyl.

Cyanides. The alkaline cyanides are all soluble in water, the cyanides of the alkaline earths and protocyanide of mercury are also soluble, but the other metallic cyanides are insoluble in water. (Gerhardt, *Tr.*)

Cyanide of Aluminum & *protoCyanide* of Platinum. Easily deliquesces. Soluble in alcohol. (Quadrat.)

Cyanide of Ammonium. NH_4Cy Very soluble in water, and alcohol. The aqueous solution soon undergoes decomposition.

Cyanide of Ammonium & of Copper(Cu_2).

I.) $NH_4Cy; Cu_2Cy$ Sparingly soluble in water; decomposed by long ebullition therein. Soluble in cyanhydric acid. (Dufau.)

II.) $NH_4Cy; 2Cu_2Cy + Aq$ Ppt. Decomposed by acids.

Cyanide of Ammonium & of Gold.

I.) $NH_4Cy; AuCy$ Very easily soluble in water, and alcohol. Almost completely insoluble in ether. (Himly, *Ann. Ch. u. Pharm.*, 1842, **42.** 342.)

II.) $NH_4Cy; AuCy_3 + 2Aq$ *Vid.* CyanAurate of Ammonium.

Cyanide of Ammonium & of Mercury(Hg). Very soluble in water. (Pean de St. Gilles, *Ann. Ch. et Phys.*, (3.) **36.** 93.)

Cyanide of Ammonium & of Nickel. $2NH_4Cy; NiCy$ Easily decomposed.

Cyanide of Ammonium & *protoCyanide* of Platinum.

I.) $NH_4Cy; PtCy$ Quickly efflorescent. Soluble in absolute alcohol.

II.) *white hydrate.*
$NH_4Cy; PtCy + Aq$

III.) *yellow hydrate.* $NH_4Cy; PtCy + 2Aq$ Soluble in about 1 pt. of water; more readily soluble in alcohol. (Schafarik.)

IV.) $6NH_4Cy; 5PtCy$ Soluble in water. (Quadrat.) Does not exist. (Schafarik.)

Cyanide of Ammonium & of Zinc. $NH_4Cy; ZnCy$ Efflorescent. Imperfectly soluble in cold water, cyanide of zinc separating out. Very sparingly soluble in spirit of 40° B. Completely soluble in ammonia-water. (Corriol & Berthemot, *J. de Pharm.*, 1830, **16.** 446.)

Cyanide of Amyl. $C_{12}H_{11}N = C_{10}H_{11}, Cy$ Sparingly soluble in water. Less soluble than cyanide of ethyl in water. Soluble in all proportions in alcohol. (Frankland & Kolbe.)

Cyanide of Anilin. *Vid.* CyanAnilin.

Cyanide of Antimony. Soluble in an aqueous solution of cyanide of potassium. (Gore.)

Cyanide of Argentammonium & of Silver. $N\left\{\begin{matrix}H_3\\Ag\end{matrix}\right. \cdot Cy; AgCy$ Decomposes in the air.

Cyanide of Argentammonium & of Platinum. $N\left\{\begin{matrix}H_3\\Ag\end{matrix}\right. \cdot Cy, PtCy$ Insoluble in water. Slowly soluble in a large quantity of ammonia-water. Unacted on by boiling mineral acids. (Knop & Schnedermann.)

Cyanide of Arsenic & of Iron? Insoluble in water. (Ittner.)

Cyanide of Barium. BaC_2N Somewhat difficultly soluble in water.

Sparingly soluble in water. (Schulz.) Very soluble in water. Also soluble in boiling rectified spirit. (F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4.** 96.) The aqueous solution suffers decomposition when boiled.

Cyanide of Barium & of Copper(Cu_2). Soluble in water. (Meillet.)

Cyanide of Barium & of Nickel.
$2BaCy; NiCy$

Cyanide of Barium & *protoCyanide* of Platinum. $BaCy; PtCy$ Soluble in water, and alcohol. (Schafarik.) Quadrat gives the composition of this salt as $6BaCy; 5PtCy + 22Aq.$, and says that it is soluble in 33 pts. of cold, and more readily in hot water.

Cyanide of Barium & of Zinc. $BaCy; 2ZnCy$ Very slowly soluble in water. (Rammelsberg.)

Cyanide of Benzoyl. $C_{14}H_5O_2, Cy$ Insoluble in water; but is slowly decomposed when in contact with either hot or cold water. (Liebig & Wœhler.)

Cyanide of Benzyl. *Vid.* Cyanide of Toluenyl.

Cyanide of Bismuth. Ppt. Insoluble in an aqueous solution of cyanide of potassium, but soluble in acids. (H. Rose, *Tr.*)

Cyanide of Bismuth & of Copper(Cu_2). Ppt. Decomposed by acids. (Ittner.)

Cyanide of Bismuth & of Iron. Ppt. Insoluble in aqueous solutions of the ammonia salts. Soluble in nitric acid, from which it is precipitated by water.

Cyanide of Bismuth & *protoCyanide* of Platinum. Ppt.

Cyanide of Butyl. (*Valeronitril. Cyanhydrate of Butyrene. Cyanide of Tetryl.*) $C_{10}H_9N = C_8H_9, C_2N$ Soluble in about 4 vols. of water, and in all proportions in alcohol, and ether. (Guckelberger.) Tolerably soluble in water. (Schlieper.) Scarcely at all soluble in water. (Schwanert.)

Cyanide of Cacodyl. $C_6H_6AsN = C_4H_6As, Cy$ Sparingly soluble in water. Very readily soluble in alcohol, and ether.

Cyanide of Cadmium. $CdCy$ Permanent. Very sparingly soluble in water. Easily soluble in an aqueous solution of cyanide of potassium; and, with decomposition, in acids. (Schueler, *Ann. Ch. u. Pharm.*, **87.** 47.) Soluble in warm ammonia-water, but insoluble in solutions of the ammoniacal salts. (Wittstein.)

The above is the ordinary normal salt, but Rammelsberg describes another cyanide of cadmium, which is soluble in water: this is probably an acid salt.

Cyanide of Cadmium & of Copper(Cu). $2CdCy; CuCy$ Very unstable. (Schueler.)

Cyanide of Cadmium & of Copper(Cu_2). $2CdCy; Cu_2Cy$ Permanent. Very sparingly soluble in cold, more soluble in boiling water.

Insoluble in water. Soluble in warm concentrated chlorhydric acid, and is destroyed only after long-continued boiling therewith; it is but slightly acted upon by cold chlorhydric acid. Insoluble in solutions of the ammoniacal salts, or in boiling ammonia-water. (Schueler, *Ann. Ch. u. Pharm.*, **87.** 49.)

Cyanide of Cadmium & of Iron. Ppt.
$Cd\,Cy;\ Fe\,Cy_2$?

Cyanide of Cadmium & of Lead. Ppt.
$Cd\,Cy;\ 2\,Pb\,Cy$

Cyanide of Cadmium & of Mercury(Hg).
$2\,Cd\,Cy;\ 3\,Hg\,Cy$ Permanent. Readily soluble in cold water. Decomposed by dilute acids. (Schueler, *Ann. Ch. u. Pharm.*, **87.** 54.)

Cyanide of Cadmium & of Nickel. Soluble in an aqueous solution of cyanide of potassium, and in acids. (Rammelsberg.)

Cyanide of Cadmium & of Potassium.
$Cd\,Cy;\ K\,Cy$ Permanent. Soluble in 3 pts. of cold, and 1 pt. of boiling water. Not perceptibly soluble in absolute alcohol. (Rammelsberg.)

Cyanide of Cadmium & of Silver. Ppt. Soluble in an aqueous solution of mixed cyanide of cadmium and cyanide of potassium.

Cyanide of Calcium. Soluble in water, the
$Ca\,C_2\,N$ solution undergoing decomposition when evaporated.

Cyanide of Calcium & of Gold. Soluble in an aqueous solution of cyanide of calcium. (Scheele.)

Cyanide of Calcium & of Nickel. Soluble
$2\,Ca\,Cy;\ Ni\,Cy$ in water. (Wœhler.)

Cyanide of Calcium & *proto*Cyanide of
$Ca\,Cy,\ Pt\,Cy + 5\,Aq$ Platinum. Easily soluble in water. (Quadrat.)

Cyanide of Calcium & of Silver. Soluble in an aqueous solution of nitrate of silver; in this solution neither chloride of ammonium nor chlorhydric acid produces any precipitate. (Scheele.)

Cyanide of Calcium & of Zinc. Tolerably soluble in water. (Schindler.)

Cyanide of Cerium. Ppt.
$Ce\,C_2\,N$

Cyanide of Cetyl. Insoluble in water.
$C_{32}\,H_{33}\,C_2\,N$ Easily soluble in hot ordinary alcohol and in ether. (Becker, *Ann. Ch. u. Pharm.*, **102.** 213.)

Cyanide of *ter*ChloroMethyl.
(Isomeric with *ChlorAcetonitrile.*)
$C_4\,Cl_3\,N = C_2\,Cl_3,\ C_2\,N$

Cyanide of ChloroPhenyl. Insoluble in water. Easily soluble in alcohol, and ether.
(*ChloroBenzoNitril.*)
$C_{14}\,H_4\,Cl\,N = C_{12}\,H_4\,Cl,\ C_2\,N$

*Proto*Cyanide of Chromium. Ppt. Insoluble
$Cr,\ C_2\,N$ in an aqueous solution of cyanide of potassium.

*Sesqui*Cyanide of Chromium. Insoluble in
$Cr_2''',\ (C_2\,N)_3$ water, alcohol, or an aqueous solution of cyanide of potassium; but soluble in an excess of a solution of sesquichloride of chromium. When recently precipitated it is soluble in dilute acids, even in acetic acid. (Berzelius.) Insoluble in water. Slowly soluble in cold water acidulated with nitric acid. (F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4.** 101.)

Cyanide of Cinnamyl. Decomposed by
$C_{18}\,H_7\,O_2,\ C_2\,N$ water.

Cyanide of Cobalt.

I.) *normal.* Insoluble in water.
$Co\,C_2\,N + 2\,Aq$ Soluble, with combination, in an aqueous solution of cyanide of potassium. (F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4.** 100; Haidlen & Fresenius.) Readily soluble in ammonia-water, and in aqueous solutions of carbonate of ammonia and succinate of ammonia; but insoluble in solutions of sulphate or nitrate of ammonia or chloride of ammonium. (Wittstein.)

II.) *sesqui.* Known only in combination.

III.) $\frac{8}{5}$ *basic.* Ppt. (Gmelin.)
$8\,Co\,Cy;\ Co_2\,Cy_3$

Cyanide of Cobalt & of Copper(Cu). Ppt.

Cyanide of Cobalt & of Nickel. Ppt.
$Co\,Cy;\ Ni\,Cy$ Unacted upon by boiling chlorhydric acid (?)

Cyanide of Cobalt & of Silver. Ppt.
$Co\,Cy;\ Ag\,Cy$

Cyanide of Cobaltammonium & *protocyanide* of Platinum. Insoluble in pure water; but soluble in water which contains ammonia, on boiling.
$N\left\{\begin{matrix}H_3\\Co\end{matrix}\right.\cdot Cy;\ Pt\,Cy$

*Proto*Cyanide of Copper. Easily decom-
$Cu,\ C_2\,N$ posed. Insoluble in water. Readily soluble in aqueous solutions of cyanide of potassium, carbonate of ammonia, and caustic ammonia. (Gore.) Soluble in chlorhydric acid, from which it is reprecipitated on the addition of water. Soluble in an aqueous solution of cyanide of potassium. (F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4.** 100.)

*Di*Cyanide of Copper. Permanent. Insol-
$Cu_2,\ C_2\,N$ uble in water. Soluble in chlorhydric acid, from which solution it is precipitated on the addition of water (L. Gmelin), or of potash. (Vauquelin.) Insoluble in warm dilute sulphuric acid. Decomposed by nitric acid. Soluble in dilute acids. (Gerhardt.) Soluble in ammonia-water (Vauquelin), and in aqueous solutions of the alkaline cyanides.

Also in aqueous solutions of carbonate and succinate of ammonia, and in hot solutions of sulphate and nitrate of ammonia and chloride of ammonium. (Wittstein.)

*Proto*Cyanide of Copper & *di*Cyanide of Copper.

I.) $Cu\,Cy;\ Cu_2\,Cy + 5\,Aq$ Decomposed when boiled with water. Easily soluble in aqueous solutions of cyanide of potassium, carbonate of ammonia, and in hot solutions of other ammoniacal salts, also in ammonia-water. (Wittstein.) Soluble in cold chlorhydric acid; in this solution water produces a precipitate. Decomposed by hot chlorhydric and nitric acids.

II.) $Cu\,Cy;\ 2\,Cu_2\,Cy + Aq$ Ppt.

Cyanide of Copper & of Cupr(*ic*)ammonium. Permanent. Slightly soluble in cold, decomposed by boiling water. Readily soluble in ammonia-water. (Dufau.)

I.) $C_4\,H_3\,N_3\,Cu_3 + Aq = Cu_2\,Cy;\ N\left\{\begin{matrix}Cu\\H_3\end{matrix}\right.,\ Cy + Aq$

II.) $C_6\,H_3\,N_4\,Cu_5 + Aq = 2\,Cu_2\,Cy;\ N\left\{\begin{matrix}Cu\\H_3\end{matrix}\right.,\ Cy + Aq$ Ppt.

III.) $C_6\,H_6\,N_4\,Cu_3,\ \&\ + Aq = Cu_2\,Cy;\ N_2\left\{\begin{matrix}Cu\\H_5\end{matrix}\right.\cdot H,\ Cy$ Insoluble in cold, decomposed by boiling water. Soluble in aqueous solutions of carbonate of ammonia and caustic ammonia. Decomposed by dilute acids and by solutions of the caustic alkalies. (Liebig & Hilkenkamp, *Ann. Ch. u. Pharm.*, **97**. 218.)

IV.) $C_6 H_6 N_5 Cu_5$ & + 2 Aq = $2 Cu_2 Cy ; N_2 \left\{\begin{matrix} Cu \\ H_5 \end{matrix}\right. . H, Cy$

V.) $C_4 H_9 N_4 Cu_3 = Cu_2 Cy ; N_2 \left\{\begin{matrix} Cu \\ H_8 \end{matrix}\right. . H , Cy$

*Proto*CYANIDE OF COPPER & OF GOLD. Ppt.

*Di*CYANIDE OF COPPER & *proto Cyanide* OF IRON. Ppt. Decomposed by acids, which dissolve out the dicyanide of copper. (Ittner.)

*Di*CYANIDE OF COPPER & *proto Cyanide* OF LEAD. Ppt. Decomposed by acids. (Ittner.)

*Di*CYANIDE OF COPPER & *proto Cyanide* OF MANGANESE. Ppt.

*Di*CYANIDE OF COPPER & *sesqui Cyanide* OF MANGANESE. Ppt.

*Di*CYANIDE OF COPPER & *proto Cyanide* OF NICKEL. Ppt.

*Proto*CYANIDE OF COPPER & OF NICKEL. Ppt. Soluble in ammonia-water. (F. & E. Rodgers.)

*Proto*CYANIDE OF COPPER & OF PLATINUM.
$Cu Cy, Pt Cy$ Insoluble in water. Soluble in ammonia-water. (Quadrat.) Unacted upon by dilute acids. (Schafarik.)

*Di*CYANIDE OF COPPER & *proto Cyanide* OF POTASSIUM.
(*Cupro Cyanide of Potassium.*)

I.) $Cu_2 Cy ; K Cy$ Sparingly soluble in water, with separation of some dicyanide of copper. Rammelsberg supposes this solvent action of the water to depend entirely on the presence of No. 2, in a hot solution of which the compound now under consideration is soluble to a considerable extent. From such a solution it crystallizes out before any of compound No. 2 separates.

Neither decomposed nor altered by alkaline solutions. Acids decompose it, precipitating dicyanide of copper, which is finally re-dissolved, with decomposition, when more acid is added.

II.) $Cu_2 Cy ; 3 K Cy$ Permanent. Readily soluble in water. The solution is decomposed on the addition of acids.

III.) $3 Cu_2 Cy ; 2 K Cy$

*Di*CYANIDE OF COPPER & *proto Cyanide* OF SILVER.

I.) $Cu_2 Cy; Ag Cy$ Ppt.

II.) $Cu_2 Cy ; 3 Ag Cy$ Ppt. Soluble in an excess of a solution of dicyanide of copper with protocyanide of potassium (No. 2.) (Rammelsberg.)

*Proto*CYANIDE OF COPPER & OF SILVER. Ppt.
$Cu Cy ; Ag Cy$ Sparingly soluble in ammonia-water. Decomposed by acids. (Ittner.)

*Di*CYANIDE OF COPPER & OF SODIUM. Permanent. Soluble in water. (Meillet.)

*Di*CYANIDE OF COPPER & *proto Cyanide* OF TIN. Ppt.

*Di*CYANIDE OF COPPER & *proto Cyanide* OF URANIUM. Ppt.

*Di*CYANIDE OF COPPER & *proto Cyanide* OF ZINC. Ppt. Decomposed by acids. (Ittner.)

CYANIDE OF COPPER with NITRATE OF SILVER. Insoluble in water. (Wœhler.)

CYANIDE OF CUMENYL. Insoluble in water.
(Isomeric, or identical with *Cumonitril.*)
$C_{20} H_{11} N = C_{18} H_{11}, C_2 N$ Soluble in all proportions in alcohol, and ether. (Field.)

CYANIDE OF CUPR(*ic*)AMMONIUM & OF CUPR-(*eous*)AMMONIUM.

I.) $C_4 H_6 N_4 Cu_3 = (N H_3 Cu) Cy; (N H_3 Cu_2) Cy$ Permanent. Insoluble in water. Readily soluble in warm ammonia-water. (Dufau.)

*Proto*CYANIDE OF CUPR(*ic*)AMMONIUM & OF PLATINUM.
$N \left\{\begin{matrix} H_3 \\ Cu \end{matrix}\right. . Cy, Pt Cy + Aq$

*Proto*CYANIDE OF CUPR(*ic*)AMMONIUM & OF PLATIN(*ous*)AMMONIUM.
$N \left\{\begin{matrix} H_3 \\ Cu \end{matrix}\right. . Cy, N \left\{\begin{matrix} H_3 \\ Pt \end{matrix}\right. . Cy + Aq$ Very soluble in water, alcohol, and ether. Decomposed by acids. (Quadrat.)

CYANIDE OF ETHYL. Rather soluble in water.
(*Metacetonitrile.*)
(Isomeric with *Proprionitrile.*)
$C_6 H_5 N = C_4 H_5, Cy$ Insoluble in a saturated aqueous solution of chloride of sodium. (Frankland & Kolbe.) Soluble in all proportions in alcohol and ether. (Pelouze.)

CYANIDE OF ETHYL & OF PLATINUM. Very
$C_8 H_7 N_2 Pt O_2 = C_4 H_5, C_2 N ; Pt C_2 N + 2 Aq$ easily decomposed by water. Soluble in hot, less soluble in cold alcohol. Partially soluble in ether. (v. Thann.)

CYANIDE OF ETHYLAMMONIUM & OF PLATINUM.
$N \left\{\begin{matrix} H_3 \\ C_4 H_5 \end{matrix}\right. . Cy, Pt Cy$ Very readily soluble in water, and alcohol. (v. Thann.)

CYANIDE OF ETHYLAMMONIUM & OF SILVER.
$C_4 H_5, C_2 N ; Ag C_2 N$ Soluble in boiling, less soluble in cold water. (E. Meyer.)

*Proto*CYANIDE OF IRON & OF GOLD. Ppt.

*Proto*CYANIDE OF GOLD. Permanent. Insol-
$Au C_2 N$ uble in water, alcohol, or ether. (Figuier.) Soluble in an aqueous solution of cyanide of potassium. Unacted upon by sulphuric, chlorhydric, or nitric acids, or by aqua-regia, even when these are boiling. (Figuier.) Soluble in ammonia-water, and in an aqueous solution of hyposulphite of soda. (Glassford & Napier.)

Completely insoluble in water, alcohol, or ether. Neither dissolved nor altered by the strongest acids. Unacted upon in the cold, but is dissolved, with partial decomposition, by long-continued boiling, in concentrated potash-lye. Soluble in aqueous solutions of cyanide of potassium and the other soluble cyanides, with combination. Slowly dissolved by an aqueous solution of sulphide of ammonium. (Himly, *Ann. Ch. u. Pharm.*, 1842, **42**. pp. 158, 161.) When recently precipitated, it is slightly soluble in sulphuric, chlorhydric, and nitric acids. (Glassford & Napier.) Unacted upon by cold, partially decomposed by boiling caustic potash.

*Ter*CYANIDE OF GOLD. Permanent. Soluble
(*Auro Cyanhydric Acid.*)
$Au.Cy_3 + 6 Aq$ in all proportions in water; and almost as readily in absolute alcohol, and ether. Melts in its water of crystallization, at 50°. The aqueous solution undergoes partial decomposition when evaporated. (Himly, *Ann. Ch. u. Pharm.*, 1842, **42**. 338.)

*Proto*CYANIDE OF GOLD & OF LEAD. Ppt.

*Proto*CYANIDE OF GOLD & OF MANGANESE. Ppt.

*Proto*CYANIDE OF GOLD & OF POTASSIUM.

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$\mathrm{Au\,Cy;\ K\,Cy}$ Permanent. Soluble in 7 pts. of cold, and in less than 0.5 pt. of boiling water. (Himly, *Ann. Ch. u. Pharm.*, 1842, **42.** pp. 160, 161.) Soluble in 4 pts. of cold, and in 0.8 pt. of boiling water. (Glassford & Napier.) Only sparingly soluble in cold, somewhat more soluble in boiling alcohol; being the more soluble in alcohol in proportion as this contains more water. Insoluble in ether. Decomposed by warm chlorhydric acid. (Himly, *loc. cit.*, p. 161.) Also decomposed by sulphuric and nitric acids, and even by oxalic, tartaric, and acetic acids at a boiling heat. (G. & N.)

*Ter*Cyanide of Gold & *protoCyanide* of Potassium. $\mathrm{K\,Cy,\ Au\,Cy_3}$ *Vid.* CyanAurate of Potassium.

*Proto*Cyanide of Gold & of Silver. Ppt. $\mathrm{Au\,Cy;\ Ag\,Cy}$

*Ter*Cyanide of Gold & *protoCyanide* of Silver. $\mathrm{Ag\,Cy,\ Au\,Cy_3}$ *Vid.* CyanAurate of Silver.

*Proto*Cyanide of Gold & of Tin. Ppt.

*Proto*Cyanide of Gold & of Zinc. Ppt.

Cyanide of HydrargEthyl. *Vid.* Cyanide of Mercur(*ous*)Ethyl.

Cyanide of *bin*IodoMethyl.
$\mathrm{C_4\,H\,I_2\,N = C_2\,H\,I_2,\ Cy}$

*Proto*Cyanide of Iridium.

I.) *normal.* Insoluble in water. (Dœbereiner.)
$\mathrm{Ir\,Cy}$

II.) *acid.* Soluble in water, and alcohol. $\mathrm{Ir\,Cy,\ H\,Cy}$ (Dœbereiner, in *Berzelius's Lehrb.*, **3.** 1003.)

Cyanide of Iridium & of Mercury. $\mathrm{Ir\,Cy,\ Hg\,Cy}$ Insoluble in water, or in warm dilute nitric acid. (Dœbereiner, in *Berzelius's Lehrb.*, **3.** 1003.)

*Proto*Cyanide of Iron. $\mathrm{Fe\,Cy}$ Ppt. Insoluble in, and unacted upon by, dilute chlorhydric or sulphuric acids. Decomposed by boiling with concentrated chlorhydric acid. Soluble, with combination, in alkaline liquors.

*Sesqui*Cyanide of Iron.

a = ordinary modification. Known only in aqueous solution, which is decomposed when evaporated to dryness.

b = green modification. $\mathrm{Fe_2\,Cy_3 + 8\,Aq}$ Insoluble in water, or alcohol. (Posselt.)

*Proto*Cyanide of Iron & of Nickel. Ppt.

*Proto*Cyanide of Iron & of Platinum. Ppt.

*Sesqui*Cyanide of Iron & *protoCyanide* of Platinum. Ppt.

Cyanide of Iron & of Tin. $\mathrm{Fe,\ Sn,\ Cy_3}$ (?) Insoluble in ammonia-water, and in solutions of ammoniacal salts. (Wittstein.)

Cyanide of Lead. $\mathrm{Pb\,Cy}$ Insoluble in water. (Scheele.) Sparingly soluble in cold, more soluble in hot water. Soluble in nitric acid. (F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4.** 100.) Insoluble in an aqueous solution of cyanide of calcium. (Scheele.) Soluble in an aqueous solution of cyanide of potassium.

Insoluble in a solution of cyanide of potassium. (H. Rose, *Tr.*) Soluble, with decomposition, in nitric and acetic acids. Partially soluble in ammonia-water, and in aqueous solutions of carbonate and nitrate of ammonia, more soluble in solutions of chloride of ammonium and succinate of ammonia. (Wittstein.) It is not precipitated from solutions which contain citrate of soda. (Spiller.)

*Proto*Cyanide of Lead & of Mercury(Hg). $\mathrm{Pb\,Cy;\ Hg\,Cy}$ (?) Ppt.

*Proto*Cyanide of Lead & of Nickel. $\mathrm{2\,Pb\,Cy;\ Ni\,Cy}$ Soluble in nitric acid. (F. & E. Rodgers.)

*Proto*Cyanide of Lead & of Silver. Ppt.

*Proto*Cyanide of Lead & of Zinc. Ppt. $\mathrm{Pb\,Cy;\ 2\,Zn\,Cy}$ Decomposed by washing.

Cyanide of Magnesium. $\mathrm{Mg\,C_2\,N}$ Soluble in water, but the solution cannot be evaporated by the aid of heat without decomposition. (F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4.** 93.)

*Proto*Cyanide of Magnesium & of Platinum. $\mathrm{Mg\,Cy,\ Pt\,Cy + 7\,Aq}$ Soluble in water. Tolerably soluble in hot, less soluble in cold alcohol. (Quadrat.)

*Proto*Cyanide of Manganese. $\mathrm{Mn\,Cy}$ Insoluble in water. Soluble in aqueous solutions of the alkaline cyanides. (Ittner.)

*Sesqui*Cyanide of Manganese. $\mathrm{Mn_2\,Cy_3}$ Known only in combination with other cyanides.

*Proto*Cyanide of Manganese & of Potassium. $\mathrm{Mn\,Cy;\ 2\,K\,Cy}$

*Proto*Cyanide of Manganese & of Silver. $\mathrm{Mn\,Cy;\ Ag\,Cy}$ Ppt. Decomposed by chlorhydric acid. (Ittner.)

Cyanide of Mercur(*ous*)Ethyl. $\mathrm{C_4\,H_5\,Hg_2,\ C_2\,N}$ Sparingly soluble in alcohol, and ether. (Dunhaupt.)

*Proto*Cyanide of Mercury.

I.) *normal.* $\mathrm{Hg\,Cy}$ Permanent. 100 pts. of the aqueous solution saturated at its boiling temperature (101.1°) contains 35 pts. of the dry salt; or 100 pts. of water dissolve 53.846 pts. of it at 101.1°; or 1 pt. of the dry salt is soluble in 1.8571 pts. of water at 101.1°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) Soluble in 8 pts. of water at 15.5°; the saturated solution containing 12% of it. Soluble in 8 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) Tolerably soluble in water; less easily soluble in spirit, and nearly insoluble in absolute alcohol.

Soluble in 11 pts. of cold, and in 2.5 pts. of boiling water; in 20 pts. of cold, and in 5 pts. of boiling alcohol. It is not decomposed by any of the oxygen acids, excepting hot concentrated sulphuric acid, or by aqueous solutions of the caustic alkalies. The hydrogen acids decompose it. (Wittstein's *Handw.*) Soluble in an aqueous solution of cyanide of potassium. Soluble, with combination, in aqueous solutions of the alkaline chlorides.

Soluble, without decomposition, in nitric acid. (Berzelius, *Lehrb.*)

II.) *basic.* *Vid.* OxyCyanide of Mercury.

Cyanide of Mercury & of *X*. *Vid.* CyanoMercurate of *X*.

Cyanide of Mercury with FerroCyanide of Potassium. $\mathrm{8\,Hg\,Cy;\ K_2\,Fe\,Cy_3 + 4\,Aq}$ Readily soluble in water. (Kane.)

Cyanide of Mercury with Formiate of Ammonia. $\mathrm{Hg\,Cy;\ C_2\,H\,(N\,H_4)\,O_4}$

Cyanide of Mercury with Formiate of Potash. $\mathrm{Hg\,Cy;\ C_2\,H\,K\,O_4}$ Easily soluble in water. (Winkler.)

Cyanide of Mercury with HypoSulphite of Potash. $\mathrm{Hg\,Cy;\ K\,O,\ S_2\,O_2}$ Permanent. Soluble in water. (Kessler.)

Cyanide of Mercury with Iodide of Barium. $\mathrm{2\,Hg\,Cy;\ Ba\,I + 4\,Aq}$ Slowly deliquesces. Soluble in 16.5 pts. of cold water, and very easily soluble in boiling water. Soluble in 22.5 pts. of cold, and in 1.6 pts. of hot

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alcohol of 90%. On boiling, the solutions turn yellow, and a little carbonate of baryta separates out. (Custer, in *Wittstein's Handw.*)

Cyanide of Mercury with Iodide of Calcium.
$2\,Hg\,Cy;\ Ca\,I + 5\,Aq$ Slightly efflorescent. Very soluble in water. (Poggiale.) More permanent than either the barium or strontium salt. More readily soluble than the strontium salt. (Custer.)

Cyanide of Mercury with Iodide of Potassium.
$2\,Hg\,Cy;\ K\,I$ Permanent. Soluble in 16 pts. of cold water, and in less hot water. (Caillot.) Soluble in 96 pts. of cold alcohol of 34° B. (Caillot.) Slightly soluble in ether. (Souville.) Decomposed by acids.

Cyanide of Mercury with Iodide of Sodium.
$2\,Hg\,Cy;\ Na\,I + 4\,Aq$ Soluble in 4.5 pts. of cold water; very easily soluble in boiling water. Soluble in 6.5 pts. of cold, and in 2 pts. of hot alcohol of 90%. (Custer.)

Cyanide of Mercury with Iodide of Strontium.
$2\,Hg\,Cy;\ Sr\,I + 6\,Aq$ Much more soluble in water than the corresponding barium salt. (Custer.)

Cyanide of Mercury with Nitrate *of dinoxide* of Mercury.
$Hg\,Cy;\ Hg_2\,O, N\,O_5$ Readily soluble in water. (Johnston.)

Cyanide of Mercury with Nitrate *of protoxide* of Mercury.
$Hg\,Cy;\ Hg\,O, N\,O_5 + 2\,Aq$ (Desfosses.)

Cyanide of Mercury with Nitrate of Silver.
$2\,Hg\,Cy;\ Ag\,O, N\,O_5 + 8\,Aq$ Sparingly soluble in cold, much more readily soluble in hot water. About as soluble in alcohol as in water. Soluble, without decomposition, in boiling nitric acid. Decomposed by chlorhydric acid. (Wœhler.)

Cyanide of Mercury with Oxalate *of dinoxide* of Mercury.
$4(Hg\,C_2\,N);\ Hg_2\,O, C_2\,O_3$ Sparingly soluble in cold, very soluble in boiling water. The aqueous solution is decomposed by long-continued ebullition. (Saint-Evre, *Ann. Ch. et Phys.*, (3.) **41.** 461.)

Cyanide of Mercury with Strychnine.
$2\,Hg\,Cy;\ C_{42}\,H_{22}\,N_2\,O_4$ Somewhat soluble in water, and in alcohol. Insoluble in ether. (Abel & Nicholson, *J. Ch. Soc.*, **2.** 260.)

Cyanide of Mercury with SulphoCyanide of Barium.
$2\,Hg\,Cy;\ \left.\begin{matrix}Cy\\Ba\end{matrix}\right\}S_2$ Very easily soluble in boiling water, from which it crystallizes out as the solution cools. (Bœckmann, *Ann. der Pharm.*, 1837, **22.** pp. 153, 156.)

Cyanide of Mercury with SulphoCyanide of Calcium.
$2\,Hg\,Cy;\ \left.\begin{matrix}Cy\\Ca\end{matrix}\right\}S_2$ Very easily soluble in boiling water, from which it crystallizes on cooling. (Bœckmann, *Ann. der Pharm.*, 1837, **22.** pp. 153, 157.)

Cyanide of Mercury with SulphoCyanide of Magnesium.
$2\,Hg\,Cy;\ \left.\begin{matrix}Cy\\Mg\end{matrix}\right\}S_2$ Very easily soluble in boiling water, from which it crystallizes out on cooling. (Bœckmann, *Ann. der Pharm.*, 1837, **22.** pp. 153, 155.)

Cyanide of Mercury with SulphoCyanide of Potassium.
$2\,Hg\,Cy;\ \left.\begin{matrix}Cy\\K\end{matrix}\right\}S_2$ Sparingly soluble in cold, very soluble in hot water. (Porrett, *Phil. Trans.*, 1814, p. 552.) Very easily soluble in boiling water, from which it crystallizes out on cooling. (Bœckmann, *Ann. der Pharm.*, 1837, **22.** 153.)

Cyanide of Methyl. Miscible with water in all proportions. (Dumas; Malaguti & Leblanc.)
(*Nitride of Acetyl. Cyanhydrate of Methylene. Isomeric* with *Acetonitril.*)
$C_4\,H_3\,N = C_2\,H_3, Cy$

Cyanide of Nickel. Insoluble in water.
$Ni\,Cy$ Soluble in ammonia-water; in aqueous solutions of cyanide of potassium (F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4.** 100); of carbonate of ammonia and in warm solutions of sulphate and succinate of ammonia. Imperfectly soluble in solutions of chloride of ammonium, and nitrate of ammonia. Insoluble in concentrated sulphuric, nitric, or chlorhydric acids; but is decomposed when heated therewith. (Wittstein.)

Cyanide of Nickel & of Potassium.
$Ni\,Cy;\ K\,Cy + Aq$ Soluble in water. Decomposed by sulphuric, nitric, and chlorhydric acids, cyanide of nickel being precipitated. (Compare F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4.** 97.)

Cyanide of Nickel & of Silver.
$Ni\,Cy;\ Ag\,Cy$ Soluble in ammonia-water. Insoluble in nitric acid. (F. & E. Rodgers.)

Cyanide of Nickel & of Sodium.
$Ni\,Cy;\ Na\,Cy + 3\,Aq$

*Proto*Cyanide of Nickelammonium & of Platinum.

a = anhydrous.

$N\left\{\begin{matrix}H_3\\Ni\end{matrix}\right. Cy, Pt\,Cy$

b = hydrated.

$N\left\{\begin{matrix}H_3\\Ni\end{matrix}\right. Cy, Pt\,Cy + Aq$

Cyanide of NitroPhenyl. Tolerably soluble in boiling, less soluble in cold water. Soluble in concentrated acids, from which solution it is precipitated on the addition of water.
(*NitroBenzoNitril.*)
$C_{14}H_4\,N_2\,O_4 = C_{12}\,H_4\,(N\,O_4), Cy$

Cyanide of Palladammonium.
$N\left\{\begin{matrix}H_3\\Pd\end{matrix}\right. . Cy$ Soluble in boiling, less soluble in cold water. Soluble in ammonia-water.

Cyanide of Palladium. Insoluble, or very
$Pd\,Cy$ slightly soluble, in water. Soluble in an aqueous solution of cyanide of potassium, in dilute acids, and in ammonia-water.

*Bi*Cyanide of Palladium.
$Pd\,Cy_2$

Cyanide of Palladium & of Potassium.
$Pd\,Cy;\ K\,Cy + 8\,Aq$ Efflorescent.

Cyanide of Palladium with Nitrate of Palladium. Ppt.

Cyanide of Phenyl. Soluble in 100 pts. of water at 100°; less soluble in cold water. Easily soluble in alcohol, and ether.
(*Benzonitril.*)
$C_{14}\,H_5\,N = C_{12}\,H_5, Cy$

Cyanide of Phosphorus. Soluble in water with decomposition. (Cenedella.)

Cyanide of Platin(*ous*)*bi*amin & of Platinum. Insoluble in water. Dissolves slowly in boiling ammonia-water, and crystallizes therefrom without alteration. (Reiset, *Ann. Ch. et Phys.*, (3.) **11.** 426.) Slightly soluble in cold, much more readily soluble in boiling water. Soluble, without decomposition in an aqueous solution of caustic
(*Cyanide of Platosammonium* (of Reiset). *Cyanide of Platinum & of diPlatosammonium.*)
$N_2\left\{H_6 . Pt', Cy;\ Pt\,Cy\right.$

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potash, in chlorhydric acid, and in dilute sulphuric acid. Decomposed by concentrated nitric, or sulphuric, acid. (Buckton, *J. Ch. Soc.*, **4.** pp. 27, 33.)

CYANIDE OF PLATIN(*ous*)AMMONIUM. Much more soluble in water, and in ammonia-water, than the cyanide of platin(*ous*)*bi*amin & of platinum. (Buckton, *J. Ch. Soc.*, **4.** 34.)
(*Cyanide of Platosammonium. Ammonio protoCyanide of Platinum. Cyanhydrate of Platosamine.*)
$N\left\{\begin{matrix}H_3\\Pt\end{matrix}\right., Cy$

*Proto*CYANIDE OF PLATINUM.

I.) *normal.* Insoluble in water, in solutions of the alkalies, or in acids. (Dœbereiner.) When recently prepared, some samples of it are soluble in ammonia-water and in a solution of cyanide of ammonium; other samples are insoluble in these liquids. (Knop & Schnedermann.)
$Pt\,Cy$

II.) *acid.* Deliquescent. Easily soluble in water and in absolute alcohol. (Reiset, in *Berzelius's Lehrb.*, **3.** 983.)
$Pt\,Cy, H\,Cy$

*Sesqui*CYANIDE OF PLATINUM. *Vid.* PlatinoSesquiCyanhydric Acid.
$Pt_2\,Cy_3$

*Sesqui*CYANIDE OF PLATINUM with *X*. *Vid.* PlatinoSesquiCyanide of *X*.

*Bi*CYANIDE OF PLATINUM. Known only in combination with other cyanides. *Vid.* CyanoPlatinates.

*Proto*CYANIDE OF PLATINUM & OF POTASSIUM. Efflorescent. Abundantly soluble in warm, much less soluble in cold water. Soluble in sulphuric acid. Decomposed by nitric acid. Soluble in alcohol, and ether. (L. Gmelin.)
$Pt\,Cy, K\,Cy + 3\,Aq$

*Proto*CYANIDE OF PLATINUM & OF SILVER. Insoluble in water. Soluble in ammonia-water. (Buckton.)
$Pt\,Cy, Ag\,Cy$

*Proto*CYANIDE OF PLATINUM & OF QUININE.
$C_{40}\,H_{24}\,N_2\,O_4, 2\,(H\,Cy, Pt\,Cy) + 2\,Aq$

*Proto*CYANIDE OF PLATINUM & OF SODIUM. Soluble in water, and alcohol. (Quadrat.)
$Pt\,Cy\,;\,Na\,Cy + 3\,Aq$

*Proto*CYANIDE OF PLATINUM & OF STRONTIUM. Soluble in water.
$Pt\,Cy\,;\,Sr\,Cy + 5\,Aq$

*Proto*CYANIDE OF PLATINUM & OF TIN. Ppt.

*Proto*CYANIDE OF PLATINUM & OF ZINC. Ppt.

*Proto*CYANIDE OF PLATINUM & OF ZINCAMMONIUM.
$N\left\{\begin{matrix}H_3\\Zn\end{matrix}\right. . Cy\,;\,Pt\,Cy + Aq$

CYANIDE OF PLATOSAMMONIUM. *Vid.* Cyanide of Platin(*ous*)ammonium.

CYANIDE OF PLATOSAMMONIUM(of Reiset). *Vid.* Cyanide of Platin(*ous*)*bi*amin & of Platinum.

CYANIDE OF POTASSIUM. Deliquescent. Very soluble in water. 100 pts. of the aqueous solution saturated at its boiling temperature (103.3°) contains 55 pts. of the dry salt; or, 100 pts. of water dissolve 122.222 pts. of it at 103.3°; or 1 pt. of the dry salt is soluble in 0.8182 pt. of water at 103.3°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) Almost insoluble in absolute alcohol. Soluble in 80 pts. of boiling spirit of 95%; more readily soluble in spirit of 78%; and abundantly soluble in spirit of 35%. Alcohol of 95% precipitates it from the aqueous solution. (Geiger.) Not very soluble in alcohol. (F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4.** 94.)
$K\,Cy$

CYANIDE OF POTASSIUM & OF SILVER. Permanent. Soluble in 8 pts. of cold, and in 1 pt. of boiling water. (Glassford & Napier.) Soluble in 4.7 pts. of water at 15°, in 4 pts. at 20°, and much more soluble as the temperature is more elevated. "The solubility given by Glassford & Napier (in 8 pts. of water) is too low." (Baup, *Ann. Ch. et Phys.*, (3.) **53.** 464.) Soluble in 25 pts. of 85% alcohol at 20°. (Baup, *loc. cit.*) Soluble in boiling alcohol. Decomposed by acids. (Glassford & Napier.)
$K\,Cy\,;\,Ag\,Cy$

CYANIDE OF POTASSIUM, OF SILVER, & OF SODIUM. Soluble in 4.4 pts. of water at 15°, and in 22 pts. of alcohol, of 85%, at 17°. (Baup, *Ann. Ch. et Phys.*, (3.) **53.** 466.)
(*Hydrated Cyanide of Potassium & of Silver, or Salt "b" of Glassford & Napier.*)
$3\,(K\,Cy, Ag\,Cy)\,;\,Na\,Cy, Ag\,Cy$

CYANIDE OF POTASSIUM & OF TELLURIUM. Decomposed by water. (Berzelius.)
(*Telluro Cyanide of Potassium.*)

CYANIDE OF POTASSIUM & OF ZINC.

I.) $K\,Cy\,;\,Zn\,Cy$ Permanent. Readily soluble in cold water, and not much more abundantly in hot water. (L. Gmelin.) Decomposed by alcohol.

II.) $2\,K\,Cy\,;\,Zn\,Cy$

CYANIDE OF POTASSIUM with IODIDE OF SILVER. (Liebig.)

CYANIDE OF PROPYL. Decomposed by a boiling solution of caustic potash.
(*Butyronitrile. Cyanide of Trityl.*)
$C_8\,H_7\,N = C_6\,H_7, Cy$

CYANIDE OF SILVER. Insoluble in water and in dilute nitric acid. (Fresenius, *Quant.*, p. 142.) Sparingly soluble in dilute nitric acid; more readily in boiling than in cold. (Thaulow.) Unacted upon by other dilute oxygen acids. Decomposed by strong acids. (Ittner.) Not soluble to a perceptible extent in commercial cyanhydric acid. (Gore.) Soluble in aqueous solutions of the cyanides of ammonium, potassium, sodium, calcium, barium, and strontium.
$Ag\,C_2\,N = Ag\,Cy$

Very readily soluble in aqueous solutions of the cyanides of potassium and of sodium, of chloride of ammonium, and of hyposulphite of soda. (Gore.) Soluble in boiling aqueous solutions of the chlorides of potassium, sodium, calcium, barium, and magnesium; but at ordinary temperatures this solution takes place very slowly. Also soluble in solutions of hyposulphite of soda, ferrocyanide of potassium, carbonate, sulphate, nitrate, and succinate of ammonia, and in a large excess of a hot solution of chloride of ammonium. Soluble in ammonia-water. (Wittstein.) Easily soluble in ammonia-water, but is not decomposed by solutions of the caustic alkalies. (Berzelius, *Lehrb.*) Soluble in a strong boiling solution of nitrate of silver. (Wœhler.) Slightly soluble in an aqueous solution of citrate of soda. (Spiller.) Soluble in an aqueous solution of nitrate of protoxide of mercury, from which it is precipitated on the addition of cyanhydric acid, but it is not precipitated either by nitric acid or by a solution of nitrate of silver. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 317.) Easily soluble in ammonia-water. Not decomposed by the fixed alkalies.

*Bi*CYANIDE OF SILVER? Soluble in water. (Meillet.)
(*ArgentoPrussic Acid.*)
$H\,Cy, Ag\,Cy$

CYANIDE OF SILVER & OF IRON. Ppt. Decomposed by chlorhydric acid, but insoluble in other acids. (Ittner.) Soluble in ammonia-water. (Monthiers.)

CYANIDE OF SILVER & OF SODIUM. Much more soluble in hot than in cold water, and alcohol. Soluble in 5
$Ag\,Cy\,;\,Na\,Cy$

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pts. of water at 20°; and in 24 pts. of alcohol, of 85%, at 20°. (Baup, *Ann. Ch. et Phys.*, (3.) **53.** 468.)

Cyanide of Silver & of Zinc. Ppt.

Cyanide of Silver with Nitrate of Silver. Decomposed by water. (Wœhler.)
$2\,Ag\,Cy;\ Ag\,O, N\,O_5$

Cyanide of Sodium. Soluble in water, and alcohol, especially if these be hot.
$Na\,C_2\,N$

Easily soluble in water. Insoluble in alcohol. (Berzelius's *Lehrb.*, **3.** 218.) May be dissolved in boiling rectified spirit, from which it crystallizes on cooling, but is not very soluble in alcohol. (F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4.** pp. 95, 96.) [Mixed cyanide of sodium and of potassium, such as is often met with in commerce, is much less readily soluble in water, than pure cyanide of potassium. (I. D. Fisher, private communication.)]

Cyanide of Sodium & of Zinc. Much more readily soluble in water than the cyanide of potassium and of zinc. (Rammelsberg.)
$Na\,Cy;\ 2\,Zn\,Cy + 5\,Aq$

Cyanide of StibEthyl.
$(C_4\,H_5)_3\,Sb\,Cy_2$

Cyanide of StibEthyl with *prot***Iodide of Mercury.**

Cyanide of StibMethyl.

Cyanide of StibMethylEthylium. Soluble in water.

Cyanide of SulphoBenzoyl. Insoluble in water. Soluble with decomposition, in alcohol, and ether.
$C_{16}\,H_5\,N\,S_2 = C_{14}\,H_5\,S_2, C_2\,N$

Cyanide of Tetryl. *Vid.* Cyanide of Butyl.

Cyanide of Titanium. Easily soluble in water. (Dœbereiner, in *Berzelius's Lehrb.*)
$Ti\,Cy_2$

Cyanide of Toluenyl. Soluble in alcohol.
(*Cyanide of BenzEthyl.*
Cyanide of Toluonitrile.)
$C_{16}\,N\,H_7 = C_{14}\,H_7, N\,C_2$

Cyanide of Trityl. *Vid.* Cyanide of Propyl.

*Sesqui***Cyanide of Uranium.**

I.) *basic.* Insoluble in water. Soluble in nitric acid. Very sparingly soluble in an aqueous solution of cyanide of potassium. (F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4.** 99.)
$Ur_2\,Cy_3;\ 2\,Ur_2\,O_3$

Cyanide of Vanadium. Insoluble in water. Soluble in an aqueous solution of cyanide of potassium.
$Va\,Cy_2$

Cyanide of Yttrium. Efflorescent. Easily soluble in water, and alcohol. (Berlin.)
$Yr\,N\,C_2$

Cyanide of Zinc. Insoluble in water, or in an aqueous solution of cyanide of calcium. (Scheele.) Insoluble in water, or alcohol. Soluble in dilute mineral acids, and in aqueous solutions of caustic potash and ammonia, and of carbonate of ammonia and in hot solutions of other ammoniacal salts. (Wittstein.) Easily soluble in solutions of the alkaline cyanides. About one half as soluble as protocyanide of copper in an aqueous solution of cyanide of potassium. Readily soluble in a solution of sesquicarbonate of ammonia. (Gore.)
$Zn\,N\,C_2$

Cyanide of Zinc with Iodide of Potassium. Easily deliquescent. (Rammelsberg.)
$K\,I;\ 2\,Zn\,Cy$

CyanicAnilid. *Vid.* **CyanAnilid.**

Cyanilic Acid. Efflorescent. Somewhat more soluble than cyanuric acid in water. (Liebig.)
$C_6\,H_3\,N_3\,O_6$

Cyanilate of Silver. Ppt.
$C_6\,H_2\,Ag\,N_3\,O_6$

Cyanilide. *Vid.* CyanAnilid.

Cyanilin. *Vid.* CyanAnilin.

*Di***Cyanimid.** Sparingly soluble in cold, more easily soluble in boiling water, alcohol, or ether, oils (fixed or volatile), acids, and weak solutions of the alkalies. Soluble, with decomposition, in concentrated sulphuric acid, and in nitric acid.
HydroMellon(of Liebig).
$N\,H\,Cy_2$

Cyanin. Soluble in water, and alcohol. Insoluble in ether. (Fremy & Cloez.)
(*Anthokyan.*)

Cyano*bi***BromoPicrin.** *Vid. di*BromoNitrAcetonitril.

CyanoCodein. Sparingly soluble in water. Soluble in boiling absolute alcohol, and in a mixture of alcohol and ether. It is also soluble in weak spirit, but this solution undergoes decomposition when evaporated.
$C_{40}\,H_{21}\,N_3\,O_6 = C_{36}\,H_{21}\,N\,O_6, 2\,N\,C_2$

CyanoCumidin. Far more soluble in boiling alcohol than cyanilin. Water precipitates it from the cold alcoholic solution. (Hofmann, *J. Ch. Soc.*, **1.** 170.)
$C_{40}\,H_{26}\,N_4 = 2\,(C_{18}\,H_{13}\,N, N\,C_2)$

Cyanoform. Soluble in water, alcohol, and ether. (Bonnet.)

Cyanogen. Water absorbs 4.5 times its own volume at 20°, and alcohol 23 times its volume of cyanogen gas. Ether absorbs 5 volumes of it. (Gay-Lussac.) It is also absorbed by the essential oils, and a few other organic liquids. Alcohol absorbs 40 vols. of it. (Johnston.) 1 vol. of oil of turpentine absorbs 5 vols. of it. (Gay-Lussac.) It is absorbed in large quantity by solutions of dichloride of copper. (Le Blanc.) Insoluble in caoutchin.
$N\,C_2$ or $N_2\,C_4 = \left.\begin{matrix}Cy\\Cy\end{matrix}\right\}$

(*Solid*) **Cyanogen.** *Vid.* ParaCyanogen.

Cyanogen with Sulphydric Acid.

I.) $C_4\,H_2\,N_2\,S_2$ Soluble in water, and alcohol. Very soluble in ether.

II.) $C_4\,H_4\,N_2\,S_4$ Very sparingly soluble in cold, more soluble in boiling water, and still more soluble in alcohol, and ether.

No. II. with **Oxide of Lead.** Decomposed by boiling water.
$C_4\,H_2\,Pb_2\,N_2\,S_4$

*Bi***CyanoMelAnilin.** Insoluble in water. Soluble, with decomposition, in cold dilute acids. Sparingly soluble in cold, rather easily soluble in boiling alcohol. (Hofmann, *J. Ch. Soc.*, **1.** 308.) Remarkably easily soluble in cold dilute mineral acids as well as in vegetable acids. These solutions soon undergo decomposition, however (Hofmann, *Ibid.*, **1.** 310, & **2.** 308.)
$C_{30}\,H_{13}\,N_5 = C_{26}\,H_{13}\,N_3, Cy_2$

*Bi***CyanoMenaphthylamin.** Insoluble in water. Tolerably soluble in alcohol, and ether. Readily soluble in dilute acids, but the solutions thus obtained soon decompose. (Perkin.)
(*DiCymenaphthalamin.*)
$C_{46}\,H_{17}\,N_5$

CyanoMercurate of Barium. 100 pts. of water dissolve 17 pts. of it at the ordinary temperature. Somewhat soluble in alcohol. (Berzelius's *Lehrb.*)

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CyanoMercurate of Berberin. Permanent. Insoluble in cold, soluble in boiling water, or dilute spirit. (Kohl & Swoboda.)
$C_{42}H_{19}NO_{10}, HCl, HgCy$

CyanoMercurate of Calcium. Soluble in water.

CyanoMercurate of Copper. Ppt.

CyanoMercurate of Ethylamin. Permanent. Soluble in water. Sparingly soluble in cold alcohol. (Kohl & Swoboda.)
$N\left\{\begin{matrix}C_4H_5\\H_2\end{matrix}\right. . HCl, HgCy$

CyanoMercurate of Iron. Ppt.

CyanoMercurate of Lead. Ppt.

CyanoMercurate of Magnesium. Soluble in water.

CyanoMercurate of Methyl. Decomposed by moist air. (Hesse.)
$C_2H_3Cy; 4HgCy$

CyanoMercurate of Platinum. Insoluble in water. Soluble in hot chlorhydric acid. (Dœbereiner.)
$PtCy, HgCy$

CyanoMercurate of Platinum with Nitrate *of dinoxide* **of Mercury.** Ppt. (Rammelsberg.)
$5(HgCy, PtCy); Hg_2O, NO_5$

CyanoMercurate of Potassium. Permanent. Soluble in 4.4 pts. of cold water. Somewhat soluble in alcohol. Decomposed by acids. (L. Gmelin.)
$KCy, HgCy$

CyanoMercurate of Silver. Ppt.
$AgCy, HgCy$

CyanoMercurate of Silver with Nitrate *of protoxide* **of Mercury.**
$AgCy, HgCy; HgO, NO_5 + 4Aq$

CyanoMercurate of Silver with Sulphate *of protoxide* **of Mercury.**
$AgCy, HgCy; HgO, SO_3 + Aq$

CyanoMercurate of Sodium. Soluble in water.

CyanoMercurate of Strontium. About as soluble in water as the barium salt. (Berzelius's *Lehrb.*)

CyanoMercurate of Strychnine.

I.) $C_{42}H_{22}N_2O_4, HgCy$ More soluble than the corresponding chloromercurate in water, and alcohol. Insoluble in ether.

II.) $C_{42}H_{22}N_2O_4, HCy, HgCl$ Sparingly soluble in cold water. Tolerably soluble in boiling water, and alcohol.

III.) $C_{42}H_{22}N_2O_4, HCl, 4HgCy$

CyanoMercurate of Zinc. Ppt.
$ZnCy, HgCy$?

CyanoPhenylamin. *Vid.* **CyanAnilid.**

CyanoPhenyl*di*Phenyl*bi*amin. Insoluble in water. Difficultly soluble in boiling alcohol. Soluble in ether.
(*CyanotriPhenylbiamine.*)
$C_{38}H_{17}N_3 = N_2\left\{\begin{matrix}C_{12}H_4(C_2N)\\(C_{12}H_5)_2\\H_3\end{matrix}\right.$

CyanoPlatinic Acid. *Vid.* BiCyanide of Platinum.

CyanoPlatinate of Quinine.
$C_{40}H_{24}N_2O_4, 2(HCy, PtCy_2)$

CyanoPlatinate of ***X.*** *Vid.* Cyanide of *X* & of Platinum.

CyanoSalicyl. Soluble in alcohol. (Cahours.)
$C_{16}H_5NO_4$

CyanoToluidin. Less soluble in alcohol and ether than cyanilin. Soluble in dilute chlorhydric acid. (Hofmann, *J. Ch. Soc.*, I. 170.)
$C_{32}H_{18}N_4 = 2C_{14}H_9N, Cy_2$

*Insoluble***Cyanuric Acid.** *Vid.* Cyamelid.

Cyanuric Acid. Effloresces in warm air. Soluble in 40 pts. of cold water, more soluble in hot water. Difficultly soluble in cold water. Soluble in 24 pts. of boiling water, (Wittstein's *Handw.*) Readily soluble in boiling, less soluble in cold alcohol of 36° B. (Chevallier & Lassaigne.) Soluble in boiling concentrated sulphuric acid, from which solution water precipitates cyanilic acid. (Liebig.) Also soluble in hot nitric acid. (Sérullas.) The cyanurates are, for the most part, but sparingly soluble in water.
(*Pyruric Acid.*)
$C_6H_3N_3O_6 + 4Aq$

Cyanurate of Ammonia. Effloresces, with loss of ammonia. Even cold water, in which it is difficultly soluble, abstracts a portion of its ammonia. (Berzelius's *Lehrb.*) Easily soluble in water containing free ammonia. (Knapp, *Ann. der Pharm.*, 1837, **21.** 247.)
$C_6H_2(NH_4)N_3O_6 + 2Aq$

Cyanurate of Ammonia & of Copper. Insoluble in cold water. Slightly soluble in ammonia-water.
$C_6HCu(NH_4)N_3O_6$

Cyanurate of Ammonia & of Silver.
$C_6(NH_4)_2N_3O_6; C_6Ag_3N_3O_6 + 2Aq$

"**Cyanurate of Amyl**" (of Schlieper). *Vid.* Allophanate of Amyl.

Cyanurate of Argentammonium.
$C_6H(NH_2Ag)_2N_3O_6$

Cyanurate of Baryta.

I.) *mono.* Almost insoluble in water.
$C_6H_2BaN_3O_6 + 2Aq$

II.) *di.* Sparingly soluble in water. (Chevallier & Lassaigne.)
$C_6HBa_2N_3O_6 + 3Aq$

Cyanurate of Cinchonin. Sparingly soluble in water. Insoluble in alcohol or ether. (Elderhorst.)

Cyanurate of Cupr(*ic*)ammonium.

I.) *mono.* Insoluble in cold, very sparingly soluble in hot water. Insoluble in ammonia-water. (Wiedemann.)
$C_6(NH_2Cu)H_2N_3O_6$

II.) *di.* Permanent. Sparingly soluble in water. Nearly insoluble in ammonia-water. (Wœhler.)
$C_6(NH_2Cu)_2HN_3O_6 + 2Aq$

"**Cyanurate of Ethyl**" (of Liebig & Wœhler). *Vid.* Allophanate of Ethyl.

Cyanurate of Ethyl.

I.) *di.* Tolerably readily soluble in water, alcohol, and ether. (Limpricht.)
$C_{14}H_{11}N_3O_6 = Cy_3(C_4H_5)_2HO_6$

II.) *tri.* Sparingly soluble in water, though more soluble in hot than in cold. Easily soluble in alcohol, especially if this be concentrated. Soluble in ether. Sparingly soluble, without decomposition, in ammonia-water at 100°, less soluble in the cold. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **42.** 57.) Sparingly soluble in water. Readily soluble in alcohol, and ether. Readily soluble, without decomposition, in acids, even in concentrated nitric acid. (Habich & Limpricht.)
(*Cyanuric Ether.*)
$C_{18}H_{15}N_3O_6 = Cy_3(C_4H_5)_3O_6$

*Di***Cyanurate of Ethyl & of Silver.** Ppt.
$C_{14}H_{10}N_3AgO_6 = Cy_3(C_4H_5)_2AgO_6$

Cyanurate of Lead. Ppt.
$C_6Pb_3N_3O_6 + 3Aq$

Cyanurate of Lead & of Silver. Ppt.
$C_6PbAg_2N_3O_6 + 2Aq$

Cyanurate of Lime. Readily soluble in water.

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"**Cyanurate of Methyl**"(of Richardson). *Vid.* Allophanate of Methyl.

Cyanurate of Methyl. Insoluble in cold water. Somewhat sparingly soluble in boiling water. Soluble in alcohol. Sparingly soluble in cold, more soluble in hot spirit. (Wurtz, *Ann. Ch. et Phys.*, (3.) **42.** 62.)
$C_{12}H_9N_3O_6 = (C_2H_3)_3Cy_3O_6$

Cyanurate of Morphine.

Cyanurate of Phenyl. Soluble in alcohol.
$C_{42}H_{15}N_3O_6 = (C_{12}H_5)_3Cy_3O_6$

Cyanurate of Potash.

I.) *mono.* Very difficultly soluble in cold water. Insoluble in acetic, nitric, or chlorhydric acids. (Liebig.)
("*acid.*")
$C_6KH_2N_3O_6$

II.) *di.* Easily soluble in dilute alkaline solutions. Decomposed by pure water, with separation of No. I. Insoluble in alcohol. (Liebig & Wœhler.)
("*neutral.*")
$C_6K_2HN_3O_6$

Cyanurate of Potash & of Silver.

Cyanurate of Quinine. Soluble in water, and alcohol. (Elderhorst.)

Cyanurate of Silver.

I.) *mono.* Insoluble in water, or acetic acid. Soluble, with decomposition, in nitric acid. (Wœhler.)
$AgH_2Cy_3O_6$

II.) *di.* Insoluble in water. Soluble in nitric acid.
$Ag_2HCy_3O_6$

III.) *tri.* Insoluble in water. Very sparingly soluble in dilute nitric acid.
$Ag_3Cy_3O_6 + Aq$

Cyanurate of Soda. Readily soluble in water. (Chevallier & Lassaigne.)

Cyanurate of Urea. Soluble in hot, less soluble in cold water. Also soluble in alcohol. (Berzelius's *Lehrb.*, **3.** 345.)
$C_2H_4N_2O_2, H_3Cy_3O_6$

Cyanurenic Acid. *Vid.* Kynurenic Acid.

Cyanylic Acid. *Vid.* Cyanilic Acid.

Cyclamin. *Vid.* Arthanitin.

***Di*CyMeNaphthalamin.** *Vid. bi*CyanoMe-Naphthylamin.

Cymene. Permanent. Insoluble in water. Easily soluble in alcohol, ether, and the essential oils. (Gerhardt & Cahours.)
(*Cymol. Camphogene. Hydride of Thymyl.*)
(Isomeric or identical with *Hydride of Cumicyl.*)
$C_{20}H_{14}''$

CymeneSulphurous Acid. *Vid.* Thymyl-Sulphurous Acid.

Cymidin. Somewhat soluble in water. Easily soluble in alcohol, and ether. (Barlow, *Ann. Ch. u. Pharm.*, **98.** 249.)
(*Cumicylamin.*)
$C_{20}H_{15}N = N\left\{\begin{matrix}C_{20}H_{13}\\H_2\end{matrix}\right.$

Cyminic Acid. Insoluble in water, alcohol, ether, and most other liquids. (Persoz.)

"**Cymyl**"(of Kolbe). Same as Cumicyl.
$C_{20}H_{13}$

Cynapin(from *Æthusa cynapium*).

Cynene. Permanent. Insoluble in water. Readily soluble in alcohol, and ether. Insoluble in concentrated sulphuric acid; soluble, with combination, in fuming sulphuric acid. Unacted upon by dilute nitric acid. (Vœlckel, *Ann. Ch. u. Pharm.*, **89.** 359.)
$C_{24}H_{18}''$

Cynodin(from *Cynodon dactylon*).

Cystic Oxide. *Vid.* Cystin.

Cystin. Insoluble in water or alcohol. Soluble in chlorhydric, sulphuric, nitric, oxalic, and phosphoric acids. Soluble in solutions of the fixed alkalies and the alkaline carbonates. (Wollaston.) Also soluble in ammonia-water and in solutions of the bicarbonates of potash and of soda. (Cloetta.) Insoluble in a solution of bicarbonate of ammonia. It is not precipitated from alkaline solutions by sulphuric, chlorhydric, or nitric acids; but is precipitated by acetic, tartaric, and citric acids. Insoluble in aqueous solutions of acetic, tartaric, or citric acids. (Wollaston.)
$C_6H_7NS_2O_4 = N\left\{\begin{matrix}C_6H_6S_2O_4\\H_2\end{matrix}\right.$

D.

Dadyl. *Vid.* Camphilene.

Damaluric Acid. Somewhat soluble in water.
$C_{14}H_{12}O_4 = C_{14}H_{11}O_3, HO$

Damalurate of Baryta. Soluble in water. (Stædeler.)
$C_{14}H_{11}BaO_4$

Damalurate of Lead. Ppt.

Damalurate of Silver. Ppt.
$C_{14}H_{11}AgO_4$

Dammarane. Insoluble in weak alcohol. Soluble in absolute alcohol and in oil of turpentine. (R. D. Thomson.)
$C_{40}H_{31}O_6$

Dammaric Acid. Insoluble in water. Easily soluble in ordinary alcohol, ether, the fatty oils, concentrated sulphuric acid, and aqueous solutions of caustic potash and ammonia.
$C_{80}H_{60}O_{12}$?

Dammarate of Silver. Ppt.
$C_{80}H_{59}AgO_{12}$

Dammarin. *Vid.* β resin of Dammara Resin; under **Resins.**

Dammarole.
$C_{40}H_{31}O_6$

Dammarone.
$C_{38}H_{30}O$

Damolic Acid.
$C_{26}H_{26}O_3, HO$ (?)

Damolate of Baryta. Soluble in water, though less so than the damalurate of baryta. (Stædeler.)

Daphnin(from *Daphne gnidium*, and *mezereum*). Sparingly soluble in cold, more easily soluble in hot water. Also soluble in alcohol, and ether.
(*Daphin.*)

Datiscetin. Almost insoluble in water. Sparingly soluble in cold, easily soluble in hot alcohol. Soluble in almost all proportions in ether. Soluble in alkaline solutions. (Stenhouse, *J. Ch. Soc.*, **9.**)
$C_{30}H_{10}O_{12}$

Datiscetin with Oxide of Lead. Insoluble in water or alcohol.
$C_{30}H_8Pb_2O_{12}$

Datiscin(of Braconnot and Stenhouse). Sparingly soluble in cold, tolerably soluble in boiling water. Very readily soluble in cold alcohol, and in almost all proportions in boiling alcohol. Sparingly soluble in ether. Soluble in aqueous solutions of ammonia, potash, soda, lime, and baryta. (Stenhouse, *J. Ch. Soc.*, **9.** 228.)
$C_{42}H_{22}O_{24}$

Daturin. *Vid.* Atropin.

Delphin, or **Delphinin**(from *Delphinium Staphisagria*). Insoluble, or but sparingly soluble in pure water. Soluble in absolute alcohol and in ether. Soluble in dilute acids.

Delphinin(of Chevreul). Consists, according to Berthelot, of a mixture of mono, bi, & ter-Valerin, *q. v.*

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Delphinic Acid. *Vid.* Valeric Acid.

Delphinone. *Vid.* Valerone.

DeutOxide (&c.) of *X*. See under Oxide (&c.) of *X*.

Dextrin.

$C_{12} H_{10} O_{10}$

[*Starch which has been rendered fluid by the action of diastase, or sulphuric acid.*]

I.) *Dextrin proper.* Insoluble in cold water, forming a jelly therewith. Soluble in boiling water, from which it separates on cooling. Alcohol precipitates it from the aqueous solution. Boiling acids, even when weak, but especially if concentrated, convert it into glucose.

1 pt. of dextrin, in the condition of a granular powder, obtained from potato-starch by means of malt in the ordinary way, and purified from sugar by means of alcohol, then dried until it ceased to lose weight at 100°, being treated with 1000 pts. of alcohol of 0.837 sp. gr., at first at the ordinary temperature, and then at the boiling temperature, suffered no alteration of volume, lustre, or transparency; with alcohol of 0.880 sp. gr. the quantity of the dextrin was not lessened, but it softened, became cloudy, and finally formed a single lump: the boiling alcohol deposited nothing on cooling; with alcohol of 0.910 sp. gr. the separate grains of the dextrin cohered to a single lump, the volume of which, at the ordinary temperature, appeared to be equal to that of its component grains, or nearly so, but on heating the spirit to boiling the greater part of the dextrin dissolved, although the solution was not complete. When 10 pts. of dextrin (instead of 1 pt., as above) were taken, to 1000 pts. of the alcohol, and the mixture kept hot for some time, and constantly agitated, more of it dissolved, although, as before, complete solution could not be obtained, and the solution become cloudy on cooling. When 100 pts. of dextrin were added to 1000 pts. of the alcohol and the mixture maintained for a time at the temperature of boiling the volume of the dextrin decreased about ⅓, and the undissolved portion lay as a thick fluid beneath the solution. The latter became cloudy on cooling, depositing viscid drops of dextrin, and after having stood for six days [at the ordinary temperature] it contained 0.9% of dextrin.

7 pts. of the dextrin being gently heated in 1000 pts. of alcohol of 0.950, complete solution ensued; on cooling, the solution became cloudy, and so much dextrin separated that but 3.6% of it (anhydrous) remained in solution. 340 pts. of dextrin being boiled with 1000 pts. of the same alcohol, dissolved completely after long-continued agitation, but separated again for the most part on cooling, the cold solution having retained 19% of it (anhydrous).

Hence it appears that dextrin is entirely insoluble in cold or boiling alcohol of 0.837 @ 0.880 sp. gr., although it combines with a portion of the water of the latter and becomes soft; that alcohol of 0.910 begins to dissolve it, though only sparingly and incompletely, being incapable of dissolving completely so much as $\frac{1}{10}$ of a per cent of it, although the same alcohol is capable of dissolving about 3% of dextrin at the boiling heat, when an excess of the latter is present, depositing 2.1% on cooling, so that the cold solution contains only 0.9%; that dextrin dissolves in considerable quantity (about ⅓) and completely in alcohol of 0.950, from which solution about ½ of the dissolved matter is deposited again on cooling, both from strong and from more dilute solutions: from which it would seem to follow that the dextrin is decomposed by alcohol of 0.950 sp. gr. into two different substances which are present in about equal quantities, and of which one is only soluble in hot alcohol of 0.950 sp. gr., while the other is soluble both in hot and in cold alcohol of this strength. (C. F. Anthon, *Dingler's polyt. J.*, 1860, **155.** pp. 458–460.) Insoluble in very strong alcohol, but soluble to no inconsiderable extent in weak alcohol; being incomparably more soluble than soluble starch in ordinary alcohol. (Bèchamp, *Ann. Ch. et Phys.*, (3.) **48.** 492.) Dextrin is easily soluble in water. Also soluble in alcohol of 30%, but insoluble in alcohol of 80%, and in ether. (Wittstein's *Handw.*)

[*Product of the longer-continued action of sulphuric acid upon No. 1.*]

II.) *Dextrin Gum.* Easily soluble in cold or hot water. Alcohol, when added in sufficient quantity, precipitates it from the aqueous solution.

[*Roasted Starch.*]
(*British Gum. Gum Substitute.*)

III.) *Leïocome.* Soluble in cold water. [The term *British gum* is ordinarily applied to roasted wheat-starch, while roasted potato-starch is called *gum substitute*, and the distinction is said to be founded on a real difference as great as that between the starches themselves. (Ordway, *Am. J. Sci.*, (2.) **31.** 451.)]

DextroRacemic Acid. Identical with Tartaric Acid (*right*), *q. v.*

Di or DinAcetate (&c.) of *X*. See under Acetate (&c.) of *X*, as *din*Acetate of *X*, *di*Chloride of *X*, and the like.

Dialuramid. Insoluble in cold, sparingly soluble in boiling water. It requires more than 10,000 pts. of water to dissolve it. (Prout.) Insoluble in alcohol or ether, or in acetic, tartaric, or citric acids. Not perceptibly soluble in dilute phosphoric, sulphuric, or chlorhydric acids. (Prout.) Soluble in cold concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water.

(*Murexan. Uramil.*)
$C_8 H_5 N_3 O_6$

Easily soluble in aqueous solutions of the fixed alkalies, and ammonia, without neutralizing them. (Liebig & Wœhler.)

Dialuric Acid. Tolerably easily soluble in water. Soluble in chlorhydric acid.

$C_8 H_4 N_2 O_8 = C_8 H_3 N_2 O_7, H O$

Dialurate of Ammonia.

I.) *mono.* Sparingly soluble in cold, very soluble in boiling water. (Gregory.)

$C_8 H_3 (N H_4) N_2 O_8$

II.) *acid.* Soluble in 6 @ 8 pts. of cold, and in 3 pts. of hot water. Soluble in cold concentrated sulphuric and nitric acids. (Liebig & Wœhler.)

(*Uramilic Acid.*) (Liebig & Wœhler.)
$C_{16} H_7 (N H_4) N_4 O_{16}$

Dialurate of Baryta. Scarcely at all soluble in water. (Gregory.)

$C_8 H_3 Ba N_2 O_8 + Aq$

Dialurate of Lead. Ppt.

Dialurate of Potash. Sparingly soluble either in hot or in cold water. Insoluble in acetic acid. Soluble in weak potash-lye. (Gregory.)

$C_8 H_3 K N_2 O_8$

Diastase. Soluble in water and in weak alcohol. Insoluble in strong alcohol.

Didymium. When fused, it does not decom-

D pose water; but appears to do so when in the pulverulent state. Readily soluble in acids. (Marignac.)

Diethylin. *Vid.* *di*Ethylin.

Diffluan. Deliquescent. Very soluble in $C_6H_4N_2O_5$ water. Insoluble in alcohol. (Schlieper.)

Digestive Salt. *Vid.* Chloride of Potassium.

Digitalic Acid. Very soluble in water; the solution subsequently undergoing partial decomposition. Tolerably soluble in alcohol; less soluble in ether. Many of its salts are soluble, but are prone to undergo decomposition when in solution.

Digitalate of Baryta. Very soluble in water. Insoluble in alcohol or ether.

Digitalate of Copper.

Digitalate of Iron. Ppt.

Digitalate of Lead. Ppt.

Digitalate of Lime. Very soluble in water. Insoluble in alcohol or ether.

Digitalate of Magnesia. Soluble in water.

Digitalate of Potash. Exceedingly soluble in water.

Digitalate of Silver. Soluble in nitric acid.

Digitalate of Soda. Soluble in water.

Digitalate of Zinc.

Digitalicrin. Insoluble in water. Easily $C_{22}H_{20}O_6$ soluble in alcohol. Sparingly soluble in ammonia-water. Soluble in strong mineral acids. (Walz, in *Wittstein's Handw.*)

Digitalin. Very sparingly soluble in water. $C_{20}H_{18}O_8$ Soluble in alcohol; more readily in dilute than in concentrated; more readily in hot than in cold. Very little acted upon by ether. Soluble in concentrated sulphuric, nitric, and chlorhydric acids. (Lebourdais, *Ann. Ch. et Phys.*, (3.) **24**. 61.) Very sparingly soluble in water. Soluble in 2000 pts. of cold, and in 1000 pts. of boiling water. Readily soluble in alcohol.

Soluble in 1920 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, 8. 201, in *Canstatt's Jahresbericht, für* 1854, p. 75.) Soluble in 288 pts. of ether of 0.748 sp. gr., and in 1250 pts. of 0.726 sp. gr. Soluble in concentrated chlorhydric, and in acetic acid. According to Walz, the digitalin of previous observers, as cited above, was contaminated with several other substances. He finds that 1 pt. of pure digitalin is soluble in 1000 pts. of cold, and in 250 pts. of hot water; in 3 pts. of cold, and in 2 pts. of hot alcohol. Easily soluble in ammonia-water, and in concentrated sulphuric, chlorhydric, and nitric acids. (Wittstein's *Handw.*) 100 pts. of chloroform dissolve 1.25 pts. of it. (Schlimpert, *Kopp & Will's J. B. für* 1859, p. 405.)

Digitaloic Acid. Insoluble in water. Soluble $C_{22}H_{22}O_4$ in hot, less soluble in cold alcohol. Insoluble in aqueous solutions of caustic potash or ammonia. (Walz.)

Digitoleic Acid. Very sparingly soluble in water. Readily soluble in alcohol, and ether. The alkaline digitoleates are soluble in water; the other salts are insoluble.

Digitoleate of Baryta.

Digitoleate of Cobalt. }
Digitoleate of Copper. } Ppts.
Digitoleate of Iron. }

Digitoleate of Lead.

I.) *basic.* Insoluble in ether.

II.) *acid.* Soluble in ether.

Digitoleate of Lime. }
Digitoleate of Mercury (Hg). } Ppts.
Digitoleate of Nickel. }

Digitoleate of Potash. Soluble in water, and alcohol.

Digitoleate of Silver. Ppt.

Digitoleate of Soda. Soluble in water.

Digitoleate of Zinc. Ppt.

Digitolosin. Soluble in 125 pts. of cold, and $C_{36}H_{32}O_{18}$ in 42 pts. of boiling water; and in about 2 pts. of alcohol. Soluble in ammonia-water and in the strong mineral acids. (Walz, in *Wittstein's Handw.*)

Digitolosmin (from *Digitalis purpurea*). Insoluble in cold water. Readily soluble in alcohol, from which it is precipitated on the addition of water. Very easily soluble in ether. (Walz.)

Dilituric Acid. Nearly insoluble in cold, sparingly soluble in hot water. Soluble in a dilute solution of potash. Readily soluble, without decomposition, in concentrated sulphuric acid, from which it is precipitated on the addition of water. Unacted upon by strong nitric acid.

Diliturate of Potash.

I.) *normal.* Tolerably soluble in water; insoluble in alcohol.

II.) *acid.* Sparingly soluble in cold, more readily soluble in hot water. Soluble in concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water. (Schlieper.)

Diliturate of Silver. Ppt.

Diosmin (from *Diosma crenata*). Insoluble in water. Soluble in alcohol, ether, essential oils, and dilute acids. (Landerer.)

DiPhanine. *Vid.* *di*Phenin.

Disacryl. Insoluble in water, alcohol, ether, $C_{10}H_7O_4$ (?) bisulphide of carbon, fatty or essential oils, acids, or alkaline solutions. (Redtenbacher.)

Disacryl Resin. Insoluble in water. Easily $C_{20}H_{18}O_6$ (?) soluble in alcohol, ether, and alkaline solutions. (Redtenbacher.)

***Di*SulphoMetholic Acid.** *Vid.* Methionic Acid.

Dœglinic Acid. Easily soluble in 1 pt. of (*Dæglingsæure.*) alcohol of 0.826 sp. gr. $C_{38}H_{36}O_4 = C_{38}H_{35}O_3, HO$ (Scharling.)

Dœglinate of Baryta. Soluble in boiling alcohol.

Dœglinate of Lead. Soluble in ether.

Dracic Acid. }
Draconic Acid. } *Vid.* Anisic Acid.

Dracol. *Vid.* Phenate of Methyl.

Draconyl. *Vid.* MetaStyrol.

Dracyl. *Vid.* Hydride of Toluenyl.

Dragonic Acid. *Vid.* Anisic Acid.

Dragonyl. *Vid.* Essence of Anise.

Dulcamarin. Permanent. Soluble in 1075 pts. $C_{66}H_{50}NO_{20}$ of water; in 10 pts. of cold alcohol, more soluble in hot alcohol; and in 1440 pts. of ether. Tolerably abundantly soluble in acetic acid. Swells up to a jelly in ammonia-water, but does not dissolve therein. Soluble in concentrated chlorhydric and sulphuric acids. Strong nitric acid also dissolves it rapidly. (Wittstein.)

Dulcose or Dulcin. Easily soluble in boil-

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(*Dulcit.*) $C_{12} H_{14} O_{12}$ ing, less soluble in cold water. Very sparingly soluble in boiling, and still less soluble in cold alcohol. Soluble, apparently without decomposition, in a warm dilute solution of caustic potash; decomposed by a concentrated solution of potash.

Dumasin(of Kane). [Not identical with *Oxide of Mesityl.*] (Zittig.) $C_{12} H_{10} O_2$ Insoluble in water. Soluble in all proportions in alcohol, and ether.

Dutch Liquid. *Vid.* Chloride of Ethylene.

Dyslysin. $C_{48} H_{36} O_6$ Insoluble in water, and in cold alcohol. Sparingly soluble in boiling alcohol; more soluble in boiling ether. Insoluble in aqueous solutions of potash or ammonia, or in acids.

Dyslyte. Soluble in 24000 pts. of water at 10°. Soluble in about 2200 pts. of alcohol of 88% at 10°; and in about 1500 pts. of 97% at 10°. Soluble in ether, and in concentrated sulphuric acid. (Baup, *Ann. Ch. et Phys.*, (3.) **33.** 198.)

E.

Eblanin. *Vid.* PyroXanthin.

Elaene. *Vid.* Nonylene.

Elaic Acid. *Vid.* Oleic Acid.

Elaidic Acid. $C_{36} H_{34} O_4 = C_{36} H_{33} O_3, HO$ Insoluble in water. Easily soluble in alcohol, and, though less so, in ether.

The metallic elaidates, excepting those of the alkalies, are insoluble in water; they are, however, decomposed by an excess of water.

Elaidate of Ammonia. Sparingly soluble in ether.

Elaidate of Baryta. Sparingly soluble in water, alcohol, and ether.

Elaidate of Ethyl. $C_{36} H_{33} (C_4 H_5) O_4$ Insoluble in water. Soluble in about 8 pts. of absolute alcohol. Scarcely at all soluble in ordinary alcohol. Soluble in all proportions in ether.

Elaidate of Glyceryl. *Vid.* Elaidin.

Elaidate of Lead. Sparingly soluble in water, alcohol, or ether.

Elaidate of Methyl.
$C_{36} H_{33} (C_2 H_3) O_4$

Elaidate of Potash.

Elaidate of Silver. $C_{36} H_{33} Ag O_4$ After having become dry it is sparingly soluble in water, alcohol, and ether. When recently precipitated it is more readily soluble. Easily soluble in warm ammonia-water.

Elaidate of Soda. Soluble in alcohol, and in warm ether. The alcoholic solution is decomposed by water, a bisalt crystallizing out.

Elaidinamid. Easily soluble in alcohol.
$N \left\{ \begin{matrix} C_{36} H_{33} O_2 \\ H_2 \end{matrix} \right.$

Elaidin. Insoluble in water. Almost insoluble in alcohol. Readily soluble in ether.

Elaierin. 1000 pts. of alcohol, of 0.805 sp. gr. dissolve 7 pts. of it at 15°. Only very slowly attacked by potash-lye. (Chevreul.)

Elain. *Vid.* Olein.

Elaldehyde. Soluble in water.
$C_4 H_4 O_2$

Elaone. *Vid.* Oleone.

Elaterin. $C_{60} H_{24} O_{18}$ Insoluble in water. Readily soluble in alcohol. Sparingly soluble in ether. Insoluble in dilute acids or alkalies, or in concentrated chlorhydric acid. Soluble in concentrated sulphuric and nitric acids, from which solutions it is precipitated unchanged, on the addition of water. Almost entirely soluble in water, alkaline solutions, or dilute acids. Soluble in 5 pts. of cold, and in 2 pts. of hot alcohol; and in 118 pts. of ether. Also soluble in hot oil of turpentine, and in fatty oils. (Wittstein's *Handw.*)

Elathin(from the action of sulphur and ammonia upon acetone). Insoluble in water. Soluble in alcohol, and ether. (Zeise.)

Elayl. *Vid.* Ethylene.

ElaylOxalate of Silver(of Plantamour).
$2 Ag O, C_8 H_4 O_6$

ElaylStannEthyl. *Vid.* $\frac{1}{4}$ StannEthyl.
$(C_4 H_5)_4 Sn_4$

Elemi. See under **Resins.**

Ellagic Acid. (*Bezoaric Acid. Bezoardic Acid.*) $C_{28} H_6 O_{16} + 4 Aq$ Not entirely, but nearly insoluble in water. Sparingly soluble in alcohol. Insoluble in ether. Soluble in alkaline solutions, and in warm concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water.

Ellagate of Ammonia. Insoluble, or but sparingly soluble, in water.

Ellagate of Baryta. $C_{28} H_4 Ba_2 O_{16}, Ba O, H O (?)$ Decomposes when exposed to the air. Insoluble in boiling water.

Ellagate of Lead(basic).
$C_{28} H_4 Pb_2 O_{16}, 2 Pb O$

Ellagate of Lime.

Ellagate of Manganese. Insoluble in water.

Ellagate of Potassium.

I.) $C_{28} H_4 K_2 O_{16}$ Sparingly soluble in cold water.

II.) $C_{28} H_4 K_2 O_{16} + K O, H O (?)$ Very soluble in water. Sparingly soluble, or insoluble in alcohol.

Ellagate of Soda.

I.) $C_{28} H_4 Na_2 O_{16}$ Less soluble than the corresponding potash-salt in water.

II.) *basic.* Decomposed when exposed to the air. Readily soluble in water.

Emetin(from *Cephaëlis ipecacuanha*). Difficultly soluble in cold, more easily soluble in warm water. Very soluble in alcohol, and in dilute acids. Almost insoluble in ether and the oils. Most of its salts are easily soluble in water. The salt of emetin, which exists naturally in the root of ipecacuanha, is soluble in water, wine, and diluted alcohol. (Parrish's *Pharm.*, p. 408.)

Emodin. $C_{40} H_{15} O_{13}$ Readily soluble in boiling alcohol, and in fusel oil (amylalcohol). Somewhat soluble in hot, less soluble in cold benzin. Soluble in glacial acetic acid, and in solutions of the caustic alkalies.

Emulsin. *Vid.* Synaptase.

Emydin. Very soluble in weak solutions of caustic potash. Soluble in boiling chlorhydric acid. Swells up in acetic acid, without dissolving therein. (Fremy, *Ann. Ch. et Phys.*, (3.) **50.** 161.)

***DiEpi*BromHydrophosphoryl.** $C_{12} H_9 Br_3 P$ Sparingly soluble in ether. (Berthelot & De Luca.)

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Equisetic Acid. *Vid.* Maleic Acid.

Equisetic Acid. *Vid.* Aconitic Acid.

Ergotin. Insoluble in water. Easily soluble in alcohol. Insoluble in ether. Soluble in concentrated acetic acid, from which it is precipitated by water. Insoluble in weak mineral acids. Soluble in concentrated sulphuric acid, from which it is precipitated by water. Decomposed by nitric acid. Soluble in a solution of caustic potash.

Erucic Acid. Soluble in hot alcohol.
$C_{44}H_{43}O_4 = C_{44}H_{41}O_3, HO$

Erucate of Baryta. Ppt., in alcohol.
$C_{44}H_{41}BaO_4$

Erucate of Lead. Insoluble in ether.
$C_{44}H_{41}PbO_4$

Erucate of Silver. Ppt., in alcohol.
$C_{44}H_{41}AgO_4$

Erucate of Soda. Soluble in alcohol.

Erucin (from *Sinapis alba*). Insoluble in water, or alkaline solutions. Difficultly soluble in boiling alcohol. Easily soluble in ether, bisulphide of carbon, and oils. (E. Simon.)

Eryglucin. *Vid.* ErythroMannite.

Erythrarsin. Insoluble in water, alcohol,
$C_4As_3H_6O_3$ ether, or potash-lye.

"**Erythric Acid.**" *Vid.* Alloxan.

Erythric Acid. Very sparingly soluble in
(*Erythrin. Erythrylin.*)
$C_{22}H_{16}O_{16}$
cold water. Soluble in 240 pts. of boiling water (Schunck); in 170 (174?) pts. of boiling water, separating out again as soon as the temperature of the solution has fallen a few degrees. (Heeren.) More soluble in alcohol, especially when this is boiling, than in water. (Schunck.) Soluble in 2.29 pts. of boiling alcohol, of 0.81 sp. gr., and in 32.5 pts. of the same alcohol at 12°. Insoluble in ether. (Heeren.) Sparingly soluble in oil of turpentine. Easily soluble in ether. (Schunck.) Soluble, with tolerable facility, in boiling acetic acid. Easily soluble, without alteration, in cold aqueous solutions of the caustic and carbonated alkalies. Insoluble in concentrated boiling chlorhydric acid. (Heeren.)

Erythrate of Ethyl. *Vid.* Orsellate of Ethyl.

Erythrate of Lead. Ppt.

Erythrate of Methyl. *Vid.* Orsellate of Methyl.

Erythrate of Silver. Ppt.

Erythrelic Acid. Somewhat less soluble than orsellic acid in water. Soluble in alcohol.

Erythrelate of Baryta. Very soluble in water.

Erythric Ether. *Vid.* Orsellate of Ethyl.

Erythrilin. Insoluble in water. Decom-
$C_{22}H_{16}O_6$ posed by boiling with water. Soluble in alcohol, and ether. Readily soluble in ammonia-water, and in alkaline liquors. (Kane.)

Erythrischic Acid. *Vid.* Alloxan.

Erythrobetic Acid (from the red beet). Slowly deliquescent. Very easily soluble in water. Insoluble in absolute alcohol, or in ether. Sparingly soluble in alcohol of 80%, tolerably easily soluble in alcohol of 60%. (L. Meier.)

Erythrin. *Vid.* Orsellate of Ethyl.

Erythrin. *Vid.* Erythric Acid.

Erythrogene. Insoluble in water, ether, or aqueous alkaline solutions. Easily soluble in alcohol and oils. (Bizio.)

Erythroglucin. *Vid.* ErythroMannite.

Erythroleic Acid. Nearly insoluble in
$C_{26}H_{22}O_8$ water. Soluble in alcohol, and ether. Insoluble in oil of turpentine. Soluble in solutions of the alkalies. With metallic oxides it forms precipitates. (Kane.)

Erythrolein. Nearly insoluble in water.
$C_{20}H_{22}O_4$ Soluble in alcohol, and ether. Insoluble in oil of turpentine. Soluble in ammonia-water. (Kane.)

ErythroLitmin. Very sparingly soluble in
$C_{22}H_{22}O_{12} + Aq$ water. Abundantly soluble in hot, somewhat less soluble in cold alcohol. Very sparingly soluble in ether. Soluble in strong solutions of caustic potash. (Kane.)

ErythroMannite. Extremely soluble in
(*Phycite. ErythroGlucin. Pseudo Orcin.*)
$C_{24}H_{30}O_{24} = \left.\begin{matrix}C_{24}H_{24}O_{16}^{\text{IV}}\\H_4\end{matrix}\right\}O_8 + 2\,Aq$
water, even when this is cold. Very sparingly soluble in cold, strong, or absolute alcohol; more readily soluble at the temperature of boiling, and more readily soluble in dilute alcohol. Insoluble in cold, somewhat soluble in boiling ether. Soluble, with combination, in cold concentrated sulphuric acid. Unacted upon by ammonia-water or by solutions of the caustic or carbonated alkalies. (Stenhouse; Lamy, *Ann. Ch. et Phys.*, (3.) **35.** 139.)

Erythrophylle. Soluble in water, and alco-
(*Red coloring matter of autumn leaves.*)
hol. Soluble in solutions of the caustic alkalies. (Berzelius, *Ann. der Pharm.*, **21.** 265.)

Erythroretin. Almost insoluble in water.
$C_{19}H_9O_7$ Easily soluble in alcohol. Somewhat difficultly soluble in ether, or acetic acid. Insoluble in chlorhydric, or in dilute sulphuric, acid. Soluble in cold concentrated sulphuric acid, and in aqueous alkaline solutions. (Schlossberger & Dœpping.) Readily soluble in alcohol, ether, and benzin.

Erythrosin. Soluble in acidulated spirit and in aqueous solutions of caustic potash and soda. Also soluble in concentrated sulphuric acid. (Stædeler.)

Erythrylin. *Vid.* Erythric Acid.

Esculic Acid. *Vid.* Kinovic Acid.

Esculetin. Very sparingly soluble in cold, a
$C_{18}H_6O_8$ or $C_{64}H_{22}O_{28} + 5\,Aq$
little more soluble in hot water. Almost insoluble in cold, easily soluble in boiling alcohol. Almost insoluble in ether. Soluble, with alteration, in concentrated chlorhydric acid. Decomposed by warm concentrated sulphuric acid, and by nitric acid. Easily soluble in solutions of the alkalies. (Zwenger, *Ann. Ch. u. Pharm.*, **90.** 69.)

Esculetin with Oxide of Lead. After
$C_{64}H_{15}O_{21}; 7\,PbO$ having become dry, it is insoluble in water; but when recently precipitated, it is very sparingly soluble therein, a portion of it being re-precipitated from the solution after this has stood for a long time. Insoluble in spirit. (Zwenger, *Ann. Ch. u. Pharm.*, **90.** 74.)

Esculin. Soluble in 600 pts. of cold, and in
(*Polychrome. Bicolorin.*)
$C_{78}H_{41}O_{47} + 5\,Aq$
13 pts. of boiling water; the saturated hot solution solidifying on cooling. (Wittstein's *Handw.*) Soluble in 24 pts. of boiling, less soluble in cold alcohol of 0.798 sp. gr. Very

sparingly soluble in absolute ether. Soluble in solutions of the alkalies. Decomposed by boiling dilute sulphuric or chlorhydric acid.

Esculin with Oxide of Lead. Ppt. Decomposed by washing with warm or cold water, and by spirit. (Zwenger, *Ann. Ch. u. Pharm.*, **90.** 66.)

Esenbeckin(from *Esenbeckia febrifuga*).

The **Essences**; **Essential Oils**; or Volatile Oils, as they are often called, are mostly soluble in water to a very limited extent. They in turn dissolve a small proportion of water, which separates out again at low temperatures. They are generally soluble to an unlimited extent in absolute alcohol, ether, naphtha, and the fixed oils. Those composed solely of carbon and hydrogen, *i. e.* those containing no oxygen, are as a class the least soluble in alcohol, and water. (Parrish's *Pharm.*, pp. 335, 336.) Many of them are soluble in benzin (Mansfield, *J. Ch. Soc.*, **1.** 261); in concentrated acetic acid, and in oil of turpentine. In oil of ocotea (Hancock); and in oil of mandarin (De Luca).

For the solid essences, see under **Camphors.**

Oleum absinthii. *Vid.* Oil of Wormwood.

Oleum acori. *Vid.* Oil of Calamus.

Oil of Acorns. Appears to consist of an oil soluble in ether, and another oil soluble in alcohol of 0.85 sp. gr. (Bley.)

(From the fruit of *Quercus robur* and *Q. pedunculata.*)

Oil [empyreumatic] **of Amber.** Insoluble in water. Soluble in 15 pts. of alcohol of 0.85 sp. gr. (Zeller); in 2 pts. of alcohol of 0.800 sp. gr. (Anthon); in 50 pts. of alcohol of 0.855 sp. gr., at the temp. of the hand. Readily soluble in ether (Elsner, Dœpping); in 2 pts. of ether (Anthon). Soluble in fixed and volatile oils. (Elsner.)

(*Amber Eupion.*)
$C_{20}H_{16}$

Oleum amomi. *Vid.* Oil of Pimento.

Oleum anethi. *Vid.* Oil of Dill.

Oil of Angelica(from the root of *Angelica archangelica*). Soluble to a considerable extent in water.

Oil of Angustura(from the bark of *Galipea officinalis*).

Oil of Animé(from the resin of *Hymenæa Courbaril*). Soluble, without turbidity, in alcohol. (Paoli.)

Oil of Anise(from the seeds of *Pimpinella Anisum*). Soluble in 2.4 pts. of alcohol, of 0.84 sp. gr., at 24°, and in all proportions in cold alcohol of 0.806 sp. gr. (Saussure.) Soluble in 5 pts. of alcohol of 0.85 sp. gr. (Parrish's *Pharm.*, p. 347.) [Compare Anethol.]

Oleum anthemidis. *Vid.* Oil of Chamomile.

Oleum anthos. *Vid.* Oil of Rosemary.

Oil of Ants(in the red ant, *Formica rufa*). Insoluble in water. Sparingly soluble in absolute alcohol. (Marggraf, Nolle.)

Oil of Aristolochia(*Clematitis*). Soluble in 15 @ 28 pts. of alcohol, of 0.85 sp. gr. (Walz.)

$C_{32}H_{18}O_6$

Oil of Arnica.

a = (from the flowers of *Arnica montana.*) Soluble in 100 pts. of alcohol of 0.85 sp. gr., becoming turbid and flocculent; with 10 @ 60 pts. of absolute alcohol it forms a turbid liquid, which becomes clear only when heated. (Zeller.)

b = (from the roots of *Arnica montana.*) Soluble in 2 pts. of alcohol of 0.85 sp. gr., and in all proportions in absolute alcohol. (Zeller.)

Oil of Artemesia(*Santonica*). Insoluble in water. Easily soluble in alcohol, and ether. Soluble in concentrated sulphuric acid, the solution subsequently undergoing decomposition. (Vœlcker, *Ann. Ch. u. Pharm.*, **87.** 314.)

$C_{10}H_{18}O$

Oil of Artemisia *vulgaris.* *Vid.* Oil of Mugwort.

Oil of Asarum(from the root of *Asarum europæum*). Only sparingly soluble in water. Readily soluble in alcohol, ether, and the fixed and volatile oils. (Græger, Sell & Blanchet.)

(*Essence de Cabaret.*)

Oil of Assafœtida. Soluble to no inconsiderable extent in water. Very easily soluble in alcohol, and ether. (Hlaziwetz.)

Oleum asphalti. Soluble in 30 pts. of alcohol of 0.85 sp. gr. (Parrish's *Pharm.*, p. 346.)

Oil of Athamanta. *Vid.* Oil of Peucedanum.

Oleum aurantiorum. *Vid.* Oil of Orange.

Oil of Auricula(from *Primula auricula*). Insoluble in water. Soluble in alcohol. (Huenefeld.)

(*Aurikel Camphor. Stearoptene of Auricula.*)

Oleum badiani. *Vid.* Oil of StarAnise.

Oil of Balm(in the herb *Melissa officinalis*). Soluble in 5 @ 6 pts. of alcohol of 0.856 sp. gr. (Zeller.)

Oil of Basil(from *Ocymum basilicum*).

I.) *liquid.*

II.) *solid.* Sparingly soluble in cold, easily soluble in hot water. Imperfectly soluble in cold, easily soluble in hot alcohol. Scarcely any of it is dissolved by six pts. of ether. Easily soluble in acetic and nitric acids, and in ammonia-water. (Bonastre.)

(*Basil Camphor.*)
$C_{20}H_{16} + 6\,Aq$

Oil of Bay(from the berries of *Laurus nobilis*). Easily soluble in alcohol. The least volatile portion of the oil dissolves but partially in alcohol, or in aqueous solutions of caustic potash or ammonia, leaving a brown oil, while the alcoholic solution contains a crystalline substance. Readily soluble in ether, and in fixed and volatile oils. (Brandes.)

(*Oil of Laurel.*)

Oil of Beans(in dry beans, *Phaseolus communis*).

Oil of Bergamot(in cells in the rind of *Citrus Bergamia*). Does not take up water, even when boiled with it for a considerable time. (Soubeiran & Capitaine.)

Soluble in 0.5 pt. of alcohol of 0.85 sp. gr.
" 2. " 0.951 "
" 28. " 0.966 "
(Vauquelin.)

Soluble in ether, and in concentrated acetic acid.

An opaque emulsion, formed by agitating a certain quantity of oil of bergamot with alcohol having been subjected to a pressure of 1100 atmospheres for a few minutes became perfectly transparent, the solution of the oil in the alcohol being now complete. (Perkins, *Ann. Ch. et Phys.*, 1823, (2.) **23.** 411.) [See also Bergaptene.]

Oleum betulæ. *Vid.* Oil of Birch.

Oil of Birch-leaves(from *Betula alba*).

I.) Insoluble, or very sparingly soluble, in wa-

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ter. Soluble in 8 pts. of alcohol, of 0.85 sp. gr., at 12.5°, forming a clear liquid, which becomes turbid at 0°. Slowly soluble in ether, separating out again slowly at 0°. (Grassmann.)

II.) (From *Betula lenta.*) Identical with oil of winter-green, *q. v.* (Procter.)

Oil[empyreumatic] **of Birch.** *(Essence de bouleau.)* Sparingly soluble in water. Easily soluble in alcohol, and ether. (Sobrero.)

Oil of Cajeput(from the leaves of *Malaleuca Cajeputi, etc.*). Readily soluble in alcohol. (Guibourt, Zeller.) Soluble in 1 pt., or less, of alcohol of 0.85 sp. gr. (Parrish's *Pharm.*, p. 347.)

Oil of Calamus(from the root of *Acorus calamus*, sweet flag). *(Essence d'acore.)* Scarcely at all soluble in water. Soluble in all proportions in absolute alcohol.

Soluble, without turbidity, in absolute alcohol, and in 1 pt. of alcohol of 0.85 sp. gr. According to Schnedermann, it contains several different oils, the most volatile of which is most probably of composition C_{20} H_{16}.

Oil of Camomile. *Vid.* Oil of Chamomile.

Oil of Camphor.

a = fluid camphor from Dryobalanops camphora. Vid. Borneene.

b = fluid camphor from Laurus camphora. Insoluble in water. Miscible in all proportions with alcohol, ether, and oils. Also soluble in concentrated acetic, and sulphuric acids.

Oil of Caoutchouc. *Vid.* Caoutchin.

Oil of Caranna. *Vid.* Oil of Gomart.

Oil of Caraway(from the seeds of *Carum carvi*). *(Oleum carvi.)* The crude oil is a mixture of *carvene* and *carvol*, *q. v.* It is somewhat soluble in water, and easily soluble in alcohol, and ether. (Schweizer.) Soluble in 1 pt., or less, of alcohol of 0.85 sp. gr. (Parrish's *Pharm.*, p. 347.)

Oil of Cardamom(from the seeds of *Elettaria Cardamomum*). *(Oleum Cardamomi.)* Soluble in alcohol, ether, oils, acetic acid, and potash-lye. (Dumas & Péligot.) Soluble in 1 pt. of alcohol of 0.85 sp. gr. (Parrish's *Pharm.*, p. 347.)

Oil of Carrot(from the roots of *Daucus Carota*). Sparingly soluble in water. Readily soluble in alcohol, and ether. (Wackenroder.)

Oleum Caryophylli. Vid. Oil of Cloves.

Oil of Cascarilla(from the bark of *Croton Elateria*). Sparingly soluble in water. Easily soluble in 1 @ 2 pts. of alcohol of 0.85 sp. gr., the solution becoming opalescent on the addition of 3 or more pts. of alcohol. (Zeller.) Readily soluble in alcohol. (Trommsdorff.)

Oil of Cassia. *Vid.* Oil of Cinnamon.

Oil of Castoreum. Sparingly soluble in water. Readily soluble in alcohol. (Bohn.) Soluble in ether. (Brandes.)

Oil of Cedar. *Vid.* Oil of Juniper.

Oleum Cedro. Vid. Oil of Lemon.

Oil of Celery(from *Apium graveolens*). Sparingly soluble in water. Readily soluble in alcohol, and ether. (Vogel, Tietzmann.)

Oil of Chamomile [Roman](from the flowers of *Anthemis nobilis*). *(Oleum anthemidis.)* Is a mixture of a hydrocarbon (C_{20} H_{16}) with hydride of angelicyl (C_{10} H_7 O_2, H), and a small quantity of angelic acid. It is easily soluble in alcohol, ether, and oils.

Oil of Chamomile[wild](from the flowers of *Matricaria Chamomilla*). Soluble in 8 @ 10 pts. of alcohol of 0.85 sp. gr. Easily soluble in ether. (Zeller.)

Oil of Checkerberry. *Vid.* Oil of Wintergreen.

Oil of Chenopodium(*Ambrosioides*). *(Oil of Mexican Wormseed.)* Sparingly soluble in water. Easily soluble in alcohol, ether, and the fixed and volatile oils. (Bley.) Soluble in 30 pts. of water and in 3 pts. of alcohol. (Becker.)

Oil of Cinnamon(from *Laurus cinnamomum*).

I.) *Oleum cinnamomi veri.* When freshly prepared it is sparingly soluble in water; and easily soluble in alcohol.

Soluble in 1 pt. of alcohol of 0.85 sp. gr.; and in glycerin. (Parrish's *Pharm.*) Soluble in concentrated acetic acid. When old, essence of cinnamon contains two resins:

a.) Soluble in cold alcohol.

β.) Very sparingly soluble in cold, but more soluble in hot alcohol.

II.) *Chinese oil of Cinnamon*(from *Laurus cassia*). *(Oil of Cassia.)* Sparingly soluble in water. Very easily soluble in alcohol, and ether.

Soluble in 1 pt. of alcohol of 0.85 sp. gr. (Parrish's *Pharm.*, p. 347.)

Oleum citri. Vid. Oil of Lemon.

Oil of *Citrus Lumia.* C_{20} H_{18} Slightly soluble in alcohol. Very easily soluble in ether, and bisulphide of carbon. (De Luca.)

Oil of Cloves(from the buds or flower-stalks of *Eugenia caryophyllata*). *(Oleum Caryophylli.)* [Contains eugenic acid, *q. v.*, and a neutral oil, C_{20} H_{16}.]

Soluble in 1 pt. of alcohol of 0.85 sp. gr. (Parrish's *Pharm.*, p. 347.) Completely soluble in alcohol, ether, and concentrated acetic acid. (Bonastre.) Insoluble in acetic acid of 1.05 sp. gr. (Jahn.) Soluble in glycerin. The indifferent oil, C_{20} H_{16} ("Camphene of Oil of Cloves") is much less soluble in alcohol than oil of turpentine. (Gr. Williams.)

Oil of Coffee. Soluble in ether. (Payen.)

Oil of Convolvulus (*scoparius*).
(Huile de bois de Rhode. Rosenholzœl.)

Oil of Copaiba(from the balsam which exudes from various species of *Copaïfera*).

I.) C_{20} H_{16} Insoluble in water. Soluble in all proportions in absolute alcohol (Stoltze); soluble in 2.5 pts. of absolute alcohol; in 25 @ 30 pts. of alcohol of 0.85 sp. gr. at 25° (Blanchet); in 8 pts. of the most highly rectified spirit (Schœnberg). Soluble in all proportions in absolute ether (Stoltze); in less than 0.5 pt. of common ether (Blanchet). Soluble in all proportions in bisulphide of carbon. (Gerber.) Soluble in acetic acid.

II.) *Para-copaiba Oil*(in a variety of balsam copaiba from Brazil). C_{20} H_{16} Soluble in all proportions in ether; less easily soluble in absolute alcohol, and still less in common alcohol.

Oil of Coriander(from the fruit of *Coriandrum sativum*). C_{20} H_{18} O_2 Readily and abundantly soluble in alcohol, ether, glacial acetic acid, and the fixed oils. (Trommsdorff.)

Oil of Courbaril. *Vid.* Oil of Animé.

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Oil of Cubebs(from *Piper cubeba*). Contains Cubebene, *q. v.*; and Camphor of Cubeb-Oil, *q. v.* It dissolves to an opalescent solution, in 27 pts. of alcohol of 0.85 sp. gr. (Parrish's *Pharm.*, p. 346.)

Oil of Culilawan(from the bark of *Cinnamomum Culilawan*).
(*Oleum culilabani.*)

Oil of Cumin(from *Cuminum Cyminum.*) Contains Cymene, and Cuminol, *q. v.* It is soluble in 3 pts. of alcohol of 0.85 sp. gr. (Parrish's *Pharm.*, p. 347.)

Oil of Curcuma(from the root of *Curcuma longa*).

Oil of Dahlia(from the roots of several species of *Dahlia*). Forms a turbid emulsion with water. Soluble in alcohol. (Payen.)

Oil of Dill(from the seeds of *Anethum graveolens*). Slightly soluble in water. Easily soluble in alcohol, and ether. Soluble in all proportions in alcohol of 0.85 sp. gr. (Parrish's *Pharm.*, p. 347.)
(*Oleum anethi.*)

Oil of Elder-flowers(from *Sambucus nigra*). Soluble in absolute alcohol, and ether. Sparingly soluble in alcohol of 0.85 sp. gr., in oil of rosemary, and in water. (Eliason.)

Oil of Elemi(in the resin of *Icica Icicariba*, *etc.*). Insoluble in water. Sparingly soluble in weak alcohol. Easily soluble in alcoholic ether. (Stenhouse.)

Oil of Ergot. Soluble in alcohol, ether, and alkaline solutions.

Oil of Fennel(from the seeds of *Anethum Fœniculum*). Consists almost entirely of two oils, a light oil, volatile between 185° and 190°, isomeric with oil of turpentine, and anethol, *q. v.* (Cahours.) Soluble in from 2 to 4 pts. of alcohol of 0.85 sp. gr. (Parrish's *Pharm.*, p. 347.)

Oil of Fennel with Nitric Oxide. Sparingly soluble in absolute alcohol, but scarcely at all soluble in spirit of 0.80. Soluble in ether; also in strong potash-lye, from which it is re-precipitated on the addition of acids. (Cahours.)
$C_{60} H_{48} N_8 O_{16} = 3 C_{20} O_{16}'', 8 N O_2$ (?)

Oil of Galanga(from the roots of *Alpinia Galanga*). Partially soluble in an aqueous solution of caustic potash; completely and readily soluble in alcohol, and ether. (Vogel.)

Oil of Gale(from *Myrica Gale*). Soluble in 40 pts. of alcohol of 0.875 sp. gr., at 15°; more abundantly soluble in ether. (Rabenhorst.)

Oleum Gaultheriæ. *Vid.* Oil of Winter-green.

Oil of Geranium.

Oil of *Geum urbanum*. Readily soluble in alcohol, and ether. (Trommsdorff.)

Oil of Ginger(from the roots of *Zinziber officinalis*).
(*Ingweræl. Essence de gingembre.*)
$C_{80} H_{64} + 5 Aq$

Oil of Gomart(from the resin of *Bursera gummifera*).
(*Bursera Oil.*)
$C_{20} H_{16}$

Oil of Hedwigia(from the balsam of *Hedwigia balsamifera*). It dissolves completely at first in more than 4 pts. of alcohol and in all proportions in ether. (Bonastre.)

Oil of Hemp(from *Cannabis sativa*).

Oil of Hops. Soluble in 10,000 pts. of water. (Payen & Chevallier); in more than 600 pts. of water. (Wagner.)
$C_{20} H_{16}$

Oil of Hyssop(from *Hyssopus officinalis*). Easily soluble in absolute alcohol. Forms a clear solution in from 1 @ 4 pts. of alcohol of 0.85 sp. gr., a slightly opalescent solution with a larger quantity of this alcohol. (Zeller.)

Oil of Imperatoria. *Vid.* Oil of Masterwort.

Oil of Jasmin. Compare Jasmin Camphor, under Camphor.

Oil of Jonquil(from *Narcissus Jonquilla*). Soluble in ether. (Robiquet.)

Oil of Juniper(from *Juniperus communis*). The oil from ripe berries, *i. e.* ordinary oil of juniper, is sparingly soluble in alcohol of 0.85 sp. gr.; but is soluble in 8 pts. of absolute alcohol, and is miscible in all proportions with ether. (Blanchet.) The oil from unripe berries is a mixture of two oils, the less volatile of which is identical with the oil of ripe berries. The more volatile oil is sparingly soluble in alcohol of 0.85 sp. gr., is miscible with 1 pt. of absolute alcohol, but separates out on the addition of more alcohol. Soluble in absolute ether in all proportions. (Blanchet.) Soluble in 10 @ 12 pts. of alcohol of 0.85 sp. gr., forming a turbid solution. (Parrish's *Pharm.*, p. 346.) Very sparingly soluble in water. Very soluble in warm, less soluble in cold alcohol.
(*Oil of Cedar.*)
$C_{20} H_{16}$

Oil of juniper forms a clear solution with 0.5 pt. of absolute alcohol, and a turbid solution with from 1 to 10 pts. (Zeller.)

Oil of Laurel. *Vid.* Oil of Bay.

Oil of Guiana Laurel. *Vid.* Oil of Ocotea.
(*Essence de Laurier.*)

Oil of LançonBalsam. Soluble in from 10 to 12 pts. of alcohol of 0.85 sp. gr., forming a somewhat turbid liquid; and in all proportions in ether, forming a clear solution. (Bonastre.)

Oil of Lavender(from the flowers and leaves of *Lavandula angustifolia*). Contains an oil isomeric with oil of turpentine, and a camphor similar to or identical with common camphor. It is soluble in all proportions in absolute alcohol, and in alcohol of 0.85 sp. gr. (Zeller); of 0.83 sp. gr. (Saussure). Soluble in 2.5 pts. of alcohol of 0.887 sp. gr., at 20°. (Saussure.) Oil of spike dissolves in alcohol like oil of lavender. (Zeller.) Soluble in acetic acid. (See under *Acetic Acid.*)
(*Oil of Spike.*)

Oil of Lemon(from the rind of *Citrus limonum*, or *medica*). Slightly soluble in water. Soluble in all proportions in absolute alcohol (Saussure, Zeller); in 7.14 pts. of alcohol, of 0.837 sp. gr., at 16° (Saussure); with turbidity in 10 pts. of alcohol of 0.85 sp. gr. (Zeller.) Soluble in alcohol, and in glacial acetic acid. (Berthelot, *Ann. Ch. et Phys.*, (3.) 37. 226.) Easily soluble in ether. Easily miscible with essential and fatty oils.
(*Oleum citri. Essence de Citron. Huile de Cedro. Citronenæl. Cederæl.*)
$C_{20} H_{16}$

Oil of Lilac(from the flowers of *Syringa vulgaris*). Soluble in ether.

Oil of Lime(from the rind of *Citrus limetta*). Resembles oil of lemon.
$C_{20} H_{16}$

Oil of Lime-flower(from the flowers of *Tilia Europea*). Soluble in alcohol. (Landerer.) Soluble in ether. (Herberger.)

Oleum macis (or *macidis*). *Vid.* Oil of Nutmeg-flowers.

Oil of Mandarin(from the rind of *Citrus bigaradia sinensis* and *myrtifolia*). Insoluble in water, to which, however, it imparts its odor. Soluble in 10 pts. of alcohol, in
$C_{20} H_{16}$

ether, glacial acetic acid, and in every proportion in bisulphide of carbon. (Luca.)

Oil of Marjoram(from *Origanum majorana*). Soluble, without turbidity, in 1 pt. of alcohol of 0.85 sp. gr., and with opalescence in 2 or more pts. (Zeller.)

Oil of [Wild] Marjoram. *Vid.* Oil of Origanum.

Oil of Massoy(from the bark of *Cinnamomum Kiamis*).

a = light oil. Readily soluble in alcohol, ether, and strong acetic acid, and is separated from the latter by the addition of 3 pts. of water. (Bonastre.)

b = heavy oil. Soluble in all proportions in alcohol, ether, and strong acetic acid, from which last it is precipitated by water.

Oil of Masterwort(from the root of *Imperatoria Ostruthium*). (*Essence d'Imperatoiré.*)

Oil of Matico(from the leaves of *Piper asperifolium*). Readily soluble in alcohol, and ether. Insoluble in aqueous solutions of caustic potash or ammonia. Soluble in oil of vitriol, the solution becoming milky on the addition of water. (Hodges.)

Oil of Meadow-Sweet. *Vid.* Oil of Spirea.

Oil of Mecca-Balsam(from *Balsamodendron gileadense*). Soluble, with turbidity, in 12 pts. of alcohol. (Bonastre.) Soluble in all proportions in ether, forming a clear solution. Easily soluble in rock-oil, and the fixed oils. Insoluble in aqueous solutions of caustic soda or ammonia. (Bonastre.) Easily soluble in strong acetic acid. Insoluble in an aqueous solution of caustic potash. (Trommsdorff.)

Oleum melissæ. *Vid.* Oil of Balm.

Oleum Menthæ crispæ. *Vid.* Oil of Mint.

Oleum Menthæ piperitæ. *Vid.* Oil of Peppermint.

Oleum Menthæ viridis. *Vid.* Oil of Spearmint.

Oil of Mignonette(from the flowers of *Reseda odorata*). Soluble in ether. (Buchner.)

Oil of Millefoil(from *Achillea millefoliam*).

I.) Readily soluble in alcohol, and ether. (Bley.) Soluble, without turbidity, in 1 pt. of alcohol of 0.85 sp. gr.; with a larger quantity of the alcohol, even with 40 pts., it forms a turbid solution. Absolute alcohol dissolves it in all proportions. (Zeller.)

II.) **Oil of Noble Millefoil**(from *A. nobilis*). Soluble in alcohol, ether, and the fixed and volatile oils. (Bley.)

Oil of Mint. (*Oleum Menthæ crispæ.*) Soluble in 1 pt. of alcohol of 0.85 sp. gr.

Essence de Mirbane. *Vid.* NitroBenzin.

Oleum Monardæ.
(*Oil of Horsemint.*)

Oil of Mugwort(from the root of *Artemisia vulgaris*). (*Beifussœl.*) Readily soluble in alcohol, ether, and the oils of rosemary, turpentine, and poppy. (Bretz & Eliason.) Insoluble in aqueous alkaline solutions.

Essence of Mustard. *Vid.* SulphoCyanide of Allyl.

Oil of Myrrh(from *Balsamodendron*, *Myrrha*, and *B. Kalaf*). $C_{20}H_{14}O_2$ Soluble in alcohol, and ether. (Ruickholdt.)

Oleum myristicæ. *Vid.* Oil of Nutmeg.

Oil of Nasturtium(from *Tropæolum majus*). (*Essence de Capucine.*)

Oil of Neroli(from the flowers of *Citrus Aurantium*). (*Oil of Orange-flower. Oleum aurantiorum florum.*) Dissolves to a clear solution in 1 @ 3 pts. of alcohol of 0.85 sp. gr., and with turbidity in a larger quantity. (Zeller.) One portion of the crude oil is easily soluble in water, the other sparingly soluble. (Soubeiran.) Ether, almond-oil, and castor-oil, abstract the whole of the volatile oil from orange-flower water. (Ader.)

Oil of Nigella(from the seeds of *Nigella sativa*). Soluble in alcohol, and ether. (Reinsch.)

Oil of Nutmeg(from the seed of *Myristica aromatica*). (*Oleum macis* (or *macidis*). *Oleum myristicæ.*) Readily soluble in alcohol, the solution becoming milky on the addition of water. (Hasse.) It unites with aqueous solutions of the caustic alkalies, forming a soapy mass. (Bley.) Soluble in 6 pts. of alcohol of 0.85 sp. gr. Soluble in ether.

Oil of Ocotea(from several species of *Ocotea*). (*Laurel oil of Guiana. Essence de Laurier.*) $C_{20}H_{16}$ Insoluble in water. Soluble in alcohol, and ether, and the fatty and volatile oils. (Hancock.)

Oil of Olibanum(in frankincense, the gum resin of *Boswellia floribunda*, and *B. serrata*). $C_{35}H_{28}O$ Soluble in all proportions in absolute alcohol, and ether; less soluble in weaker alcohol. (Stenhouse.)

Oil of Orange-peel(from the rind of *Citrus Aurantium*). (*Oleum aurantiorum. Oleum portugallo.*) $C_{20}H_{16}$ Soluble in absolute alcohol, and with turbidity in 7 @ 10 pts. of alcohol of 0.85 sp. gr. (Zeller.)

Oil of Origanum(from *Origanum vulgare*). (*Oil of Wild Marjoram.*) Soluble in 12 @ 16 pts. of alcohol of 0.85 sp. gr., forming a turbid liquid, and in all proportions in absolute alcohol. (Zeller.) Soluble in hot ether.

Oil of Osmitopsis(from *Osmitopsis asteriscoides*). $C_{20}H_{18}O_2$ Insoluble, or exceedingly sparingly soluble in water. Soluble in all proportions in alcohol, and ether. (Gorup-Besanez, *Ann. Ch. u. Pharm.*, **89.** 214.)

Oil of Parsley(from the seeds of *Apium petroselinum*). (*Oleum petroselini. Essence de persil.*) $C_{20}H_{16}$ Soluble in 2.5 pts. of alcohol of 0.85 sp. gr. (Zeller.) Tolerably easily soluble in ether, and oils.

"**Pear Oil**" of the Confectioners. *Vid.* Acetate of Amyl.

Oil of Pelargonium(from various species of *Pelargonium*). Readily soluble in alcohol of 0.85 sp. gr. (Simonnet.)

Oil of Pennyroyal(European)(from *Mentha pulegium*). (*Oleum pulegii.*) $C_{20}H_{16}O_2$ Miscible with oil of turpentine. (Kane.)

Oil of Pennyroyal(American)(from *Hedeoma pulegioides*).

Oil of Pepper(from *Piper nigrum*).
$C_{20}H_{16}$

Oil of Peppermint(from *Mentha piperita*). (*Oleum Menthæ piperitæ.*) Slightly soluble in water. Soluble in 1 @ 3 pts. of alcohol of 0.85 sp. gr., forming a clear solution. With a larger quantity of alcohol it forms an opalescent solution. (Zeller.) Soluble in all proportions in alcohol of 0.815 sp. gr., and in 10 pts.

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of alcohol of 0.868 sp. gr. (Bley.) Soluble with turbidity in bisulphide of carbon. (Bley.) Readily soluble, even in cold wood-spirit, alcohol, ether, and bisulphide of carbon; less soluble in oil of turpentine.

Oleum petræ. *Vid.* Petroleum.

OIL OF PIMENTO(from the fruit of *Myrtus pimenta*). Completely soluble in alcohol, and ether. (Bonastre.)

OIL OF PIMPINELLA.

a = from the root of Pimpinella Saxifraga. Slightly soluble in water. Easily soluble in alcohol, and ether. (Bley.)

b = from the root of Pimpinella nigra. Slightly soluble in water. Easily soluble in alcohol, ether, and the fixed and volatile oils.

Oleum bini-semen. *Vid.* Templin Oil.

OIL OF POPLAR-BUDS(from the buds of *Populus nigra*). Insoluble in water. Sparingly soluble in alcohol. Very soluble in ether. (Pellerin.)

Oleum pulegii. *Vid.* Oil of Pennyroyal.

OIL OF PULEGIUM(*micranthum*). $C_{20}H_{16}O_2$ Readily soluble in alcohol, ether, and oils. (Butlerow.)

OIL OF PYRETHRUM. *Vid.* Oil of Feverfew.

OIL OF ROMAN CAMOMILE. *Vid.* Oil of Chamomile.

OIL OF ROSEMARY(in *Rosmarinus officinalis*). (*Oleum anthos. Oleum rosmarini.*) Soluble in all proportions in alcohol of 0.85 sp. gr. (Zeller.) Soluble in 40 pts. of alcohol of 0.887 sp. gr. at 18°. (Saussure.) Soluble in oil of turpentine.

OIL OF ROSES(from the flowers of various species of *Rosa*). Sparingly soluble in water. Soluble in 160 pts. of alcohol, of 0.815 sp. gr., at 18.7° (Gœbel); in 143 pts. of alcohol, of 0.806 sp. gr., at 14°, and in 33 pts. of this alcohol at 22°. (Saussure.) The oil is not separated from its alcoholic solution by water. (Blanchet.)

OIL OF RUE(from *Ruta graveolens*). (*Oleum rutæ.*) *Vid.* Hydride of Rutyl.

OIL OF SAFFRON(from *Crocus sativus*). Easily soluble in water. (Bouillon.)

OIL OF SAGE(from *Salvia officinalis*). (*Oleum salviæ.*) Soluble in all proportions in alcohol of 0.85 sp. gr. (Zeller.)

OIL OF SASSAFRAS(from the wood and bark of $C_{18}H_{10}O_4$ (?) the roots of *Laurus Sassafras*). Soluble in 4 @ 5 pts. of alcohol of 0.85 sp. gr. Sparingly soluble in aqueous solutions of the caustic alkalies. (Zeller, Bonastre.) Decomposed by concentrated sulphuric, and nitric acids.

OIL OF SAVIN(from the leaves, &c., of *Juniperus Sabina*). (*Oleum Sabinæ.*) Soluble in all proportions in absolute alcohol; to a clear liquid in 2 pts. of alcohol of 0.85 sp. gr., with opalescence in 3 pts. or more of this alcohol. (Zeller.)

OIL OF SEMEN-CONTRA. *Vid.* Oil of Wormseed.

Oleum Serpylli. *Vid.* Oil of Wild Thyme.

OIL OF SPEARMINT. Soluble in alcohol. (*Oleum Menthæ viridis.*)

OIL OF SPIKE(from *Lavendula latifolia*). (*Oleum Spicæ.*) Resembles Oil of Lavender, *q. v.*

OIL OF SPIRÆA. Readily soluble in alcohol, (*Oil of Meadow-sweet.*) and ether. (Ettling.)

OIL OF SQUILL(from *Scillus Maritimus*). Soluble in alcohol. (Landerer.)

OIL OF STAR-ANISE(from the seeds of *Illicium anisatum*). (*Oleum badiani.*) Readily soluble in alcohol, and ether. (Meissner, *Alman.*, 1818, p. 63 [Gm.].) Soluble in 5 pts. of alcohol of 0.85 sp. gr. (Parrish's *Pharm.*, p. 347.) [Compare Anethol.]

OIL OF SWEET SEDGE(or SWEET FLAG). *Vid.* Oil of Calamus.

"OIL OF SYRINGA"(*vulgaris*). *Vid.* Oil of Lilac.

OIL OF SYRINGA(from *Philadelphus coronarius*). Soluble in ether. (Buchner.)

OIL OF TANSY. Readily soluble in alcohol. (*Oleum tanaceti.*)

OIL OF TARRAGON(from *Artemisia Dracunculus*). (*Estragonæl.*) *Vid.* Anethol.

OIL OF TEA. Insoluble, or very sparingly soluble, in water. Soluble in ether. (Mulder.)

TEMPLIN OIL(from the cones on *Pinus picea*). (*Oleum pini-semen.*) Soluble in 10 pts. of alcohol of 0.85 sp. gr. (Parrish's *Pharm.*, p. 346.) Resembles oil of turpentine in solubility. (Flueckiger.)

OIL OF THUJA(from the twigs of *Thuja occidentalis*) (Arbor-vitæ). Only slightly soluble in water. Very easily soluble in alcohol, and ether. (Schweizer.)

OIL OF THYME(from *Thymus vulgaris*). (*Ol. thymi. Thymen.*) $C_{20}H_{16}$ Soluble in 1 pt. of alcohol of 0.85 sp. gr. (Parrish's *Pharm.*, p. 348.) Soluble in concentrated acetic acid.

OIL [empyreumatic] OF TOBACCO. See under Oils, fatty.

OIL OF TROPÆOLUM. *Vid.* Oil of Nasturtium.

OIL OF TURPENTINE. (*Spirits of Turpentine. Essence of Turpentine. Camphene*(of Deville).) $C_{20}H_{16}''$ Almost entirely insoluble in water. Soluble in all proportions in absolute alcohol; and in 12 pts. of alcohol of 0.858 sp. gr., at 10° (Blanchet & Sell); in 7.4 pts. of alcohol, of 0.84 sp. gr., at 22° (Saussure); in 4 vols. alcohol of 0.83 sp. gr.; in 5 vols. alcohol. (Auduard.) 5 vols. of oil of turpentine are miscible with 1 vol. of alcohol, and the mixture is not clouded by water, the water only slowly removing the alcohol. (Vauquelin.) Does not dissolve well in alcohol unless this be free from water: 100 pts. of alcohol, of 0.84 sp. gr. dissolve 13.5 pts. of it at 16.6°. [T.] Soluble in strong alcohol, in benzin, and in strong wood-spirit. After alcohol or wood-spirit have been so much diluted with water that they can no longer dissolve oil of turpentine, the addition of some benzin restores their solvent power. Far more readily soluble in acetone than in ordinary alcohol. (Mansfield, *J. Ch. Soc.*, **1.** 263.) Soluble in wood-spirit in all proportions, the solution being rendered turbid on the addition of water. (Gmelin.) Soluble in alcohol, ether, and glacial acetic acid. (Berthelot, *Ann. Ch. et Phys.*, (3.) **37.** 225.) Insoluble in glacial acetic acid. (Deville.) Soluble in most of the volatile oils. Miscible with bisulphide of carbon (Lampadius), with chloroform (Huraut & Larocque) and the fatty oils (Wittstein's *Handw.*). Easily soluble in ether. (*Ib.*) Soluble in most of the volatile oils. (Braconnot.) Its solubility in alcohol is not increased, but, on the contrary, somewhat diminished, by the presence of nitric acid. (Deville, *Ann. Ch. et Phys.*, (3.) **27.** 82.) Decomposed by concentrated mineral acids. Soluble in acetate of ethyl, butyric acid, and fusel oil. (Berthelot, *Gm.*, **14.** 258)

Oil of Valerian (from *Valeriana officinalis*). Soluble in 1 pt. of alcohol of 0.85 sp. gr., and in all proportions in absolute alcohol. (Zeller.) Contains *valerole* ($C_{12}\ H_{10}\ O_2$), and borneene ($C_{20}\ H_{16}$), *q. v.* (Gerhardt, *Ann. Ch. et Phys.*, (3.) **7.** 275.)

(*Ol. Valerianæ. Baldrianœl.*)

Oil of Vitiveria. Soluble in ether. (Cap.)

Oil of Water Horehound(from *Lycopus Europæus*).

Oil of Wild Thyme(from *Thymus serphyllum*). Soluble in all proportions in alcohol of 0.85 sp. gr. (Herberger, Zeller.)

(*Oleum serphylli.*)

Oil of Winter-green(from the leaves, &c. of *Gaultheria procumbens*). Sparingly soluble in water. Easily soluble in alcohol, and ether.

(*Oil of Checkerberry. Oleum Gaultheriæ.*)

Oil of Wormseed(from the buds of various species of *Artemisia*). Soluble in 1000 pts. of water. Readily soluble in alcohol, and ether. (Trommsdorff.) Soluble in 1 pt. of alcohol of 0.85 sp. gr., and in all proportions in absolute alcohol. (Zeller.) ·[Compare Oil of Chenopodium.]

(*Oil of Semen-contra. Oleum cinæ.*)
$C_{24}\ H_{20}\ O_2$

Oil of Wormwood(from *Artemisia absinthum*). Soluble in all proportions in alcohol of 0.85 sp. gr., and in absolute alcohol. (Zeller.)

(*Oleum absinthii.*)

Oil of Zedoariæ. Easily soluble in alcohol, and ether.

Ethal. *Vid.* Hydrate of Cetyl.

Ethalic Acid. *Vid.* Palmitic Acid.

EthamAnilin. *Vid.* EthylAmylAnilin.

Ethamin. *Vid.* Ethylamin.

***Bi*EthAmylamin.** *Vid.* *di*EthylAmylamin.
$C_{18}\ H_{21}\ N$

***Tri*EthAmylamin.** *Vid.* Amy*tri*Ethylammonium.

Ethane. *Vid.* Ethylene.

EthAnilin. *Vid.* EthylAnilin.

EthAnilinUrea. *Vid.* PhenylUrea.

Ethene. *Vid.* Ethylene.

Ether. *Vid.* Oxide of Ethyl.

Ether Chlorosulfuré. *Vid.* Oxide of ChloroSulphEthyl.

"**Etherin.**" *Vid.* Ethylene.

Etherin. Insoluble in water. Soluble in alcohol, and with especial ease in ether, and in etherol (oil of wine). (Sérullas.) Insoluble in chlorhydric acid, in aqueous solutions of the caustic alkalies, or in hot acetic acid. Soluble in cold nitric acid, and in warm concentrated sulphuric acid, from which water precipitates it.

(*Ætherin. Stearoptene of Wine-oil.*)
$C_{18}\ H_{16}''$

Etherol. *Vid.* Oil of Wine.

Etherone. Soluble in water, alcohol, and ether. (Marchand.)

(*Ætheron.*)

EtheroPhosphorous Acid. *Vid.* EthylPhosphorous Acid.

Ether *sulfuré* (of Malaguti). *Vid.* Oxide of *bi*SulphEthyl.

Ethionic Acid(Anhydrous). Deliquescent. Very soluble in water, with evolution of heat, and in alcohol, with formation of the hydrated acid. Soluble in ether.

(*SulphAcetylic Acid. Sulfate de Carbyle. Carbylsulfat.*)
$C_4\ H_4\ S_4\ O_{12} = C_4\ H_4, 2\ S_2\ O_6$

Ethionic Acid. Known only in solution. The metallic ethionates are soluble in water; many of them are precipitated from the aqueous solution on the addition of alcohol. (Magnus.)

(*Carbyl Sulphuric Acid. Æthionic Acid.*)
$C_4\ H_6\ S_4\ O_{14} = C_4\ H_4, 4\ S\ O_3, 2\ H\ O$

Ethionate of Ammonia. Soluble in water.

Ethionate of Baryta. Soluble in 10 pts. of water at 20°. The concentrated, but not the dilute, aqueous solution is decomposed by ebullition. Very slowly soluble in alcohol. Absolute alcohol precipitates it from the aqueous solution. (Magnus.)

$C_4\ H_4\ Ba_2\ S_4\ O_{14} + Aq$

Ethionate of Copper.

Ethionate of Lead. Resembles the baryta salt.

Ethionate of Lime. Resembles the baryta salt.

Ethionate of Potash. Soluble in water.
$C_4\ H_4\ K_2\ S_4\ O_{14} + Aq$

Ethionate of Soda. Soluble in water.
$C_4\ H_4\ Na_2\ S_4\ O_{14} + 2\ Aq$

Ethokirrin. *Vid.* Anthokirrin.

Ethyl. Insoluble in water. (Frankland.)

$C_4\ H_5$, or $\left\{\begin{array}{l} C_4\ H_5 \\ C_4\ H_5 \end{array}\right.$

1 vol. of water under a pressure of 0m.76 of mercury at °C.	Dissolves of ethyl: — vols., reduced to 0° C. and 0m.76 pressure of mercury.
0°	0.03147
1°	0.03040
2°	0.02947
3°	0.02856
4°	0.02770
5°	0.02689
6°	0.02613
7°	0.02541
8°	0.02474
9°	0.02412
10°	0.02355
11°	0.02303
12°	0.02257
13°	0.02216
14°	0.02179
15°	0.02147
16°	0.02121
17°	0.02100
18°	0.02084
19°	0.02073
20°	0.02065

(Bunsen's *Gasometry*, pp. 288, 128, 146.)

Readily soluble in absolute alcohol, from which water sets it free. 1 volume of absolute alcohol at 14.2° and 744.8mm. pressure, absorbs 18.13 volumes of it. (Frankland, *J. Ch. Soc.*, **2.** 287.)

EthylAcetamid. Soluble in all proportions in water, and alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **42.** 54.)

$C_8\ H_9\ N\ O_2 = N \left\{\begin{array}{l} C_4\ H_5 \\ C_4\ H_3\ O_2 \\ H \end{array}\right.$

***Di*EthylAcetamid.**

$C_{12}\ H_{13}\ N\ O_2 = N \left\{\begin{array}{l} (C_4\ H_5)_2 \\ C_4\ H_3\ O_2 \end{array}\right.$

Ethyl*di*Acetamid.

$C_{12}\ H_{11}\ N\ O_4 = N \left\{\begin{array}{l} C_4\ H_5 \\ (C_4\ H_3\ O_2)_2 \end{array}\right.$

EthylAcetosamin. Soluble in water, alcohol, and ether. (Natanson.)

$C_8\ H_9\ N = N \left\{\begin{array}{l} C_4\ H_5 \\ C_4\ H_3 \\ H \end{array}\right.$

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EthylAcetone. Sparingly soluble in water. Miscible in all proportions with alcohol. (Fittig.)
$C_{10}H_{10}O_2$

EthylAllylUrea. Soluble in water.
$C_{12}H_{12}N_2O_2 = N_2\left\{\begin{matrix}C_2O_2''\\C_4H_5\\C_6H_5\\H_2\end{matrix}\right.$

Ethylamid. *Vid.* Ethylamin.

Ethylamin. Miscible in all proportions with water, with evolution of much heat. The solution is somewhat viscous; it is decomposed by long-continued boiling. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 472.)
(*Ethylammonia. Ethylamid. Ethamin. Ethyliaque.*)
$C_4H_7N = N\left\{\begin{matrix}C_4H_5\\H_2\end{matrix}\right.$

*Di*Ethylamin. Very soluble in water. Soluble in chlorhydric acid. (Hofmann.)
$C_8H_{11}N = N\left\{\begin{matrix}(C_4H_5)_2\\H\end{matrix}\right.$

*Tri*Ethylamin. Tolerably soluble in water, though less soluble than diethylamin.
$C_{12}H_{15}N = N\left\{(C_4H_5)_3\right.$

Ethylamine *bromé*, &c. *Vid.* Bromo, (&c.) Ethylamin.

Ethylammonia. *Vid.* Ethylamin.

*Tetra*Ethylammonium. Not isolated.
(*Tetrathylium.*)

EthylAmyl.
(*Ethylide of Amyl.*)
$C_{14}H_{16} = \left.\begin{matrix}C_4H_5\\C_{10}H_{11}\end{matrix}\right\}$

*Di*EthylAmylamin. Very sparingly soluble in water. Less soluble in water and in acids than methylethylamin. (Hofmann.)
$C_{18}H_{21}N = N\left\{\begin{matrix}(C_4H_5)_2\\C_{10}H_{11}\end{matrix}\right.$

*Tri*EthylAmylammonium. *Vid.* Amyl*tri*Ethylammonium.

EthylAmylAnilin. Insoluble in water. (Hofmann.)
(*EthylAmylPhenylamin. Vinemylanilin. Ethamanilin.*)
$C_{26}H_{21}N = N\left\{\begin{matrix}C_{12}H_5\\C_4H_5\\C_{10}H_{11}\end{matrix}\right.$

EthylAmylCitric Acid. Insoluble, or very sparingly soluble, in water. Soluble in alcohol, and ether. (Breunlin, *Ann. Ch. u. Pharm.*, **91.** 322.)
$C_{12}H_6(C_4H_5)(C_{10}H_{11})O_{14}$

EthylAmylPhenylamin. *Vid.* EthylAmylAnilin.

EthylAmylSolanin.
$C_{56}H_{49}NO_{14} = N\left\{\begin{matrix}C_{42}H_{33}O_{14}\\C_{10}H_{11}\\C_4H_5\end{matrix}\right.$

EthylAmyl Urea.
$C_{16}H_{18}N_2O_2 = N_2\left\{\begin{matrix}C_2O_2''\\C_4H_5\\C_{10}H_{11}\\H_2\end{matrix}\right.$

EthylAnilin. Soluble in alcohol. Its salts are remarkably soluble, especially in water. They are generally less soluble in alcohol than in water.
(*Ethanilin. EthylPhenylamin. Vinanilin.*)
$C_{16}H_{11}N = N\left\{\begin{matrix}C_{12}H_5\\C_4H_5\\H\end{matrix}\right.$

*Di*EthylAnilin.
(*DiEthylPhenylamin. BiVinAnilin.*)
$C_{20}H_{15}N = N\left\{\begin{matrix}(C_4H_5)_2\\C_{12}H_5\end{matrix}\right.$

EthylArsenic Acid. *Vid.* ArsenEthylic Acid.

Ethylate of Benzyl. *Vid.* Oxide of Ethyl & of Toluenyl.

Ethylate of Butyl. *Vid.* Oxide of Ethyl & of Butyl.

Ethylate of Ethylene. *Vid.* Acetal.

Ethylate of Methyl. *Vid.* Oxide of Ethyl & of Methyl.

Ethyl*bi*BromAllylamin. Insoluble in water. Soluble in acids. (M. Simpson.)
$C_{16}H_{13}NBr_2 = N\left\{\begin{matrix}C_4H_5\\(C_6H_4Br)_2\end{matrix}\right.$

EthylBromAnilin. Soluble in ether.
$C_{16}H_{10}BrN = N\left\{\begin{matrix}C_{12}H_4Br\\C_4H_5\\H\end{matrix}\right.$

EthylBromoSalicylic Acid. Very easily soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **10.** 364.)
(*BromoSalicylate of Ethyl.*)
$C_{18}H_9BrO_6$

Ethyl*bi*BromoSalicylic Acid. Very sparingly soluble in cold alcohol, but soluble in boiling alcohol. Soluble, with combination, in a cold concentrated aqueous solution of caustic potash; and, after a time, in ammonia-water. (Cahours, *loc. cit.*)
$C_{18}H_8Br_2O_6$

EthylBrucin. *Vid.* Hydrate of EthylBrucin.

EthylButyl.
(*EthylTetryl. Ethylide of Tetryl. Ethylate of Butyl.*)
$C_{12}H_{14} = \left.\begin{matrix}C_4H_5\\C_8H_9\end{matrix}\right\}$

EthylCacodyl. *Vid.* Arsen*bi*Ethyl.

EthylCacodylic Acid. *Vid.* ArsenEthylic Acid.

EthylCamphoric Acid. Insoluble in water. Very sparingly soluble in alcohol, and ether. Soluble, with combination, in alkaline solutions; these undergo decomposition when boiled, as does the aqueous solution after long boiling.
(*Camphovinic Acid.*)
$C_{24}H_{20}O_8 = C_{20}H_{15}(C_4H_5)O_8$

EthylCamphorate of Alumina. Insoluble in water.

EthylCamphorate of Ammonia. Soluble in water.
$C_{20}H_{14}(NH_4)(C_4H_5)O_8$

EthylCamphorate of Baryta. Soluble in water.

EthylCamphorate of Copper. Insoluble, or nearly insoluble, in water.

EthylCamphorate of Ethyl. *Vid.* Camphorate of Ethyl.

EthylCamphorate of Iron. Insoluble in water.

EthylCamphorate of Lead. Nearly insoluble in water.

EthylCamphorate of Lime. Soluble in water.

EthylCamphorate of Magnesia. Soluble in water.

EthylCamphorate of Manganese. Soluble in water.

EthylCamphorate of Mercury (Hg O). Insoluble, or nearly insoluble, in water.

EthylCamphorate of Silver. Ppt. Soluble in water. (Laurent, *Method*, p. 250.)
$C_{24}H_{19}AgO_8$

EthylCamphorate of Strontia. Soluble in water.

EthylCamphorate of Zinc. Insoluble, or nearly insoluble, in water.

EthylCaprylamin. *Vid.* EthylOctylamin.

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EthylCarbamic Acid. Unknown.
$N\left\{\begin{matrix}C_4\,H_5\\(C\,O)_2\,.\,O,\,H\,O\\H\end{matrix}\right.$

EthylCarbamate of Ethyl. Miscible with cold concentrated sulphuric acid, without decomposition. Decomposed on heating. (A. Wurtz.)
(*Ethyl Urethran.*)
$C_{10}\,H_{11}\,N\,O_4$

EthylCarbamate of Ethylamin. Soluble in water.
(*Anhydrous Carbamate of Ethylamin.*)
$C_2\,O_4,\ 2\,C_4\,H_7\,N = C_6\,H_6\,(H\,C_4\,H_7\,N)\,N\,O_4$

EthylCarbonic Acid. *Vid.* Carbonate of Ethyl.

EthylCarbonate of *X*. *Vid.* Carbonate of Ethyl & of *X*.

EthylChlorAnilin. Soluble in ether. Its salts are much more soluble than those of chloranilin.
$C_{16}\,H_{10}\,Cl\,N = N\left\{\begin{matrix}C_{12}\,H_4\,Cl\\C_4\,H_5\\H\end{matrix}\right.$

***Di*EthylChlorAnilin.** Soluble in ether.
$C_{20}\,H_{14}\,Cl\,N = N\left\{\begin{matrix}C_{12}\,H_4\,Cl\\(C_4\,H_5)_2\end{matrix}\right.$

EthylChloroPlatinic Acid. Slowly soluble in water. The aqueous solution is decomposed by boiling, unless it be strongly acidulated with chlorhydric acid. Soluble in alcohol. (Zeise.)
(*ChloroPlatinate of Ethyl.*)
$C_4\,H_4\,Pt_2\,Cl_2 = C_4\,H_4\,Pt,\ Pt\,Cl_2$

EthylChloroPlatinate of Ammonium. Soluble in less than 5 pts. of cold water; less soluble in alcohol. (Zeise.)
$C_4\,H_4\,Pt_2\,Cl_2,\ N\,H_4\,Cl + 2\,Aq$

EthylChloroPlatinate of Potassium. Soluble in 5 pts. of moderately warm water; less soluble in alcohol. The aqueous solution is decomposed when heated, unless sulphuric, nitric, or chlorhydric acids, or an excess of chloride of potassium, be present.
(*Inflammable Platino Potassic salt.*)
$C_4\,H_4\,Pt_2\,Cl_2,\ K\,Cl$

EthylChloroPlatinate of Sodium. Not readily crystallized; slowly soluble in alcohol.

Ethyl*bi*ChloroSalicylic Acid. Soluble in boiling water. Soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **27.** 461.)
(*BiChloro Salicylate of Ethyl. Salicylic Ether bichloré.*)
$C_{18}\,H_8\,Cl_2\,O_6 = C_4\,H_5\,O,\ C_{14}\,H_3\,Cl_2\,O_5$

Ethyl*bi*Cinnamylamin. *Vid.* Hydrate of Ethyl*tri*Phenylammonium.

EthylCollidin. Soluble in absolute alcohol and in ether. (Anderson.)
$C_{20}\,N\,H_{15} = C_{16}\,H_{10}\,(C_4\,H_5)\,N$

EthylComenic Acid. Easily soluble in hot water. The aqueous solution is slowly decomposed by boiling. Very readily soluble in alcohol. (How.) Its alkaline, and alkaline earthy, salts are very soluble in water.
$C_{16}\,H_8\,O_{10} = C_{12}\,H_3\,(C_4\,H_5)\,O_{10}$

EthylComenate of Ammonia.
$C_{12}\,H_2\,(N\,H_4)\,(C_4\,H_5)\,O_{10}$

EthylComenate of Silver. Ppt.
$C_{12}\,H_2\,Ag\,(C_4\,H_5)\,O_{10}$

EthylÇoniin. Sparingly soluble in water. More soluble in *cold* than in hot water. Easily soluble, with combination, in acids. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **89.** 133.)
$C_{20}\,H_{19}\,N = N\left\{\begin{matrix}C_{16}\,H_{14}''\\C_4\,H_5\end{matrix}\right.$

***Di*EthylConiin.** *Vid.* Hydrate of *di*Ethyl-Coniin.

EthylCyanamin.
(*EthylCyanamid.*)
$C_6\,H_6\,N_2 = N\left\{\begin{matrix}C_4\,H_5\\C_2\,N\\H\end{matrix}\right.$

***Di*EthylCyanamin.**
$C_{10}\,H_{10}\,N_2 = N\left\{\begin{matrix}(C_4\,H_5)_2\\C_2\,N\end{matrix}\right.$

Ethyl*di*Cyan*bi*amin.
$C_8\,H_8\,N_4 = N_2\left\{\begin{matrix}C_4\,H_5\\(C_2\,N)_2\\H_3\end{matrix}\right.$

EthylCyanAnilin. Soluble in dilute sulphuric acid, with combination.
(*CyanicEthylanilid.*)
$C_{18}\,H_{10}\,N_2 = N\left\{\begin{matrix}C_{12}\,H_5\\C_4\,H_5\\C_2\,N\end{matrix}\right.$

EthylCyanuric Acid. Readily soluble in hot, sparingly soluble in cold water. Readily soluble in alcohol, and ether. Easily soluble in dilute solutions of ammonia, potash, or baryta, crystallizing out unaltered when the liquid is evaporated
$C_{14}\,H_{11}\,N_3\,O_6 = C_6\,N_3\,O_6\,(C_4\,H_5)_2\,H$

EthylCyanurate of Baryta. Soluble in hot, less soluble in cold water.

EthylCyanurate of Çopper. Ppt.

EthylCyanurate of Lead. Ppt.

EthylCyanurate of Mercury($Hg_2\,O$). Ppt.

EthylCyanurate of Silver. Soluble in hot, less soluble in cold water. (Habich & Limpricht.)
$C_6\,N_3\,O_6\,(C_4\,H_5)_2\,Ag$

Ethylene. Very sparingly soluble in water, alcohol, or ether. Soluble in 8 vols. water (Faraday); in 12 vols. water (Dalton [?] *Phil. Mag.*, **24.** 15. [*T.*]); in 8 vols. water (Dalton, in his *New System*, **2.** 438).
(*Olefiant Gas. Bi* (or heavy) *Carburetted Hydrogen. Elayl. Ethene. Etherin. Ætherin.*)
$C_4\,H_4''$

1 vol. of water under a pressure of 0m.76 of mercury at °C.	Dissolves of olefiant gas: — vols., reduced to 0° C. and 0m.76 pressure of mercury.
0°	0.2563
1°	0.2473
2°	0.2388
3°	0.2306
4°	0.2227
5°	0.2153
6°	0.2082
7°	0.2018
8°	0.1952
9°	0.1893
10°	0.1837
11°	0.1786
12°	0.1737
13°	0.1693
14°	0.1652
15°	0.1615
16°	0.1583
17°	0.1553
18°	0.1528
19°	0.1506
20°	0.1488

(Bunsen's *Gasometry*, pp. 288, 128, 150.)

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1 vol. of alcohol under a pressure of 0m.76 of mercury at °C.	Dissolves of olefiant gas: — vols., reduced to 0° C. and 0m.76 pressure of mercury.
0°	3.5950
1°	3.5379
2°	3.4823
3°	3.4280
4°	3.3750
5°	3.3234
6°	3.2732
7°	3.2243
8°	3.1768
9°	3.1307
10°	3.0859
11°	3.0425
12°	3.0005
13°	2.9598
14°	2.9205
15°	2.8825
16°	2.8459
17°	2.8107
18°	2.7768
19°	2.7443
20°	2.7131
21°	2.6833
22°	2.6549
23°	2.6279
24°	2.6022

(Bunsen's *Gasometry*, pp. 288, 128, 152.)

At 18° C. and the ordinary pressure, 100 vols. of	Absorb vols. of C_4H_4.
Water, ...	15.5
Alcohol of 0.84 sp. gr.,	127.0
Rectified naphtha of 0.784 sp. gr.,	261.0
Oil of lavender (freshly distilled) of 0.880 sp. gr.,	209.0
Olive oil of 0.915 sp. gr.,	122.0
A saturated aqueous solution of chloride of potassium (containing 26% K Cl) of 1.168 sp. gr.,	10.

(Th. de Saussure, *Gilbert's Ann. Phys.*, 1814, **47**. pp. 167, 169.)

1 vol. of alcohol absorbs 2 vols., and 1 vol. of ether 2 vols. of it at the ordinary temperature; but one half of the gas is given off again when water is added to the alcoholic solution.

1 vol. of oil of turpentine absorbs from 2.1 @ 2.6 vols. of it. (Saussure, in *Gm.*, **14**. 270.) 1 volume of oil of turpentine absorbs 2.5 vols., and 1 vol. of olive oil 1 vol. of it. (Faraday.) 1 vol. of concentrated sulphuric acid absorbs 1.4 vols. of it. (Liebig.) 1 vol. of ether absorbs 1 vol. of it. (Kolbe's *Lehrb.*, **1**. 112.)

Sparingly soluble in water. Tolerably soluble in alcohol, in most inflammable liquids, and in a chlorhydric acid solution of dichloride of copper at the ordinary temperature; it is evolved from its solutions when these are boiled. (Berthelot, *Ann. Ch. et Phys.*, (3.) **51**. 67.) Very slowly absorbed by oil of vitriol. (Berthelot, *loc. cit.*) According to Berthelot, the statements of Faraday and others, that olefiant gas is easily soluble in oil of vitriol, are erroneous. 100 grammes of monohydrated sulphuric acid can absorb 61.7 grms. (120 vols.) of olefiant gas. It is, however, best to use twice this amount of acid, if one desires to obtain a complete absorption. (Berthelot, *Ann. Ch. et Phys.*, (3.) **43**. 391, *note*.)

1 volume of	Dissolves vols. of C_4H_4 (containing 2 per cent of impurity).
Water, ...	0.11
Ordinary alcohol,	1
Absolute alcohol,	1
Amyl alcohol,	1.5
Olein, about	1
Glacial acetic acid,	1.25
Oil of turpentine, nearly	2
Dichloride of copper (in H Cl), at least	5
Ether, about	3
Bisulphide of carbon, nearly	2
Chloroform,	3.33
Benzin (crystallizable), . .	3

(Berthelot & De Luca, *Ann. Ch. et Phys.*, (3.) **43**. 276.)

Largely soluble in naphtha. (Hess.) Insoluble in caoutchin.

ETHYLENE*brome*. *Vid.* BromEthylene.

ETHYLENE*chloré*. *Vid.* ChlorEthylene.

ETHYLENE*iodé*. *Vid.* IodEthylene.

ETHYLENEPHENYLAMIN. (Isomeric with *AcetoylPhenylamin*, and *Phtalidin*.) $C_{16}H_9N = N\left\{\begin{matrix}C_4H_4'' \\ C_{12}H_5\end{matrix}\right.$ Very easily soluble in alcohol, with subsequent decomposition.

***Di*ETHYLENE*di*PHENYL*bi*AMIN.** $C_{28}H_{18}N_2 = N_2\left\{\begin{matrix}(C_4H_4'')_2 \\ (C_{12}H_5)_2\end{matrix}\right.$ Insoluble in water. Scarcely at all soluble in cold, and difficultly soluble in boiling alcohol. Easily soluble in ether.

***Tri*ETHYLENE*tri*PHENYL*ter*AMIN.** $C_{48}H_{27}N_3 = N_3\left\{\begin{matrix}(C_4H_4'')_3 \\ (C_{12}H_5)_3\end{matrix}\right.$ Insoluble in alcohol.

ETHYLENE STANNETHYL. $(C_4H_5)_4Sn_4$ *Vid.* StannEthyl.

ETHYLFORMIAMID. $C_6H_7NO_2 = N\left\{\begin{matrix}C_2HO_2 \\ C_4H_5 \\ H\end{matrix}\right.$ Soluble in all proportions in water, and alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **42**. 56.)

ETHYLGLYCERIN. $C_4H_6O_6$

***Bi*ETHYLGLYCERIN.** *Vid. di*Ethylin.

ETHYLHEMIPINIC ACID. $C_{24}H_{14}O_{12} + 8\,Aq = C_{20}H_9(C_4H_5)O_{12} + 8\,Aq$ Sparingly soluble in cold, somewhat more soluble in boiling water. Soluble in alcohol.

ETHYLHEMIPINATE OF BARYTA. Soluble in water [?]. Very alterable.

ETHYLHYPOSULPHURIC ACID. *Vid.* IsEthionic Acid.

ETHYLHYPOSULPHUROUS ACID. *Vid.* EthylSulphurous Acid.

***Di*ETHYLIA.** *Vid. di*Ethylamin.

ETHYLIAQUE. *Vid.* Ethylamin.

ETHYLIDE OF AMYL. *Vid.* EthylAmyl.

ETHYLIDE OF BUTYL. *Vid.* EthylButyl.

ETHYLIDE OF ZINC. *Vid.* ZincEthyl.

***Di*ETHYLIN.** (*BiEthylin. BiEthylo Glycerin.*) $C_{14}H_{16}O_6 = \left.\begin{matrix}C_6H_5''' \\ (C_4H_5)_2 \\ H\end{matrix}\right\}O_6$ Insoluble, or nearly insoluble in water. (Berthelot, *Ann. Ch. et Phys.*, (3.) **41**. 306.)

ETHYLIRISIN. Less soluble than methylirisin in water. Soluble in alcohol, from which it is precipitated by ether. Soluble in acids. (v. Babo.)

***Tetra*Ethylium.** *Vid. tetr*Ethylammonium.

EthylMalic Acid. (*Malate of Ethyl.*) $C_{12} H_{10} O_{10} = C_8 H_5 (C_4 H_5) O_{10}$ Tolerably soluble in water. Soluble in ether.

EthylMalate of Lime. $(C_8 H_4) (C_4 H_5) Ca O_{10}$ Insoluble, or but sparingly soluble, in water. Soluble in alcohol. (Demondesir.)

EthylMeconic Acid. $C_{18} H_8 O_{14} = C_{14} H_3 (C_4 H_5) O_{14}$ Very readily soluble in boiling, less soluble in cold water. Soluble in warm, weak alcohol, less soluble in absolute alcohol. Readily soluble in warm ether. (How.)

EthylMeconate of Baryta.

I.) *normal.* Soluble in water. (How.)
$C_{18} H_6 Ba_2 O_{14}$

II.) *mono.* Soluble in water. (How.)
$C_{18} H_7 Ba O_{14}$

III.) *subsalt.* Insoluble in water.

EthylMeconate of Copper. Ppt.

EthylMeconate *of sesquioxide* **of Iron.** Ppt. Soluble in an aqueous solution of sesquichloride of iron.

EthylMeconate of Lead.

EthylMeconate of Silver.

I.) *mono.* Soluble in boiling water.
$C_{18} H_7 Ag O_{14} + 2 Aq$

EthylMeconic Acid with Meconic Acid. *Vid.* Meconate of EthylMeconic Acid.

***Di*EthylMeconic Acid.** $C_{22} H_{12} O_{14} = C_{14} H_2 (C_4 H_5)_2 O_{14}$ Soluble in boiling water. Readily soluble in alcohol. (How.)

***Di*EthylMeconate of Ammonia.** $C_{22} H_{11} (N H_4) O_{14}$ Readily soluble in cold water. Soluble in hot, less soluble in cold alcohol.

***Di*EthylMeconate of Baryta.** $C_{22} H_{11} Ba O_{14}$ Insoluble in boiling water. Readily solnble in a solution of chloride of barium.

***Di*EthylMeconate of Copper.** Ppt.

***Di*EthylMeconate of Lead.** Ppt.

***Di*EthylMeconate of Lime.** Ppt.

***Di*EthylMeconate of Magnesia.** Ppt.

***Di*EthylMeconate of Morphin.** [Soluble in warm water ?]

***Di*EthylMeconate of Silver.** $C_{22} H_{11} Ag O_{14}$ Insoluble in boiling water.

EthylMellitic Acid. Not isolated.
(*EthylMellic Acid.*
Mellovinic Acid.
Vinomelletic Acid.)
$C_8 H (C_4 H_5) O_8$

EthylMellitate of Baryta. $C_8 Ba (C_4 H_5) O_8$ Readily soluble in water. (Erdmann & Marchand.)

***Tri*EthylMercur(*ic*)Ethylammonium.**

$$C_{16} H_{19} N Hg = N \left\{ \begin{matrix} (C_4 H_5)_3 \\ C_4 H_4 Hg \end{matrix} \right.$$

EthylMethyl, &c. *Vid.* MethylEthyl, &c.

EthylMucic Acid. (*Mucovinic Acid.*) $C_{16} H_{14} O_{16} = C_{12} H_9 (C_4 H_5) O_{16}$ Tolerably soluble in water. Very sparingly soluble in alcohol. (Malaguti.)

EthylMucate of Ammonia. $C_{16} H_{13} (N H_4) O_{16}$ Very readily soluble in water.

EthylMucate of Baryta
EthylMucate of Copper
EthylMucate of Lead
EthylMucate of Lime
Precipitates; all soluble in acetic acid.

EthylMucate of Magnesia. Appears to be soluble in water.

EthylMucate of Silver
EthylMucate of Strontia
Precipitates; soluble in acetic acid.

EthylMucate of Zinc. Appears to be soluble in water. (Malaguti.)

EthylNaphthylamin. Not isolated.

$$N \left\{ \begin{matrix} C_{20} H_8'' \\ H \end{matrix} \right.$$

EthylNicotin. *Vid.* Hydrate of EthylNicotin.

EthylNitrAnilin. $C_{16} H_{10} N_2 O_4 = N \left\{ \begin{matrix} C_{12} H_4 (N O_4) \\ C_4 H_5 \\ H \end{matrix} \right.$ Easily soluble in alcohol, and ether; less easily soluble in boiling water.

Its salts are as readily, if not more soluble than the corresponding compounds of nitranilin. (Hofmann.)

EthylNitroPhenidin. (*Oxide of EthylNitrAnilin. NitroPhenetidin. Phenetidine nitriques*) Soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **27.** 467.)

$$C_{16} H_{10} (N O_4) N O_2 = N \left\{ \begin{matrix} C_{12} H_4 (N O_4) \\ C_4 H_5 \\ H \end{matrix} \right. . O_2$$

Ethyl*bi*NitroPhloretic Acid. $C_{22} H_{12} N_2 O_{14}$ Very slightly soluble in cold water. Readily soluble in alcohol, and ether. (Hlasiwetz.)

EthylNitroSalicylic Acid. (*NitroSalicylate of Ethyl. Indigotic Ether.*) $C_{18} H_9 N O_{10} = C_4 H_5 O, C_{14} H_4 (N O_4) O_5$ Somewhat soluble in boiling, less soluble in cold water. Readily soluble in boiling, less soluble in cold alcohol. Soluble, with combination, in cold solutions of potash and soda; these alkaline solutions are decomposed by boiling. Insoluble in ammonia-water, but is slowly decomposed thereby. (Cahours, *Ann. Ch. et Phys.*, (3.) **10.** 362.)

EthylNitroSalicylate of Potash. Soluble in water.

EthylNitroSalicylate of Soda. Soluble in water.

Ethyl*bi*NitroSalicylic Acid. (*BiNitroSalicylate of Ethyl. Salicylic Ether binitré.*) $C_{18} H_8 N_2 O_{14} = C_4 H_5 O, C_{14} H_3 (N O_4)_2 O_5$ Sparingly soluble in water. Tolerably soluble in boiling, less soluble in cold alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **25.** 19, & **27.** 462.)

Ethyl*bi*NitroSalicylate of Ammonia. Soluble in water. (Cahours.)

Ethyl*bi*NitroSalicylate of Potash. Soluble in water. (Cahours.)

Ethyl*bi*NitroSalicylate of Soda. Soluble in water. (Cahours.)

EthyloChloride of Platinum. *Vid.* EthylChloroPlatinic Acid.

Ethylo Compounds. *Vid.* Ethyl Compounds.

EthylOctylamin.
(*EthylCaprylamin.*)

$$C_{20} H_{23} N = N \left\{ \begin{matrix} C_{16} H_{17} \\ C_4 H_5 \\ H \end{matrix} \right.$$

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EthylOxalic Acid. Soluble in water, and alcohol; but these solutions undergo decomposition when evaporated. All of its salts are soluble in water, but most of them are decomposed on boiling the aqueous solution.
(*BinOxalate of Ethyl. Oxalovinic Acid.*)
$C_8 H_6 O_8 = C_4 O_6 (C_4 H_5 O), H O$

EthylOxalate of Baryta. Soluble in water.

EthylOxalate of Ethyl. *Vid.* Oxalate of Ethyl.

EthylOxalate of Lead. Soluble in water. (Laurent, *Method*, p. 250.)

EthylOxalate of Lime. Soluble in water.

EthylOxalate of Methyl. *Vid.* Oxalate of Ethyl & of Methyl.

EthylOxalate of Potash. Readily soluble in water; from this solution it can be recrystallized only with difficulty. Soluble in spirit, but scarcely at all soluble in absolute alcohol.
$C_8 H_5 K O_8$

EthylOxalate of Silver. Soluble in water. (Laurent, *loc. cit.*)

EthylOxalic Acid *quintichloré*. *Vid.* perChlorEthylOxalic Acid.

EthylOxamic Acid.
$C_8 H_7 N O_6 = N \left\{ \begin{matrix} C_4 O_4'' \\ C_4 H_5 . O, H O \\ H \end{matrix} \right.$

***Di*EthylOxamid.** More soluble than oxamid in water, and alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 490.)
(*EthylOxamide* of A. Wurtz.)
$C_{12} H_{12} N_2 O_4 = N_2 \left\{ \begin{matrix} C_4 O_4'' \\ (C_4 H_5)_2 \\ H_2 \end{matrix} \right.$

Ethyl*di*OxySulfoCarbonat. *Vid.* SulphoCarbonidate of Ethyl.

EthylParaTartaric Acid. Deliquescent. Very soluble in water. Readily soluble in alcohol. These solutions are decomposed by ebullition. Insoluble in ether. (Guérin.)
(*Racemovinic Acid. ParaTartrovinic Acid.*)
$C_{12} H_{10} O_{12} + Aq$

EthylParaTartrate of Baryta. More soluble in hot than in cold water. Insoluble in wood-spirit, or in alcohol of 0.95%.
$C_{12} H_9 Ba O_{12} + 2 Aq$

EthylParaTartrate of Lime. Insoluble in ethylparatartaric acid; but soluble in nitric acid.

EthylParaTartrate of Potash.
$C_{12} H_9 K O_{12} + 2 Aq$

EthylParaTartrate of Silver. Sparingly soluble in water. (Guérin-Varry.)
$C_{12} H_9 Ag O_{12}$

EthylParaTartrate of Soda. Insoluble in cold water.

EthylParaTartrate of Strontia. Soluble in ethylparatartaric acid.

EthylPhenylamin. *Vid.* EthylAnilin.

Ethyl*tri*PhenylAmmonium. Somewhat difficultly soluble in water; the solution undergoing decomposition when boiled. Easily soluble in alcohol. (Gœssmann, *Ann. Ch. u. Pharm.*, **100.** 66.)
$N \left\{ \begin{matrix} (C_{12} H_5)_3 \\ C_4 H_5 \end{matrix} \right.$

EthylPhenylUrea.
(*EthylAnilin Urea. EthAnilin Urea. CarbonylEthylPhenylbiamid.*)
$C_{18} H_{12} N_2 O_2 = N_2 \left\{ \begin{matrix} C_2 O_2'' \\ C_{12} H_5 \\ C_4 H_5 \\ H_2 \end{matrix} \right.$

EthylPhloretic Acid. Insoluble in water. Soluble in alcohol, and ether, from which solutions it is precipitated by water. (Hlasiwetz.)
(*Phloretate of Ethyl.*)
$C_{22} H_{14} O_6 = C_{18} H_9 (C_4 H_5) O_6$

***Tri*EthylPhosphin.** Insoluble in water.
$C_{12} H_{15} P = P (C_4 H_5)_3$

EthylPhosphoric Acid. Soluble in all proportions in water, alcohol, and ether. When diluted with several times its own volume of water, it may be boiled for a long time without suffering decomposition, but is decomposed at the same temperature when heated in its most concentrated state. (Pelouze, *Ann. Ch. et Phys.*, 1833, (2.) **52.** 49.)
(*Phospho Vinic Acid. PhospEthylic Acid.*)
$C_4 H_7 P O_8 = C_4 H_5 O, 2 H O, P O_5$

EthylPhosphate of Ammonia. Soluble in water. (Pelouze, *loc. cit.*, p. 45.)

EthylPhosphate of Baryta. Effloresces with extreme slowness.
$C_4 H_5 Ba_2 P O_8 + 12 Aq$

100 pts. of water at °C.	Dissolve pts. of the crystallised (12 Aq) salt.
0°	3.40
5°	3.30
20°	6.72
40°	9.36
50°	7.96
55°	8.89
60°	8 08
80°	4.49
100°	2.80

Or, 1 pt. of the crystallized (12 Aq) salt

is soluble in	29.41	pts. of water at	0°
“	30.30	“	5°
“	14.88	“	20°
“	10.68	“	40°
“	12.56	“	50°
“	11.25	“	55°
“	12.38	“	60°
“	22.27	“	80°
“	35.71	“	100°

The solubility of this salt is remarkable in not increasing rapidly as the temperature rises; it attains its maximum at about 40°, above as well as below which point a portion of it is precipitated. The salt which separates from the aqueous solution at 100° contains the same quantity of water of crystallization as that which separates out at the ordinary temperature. Insoluble in alcohol or ether, both of which precipitate it immediately from the aqueous solution. (Pelouze, *Ann. Ch. et Phys.*, 1833, (2.) **52.** 42, and fig. on p. 43.)

EthylPhosphate of Copper($Cu O$). Appears to be soluble in water. (Pelouze, *loc. cit.*, p. 44.)

EthylPhosphate of Gold. Appears to be soluble in water. (Pelouze, *loc. cit.*, p. 44.)

EthylPhosphate of Iron(both $Fe O$ & $Fe_2 O_3$). Appear to be soluble in water. (Pelouze, *Ibid.*)

EthylPhosphate of Lead. Is the least soluble in water of any of the ethylphosphates. Easily soluble in dilute acids. (Pelouze, *loc. cit.*, pp. 44, 45.)
$C_4 H_5 Pb_2 P O_8$

EthylPhosphate of Lime. Very sparingly soluble in water. Easily soluble in water acidulated with acetic or phosphovinic acids. (Pelouze, *Ann. Ch. et Phys.*, 1833, (2.) **52.** 45.)
$C_4 H_5 Ca_2 P O_8 + 4 Aq$

EthylPhosphate of Magnesia. Soluble in water. (Pelouze, *loc. cit.*, p. 45.)

EthylPhosphate of Manganese. Appears to be soluble in water. (Pelouze, *loc cit.*, p. 44.)

EthylPhosphate of Mercury. Ppt. Soluble in dilute acids. (Pelouze, *loc. cit.*, p. 44.)

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EthylPhosphate of Nickel. Appears to be soluble in water. (Pelouze, *loc. cit.*, p. 44.)

EthylPhosphate of Platinum. Appears to be soluble in water. (Pelouze, *loc cit.*, p. 44.)

EthylPhosphate of Potash. Very deliquescent, and soluble in water. Melts readily in its water of crystallization. (Pelouze, *loc. cit.*, p. 45.)

EthylPhosphate of Silver. Ppt. Only sparingly soluble in water. Soluble in dilute acids. (Pelouze, *loc. cit.*, pp. 44, 45.)
$C_4 H_5 Ag_2 P O_8 + x Aq$

EthylPhosphate of Soda. Like the potash salt, it is very deliquescent and soluble in water. (Pelouze, *loc. cit.*, p. 45.)

EthylPhosphate of Strontia. Much less soluble in boiling than in lukewarm water. Alcohol precipitates it from the aqueous solution. (Pelouze, *Ann. Ch. et Phys.*, 1833, (2.) **52.** 45.)

EthylPhosphate *of protoxide* of Tin. Ppt. Soluble in dilute acids. (Pelouze, *loc. cit.*, p. 44.)

*Di*EthylPhosphoric Acid. Soluble in water. Its salts appear to be all soluble in water.
$C_8 H_{11} P O_8 = \left.\begin{matrix} 2 C_4 H_5 O \\ H O \end{matrix}\right\} P O_5$

*Di*EthylPhosphate of Ammonia. Soluble in absolute alcohol.
$C_8 H_{10} (N H_4) P O_8$

*Di*EthylPhosphate of Baryta. Readily soluble in water and in dilute alcohol.

*Di*EthylPhosphate of Copper. Very soluble in water. (Vœgeli.)

*Di*EthylPhosphate of Lead. Readily soluble in cold, more soluble in warm water. Readily soluble in dilute alcohol; very slowly soluble in cold, very easily soluble in warm alcohol of 40°.
$C_8 H_{10} Pb P O_8$

*Di*EthylPhosphate of Lime. Very readily soluble in water; less soluble in dilute alcohol. Sparingly soluble in absolute alcohol.
$C_8 H_{10} Ca P O_8$

*Di*EthylPhosphate of Magnesia. Very soluble in water.

*Di*EthylPhosphate of Nickel. Very soluble in water.

*Di*EthylPhosphate of Silver. Soluble in water. (Vœgeli.)

*Tri*EthylPhosphin. Soluble in all proportions in alcohol, and ether.
$C_{12} H_{15} P = P \left\{ (C_4 H_5)_3 \right.$

EthylPhosphorous Acid. Soluble in water, with subsequent decomposition. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **16.** 218.)
(*EtheroPhosphorous Acid.*)
$C_4 H_7 P O_6 = C_4 H_5 O, 2 H O, P O_3$

EthylPhosphite of Baryta. Deliquescent. Very readily soluble in water, and alcohol. Ether precipitates it from its alcoholic solution. (Wurtz, *loc. cit.*)
$C_4 H_6 Ba P O_6$

EthylPhosphite of Copper. Deliquescent. Very soluble in water.

EthylPhosphite of Lead. Permanent. Soluble in water, and alcohol. Its aqueous solution undergoes decomposition after a time. Insoluble in ether. (Wurtz, *loc. cit.*)
$C_4 H_6 Pb P O_6$

EthylPhosphite of Potash. Soluble in water. (Wurtz, *loc. cit.*)

*Di*EthylPhosphorous Acid.
(*DiPhosphite of Ethyl.*)

*Di*EthylPhosphite *of protoxide* of Iron. Extremely soluble in water. Apparently insoluble in alcohol. (Railton.)

*Di*EthylPhosphite of Magnesia. Extremely soluble in water. Apparently insoluble in alcohol. (Railton.)

*Di*EthylPhosphite of Nickel. Extremely soluble in water. Apparently insoluble in alcohol. (Railton.)

*Di*EthylPhosphite of Potash. Deliquescent. Soluble in alcohol. Insoluble in ether. (Railton, *J. Ch. Soc.*, **7.** 220.)
$C_8 H_{10} K P O_6 = 2 C_4 H_5 O, K O, P O_3$

*Di*EthylPhosphite of Soda. Similar to the potash-salt. (Railton.)
$C_8 H_{10} Na P O_6$

*Di*EthylPhosphite of Zinc. Extremely soluble in water. Apparently insoluble in alcohol. (Railton.)

EthylPhthalamin.
$C_{20} H_{13} N O_4$

EthylPhthalidin.
$C_{16} H_8 (C_4 H_5) N$

EthylPimelic Acid.
$C_4 H_5 O, H O, C_{14} H_{10} O_6$

EthylPiperidin. Soluble in water; but less so than piperidin. Easily soluble in alcohol, and ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 95.)
$C_{14} H_{15} N$

EthylPiperylUrea. *Vid.* Cyanate of EthylPiperidin.

EthylRacemic Acid. *Vid.* EthylParaTartaric Acid.

EthylQuinine. *Vid.* Hydrate of EthylQuinine.

EthylQuinolein. *Vid.* Hydrate of EthylQuinolein.

EthylSalicylamic Acid. Nearly insoluble in cold, tolerably readily soluble in boiling water. Easily soluble in boiling alcohol, and ether, but much less soluble in these liquids at the ordinary temperature. Soluble in concentrated sulphuric, chlorhydric, and nitric acids, when these are slightly heated; it is reprecipitated from the last two as the solutions cool, and from the first on the addition of water. Soluble in a warm aqueous solution of caustic potash separating out as the solution cools. (Limpricht, *Ann. Ch. u. Pharm.*, **98.** 264.)
$C_{18} H_{11} N O_4 = N H (C_4 H_5) C_{14} H_4 O_3, H O$

EthylSalicylic Acid. Very sparingly soluble, or insoluble, in water. Insoluble in ammonia-water, but after long-continued contact therewith it is decomposed and dissolves. (Cahours, *Ann. Ch. et Phys.*, (3.) **10.** 360.)
(*Salicylate of Ethyl. Salicylic Ether. Hydrate of Ethyl Salicyl.*)
$C_{18} H_{10} O_6 = C_{14} H_5 (C_4 H_5) O_6$

EthylSalicylate of Baryta. Sparingly soluble in water. (Cahours.)

EthylSalicylate of Potash. Soluble in water. (Cahours, *loc. cit.*)

EthylSalicylate of Soda. Soluble in water. (Cahours, *loc. cit.*)

EthylSelenhydric Acid. *Vid.* Selenhydrate of Ethyl.

EthylSinamin. Insoluble in water. Soluble in alcohol, and ether. Soluble in chlorhydric acid. (Hinterberger.)
(*Sinethylamin.*)
$C_{12} H_{10} N_2 = N \left\{ \begin{matrix} C_6 H_5 \\ C_4 H_5 \\ C_2 N \end{matrix} \right.$

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EthylSolanin. Insoluble in water. Soluble in alcohol.
$C_{46}H_{39}NO_{14} = N\left\{\begin{array}{l}C_{42}H_{33}O_{14}\\C_4H_5\\H\end{array}\right.$

EthylStannEthyl. *Vid.* StannEthyl.
$(C_4H_5)_5Sn_4$

EthylSulphuric Acid. (*Sulphovinic Acid. Bisulphate of Ethyl.*) Soluble in all proportions in water, and alcohol. The aqueous solution is liable to suffer decomposition on standing, especially if it be dilute; it is also readily decomposed by boiling. Insoluble in ether. Its salts are all readily soluble in water, especially if this be hot. These solutions are decomposed on boiling. Some of the salts are soluble in alcohol, while others are precipitated from their aqueous solution on the addition of alcohol. Only the ammonia-salt is soluble in ether.
$C_4H_6S_2O_8 = C_4H_5O, HO, 2SO_3$)

EthylSulphate of Alumina. Deliquescent. Soluble in alcohol. (Marchand.)

EthylSulphate of Ammonia. Very deliquescent. Very soluble in water, with reduction of temperature. Tolerably soluble in alcohol, and ether. (Marchand.)
$C_4H_5(NH_4)S_2O_8$

EthylSulphate of Ammonia & of Lead. Soluble in water. (Marchand.)

EthylSulphate of Ammonia & of Potash. Easily soluble in water, and alcohol.
$C_4H_5(NH_4)S_2O_8; 2C_4H_5KS_2O_8$

EthylSulphate of Ammonia & of Zinc.

EthylSulphate of Baryta. Permanent. The crystalline salt is soluble in 0.92 pt. of water at 17°. (Marchand.) Soluble in spirit; but insoluble in cold absolute alcohol.
$C_4H_5BaS_2O_8 + 2\,Aq$

EthylSulphate of Cadmium. Readily soluble in water, and alcohol. Insoluble in ether. (Marchand.)
$C_4H_5CdS_2O_8 + 2\,Aq$

EthylSulphate of Cobalt. Permanent. Readily soluble in water, and alcohol. Insoluble in ether, by which it is precipitated from the alcoholic solution. (Marchand.)
$C_4H_5CoS_2O_8 + 2\,Aq$

EthylSulphate of Copper. Permanent. Readily soluble in water, and alcohol. Insoluble in ether, by which it is precipitated from the alcoholic solution. (Marchand.)
$C_4H_5CuS_2O_8 + 4\,Aq$

EthylSulphate of Ethyl. (*Mono Sulphate of Ethyl*, $C_4H_5O.SO_3$.) Insoluble in water; but is soon decomposed by water, even in the cold. Miscible in all proportions with alcohol, and ether. Soluble in fuming nitric acid, from which it is precipitated on the addition of water. (Wetherill.)
$C_8H_{10}S_2O_8 = C_4H_5(C_4H_5)S_2O_8$

EthylSulphate *of protoxide* **of Iron.** Effloresces, with decomposition. Easily soluble in water, and alcohol. (Vogel.) Insoluble in ether. (Marchand.)

EthylSulphate *of sesquioxide* **of Iron.** Deliquesces, with decomposition. Soluble in water, and alcohol. Insoluble in ether, by which it is precipitated from the alcoholic solution. (Marchand.)

EthylSulphate of Lead.

I.) *normal.* Readily soluble in water, and alcohol. Insoluble in ether, by which it is precipitated from the alcoholic solution. (Marchand.)
$C_4H_5PbS_2O_8 + 2\,Aq$

II.) *basic.* Hygroscopic. Soluble in 0.5 pt. of water (Vogel); in 0.54 pt. at 17°. (Marchand.) Easily soluble in spirit. Insoluble in ether.
$C_4H_5PbS_2O_8, PbO$

EthylSulphate of Lime. Permanent. Soluble in 1 pt. of water at 8°, in 0.8 pt. at 17°, and in 0.63 pt. at 30°. Soluble in all proportions in boiling water. Less soluble in alcohol than in water. Insoluble in ether, by which it is precipitated from the alcoholic solution. (Marchand.)
$C_4H_5CaS_2O_8 + 2\,Aq$

EthylSulphate of Lime & of Soda.

EthylSulphate of Lithia. Deliquescent. Easily soluble in water, and alcohol. Insoluble in ether. (Marchand.)
$C_4H_5LiS_2O_8 + 2\,Aq$

EthylSulphate of Magnesia. Efflorescent. Very readily soluble in water, and alcohol. Insoluble in ether. The aqueous solution is more readily decomposed than that of any of the other ethylsulphates. (Marchand.)
$C_4H_5MgS_2O_8 + 4\,Aq$

EthylSulphate of Manganese. Permanent. Readily soluble in water, and alcohol. Insoluble in ether, by which it is precipitated from the alcoholic solution. (Marchand.)
$C_4H_5MnS_2O_8 + 4\,Aq$

EthylSulphate *of protoxide* **of Mercury.** Deliquescent. Soluble in alcohol. (Marchand.)

EthylSulphate of Nickel. Readily soluble in water, and alcohol. Insoluble in ether, by which it is precipitated from the alcoholic solution. (Marchand.)
$C_4H_5NiS_2O_8 + 2\,Aq$

EthylSulphate of Potash. Permanent. Deliquesces in moist air. Soluble in 0.8 pt. of water at 17°, and in much less hot water. (Marchand.) Readily soluble in spirit. (Hennel.) Insoluble in absolute alcohol, and ether. (Marchand.) Soluble, without decomposition, in ammonia-water, with a considerable reduction of temperature. (Marchand.)
$C_4H_5KS_2O_8$

EthylSulphate of Silver. Soluble in water, and alcohol. (Marchand.)
$C_4H_5AgS_2O_8 + 2\,Aq$

EthylSulphate of Soda. Deliquesces in moist air. Effloresces in warm air. The dry salt is soluble in 0.61 pt. of water at 17°, with reduction of temperature. Also soluble in alcohol. From the saturated hot alcoholic solution a compound of the salt and alcohol crystallizes on cooling, and from the cold mother liquor ether precipitates a further portion of it, but by washing with ether the alcohol may be completely removed. (Marchand.)
$C_4H_5NaS_2O_8 + 2\,Aq$

EthylSulphate of Strontia. Soluble in water. Very readily soluble in alcohol. Insoluble in ether. (Marchand.)
$C_4H_5SrS_2O_8 + 2\,Aq$

EthylSulphate *of protoxide* **of Uranium.** Deliquescent. Soluble in water. Easily soluble, with decomposition, in alcohol. Insoluble in ether. (Marchand.)

EthylSulphate *of sesquioxide* **of Uranium.** Soluble in water. Easily soluble, with decomposition, in alcohol. Insoluble in ether. (Marchand.)

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EthylSulphate of "Wine-Oil." $C_8 H_9 S_2 O_7$ Slightly soluble in water. It is decomposed after a time when in contact with water. (Sérullas.) Readily soluble in alcohol, and ether (Hennel); water precipitates it from these solutions. Decomposed by alkaline solutions.

EthylSulphate of Zinc. $C_4 H_5 Zn S_2 O_8 + 2 Aq$ Readily soluble in water, and alcohol. Insoluble in ether, by which it is precipitated from the alcoholic solution. (Marchand.)

EthylSulphydric Acid. *Vid.* Sulphydrate of Ethyl.

EthylSulphide of *X.* *Vid.* Sulphide of Ethyl & of *X.*

EthylSulphurous Acid. (*BiSulphEthylic Acid. Bisulphite of Ethyl. HypoSulphEthylic Acid.*) $C_4 H_6 S_2 O_6 = C_4 H_5 O, H O, 2 S O_2$ Hygroscopic. Soluble in all proportions in water, and alcohol. (Lœwig & Weidmann.) Miscible in all proportions with water, and alcohol. (Muspratt, *J. Ch. Soc.*, **1.** 47.) The ethylsulphites of the metallic oxides are all soluble in water. (Muspratt.)

EthylSulphite of Ammonia. Deliquescent. Very soluble in alcohol. (Lœwig & Weidmann.)

EthylSulphite of Baryta. $C_4 H_5 Ba S_2 O_6 + Aq$ Readily soluble in water and in ordinary alcohol. Insoluble in absolute alcohol, by which it is precipitated from the aqueous solution. (Lœwig & Weidmann.) Very soluble in water, spirit, and ether. Insoluble in absolute alcohol. (Muspratt, *J. Ch. Soc.*, **1.** 47.)

EthylSulphite of Copper. $C_4 H_5 Cu S_2 O_6 + 5 Aq$ Very readily soluble in water, and alcohol. (Lœwig & Weidmann.) Very soluble in water, and spirit. (Muspratt, *J. Ch. Soc.*, **1.** 49.)

EthylSulphite *of protoxide* **of Iron.** Readily soluble in water, and alcohol. (Lœwig & Weidmann.)

EthylSulphite of Lead. $C_4 H_5 Pb S_2 O_6$ Extremely soluble in water, spirit, and alcohol. (Muspratt, *J. Ch. Soc.*, **1.** 49.)

EthylSulphite of Lime. $C_4 H_5 Ca S_2 O_6$ Permanent. Readily soluble in water, and alcohol. (Lœwig & Weidmann.)

EthylSulphite of Magnesia. Easily soluble in water, and alcohol. (Lœwig & Weidmann.)

EthylSulphite of Manganese. Readily soluble in water, and alcohol. (Lœwig & Weidmann.)

EthylSulphite of Potash. $C_4 H_5 K S_2 O_6$ Deliquescent. Sparingly soluble in cold, more soluble in boiling alcohol.

EthylSulphite of Silver. $C_4 H_5 Ag S_2 O_6$ Soluble in water, and alcohol. (Lœwig & Weidmann.)

EthylSulphite of Soda. $C_4 H_5 Na S_2 O_6 + x Aq$ Slowly deliquesces. Slowly soluble in cold, more soluble in hot alcohol. (Lœwig & Weidmann.)

EthylSulphite of Zinc. $C_4 H_5 Zn S_2 O_6 + 7 Aq$ Effloresces in dry air. Deliquesces in moist air. Very soluble in water, and alcohol. (Lœwig & Weidmann.)

EthylSulphoBenzoic Acid. (*SulphoBenzoate of Ethyl(mono).*) $C_{18} H_{10} S_2 O_{10} = C_{14} H_4 (C_4 H_5) S_2 O_9, H O$ Soluble in water, and alcohol. Its salts appear to be all easily soluble in water, since a solution of the ammonia-salt produces no precipitate with any metallic solution.

EthylSulphoBenzoate of Ammonia. $C_{18} H_9 (N H_4) S_2 O_{10}$ Easily soluble in water, and spirit. Insoluble in ether.

EthylSulphoBenzoate of Baryta. $C_{18} H_9 Ba S_2 O_{10}$ Readily soluble in water.

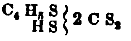
EthylSulphoBenzoate of Silver. $C_{18} H_9 Ag S_2 O_{10}$ Soluble in water.

EthylSulphoBenzoate of Soda. $C_{18} H_9 Na S_2 O_{10}$ Easily soluble in water, and alcohol. (Limpricht & v. Uslar, *Ann. Ch. u. Pharm.*, **102.** 256.)

"EthylSulphoCarbamid." *Vid.* Hydrate of SulphoCarbonylEthylammonium.

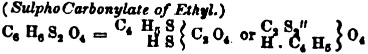
"EthylSulphoCarbonic Acid." $C_6 H_6 S_4 O_2$ *Vid.* OxySulphoCarbonate of Ethyl.

"EthylSulphoCarbonic Acid "(of Kolbe).



$\left.\begin{matrix}C_4 H_5 S\\ H S\end{matrix}\right\} 2 C S_2$ *Vid.* SulphoCarbonate of Ethyl (No. 2).

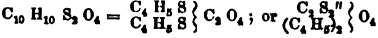
EthylSulphoCarbonic Acid. Not isolated. (*SulphoCarbonylate of Ethyl.*)



$C_6 H_6 S_2 O_4 = \left.\begin{matrix}C_4 H_5 S\\ H S\end{matrix}\right\} C_2 O_4$ or $\left.\begin{matrix}C_2 S_2''\\ H . C_4 H_5\end{matrix}\right\} O_4$

EthylSulphoCarbonate of Copper with $8 (C_6 H_5 Cu S_2 O_4) ; Cu_2 S$ *di***Sulphide of Copper.** Insoluble in water. Tolerably soluble in alcohol. Soluble in about 10,000 pts. of ether. (Debus.)

EthylSulphoCarbonate of Ethyl. (*Sulpho Carbonate of Ethyl. Carbonate of SulphEthyl.*)



$C_{10} H_{10} S_2 O_4 = \left.\begin{matrix}C_4 H_5 S\\ C_4 H_5 S\end{matrix}\right\} C_2 O_4$; or $\left.\begin{matrix}C_2 S_2''\\ (C_4 H_5)_2\end{matrix}\right\} O_4$ Insoluble in water. Easily soluble in alcohol, and ether. (Debus.)

EthylSulphoCarbonate of Lead. $C_6 H_5 Pb S_2 O_4$ Insoluble in water. Decomposed when boiled with water. Sparingly soluble in alcohol, and ether. Soluble in solutions of acetate of lead, and ethylsulphocarbonate of potash. (Debus.)

EthylSulphoCarbonate of Potash. $C_6 H_5 K S_2 O_4$ Permanent. Very soluble in water; the solution decomposes, however, in the course of a few days. Very sparingly soluble in alcohol at 0°; but very easily soluble therein at 15° @ 20°. Very sparingly soluble in ether; by which it is precipitated from the alcoholic solution. Both the aqueous and alcoholic solution are decomposed by boiling.

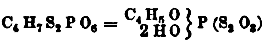
EthylSulphoCarbonate of Silver. $C_6 H_5 Ag S_2 O_4$ Insoluble in water. (Debus.)

EthylSulphoCarbonate of Zinc. Tolerably soluble in water, and in absolute alcohol. After a time these solutions undergo decomposition. (Debus.)

Ethyl*di***SulphoCarbonate of** *X.* *Vid.* OxySulphoCarbonate of Ethyl & of *X.*

Ethyl*tri***SulphoCarbonate of** *X.* *Vid.* SulphoCarbonate of Ethyl & of *X.*

EthylSulphoPhosphoric Acid.



$C_4 H_7 S_2 P O_6 = \left.\begin{matrix}C_4 H_5 O\\ 2 H O\end{matrix}\right\} P (S_2 O_8)$ Not isolated. Most of its salts are soluble in water.

EthylSulphoPhosphate of Baryta. $C_4 H_5 Ba_2 S_2 P O_6 + Aq$ Soluble in water.

EthylSulphoPhosphate of Lime. Soluble in water.

EthylSulphoPhosphate of Potash. Readily soluble in water, and alcohol. (Cloez.)

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EthylSulphoPhosphate of Soda. Readily soluble in water, and alcohol. (Cloez.)

EthylSulphoPhosphate of Strontia. Soluble in water.

EthylSulphydric Acid. *Vid.* Sulphydrate of Ethyl.

EthylTannAspidic Acid. Insoluble in water, anhydrous ether, or in the fatty or essential oils. Easily soluble in alcohol. (Luck.)

$2\,C_{26}H_{13}O_{10}, C_4H_5O$

EthylTartaric Acid. Very deliquescent. Very soluble in water, and alcohol. Its aqueous solution is decomposed by continued ebullition. Insoluble in ether. Its metallic salts are almost all readily soluble in water; but less soluble in alcohol. Their solutions are decomposed by boiling.

(*Tartrovinic Acid.*)
$C_{12}H_{10}O_{12} = C_8H_5(C_4H_5)O_{12}$

EthylTartrate of Ammonia. Soluble in water.

EthylTartrate of Baryta. Soluble in 2.63 pts. of water at 23°, and in 0.78 pt. of boiling water. Insoluble in wood-spirit and in absolute alcohol; sparingly soluble in alcohol of 0.95%. (Guérin-Varry.)

$C_{12}H_9BaO_{12} + 2\,Aq$

EthylTartrate of Copper. Efflorescent.
$C_{12}H_9CuO_{12} + 6\,Aq$ (Guérin-Varry.)

EthylTartrate *of protoxide* **of Iron.**

EthylTartrate of Lead. Insoluble in ethyltartaric acid; soluble in nitric acid. (Guérin-Varry.)

EthylTartrate of Lime. Soluble in water.
$C_{12}H_5CaO_{12} + 5\,Aq$

EthylTartrate of Potash. Easily soluble in water. Sparingly soluble in boiling absolute alcohol. Insoluble in wood-spirit, and in cold alcohol of 0.95%. (Guérin-Varry.)

$C_{12}H_9KO_{12}$

EthylTartrate of Soda. Soluble in water.

EthylTartrate of Silver. Sparingly soluble in cold water. (Guérin-Varry.)

$C_{12}H_9AgO_{12}$

EthylTartrate of Zinc. Soluble in water. (Guérin-Varry.)

Ethyl*di*ThioCarbonate. *Vid.* *bi*Carbonate of *bi*Sulphide of Ethyl.

Ethyl*di*Thionic Acid. *Vid.* EthylSulphurous Acid.

Ethyl*tri*Thionic Acid. Known only in aqueous solution.

(*TriThionate of Ethyl.*)
$C_4H_6S_3O_6$

Ethyl*tri*Thionate of Baryta. Soluble in water; more readily in hot than in cold.

$C_4H_5BaS_3O_6 + Aq$

Ethyl*tri*Thionate of Copper. Deliquescent.
$C_4H_5CuS_3O_6$ Soluble in water, and alcohol.

Ethyl*tri*Thionate of Ethyl. Insoluble in water. Miscible in all proportions with alcohol.

$C_4H_5(C_4H_5)S_3O_6$

Ethyl*tri*Thionate of Silver. Hygroscopic.
$C_4H_5AgS_3O_6$ Readily soluble in water.

Ethyl*tri*Thionate of Soda. Soluble in alcohol. (Hobson, *J. Ch. Soc.*, **10**. 55.)

$C_4H_5NaS_3O_6 + Aq$

Ethyl*tri*Thionate of Zinc.

I.) *normal.* Sparingly soluble either in hot or in cold water. Tolerably soluble in hot, almost insoluble in cold alcohol. Sparingly soluble in ether.

$C_4H_5ZnS_3O_6 + Aq$

II.) *basic.* (Hobson.)
$2(C_4H_5ZnS_3O_6); ZnO, HO$

EthylThiosinamin.
(*Thiosinethylamin.*)

$$C_{12}H_{12}N_2S_2 = N_2\left\{\begin{matrix}C_2S_2''\\C_6H_5\\C_4H_5\\H_2\end{matrix}\right.$$

EthylToluidin (or **Toluenylamin**). Insoluble, or nearly insoluble in water.

$$C_{18}H_{12}N = N\left\{\begin{matrix}C_{14}H_7\\C_4H_5\\H\end{matrix}\right.$$

***Di*EthylToluidin.** Insoluble, or nearly insoluble in water.

$$C_{22}H_{17}N = N\left\{\begin{matrix}C_{14}H_7\\(C_4H_5)_2\end{matrix}\right.$$

***Tri*EthylToluidin.** Not isolated.

EthylUrea. Very soluble in water, and alcohol.

$$C_6H_8N_2O_2 = N_2\left\{\begin{matrix}C_2O_2''\\C_4H_5\\H_3\end{matrix}\right.$$

***Di*EthylUrea.** Easily soluble in water, and alcohol. Soluble in ether. (Habich & Limpricht.)

$$C_{10}H_{12}N_2O_2 = N_2\left\{\begin{matrix}C_2O_2''\\(C_4H_5)_2\\H_2\end{matrix}\right.$$

***Tetra*EthylUrea.**
$N_2C_2(C_4H_5)_4O_2$

EthylUrethran. *Vid.* EthylCarbamate of Ethyl.

***Di*EthylZincamin.**
$N(C_4H_5)_2Zn$

Eucalyne. Soluble in water, and alcohol.
$C_{12}H_{12}C_{12} + 2\,Aq$ (Berthelot.)

Euchlorine. *Vid.* ChloroChloric Acid.

Euchroic Acid. Very sparingly soluble in cold, more soluble in hot water.

(*Mellamic Acid.*)
$C_{24}H_4N_2O_{18}$

Euchroate of Ammonia.

I.) *normal.* Very sparingly soluble in cold water.

$C_{24}H_2(NH_4)_2N_2O_{16}$

II.) *acid.* Soluble in hot water. (Wœhler.)

Euchroate of Baryta. Ppt.
$C_{24}H_2Ba_2N_2O_{16}$ (?)

Euchroate of Lead.
$C_{24}H_2Pb_2N_2O_{16} + 2\,Aq$

Euchroate of Silver. Insoluble in ammonia-water.

$C_{24}Ag_4N_2O_{16} + 2\,Aq$

Eugenic Acid. Resinifies in the air. Very sparingly soluble in water. Very easily soluble in alcohol, ether, and aqueous alkaline solutions. Also soluble in concentrated acetic acid. Scarcely more soluble in dilute ammonia-water, or in a solution of carbonate of ammonia, than in pure water.

(*Nelkensäure. Essence de Girofle oxygenée.*)
$C_{20}H_{12}O_4 = C_{20}H_{11}O_3, HO$

Eugenate of Ammonia. Insoluble in ether.
$C_{20}H_{11}(NH_4)O_4$

Eugenate of Baryta. Difficultly soluble in cold, more easily soluble in hot water. Soluble in hot, less soluble in cold alcohol.

$C_{20}H_{11}BaO_4$

Eugenate of Copper. Ppt.

Eugenate of Ethyl. Insoluble in water. Easily soluble in alcohol, and ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **52**. 206.)

(*EugenEthyl.*)
$C_{24}H_{16}O_4 = C_{20}H_{11}(C_4H_5)O_4$

Eugenate *of protoxide* **of Iron.**

Eugenate of Lead.

Eugenate of Lime. Insoluble in cold, sparingly soluble in boiling water. Soluble in 235 pts. of water. (Bonastre.)

Eugenate of Magnesia. Insoluble in water, either hot or cold. (Bonastre.)

Eugenate of Potash. Soluble in water, with partial decomposition. Soluble

$C_{20}H_{11}KO_4;\ C_{20}H_{12}O_4 + 2\,Aq$

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in hot, less soluble in cold alcohol. (Dumas.) Decomposed by alcohol, and ether. (Bonastre.)

Eugenate of Soda. Soluble in 10 @ 12 pts. of cold, and in any quantity of hot water. Soluble, with decomposition, in alcohol, and ether. (Bonastre.)
$C_{20} H_{11} Na O_4$

Eugenate of Strontia. Resembles the baryta salt.

Eugenin(from *Eugenia caryophyllata*). Somewhat soluble in water. Easily soluble in alcohol, and ether. (Bonastre.)
$C_{20} H_{12} O_4$

Eugenol. *Vid.* Eugenic Acid.

Eugenyl. Hypothetical radical in oil of clove.
$C_{20} H_{11} O_2$

Eulyte. Soluble in 10,000 pts. of water at 10°. Soluble in 170 pts. of alcohol, of 88%, at 10°; easily soluble in such alcohol when warm. Soluble in ether. Soluble in warm concentrated sulphuric acid, from which it separates out for the most part as the solution cools. (Baup, *Ann. Ch. et Phys.*, (3.) **33.** 198.)

Eupatorin(from *Eupatorium cannabium*). Insoluble in water. Soluble in absolute alcohol, and ether.

Euphorbic Acid. Easily soluble in water. Somewhat more difficultly soluble in alcohol. Its alkaline salts are easily soluble.

Euphorbate of Lead. Soluble in warm water.

Euphorbiin. Soluble in alcohol, acetic acid, and oils. Difficultly soluble in alkaline solutions. Ether only dissolves traces of it.
$C_{20} H_{16} O$

Eupion. Insoluble in water. Easily soluble in absolute alcohol, ether, and oils.
(A mixture of oils obtained by the distillation of rich coals, &c., at low temperatures. *Coal-Oil.*)

Euxanthic Acid. Very sparingly soluble in cold, more soluble in boiling water. Readily soluble in boiling alcohol. Soluble in ether. Largely soluble in cold concentrated sulphuric acid, with combination. Soluble in boiling dilute chlorhydric acid. Its alkaline salts are soluble in water, the others are more or less insoluble.
(*Purreic Acid.*)
$C_{42} H_{18} O_{22} = C_{42} H_{17} O_{21}, H O$

Euxanthate of Ammonia. Readily soluble in pure water. Insoluble in alcohol. Insoluble in concentrated aqueous solutions of the alkaline carbonates.
$C_{42} H_{17} (N H_4) O_{22}$

Euxanthate of Baryta. Soluble in boiling, much less soluble in cold water.

Euxanthate of Copper. Tolerably soluble in pure water. Insoluble in an aqueous solution of sulphate of copper.

Euxanthate *of protoxide* **of Iron.** Ppt.

Euxanthate *of sesquioxide* **of Iron.** Ppt.

Euxanthate of Lead. Sparingly soluble in water.

Euxanthate of Lime. Soluble in boiling, much less soluble in cold water.

Euxanthate of Magnesia.

I.) *normal.* Appears to be soluble in water.

II.) *basic.* Insoluble in water.

Euxanthate of Manganese. Ppt.

Euxanthate of Nickel. Ppt.

Euxanthate of Potash. Readily soluble in pure water. Insoluble in concentrated solutions of the alkaline carbonates.
$C_{42} H_{17} K O_{22}$

Euxanthate of Silver. Somewhat soluble in cold water.

Euxanthate of Soda. Readily soluble in pure water. Insoluble in concentrated solutions of the alkaline carbonates.

Euxanthone. Sparingly soluble in water, cold alcohol, and ether. Easily soluble in boiling alcohol. Readily soluble in an aqueous solution of caustic potash; also soluble in concentrated, but almost entirely insoluble in dilute, ammonia-water.
(*Purrenone.*)
$C_{40} H_{12} O_{12}$

Evernic Acid. Insoluble in cold water. Very soluble in alcohol, and ether. Soluble in solutions of caustic potash and ammonia.
$C_{34} H_{16} O_{14}$

Evernate of Baryta. Sparingly soluble in water. Very soluble in weak spirit.
$C_{34} H_{15} Ba O_{14}$

Evernate of Potash. Soluble in water, and in weak alcohol.
$C_{34} H_{15} K O_{14}$

Everninic Acid. Sparingly soluble in cold, tolerably soluble in boiling water. Readily soluble in alcohol, and ether.
$C_{18} H_{10} O_8 = C_{18} H_9 O_7, H O$

Everninate of Baryta.

Everninate of Ethyl. Insoluble in water. Very soluble in alcohol, and ether. Insoluble in ammonia-water. Easily soluble in a solution of caustic potash.
$C_{18} H_9 (C_4 H_5) O_8$

Everninate of Potash. Readily soluble in water; less soluble in cold alcohol.

Everninate of Silver.
$C_{18} H_9 Ag O_8$

Evonymin(from *Evonymus europæus*).

Fagin(from *Fagus sylvatica*). Easily soluble in water, alcohol, and dilute acids. Sparingly soluble in ether. (Buchner & Herberger.)

Fats [compare Oils(Fixed)]. The fats which occur in nature are, as a rule, exceedingly sparingly soluble in water. Scarcely at all soluble in cold ordinary alcohol, the small portion which dissolves being mostly *olein;* boiling alcohol dissolves them much more readily, some margarin being dissolved as well as olein; as the solution cools, most of the matter which has been dissolved is redeposited. Castor-oil is an exception to this rule, being tolerably soluble in ordinary alcohol, and very soluble in absolute alcohol.

The fats are very much more soluble in absolute alcohol than in weaker alcohol, their solubility decreasing with great rapidity as the sp. gr. of the alcohol is increased from 0.795 to 0.821 (Chevreul, *Ann. Ch. et Phys.*, 1816, (2.) **2.** 361; see under Stearin (natural).)

As a rule, the fats are all soluble in ether; which is generally considered to be their best solvent. They are also readily soluble in naphtha, benzin, and the various oils obtained from coal, &c., — both the coal-oils proper and the products obtained from coal-tar; also in oil of turpentine. In oil of ocotea (Hancock); and the other essential oils; in bisulphide of carbon, chloride of sulphur, protochloride of phosphorus, chloroform, fusel-oil (hydrate of amyl), capryl alcohol (hydrate of capryl) (Bouis), acetone, and the like.

They are soluble in a concentrated solution of butyric acid. (Chevreul; Barreswil, *Ann. Ch. et Phys.*, (3.) **10.** 445.) They are soluble, with combination, in concentrated sulphuric acid; and

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in the other concentrated mineral acids, with decomposition.

When boiled with aqueous solutions of the caustic alkalies, or heated in closed vessels (under pressure) with solutions of the alkaline carbonates, they are decomposed with separation of glycerin and formation of soap.

Oleic acid, and other fatty acids are soluble in almost any quantity in a mixture of oil of turpentine and alcohol. (Rousseau, *J. Ch. Méd.*, **22.** 310. [*Gm.*].)

Beef Fat. 100 pts. of boiling alcohol of 0.821 sp. gr. dissolve 2.52 pts. of it; or 1 pt. of the fat is soluble in 39.6 pts. of boiling alcohol of 0.821 sp. gr. (Chevreul, *Ann. Ch. et Phys.*, 1816, (2.) **2.** 348.) Soluble in hot oil of bay. (Brandes.)

Cacao Butter (from *Theobroma Cacao*).

Chinese Tallow (from *Stillingia Sebifera*). (*Mixture of palmitin & olein.*) Insoluble in water. The liquid portion of the tallow (its olein) being soluble in the cold in various menstrua imparts to them a solvent action on the solid portion also, which they otherwise do not possess; hence, not only do oil of turpentine and coal-tar naphtha dissolve it entirely, but it is also partially soluble in ether, in mixed ether and absolute alcohol (equal parts), ether and common alcohol, wood-spirit, absolute alcohol, and common strong alcohol. The order of these menstrua indicates the order of solubility. On boiling, it is completely dissolved by ether, by ether and absolute alcohol (equal parts), ether and common alcohol, absolute alcohol, wood-spirit, and common alcohol, — the facility of solution being indicated by the order of the solvents. The ethereal solutions remain clear after cooling, and only after some time deposit crystals. Crystals are formed immediately in the other solutions. (Maskelyne, *J. Ch. Soc.*, **8.** 2.)

Cow's Butter. Soluble in 28 pts. of boiling alcohol of 0.82.

Hog's Fat. 100 pts. of boiling alcohol, of 0.816 sp. gr. dissolve 2.8 pts. of it; or 1 pt. of the fat is soluble in 39.64 pts. of boiling alcohol of 0.816 sp. gr. (Chevreul, *Ann. Ch. et Phys.*, 1816, (2.) **2.** 348.)

Human Fat. 100 pts. of boiling alcohol of 0.821 sp. gr. dissolve 2.48 pts. of it; or 1 pt. of the fat is soluble in 40.32 pts. of boiling alcohol of 0.821 sp. gr. (Chevreul, *Ann. Ch. et Phys.*, 1816, (2.) **2.** 348.)

Jaguar Fat. 100 pts. of boiling alcohol, of 0.821 sp. gr. dissolve 2.18 pts. of it; or 1 pt. of the fat is soluble in 45.87 pts. of boiling alcohol of 0.821 sp. gr. (Chevreul, *Ann. Ch. et Phys.*, 1816, (2.) **2.** 348.)

Muscat Butter (from the nuts of *Myristica moschata*). Partially soluble in cold alcohol. Completely soluble in 4 pts. of boiling alcohol.

Mutton Fat. 100 pts. of boiling alcohol, of 0.821 sp. gr. dissolve 2.26 pts. of it; or 1 pt. of the fat is soluble in 44.24 pts. of boiling alcohol of 0.821 sp. gr. (Chevreul, *Ann. Ch. et Phys.*, 1816, (2.) **2.** 348.) Soluble in hot, less soluble in cold acetone, from which it is precipitated on the addition of water.

Nutmeg Butter (from *Myristica officinalis*). Contains two fatty oils. One soluble in alcohol, the other insoluble in alcohol, and soluble in ether.

Shea Butter. Soluble for the most part in alcohol. Completely soluble in cold ether. (Thomson & Wood.)

Ferment Oils. (*Fermentolea.*) These are volatile oils, produced by the fermentation of various plants, but not originally contained in the latter, and entirely different from the "essential oils," which are extracted from the unfermented plants by distillation with water. Ferment-oils are generally much more soluble in water than ordinary volatile oils.

Ferment-oil of Chærophyllum Sylvestre. Sparingly soluble in water. Easily soluble in alcohol, ether, and the fixed and volatile oils. It forms an emulsion with ammonia-water, and dissolves resin. (Bley.)

Ferment-oil of Chelidonium majus. Sparingly soluble in water. Readily soluble in alcohol, ether, and the fixed and volatile oils. (Bley.)

Ferment-oil of Conium maculatum. Easily soluble in alcohol, ether, and the fixed and volatile oils. (Landerer.)

Ferment-oil of diseased Apples. (*Oil of Apples. Maloil.*) Readily soluble in alcohol, and ether. (Rossignon.)

Ferment-oil of Erythræa Centaurium.

Ferment-oil of Echium vulgare. Easily soluble in alcohol, and ether. (Bley.)

Ferment-oil of Erica vulgaris. Soluble in ether. (Bley.)

Ferment-oil of Tussilago farfara. Sparingly soluble in water. Readily soluble in alcohol, and ether. (Bley.)

Ferment-oil of Marrubium vulgare. Soluble in water, in dilute nitric acid, and in an aqueous solution of caustic potash. Easily soluble in ether. (Bley.)

Ferment-oil of Achillea Millefolium. Soluble in alcohol, ether, and the fixed and volatile oils. (Bley.)

Ferment-oil of various species of Plantago. Soluble in alcohol, ether, and oils. (Bley.)

Ferment-oil of Quercus Robur. Sparingly soluble in water. Readily soluble in alcohol, ether, and the fixed and volatile oils. (Bley.)

Ferment-oil of Salix pentandra. Sparingly soluble in water. Easily soluble in all proportions in alcohol, ether, the fixed and volatile oils, and creosote. (Bley.)

Ferment-oil of Salvia pratensis. Sparingly soluble in water. Easily soluble in all proportions in alcohol, ether, and the fixed and volatile oils. Very sparingly soluble in an aqueous solution of caustic potash. Forms an emulsion with ammonia-water. (Bley.)

Ferment-oil of Trifolium fibrinum. Sparingly soluble in water. Easily soluble in alcohol, and ether. (Bley.)

Ferment-oil of Urtica urens. Resembles the ferment-oil of *Echium vulgare.*

Ferment-oil of Vitis vinifera. Sparingly soluble in water. Abundantly soluble in alcohol, ether, and the fixed oils. In oil of turpentine, and oil of lemon, it forms at first a milky solution, which afterwards becomes clear. With bisulphide of carbon it forms a milky liquid, from which it afterwards separates unaltered. Soluble, without alteration, in chlorhydric and acetic acids. Forms a soapy emulsion with ammonia-water.

Ferric Acid. Not isolated. All of the fer-

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$Fe\,O_3$ rates, excepting those of potash and soda, are insoluble in water. (Fremy, *loc. inf. cit.*)

Ferrate of Baryta. Insoluble in water. $2\,(Ba\,O,\ Fe\,O_3) + Aq$ (Denham Smith.) Insoluble in water. Decomposed by long boiling with water. Soluble in acetic acid at ordinary temperatures, without decomposition, — that is to say, the ferric acid is not destroyed, but remains in the solution. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 373.)

Ferrate of Potash. Very deliquescent. Soluble in water, with evolution of so much heat that the salt is decomposed unless the mixture be refrigerated.

Very soluble in water. Insoluble in a concentrated aqueous solution of caustic potash. The aqueous solution soon decomposes when left to itself; this decomposition is instantaneous on boiling. If a hypochlorite be present in the solution, the ferrate of potash is only slowly decomposed on boiling. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** pp. 369, 371.)

Ferrate of Soda. Soluble in water, and in a concentrated solution of caustic soda. (Fremy, *loc. cit.*, p. 373.)

FerriCyanhydric Acid. Easily soluble in $C_{12}\,H_3\,Fe_2\,N_6 = 3\,H\,Cy,\ Fe_2\,Cy_3 = H_3\,.\,\text{Cfdy}'''$ water; the solution undergoing decomposition when boiled for a long time. Also soluble in alcohol, but this solution is decomposed by the action of light. (Compare F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4.** 102.)

The ferricyanides of metals, the oxides of which are soluble in ammonia-water, or in a solution of caustic potash, are themselves soluble in solutions of ammonia and potash. (Reynoso, *Ann. Ch. et Phys.*, (3.) **30.** 255.)

FerriCyanhydrate of Cinchonin.

$N_2\left\{C_{40}\,H_{24}\,O_2^{\text{vi}},\ 3\,H\,Cy,\ Fe_2\,Cy_3 + 4\,Aq\right.$

FerriCyanhydrate of Codein.

FerriCyanhydrate of Harmalin.

FerriCyanhydrate of Harmin.

FerriCyanhydrate of Morphine. Ppt.

FerriCyanhydrate of NitroHarmalin. Less soluble in water than the nitroharmin salt.

FerriCyanhydrate of NitroHarmin. More soluble in water than the nitroharmalin salt.

FerriCyanhydrate of Quinine. Easily $C_{40}\,H_{24}\,N_2\,O_4,\ Fe_2\,Cy_3,\ 3\,H\,Cy + 8\,Aq$ soluble in water, but the solution is decomposed by evaporation. (Dollfus.)

FerriCyanhydrate of Strychnine. Very $3\,C_{42}\,H_{22}\,N_2\,O_4,\ 3\,H\,Cy,\ Fe_2\,Cy_3 + 12\,Aq$ hygroscopic. Very sparingly soluble in cold, more soluble in hot water. Soluble in cold, but more soluble in warm alcohol. (D. Brandis.)

FerriCyanide of Ammonium. Permanent. $3\,N\,H_4\,Cy,\ Fe_2\,Cy_3 + 6\,Aq$ Readily soluble in water. Soluble in alcohol (?).

FerriCyanide of Barium. Known only in $3\,Ba\,Cy,\ Fe_2\,Cy_3$ aqueous solution. (Berzelius's *Lehrb.*)

FerriCyanide of Barium & Potassium. $K\,Ba_2\,Cy_3,\ Fe_2\,Cy_3 + 6\,Aq$ Permanent. Readily soluble in water; less soluble in alcohol. (Bette.)

FerriCyanide of Bismuth. Ppt. Insoluble $Bi\,Cy_3,\ Fe_2\,Cy_3$ in chlorhydric acid.

FerriCyanide of Brucin. Resembles the ferrocyanide. (Brandes.)

FerriCyanide of Cadmium. Readily soluble $3\,Cd\,Cy,\ Fe_2\,Cy_3$ in aqueous solutions of ammoniacal salts, and in ammonia-water. (Wittstein.) Soluble in chlorhydric acid.

FerriCyanide of Calcium. Deliquescent. $3\,Ca\,Cy,\ Fe_2\,Cy_3 + 10\,Aq$ in moist air. Easily soluble in water. Also soluble in weak alcohol. (Bette.)

FerriCyanide *of protoxide* **of Cerium.** Appears to be soluble in water.

FerriCyanide *of sesquioxide* **of Cerium.** Ppt.

FerriCyanide of Cobalt. Insoluble in $3\,Co\,Cy,\ Fe_2\,Cy_3$ ammonia-water. (Wittstein.) Insoluble in chlorhydric acid. Soluble in ammonia-water. (Reynoso.)

***Di*FerriCyanide of Copper.** Ppt. Insoluble $3\,Cu_2\,Cy,\ Fe_2\,Cy_3$ in solutions of the ammoniacal salts; but soluble in ammonia-water. (Wittstein.)

***Proto*FerriCyanide of Copper.** Soluble in $3\,Cu\,Cy,\ Fe_2\,Cy_3$ ammonia-water, and in an aqueous solution of carbonate of ammonia. Only partially soluble in hot solutions of the other ammoniacal salts. (Wittstein.) Insoluble in chlorhydric acid. (H. Rose, *Tr.*)

FerriCyanide of Ferammonium. Insoluble $3\left(N\left\{\begin{matrix}H_3\\Fe\end{matrix}\right.Cy\right),\ 2\,Fe_2\,Cy_3 + 9\,Aq$ in an aqueous solution of tartrate of ammonia. Scarcely at all acted upon by ammonia-water. Decomposed by aqueous solutions of the fixed alkalies, even in the cold. (Monthiers.)

FerriCyanide of Iron.
(*Prussian Blue.*)

I.) *Turnbull's Blue.*

$C_{12}\,N_6\,Fe_5 + 12\,Aq = 3\,Fe\,Cy,\ Fe_2\,Cy_3 + 12\,Aq$

II.) *Ordinary Prussian Blue.*

$C_{18}\,N_9\,Fe_7 + 18\,Aq = 3\,Fe\,Cy,\ 2\,Fe_2\,Cy_3 + 18\,Aq$ Very hygroscopic. (Berzelius.) Insoluble in water, alcohol, ether, the essential oils, or dilute acids. Unacted upon by small quantities of cold concentrated chlorhydric acid. It dissolves at once in a cold aqueous solution of normal tartrate of ammonia. (Monthiers.) Soluble in oxalic acid. Soluble in aqueous solutions of many of the nitro-prussids. (Playfair.) Insoluble in ammonia-water. (Reynoso.) Soluble in concentrated sulphuric acid, from which it is precipitated on the addition of water. (Berzelius, *Lehrb.*, **3.** pp. 586, 588.) Decomposed by nitric acid when this is gently warmed; also by strong fuming chlorhydric acid. Decomposed by alkaline solutions. (*Ibid.*) Solutions of tartrate or citrate of iron containing free tartaric or citric acid are not precipitated, but only colored blue, on the addition of ferrocyanide of potassium. (Calloud.) It is not formed in solutions which contain tartaric acid. (Spiller.)

"In all cases in which the formation of Prussian blue occurs in presence of a compound of potassium, the Prussian blue takes up ferrocyanide of potassium in a state of intimate union, and in particular abundance when the latter is present in excess. Prussian blue containing a considerable quantity of ferrocyanide of potassium, is not soluble in the saline liquid in which it is produced; but on decanting this liquid, and washing the residue with water, the water acquires a blue color which becomes continually deeper as the soluble salts are removed, the water in fact dissolving the

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greater part of the ferrocyanide of potassium, and by means of it a large quantity of Prussian blue. This is the soluble Prussian blue described by Berzelius and Robiquet. With a smaller quantity of ferrocyanide of potassium the Prussian blue does not dissolve in the wash water, but very slowly gives up to it the ferrocyanide of potassium, so that ultimately a residue is obtained, consisting of Prussian blue free from potassium." (L. Gmelin, *Handbook*, **7**. 439.)

Prussian blue which contains much ferrocyanide of potassium is wholly or in part soluble in water, but is insoluble in saline solutions like chloride of ammonium. It is not precipitated from this solution either on boiling or by the addition of alcohol, but is thrown down by chlorhydric acid and by many salts, after which it may again be dissolved in pure water. (Robiquet.) All samples of Prussian blue give up ferrocyanide of potassium to boiling water. (Wach.)

III.) *Ammoniacal Prussian Blue.* Insoluble in an aqueous solution of normal tartrate of ammonia. (Monthiers.)
$3(Fe Cy, N H_3, H O), 2(Fe_2 Cy_3) + 9 Aq$

IV.) *Green cyanide of Iron.* (*Prussian Green.*) Soluble in pure water. (Berzelius.) Insoluble in water. Insoluble in concentrated chlorhydric acid, but is decomposed when boiled therewith during several hours. (Pelouze.)
$C_{24} N_{12} Fe_9 + 12 Aq$ or $C_8 N_4 Fe_3 + 4 Aq = Fe Cy, Fe_2 Cy_3 + 4 Aq$

V.) *Basic Prussian Blue.* Soluble in water. Insoluble in an aqueous solution of ferrocyanide of potassium and in saline solutions generally, which also precipitate it from the aqueous solution. Alcohol does not precipitate it from the aqueous solution. (Berzelius.)
$3 Fe Cy, 2 Fe_2 Cy_3; Fe_2 O_3$

VI.) "*Soluble Prussian Blue.*" Soluble in pure water. Insoluble in saline solutions, or in acids. Alcohol precipitates it from the aqueous solution. (Berzelius.)
$3 Fe Cy, 2 Fe_2 Cy_3; 2 K Cy, Fe Cy$

VII.) $2 (3 Fe Cy, 2 Fe_2 Cy_3); 2 K Cy, Fe Cy$ Insoluble in water, but is gradually oxidized and then dissolved when in contact with water. (Berzelius, *Lehrb.*, **3**. 592.)

VIII.) $3 (3 Fe Cy, 2 Fe_2 Cy_3); 2 (2 K Cy, Fe Cy)$ Soluble in water, and in dilute spirit. (*Ibid.*)

FerriCyanide of Lead. Slightly soluble in water; more soluble in hot than in cold water, but the solution deposits a powder when boiled. (Gmelin.)
$3 Pb Cy, Fe_2 Cy_3$

FerriCyanide of LuteoCobalt. Ppt.
$6 N H_3 . Co_2 Cy_3, Fe_2 Cy_3 + Aq$

FerriCyanide of Magnesium. Readily soluble in water. Soluble in spirit. (Bette.)
$3 Mg Cy, Fe_2 Cy_3 + 17 Aq$

FerriCyanide of Manganese. Insoluble in water. Insoluble in ammonia-water. (Reynoso.) Insoluble in acids. (H. Rose, *Tr.*) Slightly soluble in an aqueous solution of carbonate of ammonia. Insoluble in a solution of chloride of ammonium. (Wittstein.)
$3 Mn Cy, Fe_2 Cy_3$

FerriCyanide of Nickel. Insoluble in chlorhydric acid.
$3 Ni Cy, Fe_2 Cy_3$

FerriCyanide of Nickel & of Nickelammonium. Ppt.
$Ni Cy, 2 (N\left\{\begin{matrix}H_3\\Ni\end{matrix}\right., Cy), Fe_2 Cy_3 + Aq$

FerriCyanide of Potassium. Permanent.
$3 K Cy, Fe_2 Cy_3$

At °C.	1 pt. of the salt is soluble in pts. of water.	100 pts. of water dissolve pts. of the salt.	Sp. gr. of the solution.
4.4°	3 03	33.0	1.151
10°	2.73	36 6	1.164
15.6°	2.54	40.8	1.178
37.8°	1.70	58.8	1.225
100°	1.29	77.5	1.250
104.4°	1.21	82.6	1.265

(Wallace, *J. Ch. Soc.*, **7**. 80.)

Soluble in 2.63 pts. of water at 13°; or 100 pts. of water at 13° dissolve 38 pts. of it; or the aqueous solution saturated at 13° contains 27.5% of it, and is of 1.1630 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113**. 350.) Soluble in 3.8 pts. of cold, and in a smaller quantity of hot water (L. Gmelin.); in 2 pts. of cold and in less than 1 pt. of hot water. (Girardin.)

An aqueous solution of sp. gr. (at 13°)	Contains (by experiment) per cent of $3 K Cy, Fe_2 Cy_3$
1.0158	3.06
1.0320	6.10
1.0492	9.20
1.0668	12.20
1.1026	18.33
1.1630	27.50

From these results Schiff deduces the formula: $D = 1 + 0.005069\ p + 0.00003123\ p^2$, in which D = the sp. gr. of the solution and p the percentage of substance in the solution, by means of which Ott has calculated the following table.

An aqueous solution of sp. gr. (at 18°)	Contains per cent of $3 K Cy, Fe_2 Cy_3$	An aqueous solution of sp. gr. (at 13°)	Contains per cent of $3 K Cy, Fe_2 Cy_3$
1.0051	1	1.0891	16
1.0103	2	1.0952	17
1.0155	3	1.1014	18
1.0208	4	1.1076	19
1.0261	5	1.1139	20
1.0315	6	1.1202	21
1.0370	7	1.1266	22
1.0426	8	1.1331	23
1.0482	9	1.1396	24
1.0538	10	1.1462	25
1.0595	11	1.1529	26
1.0653	12	1.1596	27
1.0712	13	1.1664	28
1.0771	14	1.1732	29
1.0831	15	1.1802	30

(H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113**. 199.)

The saturated aqueous solution boils at 104.4°. (Wallace, *loc. cit.*) Very insoluble in strong alcohol. (F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4**. 102.) Insoluble in absolute alcohol. Very sparingly soluble in spirit. (L. Gmelin.)

FerriCyanide of Potassium & of Sodium. Soluble in water. (Laurent.)
$3 K Cy, Fe_2 Cy_3; 3 Na Cy, Fe_2 Cy_3, \& + 6 Aq$

FerriCyanide of Potassium with Iodide of Potassium. (Preuss.)
$3 K Cy, Fe_2 Cy_3; K I$

FerriCyanide of RoseoCobalt. Insoluble in cold, readily decomposed by hot water. (Gibbs & Genth, *Smithsonian Contributions*, Vol. **9**.)
$5 N H_3 . Co_2 Cy_3, Fe_2 Cy_3 + 3 Aq$

FerriCyanide of Silver. Soluble in ammonia-water, and in a hot aqueous solution of carbonate of ammonia; but insoluble in solutions of the other ammoniacal salts.
$3 Ag Cy, Fe_2 Cy_3$

Insoluble in an aqueous solution of proto-nitrate of mercury. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 317.)

FerriCyanide of Sodium. $3 Na Cy, Fe_2 Cy_3 + 2 Aq$ Effloresces in moist air. (Kramer.) Deliquescent. (Bette.) Soluble in 5.3 pts. of cold, and in 1.25 pts. of boiling water. Very sparingly soluble in alcohol (Kramer); but alcohol does not precipitate it from the aqueous solution. (Bette.) Insoluble in alcohol; but even a very concentrated aqueous solution may be mixed with a large quantity of strong alcohol without precipitating the salt. (Berzelius, *Lehrb.*, **3.** 583.)

FerriCyanide of Tin. $3 Sn Cy, Fe_2 Cy_3$ Imperfectly soluble in ammonia-water, and in aqueous solutions of the ammoniacal salts. (Wittstein.) Soluble in chlorhydric acid.

FerriCyanide of Uranium($Ur_2 O_3$). Soluble in an aqueous solution of carbonate of ammonia. (Wittstein.)

FerriCyanide of Vanadium($V O_2$). Ppt.

FerriCyanide of Zinc. $3 Zn Cy, Fe_2 Cy_3$ Readily soluble in ammonia-water, and in aqueous solutions of the ammoniacal salts. (Wittstein.) Soluble in chlorhydric acid.

FerriCyanide of Zirconium. Appears to be soluble in water.

Ferride of Potassium.

Ferride of Tin. $Sn Fe_3$ Slowly soluble in concentrated chlorhydric acid. Easily soluble in aqua-regia. It is not attacked even by boiling nitric acid. (Lassaigne.)

Ferrous Acid. *Vid. Sesqui*Oxide of Iron.

Ferrite of Iron & of Manganese. $(Fe O, Mn O), Fe_2 O_3$

Ferrite of Lime. $Ca O, 4 Fe_2 O_3$ Insoluble in pure water, or in a solution of sugar. Decomposed by an aqueous solution of carbonic acid, especially if it be boiled therewith. Decomposed by acids. Insoluble in a solution of caustic potash. (Pelouze, *Ann. Ch. et Phys.*, (3.) **33.** 7.)

Ferrite of Nickel.

Ferrite of Potash. $K O, Fe_2 O_3$ Decomposed by water, and by most liquids; but may be kept in contact with an aqueous solution of chloride of ammonium for some time without decomposition. (Salm-Horstmar.)

Ferrite of Soda. Decomposed by water, both cold and hot, the soda being entirely removed. (Schaffgotsch.) But, like the potash salt, it is not readily decomposed by a solution of chloride of ammonium. (Salm-Horstmar.)

Ferrite of Zinc. $Zn O, Fe_2 O_3$ Scarcely acted upon by cold dilute chlorhydric acid. Completely soluble in boiling concentrated chlorhydric acid. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **33.** 48.)

FerroCyanhydric Acid. (*FerroPrussic Acid.*) $C_6 N_3 Fe H_2 = 2 H Cy, Fe Cy, = H_2, Cfy''$ Soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 530.) Readily soluble in water, and alcohol. Insoluble in ether, by which it is precipitated from the aqueous solution. Very much less soluble in a mixture of ether and alcohol than in alcohol alone. (Posselt.) Insoluble in concentrated chlorhydric acid. (Robiquet.)

The ferrocyanides of metals, the oxides of which are soluble in ammonia-water or in a solution of caustic potash, are themselves soluble in solutions of ammonia, and potash. (Reynoso, *Ann. Ch. et Phys.*, (3.) **30.** 255.)

FerroCyanhydrate of Brucin.

I.) $4 C_{46} H_{26} N_2 O_8, 4 H Cy, 2 Fe Cy + 4 Aq$ Very hygroscopic. Sparingly soluble in cold, much more soluble in hot water or alcohol. (Brandes.)

II.) *acid.* Scarcely soluble in water or alcohol. Soluble in an alcoholic solution of brucin. (Brandes.)

FerroCyanhydrate of Cinchonin. $C_{40} H_{24} N_2 O_2, 4 H Cy, 2 Fe Cy + 4 Aq$ Somewhat soluble in water. Very sparingly soluble in alcohol. (Dollfus.) Insoluble in a cold aqueous solution of ferrocyanide of potassium, but dissolves when the aqueous liquor from which it has been precipitated is warmed, even when this contains an excess of ferrocyanide of potassium. (Bill, *Am. J. Sci.*, (2.) **26.** 109.)

FerroCyanhydrate of Codein. Soluble in ferrocyanhydric acid.

FerroCyanhydrate of Harmalin.

FerroCyanhydrate of Harmin. Sparingly soluble in water.

FerroCyanhydrate of Morphine. Soluble in alcohol.

FerroCyanhydrate of NitroHarmalin.

FerroCyanhydrate of NitroHarmin. Sparingly soluble in boiling water.

FerroCyanhydrate of Quinine. $C_{40} H_{24} N_2 O_4, 4 H Cy, 2 Fe Cy + 4 Aq$ Insoluble in water. Difficultly soluble in alcohol. (Parrish's *Pharm.*, p. 403.)

FerroCyanhydrate of Solanin.

FerroCyanhydrate of Strychnine.

I.) $4 C_{42} H_{22} N_2 O_4, 4 H Cy, 2 Fe Cy + 16 Aq$ Very hygroscopic. Difficultly soluble in cold water; more readily soluble in cold alcohol. It dissolves more readily in both these liquids when they are warm, but is decomposed by hot water. (D. Brandis.)

II.) $C_{42} H_{22} N_2 O_4, 2 H Cy, 2 Fe Cy + 5 Aq$ Very hygroscopic. Almost insoluble in water or alcohol. (D. Brandis.)

FerroCyanide of Aluminum.

I.) $2 Al_2 Cy_3, 3 Fe Cy$ Insoluble in water and in dilute acids. (Tissier.)

II.) Soluble in water.

FerroCyanide of Ammonium. $2 N H_4 Cy, Fe Cy + 3 Aq$ Permanent. Very soluble in cold water. Insoluble in alcohol.

There is a green isomeric modification of this salt, which is more soluble in water than the ordinary modification; alcohol precipitates it as a thick sirup from the aqueous solution. By repeated solution and evaporation it is gradually decomposed. The ordinary modification may be converted into the green modification by repeated evaporation. (Berzelius, *Lehrb.*, **3.** 577.)

FerroCyanide of Ammonium & of Copper. $N H_4 Cy, Cu Cy, Fe Cy$

FerroCyanide of Ammonium & of Magnesium. Soluble in 178 pts. of boiling water.

FerroCyanide of Ammonium & of Potassium. $N H_4 Cy, 3 K Cy, 2 Fe Cy + 6 Aq$ Easily soluble in cold, more readily in hot water. Insoluble in alcohol. (Reindel.)

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FerroCyanide of Barium. $2\,Ba\,Cy, Fe\,Cy + 6\,Aq$ Permanent. Soluble in 584 pts. of cold, and in 116 pts. of boiling water. (Duflos, *Schweigger's Journ. für Ch. u. Phys.*, 1832, **65**. 234); in 1800 pts. of cold water (Porrett, *Phil. Trans.*, 1814, p. 530); in 1920 pts. of cold, and about 100 pts. of boiling water. (Thomson.) 100 pts. of water at 15.5° dissolve 0.05 pt. of it, and at 100° 1 pt. of it. (Ure's *Dict.*) Soluble in nitric, and chlorhydric acids. [T.] Somewhat soluble in concentrated sulphuric acid. (Berzelius.)

There is an isomeric green modification of this salt which is more soluble in water than the ordinary variety; it is also soluble in weak alcohol. (Berzelius, *Lehrb.*, **3**. 577.)

FerroCyanide of Barium & of Potassium. $K\,Cy, Ba\,Cy, Fe\,Cy + 8\,Aq$ Soluble in 38 pts. of cold, and in 9.5 pts. of boiling water (Duflos, *Schweigger's Journ. für Ch. u. Phys.*, 1832, **65**. 234); in 36.38 pts. of water at 14°, and in 11.85 pts. of boiling water. (Mosander.) No more soluble in solutions of ammoniacal salts than in water. Soluble in dilute, but insoluble in concentrated chlorhydric acid. (H. Rose, *Tr.*)

FerroCyanide of Bismuth. $2\,Bi\,Cy_3, 3\,Fe\,Cy$ Ppt. Insoluble in chlorhydric acid.

FerroCyanide of Cadmium. $2\,Cd\,Cy, Fe\,Cy$ Ppt. Soluble in ammonia-water; but only incompletely soluble in hot aqueous solutions of the ammoniacal salts. (Wittstein.) Soluble in chlorhydric acid.

FerroCyanide of Calcium. $2\,Ca\,Cy, Fe\,Cy, + 12\,Aq$ Deliquescent. Very readily soluble in water. Insoluble in alcohol. (E. Marchand.)

FerroCyanide of Calcium & of Potassium. $Ca\,Cy, K\,Cy, Fe\,Cy$ Soluble in 795 pts. of water at 15°, and in 145 [144.7] pts. of boiling water. Since the solution in boiling water is of a different color from that obtained in the cold, and since it yields no precipitate on cooling, decomposition has probably occurred. The salt is also decomposed by long-continued washing with water. Soluble in dilute chlorhydric acid, from which it is precipitated, unchanged, on the addition of concentrated chlorhydric acid. Soluble in nitric acid of 1.2 sp. gr. (Mosander.) Insoluble in an aqueous solution of chloride of ammonium. (H. Rose, *Tr.*)

FerroCyanide *of protoxide* **of Cerium.** Ppt. Soluble in nitric acid.

FerroCyanide *of sesquioxide* **of Cerium.** Ppt.

FerroCyanide of Chromium. $2\,Cr\,Cy, Fe\,Cy$ Ppt.

FerroCyanide of Cobalt. $2\,Co\,Cy, Fe\,Cy + x\,Aq$ Soluble in an aqueous solution of carbonate of ammonia. Partially soluble in ammonia-water. (Wittstein.) Insoluble in a solution of chloride of ammonium (Brett), or in chlorhydric acid. Soluble, with decomposition, in concentrated sulphuric acid. It is not precipitated from solutions which contain citric acid. Soluble in an aqueous solution of cyanide of potassium.

FerroCyanide of Copper(Cu_2). $2\,Cu_2\,Cy, Fe\,Cy\,(?)$ Ppt. Soluble in ammonia-water; insoluble in solutions of the ammoniacal salts. (Wittstein.)

FerroCyanide of Copper(Cu). $2\,Cu\,Cy, Fe\,Cy$ Insoluble in water. Insoluble in, and not decomposed by, acids. Insoluble in solutions of the ammoniacal salts. (Brett, Wittstein.) Soluble in ammonia-water. (Warington, *J. Ch. Soc.*, **5**. 137.) Sparingly soluble in concentrated sulphuric acid. (Berzelius.) Insoluble in chlorhydric acid. Ammonia decomposes the precipitate, but does not dissolve it. (H. Rose, *Tr.*)

FerroCyanide of Copper & of Potassium.

I.) of Cu.

$a = Cu\,Cy, K\,Cy, Fe\,Cy$ Insoluble in cold, decomposed to a slight extent by boiling, water. (Mosander.)

$b = 3\,Cu\,Cy, K\,Cy, 2\,Fe\,Cy + 10\,Aq$ Ppt. (Winkler.)

II.) of Cu_2.

$a = 2\,(K\,Cy, Cu_2\,Cy, Fe\,Cy) + 3\,Aq$ Insoluble in water, alcohol, or ether. Soluble in an aqueous solution of cyanide of potassium. Decomposed by acids and by boiling water. (Schulz.)

$b = 2\,Cu_2\,Cy, 3\,K\,Cy, 2\,Fe\,Cy + 8\,Aq$ (Bolley & Moldenhauer.)

FerroCyanide of Copper & of Sodium.

I.) of Cu.

$Cu\,Cy, Na\,Cy, Fe\,Cy$

II.) of Cu_2.

$Cu_2\,Cy, Na\,Cy, Fe\,Cy$

FerroCyanide of Cupr(*ic*)ammonium. (*Ammonio FerroCyanide of Copper.*) $C_6\,N_5\,H_6\,Fe\,Cu_2 = 2\,N\,H_3, 2\,Cu, Fe\,Cy_3 = 2\left(N \left\{ \begin{matrix} H_3 \\ Cu \end{matrix} \right. Cy\right), Fe\,Cy$ Insoluble in water or alcohol. Soluble in ammonia-water. Decomposed by acids. (Bunsen.)

FerroCyanide of Ethyl. $2\,C_4\,H_5\,Cy, Fe\,Cy + 6\,Aq$ Readily soluble in alcohol; less soluble in ether, by which it is precipitated from the alcoholic solution. (H. L. Buff, *Ann. Ch. u. Pharm.*, **91**. 254.)

FerroCyanide of Glucinum. Easily soluble in water. (Berzelius.)

FerroCyanide of Iron. Insoluble in water or chlorhydric acid. [Compare FerriCyanide of Iron.]

FerroCyanide of Iron & of Potassium. $Fe\,Cy, K\,Cy, Fe\,Cy$ Insoluble in water. (Gerhardt's *Tr.*)

FerroCyanide of Lead. $2\,Pb\,Cy, Fe\,Cy + 3\,Aq$ Insoluble in water. Partially soluble in hot ammonia-water. Perfectly soluble in hot aqueous solutions of chloride of ammonium or succinate of ammonia, but insoluble in solutions of the other ammoniacal salts. (Wittstein.) Insoluble in an aqueous solution of chloride of ammonium. (Brett, *Phil. Mag.*, 1837, (3.) **10**. 97.) It is not precipitated from solutions containing citrate of soda. (Spiller.) Sparingly soluble in concentrated sulphuric acid, from which it is re-precipitated on the addition of water. (Berzelius.)

FerroCyanide of Magnesium. $2\,Mg\,Cy, Fe\,Cy + 12\,Aq$ Permanent. Soluble in 3 [5] pts. of cold water. (Bette.)

FerroCyanide of Magnesium & of Potassium. $Mg\,Cy, K\,Cy, Fe\,Cy$ Soluble in 1575 pts. of water at 15°, and in 238 pts. at 100°; the solution in boiling water is colored and deposits nothing on cooling. The salt is also decomposed by washing, oxidation occurring.

FerroCyanide of Manganese. Insoluble

$2\,\mathrm{Mn\,Cy, Fe\,Cy}$ in aqueous solutions of chloride of ammonium or nitrate of ammonia. (Brett.) Soluble in chlorhydric acid. (Berzelius.) Insoluble in water or acids. [T.] Soluble in acids. (H. Rose, *Tr.*)

FerroCyanide of Manganese & of Potassium. $\mathrm{Mn\,Cy, K\,Cy, Fe\,Cy}$ Ppt.

FerroCyanide *of diCyanide* **of Mercury.** $2\,\mathrm{Hg_2\,Cy, Fe\,Cy}$ Ppt.

FerroCyanide of Mercury(Hg). Soluble, with decomposition, in an excess of solution of caustic potash. (Reynoso.)

FerroCyanide of Molybdenum.

I.) *Corresponding to Mb O.* Soluble in an aqueous solution of ferrocyanide of potassium, and in ammonia-water; from the latter it is precipitated on the addition of chloride of ammonium. (Berzelius.)

II.) *Corresponding to* $Mb\,O_2$. Insoluble in a solution of ferrocyanide of potassium. Soluble, with decomposition, in ammonia-water. (Berzelius.)

III.) *Corresponding to* $Mb\,O_3$. Soluble in an aqueous solution of ferrocyanide of potassium. Very easily soluble, with decomposition, in ammonia-water. (Berzelius.)

FerroCyanide of Nickel. $2\,\mathrm{Ni\,Cy, Fe\,Cy} + x\,\mathrm{Aq}$ Soluble in an aqueous solution of cyanide of potassium.

Soluble in ammonia-water (Tupputi), with decomposition. (Reynoso.) Not precipitated from solutions containing citric acid.

Insoluble in aqueous solutions of the ammoniacal salts (Wittstein); or in chlorhydric acid.

FerroCyanide of Nickelammonium. $2\,\mathrm{(N\,H_3\,Ni)\,Cy, Fe\,Cy}$ Completely insoluble in water. Decomposed by acids. Soluble, with decomposition, in ammonia-water. (Reynoso, *Ann. Ch. et Phys.*, (3.) **30.** 254.)

FerroCyanide of Potassium. $2\,\mathrm{K\,Cy, Fe\,Cy} + 3\,\mathrm{Aq}$ Permanent. Abundantly soluble in water, more so in hot than in cold. Soluble in 4.23 pts. of water at 15°; or 100 pts. of water at 15° dissolve 23.6 pts. of it; or the aqueous solution saturated at 15° contains 19.1% of it, or 16.6% of the anhydrous salt, and is of 1.1211 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 350.)

100 pts. of water dissolve

27.8	pts. of it	at	12.2°
65.8	"	"	37.7°
87.6	"	"	65.5°
90.6	"	"	96.3°;

the solubility not being much increased by any augmentation of temperature beyond 93°. (T. Thomson, in his *System of Chem.*, London, 1831, **2.** 250.) Soluble in 3 pts. of water at 15°, and in 1 pt. of boiling water. The solution saturated at 15° contains 25% of it, and that saturated at boiling 50%. (M. R. & P.) Soluble in 4 pts. of cold, and in 2 pts. of boiling water (Wittstein's *Handw.*); in 4 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) 100 pts. of water at 15.5° dissolve 30 pts. of it; at 100°, 100 pts. of it. (Ure's *Dict.*) The aqueous solution saturated at 15° is of 1.144089 sp. gr., and contains dissolved in every 100 pts. of water at least 29.229 pts. of the salt. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.) An aqueous solution saturated at 8° is of 1.13 sp. gr. (Anthon, *Ann. der Pharm.*, 1837, **24.** 211.)

An aqueous solution of sp. gr. (at 15°)	Contains (by experiment) per cent of $2\,\mathrm{K\,Cy, Fe\,Cy} + 3\,\mathrm{Aq.}$
1.0121	2.12
1.0243	4.25
1.0380	6.40
1.0512	8.50
1.0786	12.80
1.1211	19.10

From these results Schiff deduces the formula: $D = 1 + 0.005733\,p + 0.0000321\,p^2$, in which D = the sp. gr. of the solution, and p the percentage of substance in the solution, by means of which Ott has calculated the following table: —

An aqueous solution of sp. gr. (at 15°)	Contains	
	Per cent of $2\,\mathrm{K\,Cy, Fe\,Cy} + 3\,\mathrm{Aq.}$	Per cent of anhydrous $2\,\mathrm{K\,Cy, Fe\,Cy.}$
1.0058	1	0.872
1.0116	2	1.744
1.0175	3	2.616
1.0234	4	3.488
1.0295	5	4.360
1.0356	6	5.232
1.0417	7	6.104
1.0479	8	6.976
1.0542	9	7.848
1.0605	10	8.720
1.0669	11	9.592
1.0734	12	10.464
1.0800	13	11.336
1.0866	14	12.208
1.0932	15	13.080
1.0999	16	13.952
1.1067	17	14.824
1.1136	18	15.696
1.1205	19	16.568
1.1275	20	17.440

(H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 199.)

It is liable to form supersaturated solutions. (Ogden.) Insoluble in alcohol. Soluble in concentrated sulphuric acid forming a compound soluble in water, but decomposed by alcohol. (Berzelius.) In his *Lehrbuch*, **3.** 576, Berzelius alludes to a green modification of this salt which is more readily soluble than the ordinary modification.

FerroCyanide of Potassium & of Sodium. $3\,\mathrm{K\,Cy, Na\,Cy}, 2\,\mathrm{Fe\,Cy} + 7\,\mathrm{Aq}$ Permanent. Readily soluble both in hot and in cold water. Insoluble in alcohol. (Reindel.)

FerroCyanide of Potassium & of Strontium? Soluble in water, and in aqueous solutions of ammoniacal salts. (H. Rose, *Tr.*)

FerroCyanide of Potassium & of Zinc. $\mathrm{K\,Cy}, 3\,\mathrm{Zn\,Cy}, 2\,\mathrm{Fe\,Cy} + 6\,\mathrm{Aq}$ Insoluble in water. Easily soluble in warm chlorhydric acid. (Mosander.)

FerroCyanide of Silver. $2\,\mathrm{Ag\,Cy, Fe\,Cy}$ Insoluble in water or dilute acids. Insoluble in ammonia-water or in an aqueous solution of nitrate of protoxide of mercury. (Wittstein.) Soluble in an aqueous solution of cyanide of potassium. Soluble [?] in ammonia-water, but insoluble in aqueous solutions of the ammoniacal salts. (Wittstein.) Partially soluble, with decomposition, in concentrated sulphuric acid. (Berzelius.) Unacted upon by other acids, excepting nitric acid, which decomposes it. (Ittner.)

FerroCyanide of Sodium. $2\,\mathrm{Na\,Cy, Fe\,Cy} + 12\,\mathrm{Aq}$ Effloresces in dry air. Soluble in 4.5 pts. of water at 12.7°; and in a

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much smaller quantity of boiling water (John); in 1 pt. of cold water. (Ittner.) 100 pts. of water at 15.5° dissolve 22 pts. of it. (Ure's *Dict.*) Insoluble in alcohol. (John.) Soluble in alcohol. (*Gehlen's Journ.*, (2.) **3.** 171 [T.].)

FERROCYANIDE OF STRONTIUM. Efflorescent. $2\,Sr\,Cy, Fe\,Cy + 15\,Aq$ Soluble in 2 pts. of cold, and in less than 1 pt. of boiling water. Slightly soluble in alcohol. (Bette.) Soluble in less than 4 pts. of cold water. (Henry, *Nicholson's Journ.*, **3.** 171 [T.].)

FERROCYANIDE OF TANTALUM.

FERROCYANIDE OF THORIUM. Insoluble in water, soluble in acids. (Berzelius.)

FERROCYANIDE OF TIN. Insoluble in water $2\,Sn\,Cy, Fe\,Cy$ or acids. (Ittner.) Imperfectly soluble in ammonia-water and in solutions of the ammoniacal salts. (Wittstein.) Insoluble in aqueous solutions of chloride of ammonium or nitrate of ammonia. (Brett.)

FERROCYANIDE OF TITANIUM. Ppt.

FERROCYANIDE OF URANIUM.

I.) $2\,Ur\,Cy, Fe\,Cy$ Sparingly soluble in chlorhydric or nitric acid, easily soluble, with decomposition in hot aqua-regia. Decomposed by a solution of caustic potash.

II.) $Ur_2\,Cy_3, Fe\,Cy$? Soluble in aqueous solutions of carbonate of ammonia (Wittstein), and carbonate of soda. (Herschel.) It is not precipitated from solutions containing citric acid.

FERROCYANIDE OF VANADIUM.

I.) *Corresponding to* $V\,O_2$. Insoluble in water; not perceptibly soluble in acids. (Berzelius.)

II.) *Corresponding to* $V\,O_3$. Insoluble in water or acids. (Berzelius.)

FERROCYANIDE OF XANTHOCOBALT. Almost $N\,O_2 . 5\,N\,H_3 . Co_2\,O . Cy_2, Fe\,Cy + 7\,Aq$ insoluble in cold, immediately decomposed by warm water. (Gibbs & Genth, *Smithsonian Contributions*, Vol. **9.**)

FERROCYANIDE OF YTTRIUM. Insoluble in $2\,Yr\,Cy, Fe\,Cy$ water or acetic acid. (Eckeberg.) Soluble in chlorhydric acid. (Klaproth.)

FERROCYANIDE OF ZINC. Insoluble in water $2\,Zn\,Cy, Fe\,Cy + 3\,Aq$ or acids. [T.] Soluble in ammonia-water, and in aqueous solutions of ammoniacal salts. (Wittstein.) Soluble, with decomposition, in an aqueous solution of caustic potash. (Reynoso.) Does not appear to dissolve in aqueous solutions of chloride of ammonium or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.) Sparingly soluble in boiling aqueous solutions of ferrocyanide or ferricyanide of potassium; readily soluble in a boiling solution of cyanide of potassium. (Gore.) Sparingly soluble, without decomposition, in cold dilute acids.

Insoluble in cold, sparingly soluble in boiling chlorhydric acid. (Parrish's *Pharm.*, p. 533.) Insoluble in chlorhydric acid. (Lea, *Am. J. Sci.*, (2.) **31.** 191.)

FERROCYANIDE OF ZINC & OF ZINCAMMONIUM. (*AmmonioFerroCyanide of Zinc.*) $Zn\,Cy, 3\,N\left\{\begin{matrix}H_3\\Zn\end{matrix}\right.Cy, 2\,Fe\,Cy + 2\,Aq$ Ppt. (Bunsen.)

FERROCYANIDE OF ZIRCONIUM. Ppt. (H. Rose, *Tr.*)

Fettsäure. *Vid.* Sebacic Acid.

FIBRIN. When coagulated, either spontaneously or by boiling, it is insoluble in water, alcohol, or ether; but is partially decomposed by long-continued boiling with water.

When heated to 150° with water in a closed tube it dissolves entirely with decomposition. (Hlaziwetz.) Fibrin from blood, as well as muscular fibre which has been boiled with water, dissolves completely in water, with the exception of an insignificant residue, when heated therewith to 150° in a closed vessel, during two or three hours. This solution is precipitated on the addition of acids, even by exceedingly dilute nitric acid; the precipitate produced by acetic acid being easily soluble in an excess of the latter. (Wœhler & J. Vogel, *Ann. Ch. u. Pharm.*, 1842, **41.** 239.) When exposed to the air it decomposes rapidly and putrefies, dissolving at the same time if water be present, being converted into a substance which, like albumen, is coagulable by heat. (Lehmann.) After having been dried, it swells up in water and again becomes soft and flexible.

It is softened by solutions of the caustic alkalies, and at length forms with them a homogeneous emulsion. (Caventou, *loc. inf. cit.*) More easily soluble in alkaline solutions than many of the other protein compounds. (Lehmann.) Soluble in a solution of caustic potash, even when this is very dilute. Insoluble in ammonia-water.

Most mineral acids cause fibrin to swell up. Soluble in strong, but insoluble in weak sulphuric acid. Soluble in concentrated acetic acid.

Concentrated acetic acid causes fibrin to swell up and renders it soluble in water; especially if the fibrin has been obtained from young animals. (Dumas.) More easily soluble in acetic acid than many of the other protein compounds. (Lehmann.)

Slowly soluble in cold concentrated chlorhydric acid. (Caventou, *Ann. Ch. et Phys.*, (3.) **8.** pp. 326, 328.) Decomposed by boiling chlorhydric acid. Rapidly soluble in very dilute chlorhydric acid at a temperature of 36°. (Dumas.) Blood fibrin is insoluble in water which contains 0.1 pt. of chlorhydric acid; while the fibrin of flesh dissolves in such acidulated water with greater or less rapidity, according to the animal from which it came. (Liebig.) When uncooked fibrin, either from blood or flesh, is digested with ten times its weight of water containing so little chlorhydric acid that it scarcely reddens litmus-paper, or better, containing for every 1000 grms. of water 0.634 grm., of chlorhydric acid, during twelve hours at the ordinary temperature, the liquid becomes gelatinous, the fibrin having dissolved; this jelly is soluble in water, forming a liquid which coagulates when heated; on the addition of chlorhydric acid to this solution a precipitate is formed, but this redissolves in an excess of the acid. But after having been cooked, fibrin is no longer soluble, even in extremely dilute chlorhydric acid alone, though soluble therein on the addition of a peculiar substance ["pepsin"] which occurs in the stomachs of living animals. (Bouchardat & Sandras, *Ann. Ch. et Phys.*, (3.) **5.** pp. 481, 484, 490.)

In terhydrated phosphoric acid it swells up, forming a mass which is soluble in water. Easily soluble, with decomposition, in boiling nitric acid.

Partially soluble in aqueous solutions of neutral salts of the alkalies, especially in a solution of nitrate of potash.

"It is generally supposed that spontaneously coagulated fibrin will dissolve in solutions of certain alkaline salts; but we should greatly err if we were to regard a fluid thus obtained as a

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simple solution; for fibrin not only requires a longer period to dissolve in a saline fluid than is necessary for the solution of a simple substance in an indifferent menstruum, but also a higher temperature, and the saline fluid must always be kept for an hour or more, at a temperature approximating to the hatching heat (between 30° and 40°), before any considerable quantity of fibrin will be dissolved. Moreover, the fibrin should not be too long exposed to the action of the air, if we wish to effect its solution. Denis (*Arch. Gén. de Méd.*, (3.) **1.** 171), who first noticed this solubility of fibrin, Scherer (*Ann. Ch. u. Pharm.*, **40.** 35), and Polli (*Ann. Univ. di Med.*, 1839, Apr., pp. 25–33) used for this purpose a solution of 3 pts. of nitrate of potash in 50 pts. of water. Zimmermann (*Casper's Wochenschrift*, 1843, No. 30) has, however, shown that solutions of the alkaline sulphates, phosphates, carbonates, and acetates, as well as the chlorides, bromides, and iodides, might be employed for the same object. The solution thus obtained, which is always imperfect, and contains undissolved portions requiring to be removed, is viscid, and at about 73° coagulates in flakes. It differs from an albuminous solution in being strongly precipitated by acetic acid (which is only the case to a slight degree with albumen when carefully neutralized); it is not coagulated by ether, in which respect it differs from the naturally dissolved substance which forms fibrin. When the fibrin has been digested for a sufficient length of time, the solution is not rendered turbid by dilution with water, as is the case after digestion for only a short period. At ordinary temperatures, the clear solution remains for a long time unaffected by the atmosphere, only depositing solid particles after it has absorbed oxygen, when it has passed into a state of putrefaction, and exhibits vibriones. Scherer thought that he had proved that the fibrin from arterial blood or from venous blood in inflammatory diseases could not be converted into this albuminous substance by saline solutions. This view has been contradicted by Zimmermann, but the subject has not yet been fully investigated. Lehmann's own experiments tend to show that the fibrin of the venous blood of the ox very speedily loses these properties, while that of the arterial blood of the same animal does not dissolve in a solution of nitrate of potash. In man Lehmann found that fibrin, whether from venous, arterial, or inflammatory blood, was soluble, excepting in two cases of inflammatory blood; the arterial and venous fibrin from pigs' blood dissolved equally well, and with great rapidity in water containing nitrate of potash." (Lehmann, in his *Physiol. Chem.*, London, 1851, **1.** pp. 351, 352.)

After having been boiled, fibrin can no longer be converted into this soluble, albumen-like substance by digestion in solutions of alkaline salts. With acids and alkalies, however, boiled fibrin reacts in the same manner as coagulated albumen, dissolving in alkalies, and forming combinations with acids which are insoluble in acidulated water, but freely soluble in pure water. By prolonged boiling with water it is decomposed to a soluble and an insoluble compound. (Lehmann.)

In its naturally dissolved form, fibrin is not easily distinguished from albumen. In filtered frogs' blood neither acetic acid nor ammonia-water occasion any precipitation; but a concentrated solution of caustic potash will precipitate fibrin as well as albumen; ether causes fibrin to coagulate, while it allows the albumen of frogs' blood to remain dissolved. The spontaneous coagulation of the fibrin from the plasma of all vertebrate animals, which occurs on exposure to the air, may be greatly retarded by dilute solutions of the alkaline sulphates, nitrates, chlorides, carbonates, and acetates, and may even be entirely prevented by concentrated solutions. (Lehmann.)

II.) *Vegetable Fibrin.* (*Albumine* (of Berzelius). *Zymone.*) Insoluble in water, alcohol, or ether. Soluble in dilute solutions of caustic potash. (Compare Dumas & Cahours, *Ann. Ch. et Phys.*, (3.) **6.** pp. 389, 400.)

Fibroin. Insoluble in boiling water, alcohol, ether, or acetic acid. Soluble in a cold concentrated solution of caustic potash, a precipitate being formed on the addition of water as well as by acids. Insoluble in cold, soluble in a hot, dilute aqueous solution of caustic potash. Insoluble in ammonia-water and in aqueous solutions of the alkaline carbonates. Soluble in cold concentrated sulphuric, chlorhydric, phosphoric, and nitric acids.

Fichtelite. $C_8 H_7$ Soluble in alcohol, and ether. (Clark.)

"FlavEquisetin." Very sparingly soluble in cold, more soluble in boiling water. Soluble in alcohol. Sparingly soluble in ether. (Baup, *Ann. Ch. et Phys.*, (3.) **30.** 313.)

Flavindic Acid. $C_{48} H_{21} N_3 O_{12}$

Flavindate of Silver. $C_{48} H_{18} Ag_3 N_3 O_{12}$ Ppt.

Flavindin. $C_{48} H_{15} N_3 O_6$ Slightly soluble in boiling water. Sparingly soluble in boiling alcohol. Soluble in ammonia-water. (Laurent.)

Flavin. *Vid. di*PhenylUrea.

Flowers of Benzoin. *Vid.* Benzoic Acid.

"FluoBoric Acid." $HO, BO_3, 3 HFl$ *Vid.* Fluorhydrate of Boracic Acid.

FluoBoric Acid. HFl, BFl_3 Known only in aqueous solution.

Many of the fluoborates are soluble, as such, in water.

FluoBorate of Aluminum. $Al_2 Fl_3, 3 BFl_3$ Soluble in water only when this is acidulated. Easily soluble in acids. (Berzelius.)

FluoBorate of Ammonium. $NH_4 Fl, BFl_3$ Very soluble in water. Tolerably readily soluble in alcohol. (Berzelius.)

FluoBorate of Barium. $BaFl, BFl_3 + 2 Aq$ Deliquesces in moist air. Easily soluble in water. Decomposed by alcohol, with formation of a soluble acid, and an insoluble basic, salt. (Berzelius.)

FluoBorate of Calcium. $CaFl, BFl_3$ Decomposed by water, with formation of a soluble acid, and an insoluble basic, salt. (Berzelius.)

FluoBorate of Copper. $CuFl, BFl_3$ Easily deliquescent. Soluble in water. (Berzelius.)

FluoBorate of Lead. (*Borofluoride of Lead.*) $PbFl, BFl_3$ Partially decomposed by boiling water or alcohol, to a soluble acid salt and an insoluble basic salt. (Berzelius.)

FluoBorate of Lithium. $LiFl, BFl_3$ Hygroscopic. Easily soluble in water. (Berzelius.)

FluoBorate of Magnesium. $MgFl, BFl_3$ Readily soluble in water. (Berzelius.)

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FluoBorate of Potassium. KFl, BFl_3 Soluble in 70.42 pts. of cold water; or 100 pts. of cold water dissolve 1.42 pts. of it; very much more soluble in boiling water. Slightly soluble in hot, less soluble in cold alcohol. (Berzelius.) Insoluble in strong alcohol; but somewhat soluble in weak spirit, made by mixing 2 volumes of 84% alcohol with 1 volume of water. Insoluble in a concentrated aqueous solution of acetate of potash. (Aug. Stromeyer, *Ann. Ch. u. Pharm.*, **100.** 82.) No more soluble in ammonia-water than in pure water, and crystallizes out unchanged from the boiling solution. Soluble in boiling aqueous solutions of carbonate of potash, and of soda, without any evolution of carbonic acid; also in a solution of caustic potash, separating out unchanged from the boiling solution. (Berzelius, *Lehrb.*, **3.** 102.)

FluoBorate of Sodium. $NaFl, BFl_3$ Easily soluble in water. Very sparingly soluble in alcohol. (Berzelius, *Lehrb.*)

FluoBorate of Yttrium. YFl, BFl_3 Soluble only in water which contains an excess of acid. (Berzelius.)

FluoBorate of Zinc. $ZnFl, BFl_3$ Deliquescent. Soluble in water. (Berzelius.)

FluoBoride of *X*. *Vid.* FluoBorate of *X*.

Fluohydric Acid. *Vid.* Fluorhydric Acid.

FluoPlatinic Acid. *Vid.* *bi*Fluoride of Platinum.

FluoPlatinate of Ammonium. Decomposed by water to a soluble acid, and an insoluble basic, salt. Insoluble in alcohol. (Berzelius.)

FluoPlatinate of Potassium. Deliquescent. Decomposed by water, with deposition of a basic salt. Insoluble in alcohol. (Berzelius.)

FluoPlatinate of Sodium. Decomposed by water, to a soluble acid, and an insoluble basic, salt. (Berzelius.)

Fluorhydric Acid. (*Hydrofluoric acid. Fluoric acid.*) HFl Very soluble in water, with great evolution of heat. Very soluble in water: at the ordinary temperature, 2 grains of water were observed to take up 200 times their bulk of the gas, and leave little residuum besides common air; but the solution is seldom obtained in large quantities so strong as this. (Dalton, in his *New System*, **2.**279.) Soluble in alcohol, apparently with combination. (Reinsch.) The metallic fluorides vary in solubility, several of them are soluble in ether. The double salts of the metallic fluorides dissolve with more difficulty in water than either of their component salts. (Berzelius.) The acid fluorhydrates (see bifluorides M Fl, H Fl) are all soluble in water.

Fluorhydrate of Boracic Acid. (*Fluorboric Acid.*) $HO, BO_3, 3HFl$ Known only in aqueous solution. When the concentrated solution is diluted with much water boracic acid is precipitated. Alcohol is decomposed by it with formation of ether.

[For its salts, see Borate of *X* with Fluoride of *X*.]

Fluorhydrate of Brucin. Tolerably easily soluble in water. Sparingly soluble in boiling, scarcely at all soluble in cold alcohol. (Elderhorst.)

Fluorhydrate of Cinchonidin (of Pasteur). Very readily soluble in water. (Leers, *Ann. Ch. u. Pharm.*, **82.** 159.)

Fluorhydrate of Cinchonin. $C_{40}H_{24}N_2O_2, 2HFl$ Soluble in water and in dilute alcohol. (Elderhorst.)

Fluorhydrate of Cumidin.

Fluorhydrate of Fluoride of *X*. *Vid.* *bi*Fluoride of *X*.

Fluorhydrate of MelAnilin. Tolerably easily soluble in water; less soluble in alcohol. (Hofmann, *J. Ch. Soc.*, **1.** 294.)

"**Fluorhydrate of Methylene.**" *Vid.* Fluoride of Methyl.

Fluorhydrate of Morphine. Sparingly soluble in water. Insoluble in alcohol or ether. (Elderhorst.)

Fluorhydrate of Quinine. Deliquescent. Soluble in water. Readily soluble in alcohol. (Elderhorst.)

Fluorhydrate of Strychnine. $C_{42}H_{22}N_2O_4, 4HFl + 4Aq$ Readily soluble in warm water; still more soluble in boiling alcohol. Insoluble in ether. (Elderhorst.)

Fluoric Acid. *Vid.* Fluorhydric Acid.

Fluorides. The fluorides of potassium, sodium, ammonium, and silver are soluble in water, the other metallic fluorides are insoluble. (Persoz, *Chim. Moléc.*, p. 463.)

Fluoride of Aluminum.

I.) Al_2Fl_3 Insoluble in water. Unacted upon by acids. Scarcely at all attacked by boiling concentrated sulphuric acid, or by a boiling concentrated solution of caustic potash. (Deville, *Ann. Ch. et Phys.*, (3.) **49.** 79.)

II.) *bi ? or hydrated.* Slowly soluble in cold, more readily soluble in hot water. (Berzelius.)

III.) *basic.* Insoluble in water.

Fluoride of Aluminum & of Ammonium. $Al_2Fl_3; NH_4Fl$ Slightly soluble in water. Insoluble in water which contains ammonia, or fluoride of ammonium. (Berzelius.)

Fluoride of Aluminum & of Copper. $Al_2Fl_3; CuFl$ Very slowly, but completely, soluble in water. (Berzelius.)

Fluoride of Aluminum & of Lithium. Insoluble in water. (Berzelius.)

Fluoride of Aluminum & of Nickel. $Al_2Fl_3; NiFl$ Slowly, but completely, soluble in water. (Berzelius.)

Fluoride of Aluminum & of Potassium.

I.) "*potash kryolite*" (*artificial*). Insoluble in water. (Deville.)

II.) $2KFl; Al_2Fl_3$ Very sparingly soluble in acids, and still less soluble in water. (Gay-Lussac & Thénard.)

III.) $3KFl; Al_2Fl_3$ Insoluble in water or in an aqueous solution of fluorhydric acid.

Fluoride of Aluminum & of Sodium.

I.) "*artificial kryolite.*" $NaFl; Al_2Fl_3$ Insoluble in water. (Deville.)

II.) *kryolite* (*native*). $3NaFl; Al_2Fl_3$ Sparingly soluble in water.

Fluoride of Aluminum & of Zinc. $ZnFl; Al_2Fl_3$ Very slowly, but completely, soluble in water. (Berzelius.)

Fluoride of Ammonium.

I.) *normal.* NH_4Fl Permanent. Readily soluble in water. Sparingly soluble in alcohol. These solutions lose ammonia when evaporated. (Berzelius.)

II.) *acid.* NH_4Fl, HFl Very quickly deliquesces. Soluble in water. (Berzelius, *Lehrb.*)

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Fluoride of Ammonium & of Antimony. $2 N H_4 Fl; Sb Fl_3$ Hygroscopic. Soluble in 0.9 pt. of cold water. Insoluble in alcohol or ether. (Flueckiger.)

Fluoride of Ammonium & of Chromium. $N H_4 Fl; Cr_2 Fl_6$ Sparingly soluble in water. (Berzelius.)

Fluoride of Ammonium & of Cobalt. $N H_4 Fl; Co Fl$ Sparingly soluble in water. (Berzelius.)

Fluoride of Ammonium & of Molybdenum (Mo Fl). Resembles the potassium compound.

Fluoride of Ammonium & of Molybdenum ($Mo Fl_2$). Easily soluble in water. (Berzelius, *Lehrb.*)

Fluoride of Ammonium & of Nickel. Easily soluble in water. (Berzelius.)

Fluoride of Ammonium & of Titanium.

I.) $N H_4 Fl; Ti Fl_2$ Soluble in ammonia-water.

II.) $N H_4 Fl; 2 Ti Fl_3$ Soluble in water.

Fluoride of Antimony. Deliquescent.

I.) *ter.* Very soluble in water. (Berzelius.)
$Sb Fl_3$

II.) *quadri.*
$Sb Fl_4$

III.) *quinqui.*
$Sb Fl_5$

Both very soluble in water. (Berzelius.)

Fluoride of Antimony & of Lithium. $2 Li Fl; Sb Fl_3$ Soluble in more than 20 pts. of water. (Flueckiger.)

Fluoride of Antimony & of Potassium.

I.) $2 K Fl; Sb Fl_3$ Soluble in 9 pts. of water at 13°, and in less than 2 pts. of boiling water. Insoluble in alcohol or ether. (Flueckiger.)

II.) $K Fl; Sb Fl_3$ More easily soluble than No. I., requiring only 2.8 pts. of water. (Flueckiger.)

Fluoride of Antimony & of Sodium. $3 Na Fl, Sb Fl_3$ Soluble in 14 pts. of cold, and in 4 pts. of boiling water. (Flueckiger.)

***Ter*Fluoride of Arsenic.** $As Fl_3$ Soluble, with decomposition, in water. Miscible, with more or less decomposition, with alcohol and ether, and somewhat less easily with fixed and volatile oils. (Unverdorben.)

Fluoride of Barium.

I.) *normal.* $Ba Fl$ Sparingly soluble in water. (Berzelius.) Less soluble in water than fluorspar (Ca Fl). (Wilson.) Soluble in an aqueous solution of normal citrate of soda. (Spiller.) Readily soluble in chlorhydric, nitric, and fluorhydric acids. (Gay-Lussac & Thénard.)

II.) *acid.* $Ba Fl, H Fl$ Soluble in fluorhydric acid. (Fremy.)

Fluoride of Bismuth. $Bi Fl_3$ Soluble in water. The aqueous solution is decomposed by evaporation. (Berzelius.)

Fluoride of Boron. $B Fl_3$ Almost instantly absorbed by water, with separation of some boracic acid and formation of fluoboric acid. It is the most soluble gas known, 1 vol. of water dissolving 700 vols. of it. Alcohol absorbs it, and is converted into ether. 1 vol. of concentrated sulphuric acid, of 1.85 sp. gr., absorbs 50 vols. of it; on adding a little water to this solution boracic acid is precipitated. (J. Davy.) Cold oil of turpentine absorbs 6.8% of it.

Isoterebenthene absorbs 14.3% of it at 23°. (Berthelot.) Soluble in terebene without alteration. (Berthelot.)

Fluoride of Bromine. Easily soluble in water. (Leeson.)

Fluoride of Cacodyl. $C_4 H_6 As Fl$ Insoluble in water, but appears to be decomposed thereby.

Fluoride of Cadmium. $Cd Fl$ Sparingly soluble in water; more readily soluble in fluorhydric acid. (Berzelius.)

Fluoride of Calcium. $Ca Fl$ Permanent. Soluble in 26545 pts. of water at 15.5°. More soluble in water at a higher temperature. (George Wilson, *Rep. Br. Assoc.*, 1846, p. 39.) In a subsequent, more careful research, Wilson determined that 1 pt. of fluoride of calcium dissolves in 26923 pts. of water at 15.5°. (*Rep. Br. Assoc.*, 1850, p. 69.) Boiling water dissolves no inconsiderable quantity of it, if it be finely powdered, cold water acts more slowly. (Wilson, in *Ot. Gr.*) When prepared in the moist way, it is not completely insoluble in water. Scarcely at all soluble in dilute, more soluble in concentrated chlorhydric acid. Decomposed by strong sulphuric acid. It is not decomposed by dilute alkaline solutions. (Fresenius, *Quant.*, p. 163.) Soluble in aqueous solutions of ammoniacal salts. (Rose.)

Pure fluoride of calcium, either native or artificial, is not decomposed by concentrated sulphuric acid at temperatures lower than 40°, but forms with it a thick sirup, which is completely transparent and capable of being drawn out into threads; but if silicic acid be present, fluosilicic acid gas is evolved and gypsum formed in the fluid, rendering it opaque. If water be added to the clear fluid, fluoride of calcium will be precipitated and the mass become milky. Concentrated chlorhydric and nitric acids also dissolve it to a clear fluid, but this is not viscid; on the addition of water the liquid becomes milky, and the filtrate contains but very little fluoride of calcium in solution. Fluorhydric acid dissolves only an insignificant trace of it. A solution of fluorhydric acid is rendered cloudy by the least addition of carbonate of lime, but when a very dilute solution of the acid is treated with a solution of a salt of lime, no precipitate occurs until the acid is neutralized with an alkali, and on the other hand fluorhydric acid precipitates fluoride of calcium from less dilute neutral solutions of lime. Boiling chlorhydric acid dissolves a small portion of it. It is decomposed by boiling nitric acid. The more strongly saturated solutions of fluoride of calcium in chlorhydric and nitric acids which several chemists have observed were doubtless occasioned by the presence of silica in the fluorspar examined by them; by which means fluosilicate of calcium, a salt readily soluble in acids, was formed. Not decomposed by aqueous alkaline solutions. (Berzelius, in his *Lehrb.*, 3. 397.) When free from silicic acid, it is partially decomposed by boiling with aqueous solutions of carbonate of potash and carbonate of soda. (Dulong, *Ann. de Chim.*, 82. 278.)

II.) *acid.* $Ca Fl, H Fl + 6 Aq$ Decomposed by boiling water. Soluble in fluorhydric acid. (Fremy.)

Fluoride of Calcium & of Titanium. Soluble in acidulated water. Decomposed by pure water, with formation of a precipitate and an acid salt.

***Proto*Fluoride of Cerium.** $Ce Fl$ Insoluble in water. (Berzelius, Mosander.)

***Sesqui*Fluoride of Cerium.**

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I.) Ce_2Fl_3 Insoluble in water.

II.) *basic.*
$Ce_2Fl_3;\ Ce_2O_3,\ HO$

*Proto*FLUORIDE OF CHROMIUM.

*Sesqui*FLUORIDE OF CHROMIUM. Perfectly soluble in water. This compound unites with more basic metallic fluorides forming salts which are generally difficultly soluble. (Berzelius.)
Cr_2Fl_3

*Per*FLUORIDE OF CHROMIUM. Decomposed by water, and alcohol. (Unverdorben.)
$CrFl_3$

*Sesqui*FLUORIDE OF CHROMIUM & OF POTASSIUM. Very difficultly soluble in water. (Berzelius.)
$Cr_2Fl_3;\ KFl$

*Sesqui*FLUORIDE OF CHROMIUM & OF SODIUM. Very sparingly soluble in water. (Berzelius.)

FLUORIDE OF COBALT.

I.) *normal.* Very difficultly soluble in water; more readily soluble in water which contains fluorhydric acid. When treated with a small quantity of water it dissolves without suffering decomposition, but when mixed with much water, and when boiled with water, it is decomposed to an insoluble basic salt while free acid remains in solution. (Berzelius, *Lehrb.*, 3. 642.)
$CoFl + 2\,Aq$

II.) *basic.* Insoluble in water.
$2\,(CoFl,\ CoO) + Aq$

FLUORIDE OF COBALT & OF POTASSIUM. Slightly soluble in water. (Berzelius.)

*Di*FLUORIDE OF COPPER. Permanent. Insoluble in water or fluorhydric acid. Insoluble in alcohol. Soluble in strong chlorhydric acid, from which it is precipitated on the addition of water. (Berzelius.)
Cu_2Fl

*Proto*FLUORIDE OF COPPER.

I.) *normal.* Difficultly soluble in water. When treated with a small quantity of water, it dissolves without decomposition, though slowly; but if this solution be heated or diluted with much water, a basic salt will be precipitated. (Berzelius, *Lehrb.*)
$CuFl$

II.) *basic:* Insoluble in water.
$CuFl;\ CuO$

*Proto*FLUORIDE OF COPPER & OF POTASSIUM. Easily soluble in water. (Berzelius.)
$CuFl;\ KFl$

FLUORIDE OF COPPER & OF TITANIUM. Soluble in water, with partial decomposition. Easily soluble in acidulated water.
$CuFl,\ TiFl_2 + Aq$

FLUORIDE OF ETHYL. Precipitated by water. (Reinsch.)
(*Fluorhydric Ether.*)
$C_4H_5,\ Fl$

FLUORIDE OF GLUCINUM. Easily soluble in water, even after it has been heated. It forms double salts with the alkaline fluorides. (Berzelius.) It may be somewhat basic without ceasing to be soluble in water.
$Gl_2Fl_3 + x\,Aq$

FLUORIDE OF GLUCINUM & OF POTASSIUM. Difficultly soluble in water. (Awdejew.) Much more freely soluble in hot than in cold water. (Berzelius.)
$Gl_2Fl_3,\ 3\,KFl$

*Proto*FLUORIDE OF IRON. Very difficultly soluble in water; more easily soluble in water acidulated with fluorhydric acid. (Berzelius, *Lehrb.*)
$FeFl + x\,Aq$

*Sesqui*FLUORIDE OF IRON.

I.) Fe_2Fl_3 Slowly, but completely, soluble in water. (Berzelius.)

II.) *basic.* Insoluble in ammonia-water. (Berzelius.)
$X\,Fe_2O_3,\ Fe_2Fl_3$

FLUORIDE OF IRON & OF POTASSIUM.

I.) *proto.* Soluble in water. (Berzelius.)
$KFl,\ FeFl$

II.) *sesqui.*

$a = 3\,KFl,\ Fe_2Fl_3$ Somewhat soluble in water, especially in hot water. (Berzelius.)

$b = 2\,KFl,\ Fe_2Fl_3$ Somewhat soluble in water. (Berzelius.)

*Sesqui*FLUORIDE OF IRON & *bifluoride* OF TITANIUM. Soluble, with decomposition, in water. (Berzelius.)

FLUORIDE OF LEAD.

I.) *normal.* Only very slightly soluble in water or fluorhydric acid (Berzelius); more abundantly soluble in chlorhydric and nitric acids. (Gay-Lussac & Thénard.)
$PbFl$

II.) *acid.* Soluble in chlorhydric acid. (Fremy.)

III.) *basic.* Much more abundantly soluble in water than the normal salt. (Berzelius, *Lehrb.*)

FLUORIDE OF LEAD & TANTALUM. Difficultly soluble in water.

FLUORIDE OF LEAD & OF TITANIUM. Easily soluble in water. (Berzelius.)

FLUORIDE OF LEAD with NITRATE OF LEAD.

FLUORIDE OF LITHIUM.

I.) *normal.* Scarcely soluble in water, being almost as difficultly soluble as the carbonate. (Berzelius.) Sparingly soluble in water. (Troost.)
$LiFl$

II.) *acid.* Difficultly soluble in water, but more soluble than the normal salt. (Berzelius.)
$LiFl,\ HFl$

FLUORIDE OF MAGNESIUM. Insoluble in water. Nearly insoluble in acids. (Gay-Lussac & Thénard.) Insoluble in water or fluorhydric acid. (Berzelius.) Soluble in dilute nitric acid, from which it is precipitated on the addition of alcohol. (Bergman, *Essays*, 1. 443. Compare *Ibid.*, p. 445.)
$MgFl$

FLUORIDE OF MAGNESIUM & OF TITANIUM. Easily soluble in water; when the solution is allowed to evaporate spontaneously, crystals form which cannot again be completely dissolved in water. (Berzelius, *Lehrb.*, 3. 433.) Decomposed by pure water. Soluble in acidulated water. (Berzelius, cited by Gm.)

*Proto*FLUORIDE OF MANGANESE. Soluble in acidulated water. (Berzelius.)
$MnFl$

*Sesqui*FLUORIDE OF MANGANESE. Completely soluble in a small quantity of water: but when this solution is boiled, or diluted with much water, an insoluble basic salt separates while an acid salt is formed; on cooling the hot solution a portion of the former is redissolved if acid be present. (Berzelius.)
Mn_2Fl_3

*Per*FLUORIDE OF MANGANESE. Soluble, with decomposition, in water. (Wœhler.)
Mn_2Fl_7

FLUORIDE OF MANGANESE & OF POTASSIUM. Insoluble in water. Tolerably soluble in acids. (Guy-Lussac & Thénard.)

FLUORIDE OF MANGANESE & OF SODIUM. Difficultly soluble in water. (Berzelius.)

*Di*FLUORIDE OF MERCURY. Insoluble in water.
Hg_2Fl

*Proto*FLUORIDE OF MERCURY.

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I.) *normal.* $HgFl$ Soluble in water, especially if some acid be present. (Guy-Lussac & Thénard.) With water it forms a soluble acid and an insoluble basic salt. (Berzelius.)

II.) *acid(hydrated).* Decomposed by water. Soluble in fluorhydric acid. (Fremy.)

Fluoride of Mercury with **Sulphide of Mercury.** $HgFl; 2HgS$ Decomposed by boiling water to soluble fluoride of mercury and insoluble sulphide of mercury. (H. Rose.)

Fluoride of Methyl. *(Hydrofluate of Methylene. Fluorhydrate of Methylene. Methylic Fluoride.)* C_2H_3Fl 1 vol. of water absorbs 1.66 vols. of it. (Dumas & Péligot.)

Fluoride of MethylNicotin. Soluble in water.

*Proto***Fluoride of Molybdenum.** $MoFl$ Soluble in water. After having been dried, it is no longer completely soluble in water. (Berzelius.)

*Bi***Fluoride of Molybdenum.** $MoFl_2$ Soluble in water. (Berzelius.)

*Ter***Fluoride of Molybdenum.** $MoFl_3$ Soluble in water; but if this solution be evaporated to dryness, the residue dissolves but imperfectly in water. (Berzelius.)

Fluoride of Molybdenum & of Potassium. $MoFl; KFl$ Ppt. Soluble in acidulated water.

*Bi***Fluoride of Molybdenum & of Potassium.** $KFl; MoFl_2$ Sparingly soluble in water. Less soluble than the ammonia compound. (Berzelius.)

Fluoride of Molybdenum & of Potassium with **Molybdate of Potash.** $KFl, MoFl_2; KO, MoO_3 + 2Aq$ Permanent. Soluble in boiling, less soluble in cold water. (Berzelius.)

Fluoride of Molybdenum & of Sodium.

I.) *proto.* Easily soluble in water. More soluble than the potassium salt in water.

II.) *bi.* Easily soluble in water.

Fluoride of Nickel. $NiFl$ Behaves like the cobalt salt. Soluble in water acidulated with fluorhydric acid. (Berzelius, *Lehrb.*)

Fluoride of Nickel & of Potassium. Easily soluble in water. (Berzelius.)

Fluoride of Palladium. $PdFl$ Very slightly soluble in water or in fluorhydric acid. Difficultly soluble, while yet moist, in ammonia-water. After having become dry, it is no longer soluble in ammonia-water, unless this is boiling. Insoluble in a boiling aqueous solution of normal or acid fluoride of sodium. (Berzelius, *Lehrb.*, 3. 964.)

Fluoride of Palladium & of Potassium. *(FluoPalladite of Potassium.)* Sparingly soluble in water. (Berzelius.)

Fluoride of Palladium & of Sodium. Resembles the potassium compound.

Fluoride of Phosphorus. PFl_3 Decomposed, with solution, by water.

*Bi***Fluoride of Platinum.** $PtFl_2$ Entirely soluble in water when this is not too strongly heated; if heated, a basic salt remains undissolved. Soluble in alcohol. (Berzelius.)

*Bi***Fluoride of Platinum & of *X*.** *Vid.* FluoPlatinate of *X*.

Fluoride of Potassium.

I.) *normal.* $KFl, \& + 4Aq$ Very deliquescent. Soluble in water, with evolution of heat. Sparingly soluble in alcohol. (Berzelius.) Very deliquescent and soluble in water. (Fremy, *Ann. Ch. et Phys.*, (3.) 47. 31.) Alcohol precipitates it from the concentrated aqueous solution; but it is easily soluble in weak spirit prepared by mixing 2 measures of 84% alcohol with 1 measure of water. Easily soluble in a concentrated aqueous solution of acetate of potash. (Aug. Stromeyer, *Ann. Ch. u. Pharm.*, 100. 83.)

II.) *acid.* KFl, HFl Easily soluble in water. Very difficultly soluble in water containing free fluorhydric acid. (Berzelius.) With alcohol it behaves like the normal salt. (Aug. Stromeyer, *loc. cit.*)

Fluoride of Potassium & of Tantalum. Permanent. Easily soluble in water. (H. Rose.)

Fluoride of Potassium & of Thorium. $KFl, ThFl$ Insoluble in water. Soluble in fluorhydric acid, with decomposition.

Fluoride of Potassium & of Titanium. $KFl, TiFl_2$ Readily soluble, without decomposition, in water. (Berzelius.)

Fluoride of Potassium & of Tungsten with **Tungstate of Potash.** $KFl, WFl_3; KO, WO_3 + 2Aq$ Difficultly soluble in cold, more readily soluble in hot water. It is not readily decomposed, by repeated solution, in water, or fluorhydric acid, and evaporation. (Berzelius.)

Fluoride of Potassium & of Tungsten with **Tungstate of Soda.**

Fluoride of Potassium & of Vanadium. Readily soluble in water. Insoluble in alcohol.

Fluoride of Potassium & of Yttrium.

Fluoride of Potassium & of Zinc. $KFl, ZnFl$ Soluble in water. (Berzelius.)

Fluoride of Potassium & of Zirconium.

I.) $2KFl; 2Zr_2Fl_3$
II.) $3KFl; 2Zr_2Fl_3$
Sparingly soluble in cold, more abundantly soluble in boiling water.

Fluoride of Selenium. $SeFl_2$ Soluble in water, with decomposition to fluorhydric and selenious acids. Soluble in fluorhydric acid, without decomposition. (Knox.)

Fluoride of Silicon. $SiFl_3$ Absorbed in large quantity by water, but is decomposed thereby. 1 vol. of water absorbs 265 vols. of it. Alcohol absorbs more than its own weight of it; the solution finally solidifying to a jelly. The alcoholic solution is decomposed by water, with evolution of alcohol. (Kuhlmann.) Readily absorbed by ether. (Unverdorben.) Sparingly soluble, without decomposition, in naphtha. (Berzelius.) Oil of turpentine also absorbs a considerable quantity of it. (T.)

Fluoride of Silicon & of *X*. *Vid.* FluoSilicate of *X*.

Fluoride of Silver.

I.) *normal.* $AgFl + 4Aq$ Deliquescent. Readily soluble in water. (Gay-Lussac & Thénard.)

II.) *acid.* Deliquescent. Soluble in water, and in fluorhydric acid. (Fremy.)

Fluoride of Sodium.

I.) *normal.* $NaFl$ Permanent. 100 pts. of water dissolve 4 pts. of it; *i. e.* 1 pt. of the salt dissolves in 25 pts. of water; and it is not in the least more soluble in boiling than in cold water, so that the hot saturated solution deposits nothing on cooling. However, by boiling down

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the aqueous solution until a crust of the salt has formed upon its surface, the liquid obtained is a solution of 1 pt. of the salt in 23 pts. of water. The salt, moreover, dissolves so slowly that it is difficult to obtain a solution of it unless it be reduced to an extremely fine powder. Alcohol only dissolves a trace of it. (Berzelius, *Lehrb.*, 3. 217.) 100 pts. of water at 15° dissolve 4 pts. of this salt; *i. e.* 1 pt. of it is soluble in 25 pts. of water at 15°; it is somewhat more soluble in hot water. (Fremy, *Ann. Ch. et Phys.*, (3.) 47. 32.) Difficultly soluble in a concentrated aqueous solution of acetate of potash. (Berzelius.)

II.) *bi.* Rather difficultly soluble in cold, but
$Na Fl, H Fl$ much more easily soluble in boiling water. (Berzelius, *Lehrb.*)

Fluoride of Sodium & of Tantalum. Permanent. Easily soluble in water. (H. Rose.)

Fluoride of Sodium & of Tellurium. Soluble in small quantity in boiling water; decomposed by cold water. (Berzelius.)

Fluoride of Sodium & of Titanium. Very easily soluble in water, being more soluble than the corresponding potassium compound. (Berzelius.)

Fluoride of Sodium & of Tungsten. Easily soluble in water. (Berzelius, *Lehrb.*)

Fluoride of Sodium & of Tungsten with Tungstate of Soda. More easily soluble in water than the corresponding potash compound. (Berzelius.)

Fluoride of Sodium & *bifluoride* of Vanadium. Readily soluble in water. Insoluble in alcohol.

Fluoride of Sodium with Phosphate of
$Na Fl ; 3 NaO, cPO_5 + 24 Aq$ **Soda.** Soluble in 8.31 pts. of water at 25°, and in 1.74 pts. at 70°. (Briegleb.)

Fluoride of Strontium. Very sparingly
$Sr Fl$ soluble in water. Insoluble in fluorhydric acid. (Berzelius.)

Fluoride of Sulphur.

Fluoride of Tantalum. Known only in
$Ta Fl_2$ solution, or combination with other fluorides. The aqueous solution is not decomposed by boiling, but is decomposed when evaporated to dryness. (H. Rose.)

Fluoride of TellurEthyl. Soluble in water.

***Bi*Fluoride of Tellurium.**

I.) *normal.* Deliquescent. Decomposed by a
$Te Fl_2$ large quantity of water. (Berzelius.)

II.) *basic.* Decomposed by boiling water.
$Te Fl_2 ; Te O$

Fluoride of Thorium. Insoluble in water
$Th Fl$ or fluorhydric acid. (Berzelius, *Lehrb.*)

***Proto*Fluoride of Tin.**

I.) *normal.* Easily soluble in water. (Gay-
$Sn Fl$ Lussac & Thénard.)

II.) *acid.*
$Sn Fl, H Fl$

***Bi*Fluoride of Tin.** Probably soluble in
$Sn Fl_2$ water. Soluble in fluorhydric acid; when the solution is boiled it coagulates like albumen. (Berzelius.)

Fluoride of Titanium.

I.) *normal.*

a = *anhydrous.* (Unverdorben.)
$Ti Fl_2$

b = *hydrated.* Decomposed by water to a soluble acid and an insoluble basic salt. (Berzelius, *Lehrb.*)

II.) *acid.* Soluble in water.
(*Titanfluorhydric Acid.*)
$Ti Fl_2, H Fl$

Fluoride of Tungsten. Decomposed by
$W Fl$ water. Soluble in fluorhydric acid.

***Ter*Fluoride of Uranium.**

I.) *basic.* Easily soluble in water. With the
$Ur_2 Fl_3, 2 Ur_2 O_3$ alkaline fluorides it forms salts soluble in water. (Berzelius.)

***Bi*Fluoride of Vanadium.** Perfectly solu-
$Va Fl_2$ ble in water. Soluble in absolute alcohol. Soluble, with combination, in aqueous solutions of the alkaline fluorides.

***Ter*Fluoride of Vanadium.** Soluble in wa-
$Va Fl_3$ ter.

Fluoride of Yttrium. Insoluble in water
$Y Fl$ or in fluorhydric acid. (Berzelius.)

Fluoride of Zinc. Very sparingly soluble
$Zn Fl$ in water; somewhat more freely soluble in fluorhydric acid; also in chlorhydric and nitric acids. Easily soluble in ammonia-water. With the alkaline fluorides it forms sparingly soluble compounds.

Fluoride of Zirconium. Easily soluble in
$Zr_2 Fl_3$ water. When the solution of hydrate of zirconia in fluorhydric acid is evaporated at a gentle heat a crystallized salt is obtained, which is decomposed when treated with water, an insoluble basic salt separating out while a salt with excess of acid dissolves; and if this acid solution be boiled, a portion of hydrate of zirconia will be precipitated, and the solution become still more acid. (Berzelius, *Lehrb.*, 3. 504.) Insoluble in water. Unacted upon by acids. (Deville.)

FluorBorate of *X*. *Vid.* FluoBorate of *X*.

Fluorine. Not isolated.
Fl

FluoSilicAnilid. *Vid.* FluoSilicate of Anilin.

FluoSilicic Acid. Soluble in water. Many
(*HydroFluoSilicicAcid.*) of its salts are soluble in
$H Fl, Si Fl_3 + Aq$ water.

FluoSilicate of Aluminum. Easily soluble in water. After the solution has been evaporated to dryness the residue is slowly but completely redissolved by water. (Berzelius, *Lehrb.*)

Fluo Silicate of Ammonium. Easily solu-
$N H_4 Fl, 2 Si Fl_3$ ble in water. (Berzelius.)

FluoSilicate of Anilin. Decomposed by
(*Fluo Silicanilid.*) water. Very sparingly sol-
$C_{48} H_{28} N_4 O_6 Si Fl_{11}$ (?) uble in boiling, less soluble in cold alcohol. Insoluble, or very sparingly soluble, in ether. (Laurent & Delbos, *Ann. Ch. et Phys.*, (3.) 22. 101.)

FluoSilicate of Antimony ($Sb O_3$). Read-
$Sb Fl_3 ; 2 Si Fl_3$ ily soluble in water containing fluorhydric acid. (Berzelius.)

FluoSilicate of Barium. Permanent. Very
(*Fluoride of Barium & of Silicium.*) sparingly soluble
$Ba Fl, Si Fl_3$ in water, but more freely in hot than in cold. The presence of chlorhydric acid does not increase its solubility to a noticeable extent. (Berzelius, *Lehrb.*, 3. 357.) When recently precipitated it dissolves in 3802 pts. of water at ordinary temperatures; it is more readily soluble in hot water. When a hot solution is cooled the greater portion of the salt precipitates out, but

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the cooled solution still contains somewhat more of the salt than that prepared by digestion in the cold; thus, by experiment, it was observed that 1 pt. of the salt was soluble in 3392 pts. of water. It is considerably more soluble, with more or less decomposition, in presence of free chlorhydric acid. Thus, by experiment, 1 pt. is soluble in the cold in 733 pts. of water acidulated with chlorhydric acid. 1 pt. is soluble at 12° in 640 pts. of water very feebly acidulated with chlorhydric acid when the mixture is heated to boiling before being cooled to this temperature. (Fresenius, *Ann. Ch. u. Pharm.*, 1846, **59.** 120.) Almost insoluble in spirit. (Fresenius, *Quant.*, p. 126.) Almost entirely insoluble in chlorhydric or nitric acid. (H. Rose, *Tr.*) When fluosilicic acid is added to a solution of chloride of barium it produces a precipitate after a time, even when in presence of 3800 pts. of water. (Harting.) Soluble in 428 pts. of a saturated cold solution of chloride of ammonium, and in 589 pts. of a more dilute solution obtained by mixing the saturated solution with twice its vol. of water. (J. W. Mallet, *Am. J. Sci.*, (2.) **28.** 50.)

FluoSilicate of Cadmium. $Cd\,Fl, Si\,Fl_3 + Aq$ Effloresces in warm air. Very easily soluble in water. (Berzelius.)

FluoSilicate of Calcium. $Ca\,Fl, Si\,Fl_3 + 2\,Aq$ Sparingly soluble in water, being partially decomposed thereby with formation of fluorhydric acid. Soluble in fluorhydric and in chlorhydric acids.

FluoSilicate of Chromium. Efflorescent. Soluble in water. (Berlin.)

FluoSilicate of Cobalt. $Co\,Fl, Si\,Fl_3 + 7\,Aq$ Easily soluble in water. (Berzelius.)

*Di*FluoSilicate of Copper. $Cu_2\,Fl, Si\,Fl_3$ Insoluble in water.

*Proto*FluoSilicate of Copper. $Cu\,Fl, Si\,Fl_3 + 7\,Aq$ Efflorescent. Easily soluble in water. (Berzelius.)

FluoSilicate of Glucinum. $G_2\,Fl_3, Si\,Fl_3$ Readily soluble in water. (Berzelius.)

*Proto*FluoSilicate of Iron. $Fe\,Fl, Si\,Fl_3$ Easily soluble in water. (Berzelius.)

*Sesqui*FluoSilicate of Iron. $Fe_2\,Fl_3, 3\,Si\,Fl_3$ Soluble in water. (Berzelius.)

FluoSilicate of Lead.

I.) $Pb\,Fl, Si\,Fl_3$ Very easily soluble in water. (Berzelius.)

II.) *basic?* Insoluble in water. Soluble in a saturated aqueous solution of chloride of sodium. (Becquerel, *C. R.*, 1845, **20.** 1523.)

FluoSilicate of Lithium. $Li\,Fl, Si\,Fl_3$ Exceedingly difficultly soluble in water; more readily soluble in water which contains an excess of acid. (Berzelius.)

FluoSilicate of Magnesium. $Mg\,Fl, Si\,Fl_3$ Easily soluble in water. (Berzelius.)

FluoSilicate of Manganese. $Mn\,Fl, Si\,Fl_3 + 7\,Aq$ Easily soluble in water. (Berzelius.)

*Di*FluoSilicate of Mercury. $Hg_2\,Fl, Si\,Fl_3$ Sparingly soluble in water; more freely soluble in acidulated water, from which it is precipitated on the addition of chlorhydric acid. (Berzelius.)

*Proto*FluoSilicate of Mercury. $Hg\,Fl, Si\,Fl_3$ Decomposed by water to a soluble acid and an insoluble basic salt; completely soluble in acidulated water.

*Proto*FluoSilicate of Molybdenum. (*Molybdofluoride of Silicon.*) $Mo\,Fl, Si\,Fl_3$ Easily soluble in fluorhydric acid. (Berzelius.)

*Bi*FluoSilicate of Molybdenum. $Mo\,Fl_2, 2\,Si\,Fl_3$ Decomposed by water to a soluble acid and an insoluble basic salt. Easily soluble, without decomposition, in acidulated water. (Berzelius.)

*Per*FluoSilicate of Molybdenum. $Mo\,Fl_3, 3\,Si\,Fl_3$ Mostly soluble in water, only a small amount of basic matter being left behind. (Berzelius.)

FluoSilicate of Nickel. $Ni\,Fl, Si\,Fl_3 + 7\,Aq$ Easily soluble in water. (Berzelius.)

FluoSilicate of Platinum. $Pt\,Fl_2, Si\,Fl_3$ Decomposed by water to a soluble acid and an insoluble basic salt. (Berzelius.)

FluoSilicate of Potassium. $K\,Fl, Si\,Fl_3$ Difficultly soluble in water, though somewhat more easily in hot than in cold. (Berzelius, *Lehrb.*) Difficultly soluble in water. Insoluble in dilute spirit. (Fresenius, *Quant.*, p. 286.) 100 pts. of boiling water dissolve 0.66 pt. of it. (Ure's *Dict.*) Soluble in 790 pts. of cold, and in 50 pts. of boiling water. Insoluble in alcohol. (Wittstein's *Handw.*) Unacted upon by aqueous solutions of caustic or carbonated potash at the ordinary temperature, but is dissolved, with decomposition, on boiling therewith; the solution thus obtained soon gelatinizes from separation of silicic acid. (Berzelius, *Lehrb.*) Insoluble in chlorhydric acid.

FluoSilicate of Silver. $Ag\,Fl, Si\,Fl_3$ Deliquescent.

FluoSilicate of Sodium. $Na\,Fl, Si\,Fl_3$ Difficultly soluble in water. Insoluble in dilute spirit. (Fresenius, *Quant.*, p. 286.) More readily soluble in water than the potassium salt, and much more soluble in hot than in cold water. An excess of the acid does not increase its solubility. (Berzelius, *Lehrb.*)

FluoSilicate of Strontium. $Sr\,Fl, Si\,Fl_3 + x\,Aq$ Not completely soluble in pure water, a certain slight excess of acid being required to prevent the formation of an insoluble basic salt. But the amount of the residue insoluble in water is very trifling, and the solubility of the salt is in remarkable contrast with the insolubility of fluosilicate of barium. (Berzelius, *Lehrb.*, **3.** 385.)

FluoSilicate of Tin. $Sn\,Fl_2, Si\,Fl_3$ Very easily soluble in water. (Berzelius.)

FluoSilicate of Uranium. $Ur\,Fl, Si\,Fl_3$ After having become dry it dissolves very sparingly in acid. It is but slightly changed by boiling with a solution of potash. It is not precipitated in presence of free fluorhydric acid. (Rammelsberg.)

FluoSilicate *of biFluoride* of Vanadium. Soluble in water.

FluoSilicate *of terFluoride* of Vanadium. $V\,Fl_3, 3\,Si\,Fl_3$ Partially soluble in water.

FluoSilicate of Yttrium. $Y\,Fl, Si\,Fl_3$ Insoluble in water. Soluble in dilute chlorhydric acid.

FluoSilicate of Zinc. $Zn\,Fl, Si\,Fl_3 + 7\,Aq$ Very easily soluble in water. (Berzelius.)

FluoSilicate of Zirconium. $Zr_2\,Fl_3, Si\,Fl_3$ Very soluble in water. The aqueous solution becomes turbid on boiling, but most of the salt remains dissolved. (Berzelius.)

FORMANIL. *Vid.* MethylAnilin.

FORMANILID. *Vid.* PhenylFormylamid.

FORMANILIN. *Vid.* MethylAnilin.

FORMEMYLANILIN. *Vid.* MethylAmylAnilin.

FORMENE. *Vid.* Hydride of Methyl.

"*Bi*FORMENE" (of Lallemand). *Vid.* Propylene.

FORMIC ACID. $C_2H_2O_4 = C_2HO_3, HO$ Miscible with water, alcohol, and ether, in all proportions. Soluble in glycerin. (Berthelot.) All of its salts are soluble in water, and many of them are soluble in alcohol also.

FORMIATE OF ALUMINA.

I.) *normal.* $C_6H_3Al_2'''O_{12}$ Hygroscopic. Sparingly soluble in water. (Arvidson, Richter.) Decomposed by hot water (Gœbel) only when sulphate of potash is present. (Liebig.) Deliquescent. Easily soluble in water. A solution of the pure salt may be heated to boiling without suffering decomposition, but a solution which contains sulphate of potash, or alum, becomes cloudy on boiling, from the separation of a basic salt which redissolves as the liquid cools.

II.) *terbasic.* Soluble in water; but the solution is somewhat readily decomposed. (Ordway, *Am. J. Sci.*, (2.) **26.** 204.)

FORMIATE OF AMMONIA. $C_2H(NH_4)O_4$ Very deliquescent. Easily soluble in water.

FORMIATE OF AMMONIUMCHLOROPLATIN(*ous*)AMMONIUM. (*Gros's Formiate.*)

FORMIATE OF AMYL.

I.) $C_2H(C_{10}H_{11})O_4$ Sparingly soluble in water. (H. Kopp.)

II.) *basic.*

FORMIATE OF BARYTA. C_2HBaO_4 Permanent. Soluble in nearly 4 pts. of water at 15°. (Gehlen, in *Schweigger's Journ. für Ch. u. Phys.*, 1812, **4.** pp. 40, 34.) Insoluble in alcohol. Insoluble in hot alcohol of 85%. (Scheerer.)

FORMIATE OF BARYTA & OF COPPER.

I.) $C_2H(BaCu)O_4 + 4Aq$

II.) $2(C_2HBaO_4); C_2HCuO_4 + 4Aq$

FORMIATE OF BARYTA & OF MANGANESE.
$C_2H(BaMn)O_4 + 2Aq$

FORMIATE OF BARYTA & OF ZINC.
$C_2H(BaZn)O_4 + 2Aq$

FORMIATE OF BISMUTH. $C_6H_3Bi'''O_{12}$ Easily soluble in water. (Arvidson.)

FORMIATE OF BUTYL. (*Formiate of Tetryl.*) $C_2H(C_8H_9)O_4$ Insoluble, or but sparingly soluble, in water.

FORMIATE OF CADMIUM. $C_2HCdO_4 + 2Aq$ Very soluble in water.

FORMIATE OF CERIUM. $2C_2HCeO_4 + Aq$ Very sparingly soluble in water. (Beringer.)

FORMIATE *of sesquioxide* OF CHROMIUM.

I.) *bibasic.* Soluble in water. (Ordway, *Am. J. Sci.*, (2.) **26.** 203.)

FORMIATE OF CHLORAMYL. *Vid.* ChloroCarbonate of Amyl.

FORMIATE OF CHLORETHYL. *Vid.* ChloroCarbonate of Ethyl.

FORMIATE OF *bi*CHLORETHYL. (*BiChloroFormic Ether. BiChlorovinic Formiate. Formiate d'ethyle bichloré.*) $C_6H_4Cl_2O_4 = C_2H(C_4H_3Cl_2)O_4$ Insoluble in water, in contact with which, however, it is very slowly decomposed. Easily soluble in alcohol, and ether. (Malaguti.)

FORMIATE OF CHLOROMETHYL. *Vid.* ChloroCarbonate of ChloroMethyl.

FORMIATE OF CINCHONIDIN (of Pasteur). Tolerably easily soluble in water. (Leers, *Ann. Ch. u. Pharm.*, **82.** 161.)

FORMIATE OF CINCHONIN. Readily soluble in water.

FORMIATE OF COBALT. C_2HCoO_4 Slightly soluble in water. More easily soluble in water acidulated with formic acid. Insoluble in alcohol. (Arvidson.)

FORMIATE OF COPPER.

I.) *normal.* $C_2HCuO_4 + 4Aq$ Effloresces in warm dry air. Soluble in 8.42 pts of water at 20°. At the temperature of boiling it appears to be soluble in all proportions in water, since the crystals melt in their own water when heated. Soluble in 400 pts. of alcohol, of 86%, at 17.5°. (Gehlen, *Schweigger's Journ. für Ch. u. Phys.*, 1812, **4.** pp. 28, 30.) Soluble in 7 pts. of cold water. (Arvidson.)

II.) *basic.* Slightly soluble in water.

FORMIATE OF COPPER & OF STRONTIA.

I.) $C_2H(CuSr)O_4 + 4Aq$

II.) $C_2HCuO_4 + 4Aq;\ 2(C_2HSrO_4 + 2Aq)$

FORMIATE OF ETHYL. (*Formic Ether. Ethylic Formiate. Vinic Formiate.*) $C_6H_6O_4 = C_2H(C_4H_5)O_4$ Soluble in 9 pts. of water at 17.5°. (Gehlen, *Schweigger's Journ. für Ch. u. Phys.*, 1812, **4.** 22.) The aqueous solution soon decomposes. Readily soluble in alcohol, from which solution water precipitates it. (Bucholz.) Miscible in all proportions with wood-spirit, ether, and fixed or volatile oils. (Liebig.)

*Tri*FORMIATE OF ETHYL. $3C_4H_5O, C_2HO_3 = C_{14}H_{16}O_6$ Very sparingly soluble in water. (Kay.)

FORMIATE OF ETHYL*chloré*. *Vid.* Formiate of ChlorEthyl.

FORMIATE OF ETHYL *perchloré*. *Vid.* ChloroFormiate of *per*ChlorEthyl.

FORMIATE OF GLUCINA.

I.) *basic* (*almost terbasic*). Soluble in water. (Ordway, *Am. J. Sci.*, (2.) **26.** 207.)

FORMIATE *of protoxide* OF IRON. Soluble in water.

FORMIATE *of sesquioxide* OF IRON. $C_6H_3Fe_2'''O_{12}$ Deliquescent. Easily soluble in water. Sparingly soluble in alcohol. (Arvidson.)

The basic formiates of sesquioxide of iron which contain six equivalents or less of the base may be obtained dissolved in water; but those containing more than six equivalents of base are insoluble in water. (Ordway, *Am. J. Sci.*, (2.) **26.** 202.) Some of these solutions of basic salt are decomposed by boiling.

FORMIATE OF LEAD.

I.) *normal.* C_2HPbO_4 Soluble in 36 @ 40 pts. of cold water; more readily soluble in boiling water. (Arvidson.) Formiate of lead is almost insoluble in cold, but is soluble in hot water. (Berthelot, *Ann. Ch. et Phys.*, (3.) **41.** 295.) Nearly insoluble in alcohol. (Arvidson.)

II.) *di.* Soluble in water.

III.) *tri.* $C_2HPbO_4, 2PbO$ (Berthelot, *Ann. Ch. et Phys.*, (3.) **46.** 487.)

FORMIATE OF LEAD with NITRATE OF LEAD. $3(C_2HPbO_4); PbO, NO_5 + 2Aq$ Permanent. Difficultly soluble in cold water. (Lucius, *Ann. Ch. u. Pharm.*, **103.** 115.)

FORMIATE OF LIME. Permanent. Effloresces

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$C_2 H Ca O_4 + x Aq$ in warm air. Soluble in 8 pts. of cold water (Arvidson); in 10 pts. of water at 19° (Gœbel); much more soluble in hot water. Insoluble in alcohol.

Formiate of Lithia. Deliquescent. Soluble in water. Sparingly soluble in alcohol. (Rammelsberg.)
$C_2 H Li O_4 + 2 Aq$

Formiate of Magnesia. Permanent. (Süersen.) Very difficultly soluble in water, requiring 13 pts. of water to dissolve it at a moderate heat. Insoluble in spirit. (Bergman, *Essays*, **1.** 451.) Soluble in 13 pts. of cold water. Insoluble in alcohol. (Arvidson, [Gm.].)
$C_2 H Mg O_4$

Formiate of Manganese. Efflorescent. Soluble in 15 pts. of cold water. Insoluble in alcohol. (Arvidson.)
$C_2 H Mn O_4 + 2 Aq$

Formiate of Melamin. Very soluble in water.

Formiate of ***di*****Mercur(*ous*)ammonium with** ***din*****Oxide of Mercury.** Insoluble in water.

$N \left\{ \begin{matrix} H_2 \\ 2 Hg_2 \end{matrix} \right. O, C_2 H O_3 ; 2 Hg_2 O$

Formiate of Mercury(Hg_2). Soluble in 520 pts. of water at 17°; much more abundantly soluble in warm water, but in this case incipient decomposition occurs, and on boiling the decomposition is complete. Insoluble in alcohol or ether. (Gœbel.)
$C_2 H Hg_2 O_4$

Formiate of Mercury(Hg). Easily soluble in water; the solution undergoes decomposition if it be slightly heated. (Liebig.)
$C_2 H Hg O_4$

Formiate of Methyl. Insoluble in water.
(*Methylic formiate. Formic methyl ether. Formiate of the oxide of methyl.*)
$C_4 H_4 O_4 = C_2 H (C_2 H_3) O_4$

Formiate of Methyl *perchloré*. *Vid.* Chloro-Carbonate of ChloroMethyl.

Formiate of Morphine. Readily soluble in water.

Formiate of Nickel. Difficultly soluble in water. (Berzelius, *Lehrb.*)
$C_2 H Ni O_4 + x Aq$

Formiate of Potash.

I.) *normal.* Deliquescent. Very soluble in water.
$C_2 H K O_4$

Permanent. Easily soluble in water, and alcohol. (Berzelius's *Lehrb.*, **3.** 166.)

II.) *acid.* Deliquescent. Very soluble in water, alcohol, and formic acid. The aqueous solution is partially decomposed when evaporated over the water-bath. (Bineau, *Ann. Ch. et Phys.*, (3.) **19.** 294, & (3.) **21.** 186.)
$C_2 H K O_4, C_2 H_2 O_4 + x Aq$

Formiate of Quinine. Readily soluble in water.

Formiate of Quinolein. Soluble in boiling water, and alcohol. (Gerhardt.)

Formiate of Silver. Easily [difficultly (Witts *Handw.*)] soluble in water. Insoluble in alcohol.
$C_2 H Ag O_4$

Formiate of Soda.

I.) *normal.* Melts in its water of crystallization when heated, and solidifies, as this evaporates, to a dry mass, which is deliquescent, according to Gœbel, and is soluble in 2 pts. of water, according to Afzelius. (Berzelius's *Lehrb.*, **3.** 253.)
$C_2 H Na O_4 + 2 Aq$

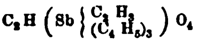
II.) *acid.* Extremely deliquescent. Very soluble in water; but the solution is decomposed by evaporation, or when a large quantity of water is added to it, to formic acid and the normal salt. (Bineau, *Ann. Ch. et Phys.*, (3.) **21.** 187.)
$C_2 H Na O_4, C_2 H_2 O_4 + x Aq$

Formiate of Solanin. ′ Soluble in water.

Formiate of StannEthyl. Tolerably soluble in water. (Cahours & Riche.)

Formiate of StibEthylium. Difficultly soluble in water; more easily soluble in alcohol.

Formiate of StibMethylethylium. Very sparingly soluble in cold water, and in alcohol. Tolerably abundantly soluble in boiling water. (Friedlænder.)



$C_2 H \left(Sb \left\{ \begin{matrix} C_2 H_3 \\ (C_4 H_5)_3 \end{matrix} \right. \right) O_4$

Formiate of Strontia. Permanent. Soluble in water.
$C_2 H Sr O_4 + 2 Aq$

Formiate of TellurMethyl. Easily soluble in water.

Formiate of Thoria. Soluble in hot water. Decomposed by cold water to an acid solution and a basic salt. Sparingly soluble in alcohol. (Berzelius.)
$C_2 H Th O_4$

Formiate *of protoxide* **of Tin.** Some samples are insoluble in water; others form a gelatinous solution from which alcohol precipitates a white powder. (Arvidson.)
$C_2 H Sn O_4$

Formiate *of protoxide* **of Uranium.** Ppt. Soluble in an aqueous solution of formiate of soda; but the solution is decomposed on boiling.
$C_2 H Ur O_4$

Formiate *of sesquioxide* **of Uranium.** Deliquescent.

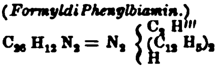
Formiate of Vanadium($V O_2$). Easily soluble in water. The solution undergoes decomposition after a time, unless free acid is present. (Berzelius.)

Formiate of Zinc. Permanent. Soluble in 24 pts. of water at 19°. (Gœbel.) Less easily soluble in water than acetate of zinc. (Berzelius, *Lehrb.*) Insoluble in alcohol. (Marggraf, Arvidson.) Soluble in 20 pts. of water at the ordinary temperature. (Arvidson & Œhrn.)
$C_2 H Zn O_4 + 2 Aq$

Formic Acid with Mannite. Tolerably soluble in alcohol of 90%.
$C_{12} H_{14} O_{12}, 2 C_2 H_4 O_4 + x Aq$

Formic Ether. *Vid.* Formiate of Ethyl.

Formicyl*di*Phenyl*bi*amin. Insoluble in water. Easily soluble in alcohol, and ether.
(*FormyldiPhenylbiamin.*)



$C_{26} H_{12} N_2 = N_2 \left\{ \begin{matrix} C_2 H''' \\ (C_{12} H_5)_2 \\ H \end{matrix} \right.$

FormoBenzoic Acid. *Vid.* FormoBenzoylic Acid.

FormoBenzoylic Acid. Very easily soluble in water, and in the smallest quantities of alcohol, and ether. Soluble in chlorhydric acid, and in concentrated sulphuric acid, the solution undergoing decomposition when heated. (Winckler.)
(*FormoBenzoic Acid. Mandelic Acid.*)
$C_{16} H_8 O_6 = C_{14} H_6 (C_2 H O_2) O_3, H O$

FormoBenzoylate of Ammonia. Soluble in almost all proportions in water, and alcohol. (Winckler.)

FormoBenzoylate of Baryta. Much less soluble than the potash salt in water. Sparingly soluble in alcohol. (Winckler.)
$C_{16} H_7 Ba O_6$

FormoBenzoylate of Copper. Nearly insoluble in water, and in alcohol. (Winckler.)
$C_{16} H_7 Cu O_6$

FormoBenzoylate of Lead. Scarcely at all soluble in water. (Winckler.)

FormoBenzoylate of Magnesia.

FormoBenzoylate of Mercury(Hg O). Ppt.

FormoBenzoylate of Potash. Very readily soluble in water and in alcohol. (Winckler.)

FormoBenzoylate of Silver. Scarcely at all soluble in cold, more soluble in boiling water.
$C_{16} H_7 Ag O_6$

FormoMethylal. Miscible with water in all proportions. (Kane.) 1 volume of it requires 1.7 vols. of water for its solution. (Malaguti.) Decomposed by a solution of caustic potash.
(*Formal.*)
$C_6 H_{10} O_6$

FormoNaphtalid. *Vid.* FormylNaphtylamid.

Formonetin. Insoluble in water. Soluble in concentrated boiling alcohol, less soluble in cold alcohol. Almost insoluble in ether. Easily soluble in solutions of the alkalies.
$C_{50} H_{22} O_{15}$

Formosal. *Vid.* Lignone.

FormoVinAmylamin. *Vid.* MethylEthylAmylamin.

Formoylamin.
(*Formiliak.*)
$C_2 H_3 N = N\left\{\begin{matrix} C_2 H \\ H_2 \end{matrix}\right.$

FormylNaphtylamid. Tolerably soluble in boiling water. Very easily soluble in alcohol. (Zinin.)
(*FormylNaphthalid.*)
$C_{22} H_9 N O_2 = N\left\{\begin{matrix} C_{20} H_8'' \\ C_2 H O_2 \end{matrix}\right.$

Frangulin. Insoluble in water. Soluble in 160 pts. of warm 80% alcohol; very sparingly soluble in cold alcohol. Scarcely at all soluble in cold, very sparingly soluble in boiling ether; — less soluble than chrysophanic acid in ether. Soluble in boiling benzin, oil of turpentine, and the fatty oils. Slowly soluble in cold, readily soluble in warm ammonia-water. Soluble in cold concentrated sulphuric acid, from which solution it is precipitated by water. Soluble in boiling concentrated nitric acid, separating out again, unchanged, as the solution cools. Insoluble in cold concentrated nitric acid. Soluble in solutions of the alkalies. (Casselmann, *Ann. Ch. u. Pharm.*, **104.** 80.)
(*Rhamnoxanthin*(impure).)
$C_{12} H_6 O_6$

Fraxin(from the bark of *Fraxinus excelsior*). Soluble in 1000 pts. of cold water. Easily soluble in hot water. Sparingly soluble in cold alcohol, though more readily soluble therein than in cold water, tolerably easily soluble in hot alcohol. Insoluble in ether. (Salm-Horstmar, *Pogg. Ann.*, **100.** 607, cited in Wittstein's *Handw.*) Several previous observers have confounded fraxinin with mannite, thus Stenhouse (*Ann. Ch. u. Pharm.*, **91.** 256) asserts that the two are identical.
(*Fraxinin.*)

Fucusamid.
$N_2\left\{(C_{10} H_4 O_2'')_3\right.$

Fucusin. Only half as soluble in water as furfurin, and much less soluble than the latter in weak alcohol.
(Isomeric with *Furfurin.*)
$C_{30} H_{12} N_2 O_6$

Fucusol. Soluble in 14 pts. of water at 13°; and in 12 pts. of concentrated ammonia-water at 13.5°. (Stenhouse.)
$C_{10} H_4 O_4$

Fulminic Acid. Not isolated.
$C_4 H_2 N_2 O_4$

Fulminate of Alumina. Easily soluble in water.

Fulminate of Ammonia & of Copper. Soluble in water. (Gladstone.)

Fulminate of Ammonia & of Silver. Very sparingly soluble in water. (Liebig.)

Fulminate of Ammonia & of Zinc. Deliquescent. Soluble in water.

Fulminate of Baryta. Easily soluble in water, and alcohol. (E. Davy.)

Fulminate of Baryta & of Silver. Sparingly soluble in water. (Liebig.)

Fulminate of Baryta & of Zinc. Soluble in water, and alcohol. (E. Davy.)

Fulminate of Cadmium & of Zinc. Somewhat soluble in water.

Fulminate of Calcium & of Silver. Readily soluble in cold water. (Liebig.)

Fulminate of Calcium & of Zinc. Deliquescent. Sparingly soluble in water.

Fulminate of Chromium & of Zinc. Easily soluble in water.

Fulminate of Cobalt & of Zinc. Sparingly soluble in cold, rather more soluble in boiling water.

Fulminate of Copper.

I.) *normal.* Very sparingly soluble in boiling water.

II.) *acid.* Soluble in water. (Liebig & Gay-Lussac.)

Fulminate of Copper & of Potash. Soluble in water. (Liebig.)

Fulminate of Gold. Insoluble in water. Soluble in chlorhydric and in concentrated sulphuric acids. Also in ammonia-water. (E. Davy.)
$\left.\begin{matrix} Au''' \\ Cy_3 \end{matrix}\right\} O_6$

Fulminate of Gold & of Zinc.

I.) Soluble in ammonia-water, and in concentrated chlorhydric and sulphuric acids.

II.) Insoluble in water or chlorhydric acid. Soluble in aqua-regia. (E. Davy.)

Fulminate of Lead & of Zinc.

Fulminate of Magnesia & of Silver.

I.) Soluble in water.

II.) *subsalt.* Insoluble in water. (Liebig.)

Fulminate of Magnesia & of Zinc. Readily soluble in water, and alcohol.

Fulminate of Manganese & of Zinc. Soluble in water.

Fulminate of Mercury. Very sparingly soluble in cold, more soluble in boiling water. Soluble in ammonia-water. Abundantly soluble in a warm aqueous solution of nitrate of protoxide of mercury (Hg O, N O_5) acidulated with nitric acid. (Schischkoff.)
$C_4 Hg_2 N_2 O_4 + Aq$

Fulminate of Mercury & of Silver. Sparingly soluble in water. (Liebig.)

Fulminate of Mercury with Iodide of Potassium. Insoluble in water or alcohol. (Schischkoff.)
$2 C_4 Hg_2 N_2 O_4 ; K I$

Fulminate of Nickel & of Zinc. Sparingly soluble in water. (E. Davy.)

Fulminate of Palladium & of Zinc.) Insoluble in water. (E. Davy.)

Fulminate of Platinum & of Zinc. Soluble in water. (E Davy.)

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Fulminate of Potash. Deliquescent. Insoluble in alcohol. (E. Davy.)

Fulminate of Potash & of Silver. Soluble in 8 pts. of boiling water; less soluble in cold water. (Liebig.)

Fulminate of Potash & of Zinc. Deliquescent. Soluble in water. Insoluble in alcohol. (E. Davy.)

Fulminate of Silver.

I.) *normal.* $C_4 Ag_2 N_2 O_4$ Very sparingly soluble in cold water. Soluble in 36 pts. of boiling water; from which it separates in great part as the solution cools. (Gay-Lussac & Liebig.) More soluble in ammonia-water, without alteration. (Descotils.)

II.) *acid.* Easily soluble in boiling, less soluble in cold water. (Liebig.)

Fulminate of Silver & of Soda. More soluble than the silver salt in water. (Liebig.)

Fulminate of Silver & of Strontia. Sparingly soluble in water. (Liebig.)

Fulminate of Silver & of Zinc. Soluble in water. (Liebig.)

Fulminate of Soda & of Zinc. Efflorescent.

Fulminate of Strontium & of Zinc.

Fulminate of Zinc.

I.) *normal.* Insoluble in cold, sparingly soluble in boiling water. Insoluble in alcohol. Very soluble in ammonia-water. Soluble in aqueous solutions of the alkalies. (E. Davy.)

II.) *acid.* Soluble in water.

Fulminuric Acid. *Vid.* IsoCyanuric Acid.

Fumaramid. $C_8 H_6 N_2 O_4 = N_2 \left\{ \begin{matrix} C_8 H_2 O_4'' \\ H_4 \end{matrix} \right.$ Insoluble in cold, soluble in boiling water. (Hagen.) Insoluble in alcohol. Slowly decomposed by water.

Fumaramid with *prot*oxide of Mercury. $C_8 H_6 N_2 O_4, 2\,Hg\,O$ Insoluble in water. (Dessaignes.)

Fumaric Acid. (*Lichenic Acid. Boletic Acid. ParaMaleic Acid.*) $C_8 H_4 O_8 = C_8 H_2 O_6, 2\,H\,O$ Permanent. Sparingly soluble in water, requiring nearly 200 pts. of water at the ordinary temperature to dissolve it.

Soluble in 390 pts. of water at 10°, and in much less hot water (Winckler); in 210 pts. of water at 12° (Lassaigne); in 216 pts. of water at 17° (Probst); in 160 pts. of water, and in 40 pts. of ordinary alcohol (Riegel); in 180 pts. of water at 20°, and in 45 pts. of alcohol at 20° (Braconnot, Thomson's *System*); in 21 pts. of cold alcohol of 76%. (Probst.) Readily soluble in alcohol of 82%. (Winckler.) Very soluble in alcohol, and ether. Easily soluble, without decomposition, in boiling dilute nitric acid. Many of the fumarates dissolve in water, but none of them are soluble in strong alcohol. (Winckler.)

Fumarate of Ammonia.

I.) *normal.* Very soluble in water; the solution undergoing decomposition when evaporated. Soluble in 26 pts. of water at 20°. (Thomson's *System.*) 100 pts. of water at 15.5° dissolve 38 pts. of it. (Ure's *Dict.*)

II.) *acid.* $C_8 H_3 (N H_4) O_8$ Very soluble in water. Insoluble in alcohol. (Winckler.)

Fumarate of Baryta. $C_8 H_2 Ba_2 O_8$ Efflorescent. Very slowly soluble in water, alcohol, and dilute acids. (Rieckher.)

Fumarate of Cobalt. $C_8 H_2 Co_2 O_8 + 6\,Aq$ Very soluble in water and in ammonia-water. Sparingly soluble in dilute spirit. (Rieckher.)

Fumarate of Copper. $C_8 H_2 Cu_2 O_8 + 6\,Aq$ Slowly soluble in water, and alcohol. Insoluble in boiling fumaric acid. (Rieckher.) Soluble in chlorhydric, and nitric acids. (Winckler.)

Fumarate of Cuprammonium. Soluble in water. Insoluble in alcohol. (Rieckher.)

Fumarate of Ethyl. $C_8 H_2 (C_4 H_5)_2 O_8$ Sparingly soluble in water. (Hagen.)

Fumarate *of protoxide* of Iron. Soluble in water. (Riegel.)

Fumarate *of sesquioxide* of Iron. $Fe_2 O_3, C_8 H_2 O_6$ Insoluble in water, ammonia-water, or a solution of fumarate of ammonia. Soluble in acids.

Fumarate of Lead.

I.) *normal.* $C_8 H_2 Pb_2 O_8$ Scarcely at all soluble in cold, easily soluble in boiling water. (Winckler.) Insoluble in alcohol. (Rieckher.) Easily soluble, with decomposition, in nitric acid. Nearly insoluble in strong acetic acid. (Winckler.)

II.) *tri.*
$C_8 H_2 Pb_2 O_8, Pb\,O$

III.) *hexa.*
$C_8 H_2 Pb_2 O_8, 4\,Pb\,O$

Fumarate of Lime. $C_8 H_2 Ca_2 O_8 + 6\,Aq$ Permanent. Scarcely at all soluble in water. Insoluble in alcohol. (Winckler.) 100 pts. of water at 15.5° dissolve 0.9 pt. of it. (Ure's *Dict.*)

Fumarate of Magnesia. $C_8 H_2 Mg_2 O_8 + 8\,Aq$ Soluble in water. Insoluble in alcohol. (Rieckher.)

Fumarate of Manganese. $C_8 H_2 Mn_2 O_8 + 6\,Aq$ Sparingly soluble in water. Insoluble in alcohol.

Fumarate *of dinoxide* of Mercury.
$C_6 H_2 Hg_2 O_8$

Fumarate *of protoxide* of Mercury.

Fumarate of Nickel. $C_8 H_2 Ni_2 O_8 + 8\,Aq$ Soluble in water, spirit, and ammonia-water. (Rieckher.)

Fumarate of Potash.

I.) *normal.* $C_8 H_2 K_2 O_8 + 4\,Aq$ Very soluble in water. Insoluble in alcohol. (Winckler.) Sparingly soluble in weak alcohol. (Rieckher.) From its aqueous solution acetic acid precipitates the acid salt. (Winckler.)

II.) *acid.* $C_8 H_3 K O_8 + 2\,Aq$ Much less soluble than the normal salt in cold water. Easily soluble in boiling water. Nearly insoluble in cold, sparingly soluble in boiling spirit of 81%. (Winckler.)

Fumarate of Silver. $C_8 H_2 Ag_2 O_8$ Absolutely insoluble in water. (Pelouze.) Soluble in ammonia-water. Easily soluble in nitric acid. (Winckler.)

Fumarate of Soda.

I.) *normal.* $C_8 H_2 Na_2 O_8 + 2\,Aq$ & $+ 6\,Aq$ Permanent. Readily soluble in cold water. Insoluble in alcohol. (Winckler.)

Fumarate of Strontia. $C_8 H_2 Sr_2 O_8 + 6\,Aq$ Very sparingly soluble in water, and alcohol. (Rieckher.)

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Fumarate of Zinc. Readily soluble in water. $C_8H_2Zn_2O_8 + 6\,Aq \;\&\; 8\,Aq$ Insoluble in alcohol. (Winckler.) The 8 Aq salt is efflorescent.

Fumaric Ether. *Vid.* Maleate of Ethyl.

Fumarimid. Very sparingly soluble in boiling $C_8H_3NO_4 + Aq = N\left\{\begin{matrix}C_8H_2O_4''\\H\end{matrix}\right.$ water. Soluble in warm concentrated acids, whence water precipitates it unaltered.

Fumarin(from *Fumaria officinalis*). Soluble in water, and alcohol. Insoluble in ether. (Peschier.)

Fungic Acid. *Vid.* Malic Acid.

Furfuramid. Insoluble in cold water. Very $C_{30}H_{12}N_2O_6 = N_2\left\{(C_{10}H_4O_2'')_3\right.$ soluble in alcohol, and ether. (Fownes.) Slowly decomposed by boiling with water or alcohol. Acids decompose it at once. Also decomposed by alkalies.

Furfuric Acid. *Vid.* PyroMucic Acid.

Furfurin. Permanent. Soluble in about $C_{30}H_{12}N_2O_6$ 137 pts. of boiling water; it is almost entirely deposited again as the solution cools. Very readily soluble in alcohol, and ether. (Fownes.)

Furfurol. Readily soluble in cold water. $C_{10}H_4O_4$ Soluble in 11 pts. of water at 13° (Stenhouse); 12 pts. at 15.6° (Fownes); and in 9 pts. of concentrated ammonia-water at 13.5°. (Stenhouse.) Easily soluble in alcohol. (Stenhouse.) Soluble in cold methylamin, and ethylamin, without reaction. Soluble in cold concentrated sulphuric acid, from which it is precipitated on the addition of water. Also soluble in concentrated chlorhydric acid. (Fownes.)

Furfurol*Selenié*. *Vid.* SelenioFurfol.

Furfurol*Sulphuré*. *Vid.* ThioFurfol.

Fusel-Oil. *Vid.* Hydrate of Amyl.

Fustin(from *Maclura tinctoria*).

G.

Gaduin. Soluble in alcohol, but by repeated $C_{35}H_{22}O_8, HO$ evaporation it passes into an insoluble isomeric modification. (Jongh.)

Gædinic Acid. Insoluble in water. Easily (*Gædinsæure.*) $C_{32}H_{30}O_4$ soluble in alcohol, and ether. (Caldwell & Gœssmann, *Ann. Ch. u. Pharm.*, **99.** 307.)

Gædinate of Copper. Insoluble in water. $C_{32}H_{29}CuO_4$ Difficultly soluble in alcohol. (C. & G., *loc. cit.*)

Gædinate of Ethyl. Insoluble in water. $C_{32}H_{29}(C_4H_5)O_4$ Somewhat difficultly soluble in alcohol. (C. & G., *loc. cit.*)

Gædinate of Silver. Insoluble in water, $C_{32}H_{29}AgO_4$ alcohol, or ether. (C. & G., *loc. cit.*)

Gædinate of Soda. Soluble in absolute alcohol. (C. & G., *loc. cit.*)

Gaiacic Acid. *Vid.* Guaiacic Acid.

Galactin. Insoluble in water; it nevertheless swells up in water. Soluble in alcohol, and ether. Readily soluble in oil of turpentine, and in olive-oil. (Th. Thomson, *Rep. Br. Assoc.*, 1838, p. 46.)

Galbanum. Soluble in alcohol.

GalLactic Acid. Exceedingly hygroscopic. $G_{14}H_8O_7, 2HO$ Miscible in all proportions with water, and alcohol. Insoluble in ether. (Bœdecker & Struckmann, *Ann. Ch. u. Pharm.*, **100.** 276.)

GalLactate of Ammonia. Exceedingly soluble in water. Alcohol precipitates it from the concentrated aqueous solution. (B. & S., *loc. cit.*)

GalLactate of Baryta. Exceedingly soluble in water. Alcohol precipitates it from the concentrated aqueous solution. (B. & S., *loc. cit.*)

GalLactate *of sesquioxide* **of Iron.** Ppt.

GalLactate of Copper. Ppt.

GalLactate of Lead. Ppt. $2\,PbO, C_{14}H_8O_7 + 8\,Aq$

GalLactate of Lime. Very hygroscopic. $C_{14}H_8Ca_2O_9 + 8\,Aq$ Soluble in water. Insoluble in spirit. (B. & S., *loc. cit.*)

GalLactate of Magnesia. Very easily soluble in water. Alcohol precipitates the aqueous solution. (B. & S., *loc. cit.*)

GalLactate *of dinoxide* **of Mercury.** Insoluble in water. Difficultly soluble in dilute nitric acid. (B. & S., *loc. cit.*)

GalLactate *of protoxide* **of Mercury.** In- $2\,HgO, C_{14}H_8O_7$ soluble in water. (B. & S., *loc. cit.*)

GalLactate of Potash. Exceedingly soluble in water. Alcohol precipitates it from the strong aqueous solution. (B. & S., *loc. cit.*)

GalLactate of Soda. Exceedingly soluble in water. Alcohol precipitates it from the strong aqueous solution. (B. & S., *loc. cit.*)

GalLactate of Zinc. Easily soluble in water; alcohol precipitates it from the aqueous solution. (Bœdeker & Struckmann, *Ann. Ch. u. Pharm.*, **100.** 276.)

Gallamic Acid. Sparingly soluble in cold, (*Gallaminsæure. Gallussæureamid. Tannigenamic Acid.*) $C_{14}H_7NO_8 + 3\,Aq$ much more soluble in hot water. Less soluble in water acidulated with chlorhydric acid than in pure water, and much more soluble in the acidulated water when hot than when cold. Dceomposed by solutions of caustic potash, and ammonia. Also decomposed by concentrated sulphuric acid.

Gallic Acid. Soluble in 100 pts. of cold, (*Gallussæure.*) $C_{14}H_6O_{10} + 2\,Aq = C_{14}H_3O_7, 3\,HO + 2\,Aq$ and 3 pts. of boiling water (Braconnot); in 20 pts. of cold water, and 3 pts. of water at 100°. The cold saturated solution, therefore, contains 4.76% of it, and the boiling saturated solution 25%. 100 pts. of water at 15.5° dissolves 8.3 pts. of it, and at 100°, 66 pts. (Ure's *Dict.*) Soluble in cold water in about the proportion of 4 grains to the ounce. (Parrish's *Pharm.*, p. 378.) Soluble in 12 pts. of cold, and in 1.5 pts. of boiling water; the aqueous solution undergoes decomposition when boiled. Soluble in 4 pts. of cold alcohol, of 0.83 ? sp. gr., and in 1 pt. of the same alcohol when boiling. Soluble in ether. (Scheele, cited in Thomson's *System.*) Soluble in 96 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 75.) Easily soluble in alcohol; less soluble in ether.

Its salts, excepting those of the alkalies, are insoluble in water, but readily soluble in alcohol;

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they are sparingly soluble in ether; and are decomposed by acids and by alkaline solutions.

Gallate of Alumina. Insoluble, or very sparingly soluble, in water.

Gallate of Ammonia.

I.) *acid.* Soluble in water, less in cold than in hot. Sparingly soluble in absolute alcohol.
$C_{14}\,H_5\,(N\,H_4)\,O_{10} + 2\,Aq$

Gallate of Antimony. Permanent. Insoluble in water.
$C_{14}\,H_3\,Sb'''\,O_{10} + 2\,Aq$

Gallate of Baryta.

I.) *acid.* Sparingly soluble in water. It is less readily soluble after having been heated to 100°. Insoluble in cold alcohol. (Buechner.)
$C_{14}\,H_5\,Ba\,O_{10} + 3\,Aq$

Gallate of Bismuth. Insoluble in water.

Gallate of Cadmium. Soluble in water.

Gallate of Cobalt.

I.) $Co\,O, 3\,C_{14}\,H_3\,Co_3\,O_{10} + 11\,Aq$ Permanent.

II.) $C_{14}\,H_4\,Co_2\,O_{10} + 6\,Aq$ Insoluble in water.

Gallate *of protoxide* **of Iron.** More soluble in water than gallotannate of iron. Abundantly soluble in acetic acid. Very easily soluble in ammonia-water and in aqueous solutions of caustic and carbonated potash. Also soluble in gallic acid. (Wittstein.)

Gallate *of sesquioxide* **of Iron.** Insoluble in water.

Gallate of Lead.

I.) *di.* Insoluble in water. When recently precipitated, it is readily soluble in warm strong acetic acid.
$C_{14}\,H_4\,Pb_2\,O_{10} + 2\,Aq$

Soluble in a saturated aqueous solution of chloride of sodium. (Becquerel, *C. R.*, 1845, 20. 1523.)

II.) *tetra.* Ppt.
$C_{14}\,H_3\,Pb_3\,O_{10}, Pb\,O$

Gallate of Lime.

I.) *acid.* Sparingly soluble in water, more difficultly after it has been dried at 100°. Insoluble in alcohol. (Buechner.)
$C_{14}\,H_5\,Ca\,O_{10} + 3\,Aq$

Gallate of Lithia. Soluble in water.

Gallate of Magnesia.

I.) *normal*, or *tri.* Soluble in water. Insoluble in alcohol. (Buechner.)
$C_{14}\,H_3\,Mg_3\,O_{10} + 6\,Aq$

II.) *di.* Very sparingly soluble in water.
$C_{14}\,H_4\,Mg_2\,O_{10} + 4\,Aq$

III.) $C_{14}\,H_3\,Mg_3\,O_{10}\,;\,2\,C_{14}\,H_4\,Mg_2\,O_{10} + 14\,Aq$ Insoluble in gallic acid; soluble in chlorhydric acid: (Buechner.)

IV.) $2\,(C_{14}\,H_3\,Mg_3\,O_{10})\,;\,C_{14}\,H_4\,Mg_2\,O_{10} + 16\,Aq$

Gallate of Manganese.

I.) Soluble in water.

II.) $C_{14}\,H_3\,Mn_3\,O_{10}\,;\,2\,C_{14}\,H_4\,Mn_2\,O_{10} + 11\,Aq$

Gallate of Mercur(*ous*)ammonium. Insoluble in water.

Gallate of Mercur(*ic*)ammonium.

Gallate *of dinoxide* **of Mercury.** Soluble in strong nitric acid. (Harff.)
$2\,C_{14}\,H_3\,Hg_6\,O_{10}\,;\,C_{14}\,H_5\,Hg_2\,O_{10} + 7\,Aq$

Gallate *of protoxide* **of Mercury.** Soluble in nitric and in chlorhydric acid. (Harff.)
$2\,C_{14}\,H_3\,Hg_3\,O_{10}\,;\,C_{14}\,H_4\,Hg_2\,O_{10} + 12\,Aq$

Gallate of Molybdenum. Insoluble in water.

Gallate of Nickel.

I.) Soluble in water.

II.) *basic.* Very sparingly soluble in water.
$2\,C_{14}\,H_3\,Ni_3\,O_{10}\,;\,C_{14}\,H_4\,Ni_2\,O_{10} + 16\,Aq$

Gallate of Potash.

I.) *peracid.* Readily soluble in water. Very sparingly soluble in alcohol. (Buechner.)
$2\,C_{14}\,H_5\,K\,O_{10}\,;\,C_{14}\,H_6\,O_{10} + 2\,Aq$

Gallate of Quinine. Almost insoluble in cold, soluble in boiling water. Soluble in alcohol, and in dilute acids.

Gallate of Soda.

I.) *acid.* Permanent. Easily soluble in water.
$C_{14}\,H_5\,Na\,O_{10} + 6\,Aq$

Gallate of Solanin. Soluble in water.

Gallate of Strontia.

I.) *acid.* Soluble in water; less easily soluble after having been heated to 100°. More readily soluble in water than the baryta salt. Insoluble in alcohol. (Buechner.)
$C_{14}\,H_5\,Sr\,O_{10} + 4\,Aq$

Gallate *of protoxide* **of Tin.**

I.) Insoluble in water. Soluble in chlorhydric acid.

II.) *basic.* Insoluble in water. (Buechner.)
$C_{14}\,H_4\,Sn_2\,O_{10}\,;\,Sn\,O$

Gallate of Uranium. Insoluble in water.

Gallate of Urea. Decomposed by water, unless an excess of urea be present, in which case it can be recrystallized. (Hlasiwetz.)
$C_{14}\,H_5\,(C_2\,H_4\,N_2\,O_2)\,O_{10} + Aq$

Gallate of Vanadium. Insoluble in water.

Gallate of Zinc.

I.) *basic.* Insoluble in water or alcohol.
$C_{14}\,H_3\,Zn_3\,O_{10}\,;\,Zn\,O + Aq$

Gallate of Zirconia. Insoluble in water. Soluble in a solution of gallic acid. (Vauquelin.)

GallHuminic Acid. *Vid.* GallUlmic Acid.

GalloLacticAcid. *Vid* GalLactic Acid.

GalloTannic Acid. Readily soluble in water. Soluble in alcohol, and ether. Readily soluble in water, glycerin, alcohol, and absolute ether. Soluble in fixed and volatile oils. (Parrish's *Pharm.*, p. 377.) Insoluble in fatty and essential oils.
(*Tannic Acid. Tannin of Nut Galls. Gallæpfelsæure.*)
$C_{54}\,H_{22}\,O_{34} = C_{54}\,H_{20}\,O_{32}, 2\,H\,O$

The concentrated ethereal solution forms a syrup, which contains from 46 to 56% of the acid; it is insoluble in ether, and consequently will not mix with a fresh portion of ether. (Mohr.) Soluble to a considerable extent in ether, from which solution it is in great measure precipitated on the addition of water, in which, however, it subsequently dissolves. (Strecker.) Only sparingly soluble in water acidulated with sulphuric acid. (Gerhardt.) Insoluble in caoutchin. (Himly.) Soluble in cold concentrated sulphuric acid. Decomposed by boiling with dilute sulphuric acid. (Strecker.) Sulphuric, phosphoric, arsenic, boracic, and especially chlorhydric acids, precipitate it from the aqueous solution. Sulphurous, selenious, acetic, citric, malic, and succinic acids do not thus precipitate it, nor do oxalic or tartaric acids, excepting from a very concentrated solution. (Wackenroder.) This precipitation depends upon the fact that with the acids first named it forms compounds which are less soluble than itself in water. (Strecker.)

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It was formerly thought that the ether with which galls are extracted should not be anhydrous, — ordinary "washed ether" being preferred, — and that the heavy layer which separates, beneath the ether, in the bottle below the displacement tube was an aqueous solution of the acid; but Mohr, Sandrock, and others now assert that this syrupy liquor is a concentrated solution of tannin in ether, which is not miscible with ether, except by the intervention of a little alcohol; they therefore reject the aqueous ether, which tends to swell up the powdered galls and to retard percolation, and recommend a mixture of alcohol of 90 per cent, and ether (1 pt. alcohol to 20 pts. ether, Guibourt). (Parrish's *Pharm.*, p. 876.)

The alkaline gallotannates are soluble in water.

GalloTannate of Ammonia. $C_{54}H_{21}(NH_4)O_{34}$ Readily soluble in water. Insoluble in strong alcohol.

GalloTannate of Anilin. Ppt. Soluble in boiling water, and in alcohol. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 147.)

GalloTannate of Antimony. Very sparingly soluble in water.

GalloTannate of Baryta.

I.) $C_{54}H_{20}Ba_2O_{34}$ Almost insoluble in cold, sparingly soluble in boiling water.

II.) Soluble in water. Insoluble in alcohol.

GalloTannate of Cadmium. $C_{54}H_{19}Cd_3O_{34}$ Insoluble in water or alcohol. (Schiff.)

GalloTannate of Caffein. Soluble in hot water, from which it separates on cooling. Soluble in alcohol. (Mulder.) Insoluble in cold, soluble in warm water. (Peligot, *Ann. Ch. et Phys.*, (3.) **11.** 137.)

GalloTannate of Cinchonin. Very sparingly soluble in water at the ordinary temperature, more soluble in boiling water. Soluble in alcohol.

GalloTannate of Copper. Soluble in ammonia-water.

GalloTannate of Emetin. Soluble in solutions of the caustic alkalies.

GalloTannate of Gelatin. Insoluble in water, alcohol, or ether. Soluble in warm potash-lye.

GalloTannate *of protoxide* **of Iron.**

GalloTannate *of sesquioxide* **of Iron.** Only traces of it are dissolved by water; scarcely more soluble in acetic acid. Easily soluble in citric, tartaric, oxalic, chlorhydric, and gallotannic acids. Completely decomposed by aqueous solutions of caustic and carbonated potash, but only incompletely decomposed by ammonia-water. (Wittstein.)

GalloTannate of Lead.

I.) $C_{54}H_{19}O_{31}, 3PbO$ Insoluble in water.

II.) $C_{54}H_{19}O_{31}, 6PbO$ Insoluble in water.

III.) $C_{54}H_{19}O_{31}, 10PbO$ Insoluble in water.

Many other gallotannates of lead have been described, but they were doubtless mixtures of those given above. The compounds analyzed by Berzelius and Pelouze are the same as No. I.; they were, however, dried at a lower temperature than this. (Strecker, *Ann. Ch. u. Pharm.*, **90.** 349.) "Tannate of lead" is soluble in 1440 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.)

GalloTannate of Lime.

I.) *normal.* Soluble in pure water.

II.) *basic.* Almost insoluble in water.

GalloTannate of Magnesia.

I.) *basic.*

GalloTannate *of dinoxide* **of Mercury.** Soluble, with subsequent decomposition, in a solution of nitrate of dinoxide of mercury.

GalloTannate *of protoxide* **of Mercury.** Insoluble in an aqueous solution of nitrate of protoxide of mercury. Soluble, with decomposition, in chlorhydric acid.

GalloTannate of Morphine. Soluble in acetic acid.

GalloTannate of Potash. $C_{54}H_{20}K_2O_{34}$ Soluble in water. Insoluble in alcohol.

GalloTannate of Quinine. Soluble in 480 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 75.) Sparingly soluble in boiling water. Readily soluble in alcohol.

Only sparingly soluble in neutral liquids. Soluble in acids, and acidulated solutions. (Parrish's *Pharm.*, p. 403.)

GalloTannate of Quinolein. Soluble in boiling water, and in alcohol.

GalloTannate of Silver.

GalloTannate of Soda. $C_{54}H_{20}Na_2O_{34}$ Easily soluble in water. Insoluble in alcohol.

GalloTannate of Solanin. Sparingly soluble in cold, very soluble in boiling water.

GalloTannate of Strychnine. Sparingly soluble in water.

Scarcely at all soluble in water. (Parrish's *Pharm.*, p. 409.)

GalloTannate of Theobromin. Soluble in boiling water, in alcohol, and in an aqueous solution of gallotannic acid.

GalloTannate *of protoxide* **of Tin.** Ppt.

GalloTannate of *tetra***Vinylium.** Insoluble in water or alcohol. (Heintz & Wislicenus.)

GalloTannate of Zinc.

GallUlmic Acid. (*Gall Huminic Acid. Meta Gallic Acid.*) $C_{12}H_4O_4$ Easily soluble in aqueous solutions of caustic potash, soda, and ammonia. Insoluble in water.

GallUlmate of Potash.

GallUlmate of Silver. $C_{12}H_3AgO_4$

Gamboge (concrete juice of a tree). (*Gummi Gutta. Gomme Gutte.*) Forms an emulsion with water. Soluble in alcohol. Sparingly soluble in benzin. Soluble in solutions of the caustic alkalies. [See also under Resins.]

Somewhat soluble in benzin. (Mansfield, *J. Ch. Soc.*, **1.** 261.)

Gardenin. Nearly insoluble in water. Tolerably readily soluble in alcohol; much less readily soluble in ether. Soluble in concentrated sulphuric acid, from which solution it is precipitated unchanged on the addition of water. Sparingly soluble in hot chlorhydric acid. (Stenhouse, *J. Ch. Soc.*, **9.** 239.)

Gaultheric Acid. *Vid.* MethylSalicylic Acid.

Gaultheric Acid *binitré.* *Vid.* Methyl *bi*-NitroSalicylic Acid.

Gaultherylene. (*Gaultherilene.*) $C_{20}H_{16}$ Insoluble in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **10.** 358.)

Gein (from *Geum urbanum*).

Gelatin. $C_{12}H_{10}N_2O_4$ Permanent. It swells up in cold water, but does not dissolve therein. Soluble in warm water. Insoluble in alcohol. Soluble in acetic acid. Decomposed by boiling with alkaline solutions. Soluble, with decomposition, in cold concentrated sulphuric

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acid; also soluble, with partial decomposition, in nitric acid.

Soluble in cold concentrated chlorhydric acid. Slowly and partially dissolved by solutions of the caustic alkalies. (Caventou, *Ann. Ch. et Phys.*, (3.) 8. 329.)

Gentianic Acid. Permanent. Soluble in 3630 pts. of water at 16°; more soluble in ether. Readily soluble in boiling alcohol. Readily soluble in solutions of the alkalies. Soluble in concentrated sulphuric acid. Unacted upon by chlorhydric, acetic, or weak sulphuric acids. The gentianin of Henry & Caventou, which, according to H. Trommsdorff, was impure, was very slightly soluble in cold, but somewhat more soluble in boiling water. Easily soluble in alcohol, and ether. More soluble in dilute alkalies than in water. Soluble to a considerable extent in acids. Trommsdorff's gentianin is insoluble in cold, and very slightly soluble in boiling water; more soluble in alcohol, and ether. Several of the acids increase its solubility in water, but only to a slight extent. Easily soluble in aqueous solutions of the alkalies and alkaline carbonates. (Trommsdorff, *Ann. der Pharm.*, 1837, 21. 136.) Soluble in 500 pts. of cold, and in 100 pts. of boiling alcohol. Only sparingly soluble in cold ether. (Wittstein's *Handw.*)

(*Gentisic Acid. Gentianin.*)
$C_{28} H_{10} O_{10}$

Gentianate of Baryta. Ppt.
$C_{28} H_8 Ba_2 O_{10} + 2 Aq$

Gentianate of Lead.
I.) *basic.* Ppt.
$C_{28} H_8 Pb_2 O_{10}; 2 Pb O, H O$

Gentianate of Potash. Soluble in alcohol.

Gentianate of Soda. Efflorescent. More soluble than gentianic acid in water.

Gentianin. *Vid.* Gentianic Acid.

Gentisin. Deliquescent. Very easily soluble in water. Sparingly soluble in absolute alcohol, more readily soluble in spirit. (Dulk.)

(*Gentian bitter. Gentianin* (of Caventou & Henry).)

Geoffroyin. *Vid.* Surinamin.

Geraniin (from the roots of various species of Geranium). Very hygroscopic. Easily soluble in water, and ordinary alcohol. Insoluble in absolute alcohol, and in ether. (Mueller.)

Gerhardt's Bases. *Vid.* Oxide of Platin(*ic*)-amin.
$N H_3 Pt O_2$ & $N_2 H_6 Pt O_2$

Githagin. *Vid.* Saponin.

Glairin. Sparingly soluble in cold water, alcohol, oil of turpentine, weak acids, or alkaline solutions; more soluble in these liquids when they are hot. Insoluble in ether.

(*Baregin. Zoogene. Luchonin.*)

Glauber's Salt. *Vid.* Sulphate of Soda.

Glaucin (from *Glaucium luteum*). Tolerably easily soluble in water, especially when this is hot; less soluble in an aqueous solution of sulphate of soda. Very easily soluble in alcohol, and ether. (Probst.)

GlaucoMelanic Acid. Not isolated.
$C_{24} H_6 O_{14} = C_{24} H_4 O_{12}, 2 H O$

GlaucoMelanate of Potash. Sparingly soluble in cold, more soluble in boiling water. (Wœhler & Merklein.) Insoluble in alcohol. Soluble in hot, strong potash-lye.
$C_{24} H_4 K_2 O_{14}$

GlaucoMelanate of Soda.

GlaucoPicrin (from the root of *Glaucium luteum*). Permanent. Soluble in water, especially if it be warm. Also soluble in alcohol, less soluble in ether. (Probst.)

Gliadin. Soluble in hot spirit, and in glacial acetic acid. (Taddei.)

Globulin. Occurs naturally in the soluble state, but becomes insoluble on being boiled. After having been dried at 50°, soluble globulin swells like albumen in water, and gradually dissolves, forming a viscid solution. Strong alcohol precipitates the aqueous solution; the precipitate formed being insoluble in water, but partially soluble in boiling alcohol; on cooling it separates again from this solution. The aqueous solution is coagulated, on the addition of ether. When dried, the soluble modification may be heated to 100° without passing into the insoluble state. The aqueous solution does not become opalescent at a lower temperature than 73°; at 83° it becomes milky, and at 93° coagulates, but this precipitate cannot be removed by filtration, unless the liquid containing it be first boiled with neutral alkaline salts. An aqueous solution of globulin is not precipitated by acetic acid or by ammonia, but it becomes turbid when both of these reagents are added successively. On the addition of a little dilute acetic acid, the solution of globulin becomes opalescent, and when heated to 50° a milky coagulum separates; the fluid rendered turbid by a little acetic acid, becomes clearer when more of the acid is added, but always remains opalescent; this fluid does not coagulate till heated to 98°; it is only when a very great excess of acetic acid has been added that the globulin ceases to be coagulable by heat. Towards mineral acids and metallic salts it behaves like albumen. It is coagulated by creosote. (Lehmann.)

(*Crystallin.*)

Glonoin. *Vid.* NitroGlycerin.

Glucic Acid. Permanent. (Mulder.) Very hygroscopic. (Peligot.) Easily soluble in water. (Mulder.) Soluble in water in all proportions. (Peligot.) The aqueous solution undergoes decomposition after long-continued boiling, and especially if chlorhydric or sulphuric acid be present. Readily soluble in alcohol. (Mulder.) The acid and normal glucates are all soluble in water, excepting the lead salt. (Peligot.)

(*Kalisaccharic Acid.*)
$C_{24} H_{18} O_{18}$

Glucate of Baryta. Appears to be soluble in water.

Glucate of Copper. Appears to be soluble in water.

Glucate *of sesquioxide* **of Iron.** Appears to be soluble in water.

Glucate of Lead.
I.) *basic.* Insoluble in water. (Peligot.)
$C_{24} H_{15} Pb_3 O_{18}; 3 Pb O + Aq$

Glucate of Lime.
I.) *normal.* Readily soluble in water. Sparingly soluble in alcohol. (Mulder.)
$C_{24} H_{15} Ca_3 O_{18} + Aq$

II.) *acid.* Soluble in water. Easily soluble in alcohol. (Mulder.)

Glucate *of dinoxide* **of Mercury.** Ppt.

Glucate of Silver. Ppt.

Glucina. *Vid.* Oxide of Glucinum.

Glucinic Acid. *Vid.* Oxide of Glucinum
$Gl_2 O_3$ (No. II. = hydrated.)

Glucinate of Potash. Soluble in aqueous

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solutions of caustic potash; when the potash is dilute, the compound is decomposed on boiling, but if the potash be concentrated, the solution may be boiled or evaporated without decomposing, and when cold it may be diluted freely with water. [Compare Oxide of Glucinum (II.) hydrated.] (H. Rose, *Tr.*)

Glucinum. Unacted upon by boiling water,
Gl
or by cold concentrated nitric acid; difficultly attacked by hot concentrated nitric acid. Easily soluble in dilute chlorhydric or sulphuric acids, but only slightly attacked by dilute nitric acid. Soluble, even at the ordinary temperature, in a concentrated solution of caustic potash, but not in ammonia-water. (Debray.)

Glucose. Soluble in 1.333 pt. of cold water,
(*Grape Sugar. Diabetic Sugar.*)
$C_{12}H_{12}O_{12}$ & + Aq & 2 Aq
and in all proportions in boiling water.

Its solution in water is attended with a considerable diminution of temperature. (Pohl, *Wien. Akad. Bericht*, **6.** 598.)

To dissolve 1 pt. of	Are required pts. of water at 15°.	Or, in other words, 100 pts. of water at 15° dissolve pts.
Anhydrous Glucose (prepared from starch by S O_3)	1.224	81.68
Monohydrated Glucose	1.119	89.36
Bihydrated Glucose	1.022	97.85

When treated with water, glucose dissolves rather rapidly at first, but more slowly as the water becomes charged with it, and only after the lapse of several days, during which time the mixture is repeatedly agitated, does it become completely saturated. The sp. gr. of a solution saturated at 15° is 1.206, and the solution contains 44.96% of glucose. The slowness with which the last portions dissolve will be seen from the following experimental results. An excess of pulverized glucose agitated with water at the ordinary temperature afforded a solution the sp. gr. of which increased as follows: —

After 36 hours the sp. gr. was 1.201
" 50 " " 1.202
" 74 " " 1.205
" 98 " " 1.206

after which no increase occurred. (C. F. Anthon, *Dingler's polyt. J.*, 1859, **151.** 214.)

Chemically pure grape-sugar in hard crystals, and dried so that it held but 0.2% of water, having been finely powdered, was added by small weighed portions to various samples of alcohol of different strengths at 17.5° C., until the last portion added no longer dissolved, even after persistent agitation of the carefully stopped bottle.

At 17.5° 100 pts. of the solution prepared with spirit of sp. gr.	Contained pts. of the grape-sugar.
0 837	1.95
0.880	9.30
0.910	17.74
9.950	36.45

Consequently, 1 pt. of grape-sugar requires for its solution,

50.2 pts. of alcohol of 0.837 sp. gr.
9.7 " " 0.880 "
4.6 " " 0.910 "
1.7 " " 0.950 "

Although in preparing these solutions at 17.5° by agitation, care was taken that they should not be warmed by the hand, they nevertheless deposited crystals of grape-sugar after standing for several hours, the quantity of the crystalline deposit being so much the greater in proportion as the sp. gr. of the alcohol employed was greater, i. e. in proportion as the alcohol was more dilute. After these crystals had ceased to form, the amount of grape-sugar remaining in solution was determined by evaporation in each case: —

In the spirit of sp. gr.	There was contained per cent of grape-sugar.
0.837	1.94
0.880	8.10
0.910	16.00
0.950	32.50

The cause of this phenomenon is not apparent. That it does not depend upon any evolution of heat on dissolving the sugar in dilute alcohol is proved by the fact that on agitating finely powdered grape-sugar with an equal quantity of alcohol of 0.950 sp. gr. there was not only no increase of temperature, but a decided diminution thereof, the thermometer having fallen 5° (from 15° to 10°). The numbers of the table last given should be regarded as expressing the real solubility of grape-sugar in alcohol; hence

1 pt. of grape-sugar (nearly anhydrous) is soluble at 17.5° in pts.	of alcohol of sp. gr.
50.54	0.837
11.34	0.880
5.25	0.910
2.07	0.950

If one calculates from the foregoing the quantities of grape-sugar which are dissolved in the water contained in the spirit employed, it appears that

100 pts. of water in the spirit of sp. gr.	Have dissolved pts. of grape-sugar.
0.837	12.37
0.880	25.92
0.910	40.52
0.950	72.95

But 100 pts. of pure water dissolve 81.68 pts. of andydrous grape-sugar at 17.5°. Whence it appears that the solubility of the sugar in spirit does not stand in proportion to the amount of water which this contains, and that a determined quantity of water is capable of dissolving so much the less sugar in proportion as it is contained in stronger spirit. Besides the above experiments at 17.5°, others were made at the temperature of boiling, from which it appeared that

100 pts. of boiling alcohol, of sp. gr.	Dissolve pts. of grape-sugar.
0.837	21.7
0.880	136.7

Or, 1 pt. of grape-sugar is soluble,

In pts. of boiling alcohol	Of sp. gr.
4.60	0.837
0.73	0.880

These boiling solutions deposit a quantity of the sugar on cooling, but even after the lapse of 7 days the cooled solutions still contain more of it than solutions which have been saturated at the ordinary temperature.

Thus, 100 pts. of the solution, in spirit of sp. gr.	Contained, after standing for 6 days at the ordinary temperature, pts. of grape-sugar.
0.837	2.9
0.880	12.4

These numbers all refer to anhydrous, or nearly anhydrous, grape-sugar; the hydrated salt would of course be somewhat more readily soluble. (C. F. Anthon, *Dingler's polyt. J.*, 1860, **155.** 386.)

Only half as soluble as cane-sugar in water, but more soluble than milk-sugar. Only slightly soluble in alcohol, being less soluble therein than cane-

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sugar. Soluble in 8 pts. of alcohol, of 85% at 25°, and in 20 pts. of absolute alcohol. Soluble in wood-spirit. Insoluble in ether. Only slightly acted upon by dilute acids. Decomposed by strong nitric acid. Soluble, with combination, in concentrated sulphuric acid. Easily decomposed by alkaline solutions.

GLUCOSATE OF BARYTA.
I.) $C_{12} H_{11} Ba O_{12}$ Readily soluble in water.
II.) $2 C_{12} H_{11} Ba O_{12}, Ba O + 6 Aq$? Insoluble in wood-spirit.

GLUCOSATE OF CHLORIDE OF SODIUM. *Vid.* Chloride of Sodium with Glucose.

GLUCOSATE OF LEAD. Ppt.
$C_{12} H_{12} O_{12}, 8 Pb O + Aq$

GLUCOSATE OF LIME. Soluble in water, from which it is precipitated on the addition of alcohol.
$C_{12} H_{12} O_{12}, 2 Ca O$

GLUCOSATE OF POTASH. Deliquescent. Soluble in water; less soluble in alcohol.
$C_{12} H_{12} O_{12}, 2 K O$

GLUE. Permanent. Swells up in cold water. Soluble in hot water, and in dilute spirit, also in acetic acid, and dilute mineral acids. Insoluble in alcohol, coal-oils, &c.

GLUTEN. Insoluble in cold, and only very slightly soluble in hot water. Decomposed by long-continued contact with water. Readily soluble in boiling alcohol, from which it is precipitated by water. [Soluble in concentrated chlorhydric acid. (J. Lehmann.)] When digested for twelve hours at the ordinary temperature with water very slightly acidulated with chlorhydric acid, freshly prepared gluten loses its coherence, and forms a limpid solution, which coagulates when heated, and is precipitated [with subsequent re-solution] on the addition of chlorhydric, nitric, or sulphuric acids. In a word, the gluten behaves precisely like fibrin, *q. v.* (Bouchardat & Sandras, *Ann. Ch. et Phys.*, (3.) **5.** 483.) Easily ("imperfectly") soluble in concentrated acetic acid. Easily soluble in weak alkaline solutions.

As prepared by kneading flour in a current of water, gluten contains at least 4 distinct substances, viz. fibrin (vegetable), casein, glutin, and a fatty matter soluble in ether. (Dumas & Cahours, *Ann. Ch. et Phys.*, (3.) **6.** 389.)

GLUTIN. Insoluble in water or ether. Easily soluble in boiling alcohol, and is not precipitated from this solution as it cools, but by evaporation a concentrated solution is obtained which solidifies on cooling. [After having been dried it appears to be insoluble in alcohol, or less soluble than before.] (Dumas & Cahours, *Ann. Ch. et Phys.*, (3.) **6.** pp. 418, 390.) Only partially soluble in cold alcohol. It swells up in water, but is insoluble therein. Soluble in acids, and in solutions of the caustic alkalies. Easily soluble in cold dilute ammonia-water; this solution coagulates when boiled. Soluble in acetic acid.
(*Glaiadin.*)

GLYCERAMIN. Very soluble in water, and ether. (Berthelot & DeLuca, *Ann. Ch. et Phys.*, (3.) **48.** 318.)
$C_6 H_9 N O_4$

GLYCERIC ACID (Anhydrous). Hygroscopic.
(*Glyceric Anhydride.*)
$C_6 H_4 O_6$

GLYCERIC ACID. Soluble in all proportions in water, and alcohol. Insoluble in ether.
$C_6 H_6 O_8$

GLYCERATE OF AMMONIA. Soluble in water.
$C_6 H_5 (N H_4) O_8$

GLYCERATE OF BARYTA.
$C_6 H_5 Ba O_8$

GLYCERATE OF COPPER.

GLYCERATE *of sesquioxide* **OF IRON.**

GLYCERATE OF LEAD. Sparingly soluble in cold, tolerably soluble in hot water.
$C_6 H_5 Pb O_8$

GLYCERATE OF LIME. Easily soluble in water. Insoluble in alcohol.
$C_6 H_5 Ca O_8 + 2 Aq$

GLYCERATE OF POTASH.
I.) *normal.* Soluble in water.
$C_6 H_5 K O_8$
II.) *acid.* Soluble in water.
$C_6 H_5 K O_8, C_6 H_6 O_8$

GLYCERATE OF SILVER. Appears to be soluble in water. (Debus.)

GLYCERATE OF ZINC.
$C_6 H_5 Zn O_8 + Aq$

GLYCERIN. Hygroscopic. Miscible in all proportions with water, and alcohol. Insoluble in ether.
(*Hydrated Oxide of Glyceryl*, or *of Lipyl.*)
$C_6 H_8 O_6 = C_6 H_5 O_3, 3 H O = \left.\begin{matrix} C_6 H_5''' \\ H_3 \end{matrix}\right\} O_6$

Soluble in water. Also soluble in absolute alcohol, from which it is partially precipitated on the addition of an equal volume of ether. (Berthelot, *Ann. Ch. et Phys.*, (3.) **43.** 262.) A small quantity of ether does not precipitate glycerin from its alcoholic solution, although it is insoluble in ether alone. (Wurtz.) Glycerin is not miscible with the fatty oils. (Parrish's *Pharm.*, p. 324.) Soluble in cold fuming chlorhydric acid.

An aqueous solution of sp. gr. (at 17.5°)	Contains per cent of glycerin of 1.26 sp. gr.*	Freezes at °C.
1.024	10	—1.25°
1.051	20	—2.5°
1.075	30	—6.25°
1.105	40	—17.5°
1.117	45	—26.25°
1.127	50	—31.25°@ [33.75°
1.159	60	Not freezing at —35°
1.179	70	
1.1204	80	
1.232	90	
1.241	100	

(Fabian, *Dingler's polyt. Journ.*, 1860, **155.** 347.)

* According to Fergusson Wilson, a sample of 1.26 sp. gr. contains 98 per cent of anhydrous glycerin.

Glycerin approaches very nearly to diluted alcohol in its solvent power. It dissolves all deliquescent salts, several metallic nitrates, chlorides, and sulphates, the alkalies, and several of the metallic oxides, as oxide of lead, in large quantities; it also dissolves many vegetable acids. (Pelouze.)

The solvent power of glycerin is between that of water and of alcohol. In general terms, substances may be said to be more soluble in glycerin the more soluble they are in alcohol. A high temperature greatly increases its solvent power. (Parrish's *Pharm.*, p. 236.) Most of the **GLYCERIDES** are insoluble, or but sparingly soluble in water. The compounds of glycerin with *baryta*, *lime* [see Oxide of Calcium], and *strontia*, are soluble in water, from which carbonic acid does not precipitate them: they are also sparingly soluble in alcohol. (Chevreul.)

GLYCEROCITRIC ACID.

GLYCEROPHOSPHORIC ACID. *Vid.* Phospho-Glyceric Acid.

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GlyceroPyroTartaric Acid. Deliquescent.
$C_{14}H_{14}O_{18} = C_6H_5(C_8H_7O_4)O_{12} + 2Aq$

GlyceroPyroTartrate of Lime. Easily soluble in water. Insoluble in alcohol. (Berzelius.)

GlyceroSuccinic Acid. Readily soluble in water.

GlyceroSuccinate of Lead. Soluble in water. Somewhat soluble in alcohol. (Van Bemmelen.)

GlyceroSulphuric Acid. *Vid.* Sulpho-Glyceric Acid.

GlyceroTartaric Acid. Deliquescent. Soluble in water. Its alkaline salts are soluble in water, but insoluble in alcohol. (Berzelius.)
$C_{14}H_{12}O_{18}$

GlyceroTartrate of Baryta.
$C_{14}H_{11}BaO_{18}$

GlyceroTartrate of Copper.
GlyceroTartrate of Lead.
Soluble in water; the solution subsequently slowly undergoing decomposition.

GlyceroTartrate of Lime. Permanent. Soluble in water. Insoluble in alcohol. (Berzelius.)
$C_{14}H_{11}CaO_{18}$

GlyceroTartrate of Magnesia.
GlyceroTartrate of Silver.
GlyceroTartrate of Zinc.
Soluble in water; the solution subsequently slowly undergoes decomposition. (Desplats.)

Glycero*bi*Tartaric Acid.
$C_{22}H_{16}O_{26}$

Glycero*bi*Tartrate of Baryta.
$C_{22}H_{14}Ba_2O_{26}$

Glycero*bi*Tartrate of Lime.
$C_{22}H_{14}Ca_2O_{26}$

Glycero*ter*Tartaric Acid.
$C_{30}H_{22}O_{38}$

Glycero*ter*Tartrate of Baryta.
$C_{30}H_{18}Ba_4O_{38}$

Glycero*ter*Tartrate of Lime.
$C_{30}H_{18}Ca_4O_{38}$

*Epi*Glycero*bi*Tartaric Acid.
$C_{22}H_{14}O_{24}$

*Epi*Glycero*bi*Tartrate of Baryta.
$C_{22}H_{12}BaO_{24}$

*Epi*Glycero*bi*Tartrate of Lime.
$C_{22}H_{12}CaO_{24}$

GlycerOxalic Acid.

GlycerOxalate of Lime. Soluble in water. (Van Bemmelen.)

Glycin. *Vid.* Glycocoll.

Glycocholic Acid. *Vid.* Cholic Acid.

Glycocin. *Vid.* Glycocoll.

Glycocoll. Permanent. (*Glycin. Glycolin. Glycocin. Sugar of Gelatin. Acetamic Acid.*) Soluble in 4.4 pts. of cold water (Mulder); in from 4.24 to 4.35 pts. of water. (Horsford, *Am. J. Sci.*, (2.) **3.** 376.) Tolerably soluble in spirit. (Braconnot.) Soluble in 930 pts. of alcohol of 0.828. (Mulder.) Much less soluble than leucin in alcohol. Insoluble in boiling absolute alcohol and in ether. (H. Kopp.) Slightly soluble in alcohol; more soluble in alcohol containing chloride of ammonium than in pure alcohol; more soluble in hot than in cold spirit. Quite insoluble in ether, and scarcely less insoluble in absolute alcohol. (Horsford, *Am. J. Sci.*, (2.) **3.** 376.) Soluble, without decomposition, in the mineral acids; and in alkaline solutions, when these are not too concentrated.

$C_4H_5NO_4 = N\left\{\begin{matrix}C_4H_2O_2\\H_2\end{matrix}\right..O_2$

Glycocoll with Baryta(BaO). Soluble in water. (Horsford, *loc. cit.*)

Glycocoll with Cadmium + Aq. Soluble in hot water. (Dessaignes.)

Glycocoll with Copper(CuO). Very soluble in water, from which it is precipitated by strong alcohol. (Horsford, *loc. cit.*)
$C_4H_4CuNO_4 + Aq$

Glycocoll with Lead(PbO). Soluble in water. Only sparingly soluble in alcohol.
$C_4H_4PbNO_4 + Aq$

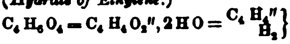
Glycocoll with Mercury(HgO). Soluble in water; the solution undergoing decomposition when boiled. (Dessaignes.)

Glycocoll with Potash. Very deliquescent, and soluble in water. Sparingly soluble in alcohol. (Horsford, *loc. cit.*)

Glycocoll with Silver(AgO). Soluble in warm water. Only sparingly soluble in spirit. (Horsford, *loc. cit.*)
$C_4H_4AgNO_4$

Glycocoll with Zinc. Soluble in hot water. (Dessaignes.)

Glycol. (*Hydrate of Ethylene.*) Soluble in all proportions in water, and alcohol. (A. Wurtz.)



$C_4H_6O_4 = C_4H_4O_2'', 2HO = \left.\begin{matrix}C_4H_4''\\H_2\end{matrix}\right\}O_4$

Glycolamid. (*Glycolamic Acid. Isomeric with Glycocoll.*) Very easily soluble in water. Sparingly soluble in spirit. (Dessaignes.)

$C_4H_5NO_4 = N\left\{\begin{matrix}C_4H_2O_2''\\H_2\end{matrix}\right..O, HO$

Glycolic Acid(Anhydrous). (*Glycolid. Glycollid.*) Insoluble in cold, very sparingly soluble in warm water. After a long time it enters into combination with water, forming glycolic acid. Soluble in a solution of caustic potash, with formation of glycolic acid. (Dessaignes.)
$C_4H_2O_2''\}O_2$

Glycolic Acid. (*Homolactic Acid.*) Deliquescent. Soluble in water in all proportions. Miscible in all proportions with alcohol, and ether. Most of the glycolates are easily soluble in water.
$C_4H_4O_6 = C_4H_2O_4, 2HO$

Glycolate of Baryta. Soluble in water.
$C_4H_3BaO_6$

Glycolate of Lime. Soluble in water, from which solution it is precipitated by alcohol. (A. Wurtz.) Sparingly soluble in water; from which solution alcohol precipitates it. (Kekulé.) Insoluble, or very sparingly soluble, in absolute alcohol. (Debus, *Phil. Mag.*, (4.) **12.** 362.)
$C_4H_3CaO_6 + 3Aq$

Glycolate of Lime with Glyoxalate of Lime. More easily soluble in hot than in cold water. (Debus, *Phil. Mag.*, (4.) **12.** 365.) Decomposed by repeated solution in hot water.
$C_4H_3CaO_6; 2C_4H_3CaO_8 + 2Aq$

Glycolate of Potash. Soluble in water.

Glycolate of Silver. Slightly soluble in cold water. (Cloez.) Readily soluble in hot water. (Dessaignes.) Sparingly soluble in cold water; soluble in hot water, with decomposition. Insoluble in alcohol. (Kekulé.)
$C_4H_3AgO_6 + Aq$

Glycolate of Zinc. Permanent. Sparingly soluble in cold water. Soluble in 33 pts. of water at 20°; more soluble in hot water. (Gerhardt's *Tr.*) Soluble in 33 pts. of hot water. (Gmelin's *Handbook.*) Insoluble in alcohol. (Socoloff & Strecker.)
$C_4H_3ZnO_6 + 2Aq$

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GlycolicAcetoButyrin. *Vid.* AcetoButyrate of Ethylene.

GlycolicBromhydrin.
$C_4H_5BrO_2$

GlycolicChloracetin. Insoluble in water. $C_8H_7ClO_4$ Difficultly decomposed by boiling water. Scarcely, if at all, acted upon by cold water.

GlycolicChlorhydrin. Soluble in water in *(Glycol monochlorhydrique.)* all proportions. (Wurtz.)
$C_4H_5ClO_2$

GlycolicChloroButyrin. Insoluble in water; $C_{12}H_{11}ClO_4$ freely soluble in alcohol. (Simpson.)

GlycolicIodAcetin. Insoluble in water. $C_8H_7IO_4$ Soluble in alcohol, and ether. (Simpson.)

GlycolicIodhydrin. Soluble in water, and $C_4H_5IO_2$ in alcohol. Insoluble in ether. (Simpson.)

Glycolide. *Vid.* Glycolic Acid(Anhydrous).

Glycolin. *Vid.* Glycocoll.

Glycollamid. *Vid.* Glycolamid.

Glycollid. *Vid.* Glycolic Acid(Anhydrous).

Glycyrrhizin. Sparingly soluble in cold, more $C_{16}H_{12}O_6$ easily soluble in boiling water. Readily soluble in absolute alcohol. Scarcely at all soluble in ether. Easily soluble in alkalies. Sparingly soluble in acids.

Glyoxal. Exceedingly deliquescent. Very *(Isomeric with anhydrous Glycolic Acid.)* $C_4H_2O_4$ easily soluble in water, alcohol, and ether. (Debus.)

Glyoxalic Acid. Very hygroscopic. Read- $C_4H_4O_8$ ily soluble in water. (Debus, *Phil. Mag.*, (4.) **12**. 361.)

Glyoxalate of Ammonia. Slowly but abun- $C_4H_3(NH_4)O_8$ dantly soluble in water; the solution undergoing decomposition on boiling, especially if it be strong. Very sparingly soluble in strong alcohol; more soluble in dilute spirit. (Debus, *loc. cit.*)

Glyoxalate of Baryta.

I.) *normal.* Soluble in water; the solution is partially decomposed by boiling. (Debus.)

II.) *basic.* Almost insoluble in water.

Glyoxalate of Lead. Ppt. Easily soluble $C_4H_2Pb_2O_8$ in acetic and nitric acids. (Debus, *loc. cit.*)

Glyoxalate of Lime.

I.) *prisms.* Soluble in 177 pts. of water at 8°; $C_4H_3CaO_8$ more soluble in boiling water. Alcohol precipitates it from the aqueous solution.

II.) *needles.* 100 pts. of water at 8° dissolve $C_4H_3CaO_8$ of the needles 0.50 pt., and of the prisms 0.56 pt. (Debus, *Phil. Mag.*, (4.) **12**. 363.)

III.) *basic.* Almost insoluble in water. It is $2C_4H_3CaO_8;\ CaO, HO$ decomposed by water, slowly at ordinary temperatures rapidly by hot water. Soluble in acetic acid. (Debus, *loc. cit.*)

Glyoxalate of Potash. Deliquescent. Very $C_4H_3KO_8$ easily soluble in water; somewhat less soluble in strong alcohol. (Debus, *loc. cit.*)

Glyoxalate of Silver. But sparingly sol- $C_4H_3AgO_8$ uble in water. (Debus, *loc. cit.*)

Glyoxalate of Zinc. Sparingly soluble in $C_4H_3ZnO_8$ water. Easily soluble in acetic, and chlorhydric acids and in a solution of caustic potash. (Debus.)

Gold. Insoluble in pure chlorhydric, or nitric, Au acid, or in sulphuric acid, even when these are concentrated. Soluble in aqua-regia and in mixtures of nitric acid with bromhydric acid, chloride of ammonium, chloride of sodium, and other metallic chlorides; and mixtures of chlorhydric acid with nitrates of the metallic oxides. Soluble in chlorine water. Soluble in chlorhydric acid which contains chromic, manganic, selenic, or arsenic acids; (or perchloride of iron, Glauber, H. Wurtz.) Soluble in selenic acid. (Mitscherlich.) Soluble in iodic acid. (Gay-Lussac.) Soluble in nitric acid, which contains nitrous acid. (Makin.) Insoluble in a mixture of chlorhydric acid and a nitrite. (Berzelius, *Lehrb.*, **3**. 49.) Soluble in mixed aqueous solutions of chloride of sodium, or alum, and nitrate of potash. When very finely divided, it is soluble in concentrated sulphuric acid which contains nitric acid. As obtained by reducing its solutions by protosulphate of iron, it is soluble in a boiling aqueous solution of cyanide of potassium.

Gold leaf is not acted upon by a boiling aqueous solution of protochloride of mercury($HgCl$). (A. Vogel, *J. pr. Ch.*, 1840, **20**. 366, *note.*)

Granatin(from *Punica granatum*). Soluble in water, and alcohol. (Landerer.) The "granatin" of Latour de Trie was mannite.

Graphitic Acid. Somewhat soluble in pure $C_{22}H_4O_{10}$ water. Insoluble in water containing acids or salts. (Brodie.)

Graphitate of Ammonia. An insoluble jelly.

Graphitate of Baryta. Insoluble in water.
$C_{22}H_3BaO_{10}$

Gratiolin. Sparingly soluble in boiling wa- $C_{40}H_{34}O_{14}$ ter. Easily soluble in alcohol. Almost insoluble in ether.

Gratiosolin. Soluble in water, and alcohol. $C_{46}H_{42}O_{25}$ Insoluble in ether. (Parrish's *Pharm.*, p. 423.)

Gros's Base. *Vid.* Oxide of Ammonium-ChloroPlatin(*ous*)ammonium.

$$N_2H_6PtClO = N\left\{\begin{matrix}H_2\\ PtCl\\ NH_4\end{matrix}\right. .\ O$$

Guacin(from *Mikania guaco*). Very sparingly soluble in cold, abundantly soluble in boiling water. Very easily soluble in alcohol, and ether. (Fauré.)

Guaiacic Acid. More readily soluble in wa- $C_{12}H_8O_6$ ter than either benzoic or cinnamic acid. Soluble in alcohol, and ether. (Thierry.) Soluble in benzin, and other light naphthas from coal. (De la Rue.)

Guaiacene. Very sparingly soluble in water. *(Guajol.)* $C_{10}H_8O_2$ Soluble in all proportions in alcohol, and ether. Soluble, with combination, in concentrated sulphuric acid. (Vœlckel, *Ann. Ch. u. Pharm.*, **89**. 347.)

Guajacene. *Vid.* Guaiacene.

Guaiacin. *Vid.* Resin of Guaiacum.

Guajacol. *Vid.* PyroGuaiacic Acid.

Guajol. *Vid.* Guaiacene.

Guanin. Insoluble in water, alcohol, and ether, $C_{10}H_5N_5O_2$ or ammonia-water. Soluble in strong acids, the solutions undergoing decomposition on the addition of water. Soluble in boiling nitric acid without decomposition. Also soluble in chlorhydric acid. (Unger.) Insoluble

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in acetic or tartaric acids. Almost entirely insoluble in lactic, citric, succinic, or hippuric acids. (Neubauer & Kerner, *Ann. Ch. u. Pharm.*, **101.** 323.) More readily soluble in aqueous solutions of caustic potash and soda than in acids. Very sparingly soluble even in boiling lime, or baryta, water.

Guanin with Soda. Efflorescent. Soluble in water, with decomposition.
$2\,NaO, C_{10}H_5N_5O_2 + 12\,Aq$

Guaranin. *Vid.* Caffein.

Gums. The gums proper swell up in water and form mucilages or pastes which approach more or less nearly to true solutions. The gums are insoluble in alcohol; many of them are soluble in concentrated acetic acid; they are all decomposed, with formation of glucose, when boiled with weak acids.

For several substances also called "gums," in commerce, see under **Resins.**

Gum Ammoniac. See under **Resins.**

Gum Arabic. Slowly soluble, but soluble in all proportions, in water. It dissolves much more rapidly in hot than in cold water. Insoluble in alcohol, ether, or the fatty and essential oils. Soluble in acetic acid. The aqueous solution may be diluted with several times its volume of alcohol without precipitation. But on the addition of a trace of chlorhydric acid, or of chloride of sodium, arabin is precipitated.
(*Arabin.*)
$C_{12}H_{10}O_{10} + Aq$

Arabin with Copper. Soluble in pure water. Insoluble in an aqueous solution of the compound of arabin and potash.

Arabin with Lead.

I.) Insoluble in water. (Berzelius.)
$PbO, C_{12}H_{10}O_{10} + Aq$

II.) *basic.* Soluble in an excess of an aqueous solution of arabin.

Arabin with Lime.

I.) $2\,C_{12}H_{10}O_{10};\ CaO$

II.) $6\,C_{12}H_{10}O_{10};\ CaO$

Arabin with Potash. Easily soluble in water. Insoluble in alcohol.

Bassora Gum. A small portion is soluble in water, either hot or cold, but the remainder (consisting of *Bassorin*, $C_{12}H_{10}O_{10}$ *q. v.*) is insoluble in water, alcohol, or ether; it softens and swells up in hot or cold water. Soluble, with decomposition, in hot dilute chlorhydric or nitric acids.

Bassorin with Lead. Insoluble in water.
$C_{12}H_9PbO_{10} + 2\,Aq$

Gum Benzoin. *Vid.* Benzoin.

Gum Caranna. See Caranna, under **Resins.**

Gum Guaiacum. See under **Resins.**

Gummi Gutta. *Vid.* Gamboge.
(*Gomme Gutte.*)

Gum Lac. See under **Resins.**

Gomme du Pays. Imperfectly soluble in water.

Gum Trajacanth. About one half of it is soluble in cold water; the remainder swelling up to form an emulsion. Insoluble in alcohol. Decomposed by boiling dilute acids.

Gun Cotton. Of the almost innumerable varieties of gun-cotton, nearly all appear to be insoluble in water, alcohol, or acetic acid. Some specimens are soluble, while others are insoluble, in mixed alcohol and ether.
(*Pyroxilin.*)
$C_{12}H_8(NO_4)_2O_{10}$ (?)

Insoluble in alcohol or ether alone, but dissolves very well in a mixture of these two liquids. (Gélis.) Acetate of ethyl, acetate of methyl, and acetone dissolve gun-cotton.

When recently prepared, and still moist, it dissolves slowly at the ordinary temperature in moderately concentrated potash-lye, with decomposition. (VanKerckhoff.) It is insoluble even in a large excess of cold nitric acid, but dissolves at a temperature of 80° @ 90° in monohydrated nitric acid (Pelouze); from this solution sulphuric acid precipitates unaltered gun-cotton, water precipitates a substance soluble in alcohol and in a large quantity of water. (DeVry.)

Béchamp (*Ann. Ch. et Phys.*, (3.) **46.** 338) distinguishes the following varieties of gun-cotton, considering them as compounds of cellulose and nitric acid.

I.) *Cellulose terNitric.* Completely insoluble in water. Soluble in cold concentrated alcohol, forming a clear solution. Insoluble in pure ether, but readily soluble in ether which contains a little alcohol. Insoluble in cold, but completely soluble in boiling acetic acid, from which it separates out for the most part as the solution becomes cold. Soluble in fuming nitric acid, a precipitate being formed in this solution on adding water. Sparingly soluble in cold, abundantly soluble in hot chlorhydric acid, a precipitate being formed on the addition of water. Easily soluble in an aqueous solution of caustic potash, even when this is dilute.
$C_{24}H_{17}O_{17}, 3\,NO_5$

II.) *Cellulose quadriNitric.* Insoluble in alcohol or ether, alone; but easily soluble in ether which contains a little alcohol or in alcohol containing a little ether; from these solutions it is precipitated on the addition of water. Insoluble in hot or cold acetic acid. Soluble in fuming nitric acid, a precipitate being formed in this solution on adding water. Insoluble in cold, but soluble, with decomposition, in hot chlorhydric acid. Insoluble in a cold dilute solution of caustic potash. Soluble, with decomposition, in a concentrated solution of potash.
$C_{24}H_{17}O_{17}, 4\,NO_5$ & $+ Aq$

III.) *Cellulose pentaNitric, or Pyroxilin.* When prepared in the cold, an insoluble modification is obtained; but when made at a slightly elevated temperature, a soluble modification is formed. According to the mode of its preparation, it is soluble or insoluble in ether which contains a small amount of alcohol. It is insoluble in alcohol, and in hot or cold acetic acid. Soluble in fuming nitric acid, a precipitate being formed in this solution on adding water. Insoluble in cold, soluble, with decomposition, in hot chlorhydric acid. Insoluble in a cold moderately concentrated solution of caustic potash, but dissolves therein, with decomposition, on the application of heat. The ethereal solution is viscous. (Béchamp, *Ann. Ch. et Phys.*, (3.) **46.** 338.)
(*Ordinary gun-cotton.*)
$C_{24}H_{17}O_{17}, 5\,NO_5$

GuttaPercha. Insoluble in water or alcohol. Soluble in ether, caoutchin, and coal-tar naphtha. (Page, *Am. J. Sci.*, (2.) **4.** 342.) Insoluble in boiling alcohol. Readily soluble in boiling oil of turpentine. Soluble in naphtha, and in coal-tar. (Oxley, *Am. J. Sci.*, (2.) **5.** 440.) Soluble in benzin. (Mansfield, *J. Ch. Soc.*, **1.** 261.) Insoluble in water, alcohol, oils, alkaline solutions, or in chlorhydric or acetic acids. It softens and partially dissolves in ether, essential oils, and coal-tar naphtha. Its best solvent is oil of turpentine. Concentrated sulphuric acid slowly chars it; concentrated nitric acid also gradually oxidizes it. (Solly, *Rep. Br. Assoc.*, 1845, p. 32.)

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Soluble in pure chloroform, in bisulphide of carbon, in rectified oils of turpentine, resin, gutta-percha, and tar; also in terebene, chlorhydrate of terebene, and, slightly, in pure ether. Of these solvents, the two first mentioned are the best, and dissolve the gutta-percha at low temperatures. The other solvents act only at temperatures above 21°, and when the solutions obtained are cooled much below 16°, the gutta-percha is deposited as a granular mass. The length of time required to produce this precipitate depends upon the degree of cold; sometimes it requires several days, at others the exposure of an hour suffices to produce it. From its solutions in chloroform and bisulphide of carbon, the gum may be recovered in its natural state either by evaporating or by precipitating it with alcohol. But when any of the hydrocarbons are used as solvents, a portion is retained with such tenacity that it cannot be removed without decomposing the gum. Solutions of gutta-percha are precipitated by alcohol. Ether also precipitates it from the solution in chloroform. Crude gutta-percha contains a small portion of a soft yellow resin, soluble in alcohol, ether, and oil of turpentine. (Kent, *Am. J. Sci.*, (2.) **6**. 246.)

Insoluble in dilute alcohol; traces of it are dissolved by strong alcohol. Only about 0.15 @ 0.22% of it is soluble in hot alcohol or ether (anhydrous). Soluble in cold bisulphide of carbon, and chloroform. Sparingly soluble in warm, insoluble in cold olive-oil. Partially soluble in cold, almost entirely soluble in hot benzin, and oil of turpentine. Unacted upon by solutions of the caustic alkalies, ammonia-water, saline solutions, carbonic acid water, or the various vegetable, and dilute mineral, acids. Unacted upon by fluorhydric acid, it is attacked by concentrated sulphuric, chlorhydric, and nitric acids. (Gerhardt's *Tr.*)

Payen finds in gutta-percha several resins [see under **Resins**], and

Pure Gutta: which is insoluble in alcohol or ether. Soluble in cold chloroform, and bisulphide of carbon; and in warm benzin, and oil of turpentine.

Gyrophoric Acid. Almost insoluble even in boiling water. Very sparingly soluble in alcohol or ether. Its best solvent is boiling alcohol. Scarcely at all soluble in ammonia-water. (Stenhouse.)

H.

Hæmathionic Acid. *Vid.* Hemathionic Acid.

Harmalin (from the seeds of *Peganum harmala*, *Ruta sylvestris*). Sparingly soluble in water. Tolerably soluble in cold, largely soluble in boiling alcohol. Sparingly soluble in ether. The salts of harmalin are readily soluble in water.
$C_{26}H_{14}N_2O_2 = N_2\left\{C_{26}H_{14}O_2^{vi}\right.$

Harmin. Almost insoluble in water. Very sparingly soluble in alcohol, and ether. Very sparingly soluble, or insoluble, in aqueous solutions of chloride of sodium or nitrate of soda.
$C_{26}H_{12}N_2O_2 = N_2\left\{C_{26}H_{12}O_2^{vi}\right.$

Hartin. Completely insoluble in water. Sparingly soluble in ether, and still less soluble in alcohol. Soluble in naphtha.
$C_{40}H_{34}O_4$

Hederic Acid. Insoluble in water. Soluble in alcohol. Insoluble in ether. Most of its salts are insoluble in water; but soluble in alcohol.

Hederate of Ammonia. Sparingly soluble in water.

Hederate of Baryta. Insoluble in water. Soluble in boiling alcohol.

Hederate of Lead.

Hederate of Lime. Insoluble in water. Soluble in boiling alcohol.

Hederate of Potash. Sparingly soluble in water.

Hederate of Silver. Soluble in boiling, less soluble in cold alcohol.

Hederin (from *Hedera helix*).

Helenin. *Vid.* Inulin.

Helicin.
$C_{26}H_{16}O_{14} + 2\,Aq$

I.) *Crystalline modification.* Very sparingly soluble in cold, very easily soluble in boiling water. Soluble in about 64 pts. of water at 8°. More soluble in ordinary alcohol than in water. Entirely insoluble in ether. More soluble in cold alkaline liquors than in water, and this without decomposition; it is decomposed, however, by a boiling solution of caustic potash. Also decomposed by boiling acids. (Piria, *Ann. Ch. et Phys.*, (3.) **14**. 288.)

II.) *amorphous modification.* (Produced by keeping No. I. in a state of fusion during some time.) Only traces of it are dissolved by water or alcohol, even boiling. Soluble, with partial decomposition, in very dilute boiling chlorhydric acid, being converted into the crystalline modification. Decomposed by a boiling solution of caustic potash. (Piria, *Ann. Ch. et Phys.*, (3.) **14**. 289.)

Helicoidin. Soluble in boiling, less soluble in cold water. Decomposed by acids, and by alkaline solutions.
(*Helicin Salicin.*)
$C_{52}H_{34}O_{28} + 8\,Aq$

Helleborin (from *Helleborus niger*). Easily soluble in water, and alcohol; still more soluble in ether. Decomposed by concentrated sulphuric and nitric acids.

Hellenene. Unacted upon by cold concentrated sulphuric acid, but when this is gently heated the hellenene dissolves, with combination. (Gerhardt, *loc. cit.*)
$C_{36}H_{26}$

Hellenin. Insoluble in water. Very soluble in alcohol, and ether. Soluble in cold concentrated sulphuric and nitric acids.
(*Camphor of Elecampane.*)
$C_{42}H_{28}O_6$

Hellonin. *Vid.* Pseudo Veratrin.

Hemaphein (yellow coloring matter of the serum of blood). Easily soluble in alcohol; less soluble in water, and ether. Also soluble in fatty oils. (J. F. Simon.)
(*Hæmaphæine.*)

Hematein. Slowly soluble in cold, more soluble in boiling water. Soluble in alcohol. Very sparingly soluble in ether. Soluble, apparently with combination, in the mineral acids; less easily soluble in acetic acid. Soluble in solutions of caustic potash and ammonia, the resulting solutions becoming colored when exposed to the air.
(*Hæmatein. Hæmatoxein. Hæmatoxeic Acid.*)
$C_{32}H_{12}O_{12}$

Hemateate of Ammonia. Easily soluble in water. Soluble in alcohol.
(*Hæmatoxeate of Ammonia.*)
$C_{32}H_{10}(NH_4)_2O_{12}$

Hemathionic Acid. Soluble in water; the solution undergoing decomposition when boiled. Soluble
(*Hæmathionic Acid.*)
$C_{28}H_{14}O_{24}, S_2O_6$

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in alcohol. Soluble in concentrated sulphuric acid.

HEMATHIONATE OF BARYTA. Soluble in water.

HEMATHIONATE OF LEAD. Ppt.

“ **HEMATIN** ”(coloring matter of blood). *Vid.* Hematosin.

HEMATIN(coloring matter of logwood). (*Hæmatoxylin. Brasilin. Hæmatin. Hæmatoxylic Acid*) $C_{32} H_{14} O_{12}$; & + 2 Aq; & + 6 Aq Sparingly and slowly soluble in cold, readily soluble in hot water. Easily soluble in alcohol, ether, and dilute acids. Not much altered by dilute chlorhydric and sulphuric acids.

HEMATOCRISTALLIN. (*Blood Crystals.*) These crystals vary in solubility according as they are derived from different animals; those from Guinea-pigs, rats, and mice are least soluble, and require 600 pts. of water for their solution. The aqueous solution is coagulated by heat, and the crystals are precipitated from it by nitric acid. On the other hand, neither sulphuric, chlorhydric, or acetic acids precipitate the crystals. They are easily soluble in acetic acid. Also soluble in ammonia-water. Insoluble in a concentrated solution of caustic potash.

HEMATOIDIN. $C_{14} H_9 N O_3$? Insoluble in water, alcohol, ether, glycerin, or acetic acid. Easily soluble in ammonia-water. When treated with aqueous solutions of potash or soda it swells up and is dissolved to a slight extent. Readily soluble in nitric acid. Slightly soluble in chlorhydric acid. Insoluble in concentrated sulphuric acid. (Ch. Robin.)

HEMATOSIN. (*Improperly* “ *Hæmatin.*” Red coloring matter of blood.) $C_{44} H_{22} N_3 O_6 Fe$ (?) Insoluble in water, alcohol, or ether; but soluble in these liquids when they contain a small quantity of caustic or carbonated potash, soda, or ammonia. Soluble in warm oil of turpentine, and linseed oil. (Mulder.) Insoluble in water, alcohol, ether, acetate of ethyl, and fatty and volatile oils; Mulder, however, regards it as slightly soluble in fatty and ethereal oils. (Lehmann.) It dissolves very readily in weak alcohol acidulated with sulphuric or chlorhydric acid; but water similarly acidulated does not dissolve it, and even precipitates it from the alcoholic solution. Insoluble in concentrated sulphuric and chlorhydric acids, which, however, abstract a little of the iron. After having been triturated with sulphate of soda, it dissolves for the most part in water. Decomposed by nitric acid.

HEMATOXYLIN. *Vid.* Hematin.

HEMIPINIC ACID. $C_{20} H_{10} O_{12} + 4 Aq = C_{20} H_8 O_{10}, 2 H O + 4 Aq$ Effloresces in dry air. Difficultly soluble in cold water; more readily soluble in alcohol, and ether. (Wœhler.) Much more readily soluble in water than opianic acid. (Blyth.)

HEMIPINATE OF AMMONIA. Permanent. Easily soluble in water.

HEMIPINATE OF ETHYL. *Vid.* EthylHemipinic Acid.

HEMIPINATE *of sesquioxide* **OF IRON.** Insoluble in water.

HEMIPINATE OF LEAD. Insoluble in water. Soluble in an aqueous solution of acetate of lead. (Wœhler.)

HEMIPINATE OF POTASH.

I.) *normal.* Readily soluble in water. (Anderson.)

II.) *acid.* $C_{20} H_9 K O_{12} + 5 Aq$ Readily soluble in water, and alcohol. Insoluble in ether. (Anderson.)

HEMIPINATE OF SILVER. $C_{20} H_8 Ag_2 O_{12}$ Insoluble in water.

HEPTA. See *hepta*, as prefix, under the generic name of the substance sought for.

HESPERIDIN(of Lebreton). (*Aurantiin.*) Insoluble in cold water. Soluble in 60 p. c. of boiling water. Readily soluble in boiling alcohol. Insoluble in ether. Soluble in warm concentrated acetic acid. Insoluble in the fatty or essential oils. Easily soluble in solutions of the caustic alkalies. Soluble in concentrated sulphuric acid, with coloration.

Widmann, on the other hand, describes hesperidin as being easily soluble in boiling water, but almost entirely insoluble in alcohol. It is admitted that the name has been applied to two different substances.

HEVEENE. $C_n H_n$ Miscible in all proportions with alcohol, ether, and the fatty and essential oils.

HEXA. See *hexa*, as prefix, under the generic name of the substance sought for.

HEXYL. *Vid.* Caproyl.

HEXYLENE. *Vid.* Caproylene.

HIPPARAFFIN. $C_{16} H_8 N O_2$ Sparingly soluble in hot, insoluble in cold water. Its solubility in water is not increased by the addition of sulphuric or chlorhydric acid, or caustic potash or ammonia. Readily soluble in boiling alcohol. Very readily soluble in ether. Easily soluble in concentrated sulphuric acid, without much alteration, from which it is precipitated by water. (Schwarz.)

HIPPURAMIC ACID. (*AmidoHippuric Acid.*)

$$C_{18} H_{10} N_2 O_6 = C_{18} H_9 N_2 O_5, H O = N_2 \left\{ \begin{array}{l} C_2 O_2'' \\ C_{14} H_5 O_2 . O_2 \\ C_2 H_3 \\ H_2 \end{array} \right.$$

Sparingly soluble in cold, easily soluble in boiling water, or alcohol. Insoluble in ether. Soluble in 370 pts. of water at 20°; and in 1200 pts. of alcohol at 15°. Easily soluble, with combination, in acids. Soluble in an aqueous solution of caustic potash. (Schwanert, *Ann. Ch. u. Pharm.*, **112**. 70, *et seq.* [K.].)

HIPPURAMID.

$$C_{18} H_{20} N_2 O_4 = N_2 \left\{ \begin{array}{l} C_2 O_2'' \\ C_{14} H_5 O_2 \\ C_2 H_3 \\ H_2 \end{array} \right.$$

Soluble in 100 pts. of water; in 60 pts of alcohol; and in 80 pts. of wood-spirit. Easily soluble in ether.

HIPPURIC ACID. (*Urobenzoic Acid.*)

$$C_{18} H_9 N O_6 = N \left\{ \begin{array}{l} C_2 O_2'' \\ C_{14} H_5 O_2 . O, H O \\ C_2 H_3 \end{array} \right.$$

Soluble in 600 pts. of water at 0°. (Liebig, *Pogg. Ann.*, 1829, **17**. 393.) Easily soluble in boiling water, and in alcohol. (Liebig.) Almost insoluble in ether; being far less soluble than benzoic acid. Soluble in hydrate of anisyl.

Very readily soluble in water containing ordinary (*di*)phosphate of soda. (Liebig.) Very sparingly soluble in liquors acidulated with chlorhydric acid. Soluble in hot strong chlorhydric acid, by which it is decomposed if the solution be maintained in ebullition.

Less soluble than benzoic acid in water. Easily soluble in concentrated sulphuric acid at 120°, without blackening, and is precipitated, unchanged,

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on the addition of water; but it undergoes decomposition when the solution is more strongly heated. Equally easily soluble in warm concentrated nitric acid, but is decomposed when the solution is boiled. Soluble in hot concentrated chlorhydric acid, from which it crystallizes unchanged on cooling. (Liebig, *Pogg. Ann.*, 1829, **17**. pp. 389, 390.)

In boiling concentrated chlorhydric acid it dissolves, without decomposition at first; for if the solution be cooled immediately after its formation, the greater part of the hippuric acid is deposited unchanged; but if the ebullition be continued during half an hour, the hippuric acid is decomposed. (Dessaignes, *Ann. Ch. et Phys.*, (3.) **17**. 50.)

With the exception of the salt of sesquioxide of iron, all the hippurates are soluble in boiling water, the alkaline salts being also easily soluble in cold water. Most of the hippurates are soluble in boiling alcohol, and a portion of them are soluble in ether also.

Hippurate of Alumina. Appears to be soluble in water. (Liebig, *Pogg. Ann.*, **17**. 396.)

Hippurate of Ammonia.

I.) *normal.* Soluble in water, the solution evolving ammonia on being evaporated. (Liebig, *Pogg. Ann.*, 1829, **17**. 394.)

II.) *acid.* Very readily soluble in water, and $C_{18}H_8(NH_4)NO_6, C_{18}H_9NO_6 + 2Aq$ alcohol. Sparingly soluble in ether. (Schwarz.)

Hippurate of Baryta.

I.) $C_{18}H_8BaNO_6 + Aq$ Soluble in water.

II.) *basic.* Soluble in water. (Liebig, *Pogg. Ann.*, **17**. 394.)

Hippurate of Cinchonidin (of Pasteur). Easily soluble in water, and spirit. (Leers, *Ann. Ch. u. Pharm.*, **82**. 162.)

Hippurate of Cinchonin. Soluble in water. (Elderhorst.)

Hippurate of Cobalt. Soluble in water, $C_{18}H_8CoNO_6 + 5Aq$ from which it is precipitated by alcohol. (Schwarz.)

Hippurate of Copper. Sparingly soluble in $C_{18}H_8CuNO_6 + 8Aq$ cold water. Readily soluble in hot, less soluble in cold alcohol. (Schwarz.)

Hippurate of Ethyl. Very sparingly solu- $C_{18}H_8(C_4H_5)NO_6$ ble in cold, more soluble in hot water. Soluble in all proportions in alcohol, from which it separates on the addition of water. Easily soluble in ether. (Stenhouse.)

Hippurate *of sesquioxide* **of Iron.** Insoluble in hot water. Readily soluble in alcohol, especially when this is hot.

Hippurate of Lead.

I.) *normal.* Effloresces in hot air. Soluble in $C_{18}H_8PbNO_6 + 2Aq$ & $3Aq$ 5 @ 6 pts. of cold water. (Liebig, *Pogg. Ann.*, **17**. 396.)

II.) *basic.* Soluble in water. (Liebig, *Pogg. Ann.*, **17**. 395.)

Hippurate of Lime. Soluble in 18 pts. of $C_{18}H_8CaNO_6 + 3Aq$ cold, and in 6 pts. of boiling water. (Liebig, *Pogg. Ann.*, 1829, **17**. 395.)

Hippurate of Magnesia. Easily soluble in $C_{18}H_8MgNO_6 + 5Aq$ water. (Liebig, *loc. cit.*, p. 394.)

Hippurate of Manganese. Appears to be soluble in water. (Liebig, *loc. cit.*, p. 396.)

Hippurate *of dinoxide* **of Mercury.** Ppt. (Liebig, *loc. cit.*, p. 394.)

Hippurate *of protoxide* **of Mercury.** Appears to be soluble in water. (Liebig, *loc. cit.*, p. 396.)

Hippurate of Methyl. Soluble in 120 pts. $C_{18}H_8(C_2H_3)NO_6$ of water at the ordinary temperature and in 60 pts. of water at 30°. Soluble in all proportions in alcohol, wood-spirit, and ether; from these solutions it is precipitated by water.

Hippurate of Morphine.

Hippurate of Nickel. Very sparingly sol- $C_{18}H_8NiNO_6 + 5Aq$ uble in cold water, more soluble in boiling water, and in alcohol. Insoluble in ether. (Schwarz.)

Hippurate of Potash.

I.) *normal.* Readily soluble in water and in $C_{18}H_8KNO_6 + 2Aq$ ordinary alcohol. Sparingly soluble in cold, more readily soluble in warm, absolute alchohol or ether. (Schwarz.)

II.) *acid.* Much more difficultly soluble than $C_{18}H_8KNO_6, C_{18}H_9NO_6 + 2Aq$ the normal salt.

Hippurate of Silver. Sparingly soluble in $C_{18}H_8AgNO_6 + Aq$ boiling, less soluble in cold water. (Schwarz.)

Hippurate of Soda. Readily soluble in wa- $C_{18}H_8NaNO_6$ ter, and in boiling alcohol. Almost insoluble in cold absolute alcohol or in ether.

Hippurate of Strontia. Somewhat spar- $C_{18}H_8SrNO_6 + 5Aq$ ingly soluble in cold water, alcohol, or ether. Easily soluble in boiling water or alcohol. (Schwarz.)

Hippurate of Strychnine. Soluble in water. (Elderhorst.)

Hippurate of Urea. Its aqueous solution soon decomposes. Soluble in hot absolute alcohol. (Dessaignes.)

Does not exist, according to Pelouze. (*Ann. Ch. et Phys.*, 1842, (3.) **6**. 67.)

Hippurate of Zinc. The anhydrous salt is $C_{18}H_8ZnNO_6 + 5Aq$ soluble in 53.16 pts. of water at 17.5°, and in about 4 pts. of water at 100°. Soluble in 60.5 pts. of boiling alcohol of 0.82 sp. gr. Almost insoluble in ether. (Lœwe.)

Hircic Acid. Very soluble in water. (Joss.) Sparingly soluble in water. Very readily soluble in alcohol. Soluble in ether. (Chevreul.)

Hircate of Ammonia.

Hircate of Baryta.

I.) Sparingly soluble in water. (Chevreul.) Tolerably easily soluble in water. (Joss.)

II.) Very soluble in water. (Joss.)

Homolactic Acid. *Vid.* Glycolic Acid.

Hordeic Acid. Soluble in alcohol, and ether. $C_{24}H_{24}O_4$

Hordein. Insoluble in water or alcohol. (*Cevadin.*)

Horn. Insoluble in boiling water, alcohol, or (*Epidermose.*) ether. It dissolves gradually in water at a high temperature in Papin's digester. Scarcely at all acted upon by hot ammonia-water. Easily soluble in solutions of caustic potash and soda, especially if these are hot.

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In warm concentrated sulphuric acid it swells up and dissolves for the most part. Decomposed by ebullition with weak sulphuric acid. Slowly soluble in boiling chlorhydric acid. Soluble, with decomposition, in nitric acid, especially if it be warm. Insoluble in acetic acid, which only causes it to swell up.

Huanokin. *Vid.* Cinchonin.

Humic Acid. Soluble in aqueous solutions of the fixed caustic alkalies, and ammonia.

Humin. Insoluble in alkaline solutions.

Humopic Acid. $C_{46}H_{22}O_{14}$ Insoluble in water or in weak acids. Soluble in alcohol and in solutions of the caustic alkalies.

Humulin. *Vid.* Lupulin.

Hurin (from *Hura crepitans*). Insoluble in water. Easily soluble in alcohol, ether, and oils.

Hydallantoinic Acid. $C_8H_8N_4O_8, HO$ Deliquescent. Soluble in water. Insoluble in absolute alcohol. Its salts appear to be generally soluble in water, and insoluble in absolute alcohol. (Schlieper.)

Hydallantoinate of Lead. $PbO, C_8H_8N_4O_8$ Insoluble in alcohol. Easily soluble in acetic acid. (Schlieper.)

Hydallantoinate of Potash. Soluble in water. Insoluble in absolute alcohol. (Schlieper, *Am. J. Sci.*, (2.) **6.** 374.)

Hydantoic Acid. $C_8H_8N_4O_8$ Deliquescent. Soluble in water. Insoluble in alcohol. Its alkaline salts are soluble in water, but insoluble in alcohol.

Hydantoate of Lead. Very sparingly soluble in hot acetic acid. Readily soluble in nitric acid.

Hydantoate of Potash. Soluble in water. Insoluble in alcohol.

Hydantoate of Silver. Ppt.

Hydranzothin. *Vid. bi*Sulphide of Sulphocarbammonium.

HydrargAcryl. *Vid.* MercurAllyl.

HydrargAllyl, &c. *Vid.* MercurAllyl, &c.

Hydrarsin. *Vid.* Cacodylate of Cacodyl.

Hydrastin (from the root of *Hydrastis Canadensis.*) Insoluble in water. Sparingly soluble in cold alcohol or ether. Soluble in chloroform and in boiling alcohol. It fuses in hot oil of turpentine. Soluble in concentrated chlorhydric acid. Only slightly acted upon by cold concentrated sulphuric acid. (Parrish's *Pharm.*, p. 394.) Soluble in warm alcohol. Nearly insoluble in cold alcohol, ether, oil of turpentine, or water. More soluble in water containing acetic acid, and in alcohol containing caustic potash or ammonia. (Parrish's *Pharm.*, p. 192.)

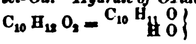
Hydrate of Acetosamin. (*Oxide of Acetylammonium.*) C_4H_6NO Readily soluble in water, and alcohol. (Natanson.)

Hydrate of Allyl. (*Allylic Alcohol. Acrylic Alcohol.*) C_6H_5O, HO Soluble in all proportions in water, alcohol, and wood-spirit. (Hofmann & Cahours, *J. Ch. Soc.*, **10.** 316.) Miscible in all proportions with water. (Berthelot & DeLuca.)

Hydrate of *tetr*Allylammonium. $C_{24}H_{21}NO_2 = N\{(C_6H_5)_4 . O, HO$ Readily soluble in water. (Cahours & Hofmann.)

Hydrate of Alumina. *Vid.* Oxide of Aluminum.

Hydrate of Amyl. (*Amyl Alcohol. Amylic Alcohol. Fusel-Oil. Hydrate of Oxide of Amyl.*)



$$C_{10}H_{12}O_2 = \left.\begin{matrix}C_{10}H_{11}O\\HO\end{matrix}\right\}$$

Insoluble in water. (Balard, *loc. inf. cit.*) Sparingly soluble in water. (Pelletan.) Soluble in all proportions in alcohol, ether, fixed and essential oils, and strong acetic acid. (Pelletan.) Soluble in an aqueous solution of acetate of potash.

Soluble in strong chlorhydric acid. (Balard, *Ann. Ch. et Phys.*, (3.) **12.** 300.) Soluble to a certain extent in an aqueous solution of caproate of potash. (Brazier & Gossleth, *J. Ch. Soc.*, **3.** 215.) Insoluble in a cold aqueous solution of chloride of zinc, but on heating the two together the hydrate of amyl is dissolved with decomposition. (Balard, *Ann. Ch. et Phys.*, (3.) **12.** 320.) Most of its compounds are, like itself, insoluble in water. (Balard, *Ibid.*, p. 296.)

Hydrate of *tetr*Amylammonium. $C_{40}H_{45}NO_2 = N\{(C_{10}H_{11})_4 . O, HO$ Somewhat deliquescent. Readily soluble in water, though less soluble than the corresponding compounds of ethyl and methyl. (Hofmann.)

Hydrate of Amylene. (*Amylic Glycol.*) $C_{10}H_{12}O_4 = C_{10}H_{10}O_2, 2HO$ When pure it is soluble in water in all proportions. (A. Wurtz.) Easily soluble in alcohol, and ether.

Hydrate of AmylStrychnine. Soluble in water, and in hot absolute alcohol, from which it is precipitated on the addition of ether. (How.)

Hydrate of AmylNicotin. Soluble in water. Its salts are soluble in water. (Stahlschmidt, *Ann. Ch. u. Pharm.*, **90.** 226.)

Hydrate of Anisoyl. (*Anisalcohol. Anisyl Alcohol.*)

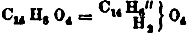
$$C_{16}H_{10}O_4 = \left.\begin{matrix}C_{16}H_9O_2\\H\end{matrix}\right\}O_2$$

Soluble in ether. (Cannizzaro & Bertagnini, *Ann. Ch. u. Pharm.*, **98.** 190.)

Hydrate of ArsenEthylium, &c. *Vid.* Oxide of ArsenEthylium, &c.

Hydrate of Baryta. *Vid.* Oxide of Barium.

Hydrate of Benzol. (*Benzol Alcohol. Benzo Glycol.*)



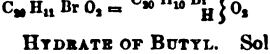
$$C_{14}H_8O_4 = \left.\begin{matrix}C_{14}H_6''\\H_2\end{matrix}\right\}O_4$$

Very unstable.

Hydrate of Benzoyl. *Vid.* Stilbous Acid.

Hydrate of Bismuth. *Vid.* Oxide of Bismuth.

Hydrate of BromoCumoyl. (*Bromocuminol. Hydride of BromoCumyl.*)

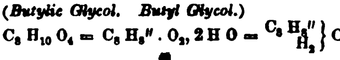


$$C_{20}H_{11}BrO_2 = \left.\begin{matrix}C_{20}H_{10}Br\\H\end{matrix}\right\}O_2$$

Decomposed by water. (Bertagnini.)

Hydrate of Butyl. (*Hydrate of Tetryl. Butylic Alcohol. Tetrylic Alcohol.*) $C_8H_{10}O_2 = C_8H_9O, HO$ Soluble in 10.5 pts. of water at 18°. Insoluble in solutions of chloride of calcium, chloride of sodium, or in general any other salt easily soluble in water. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **42.** 137.) Miscible in all proportions with alcohol, and ether.

Hydrate of Butylene. (*Butylic Glycol. Butyl Glycol.*)



$$C_8H_{10}O_4 = C_8H_8''.O_2, 2HO = \left.\begin{matrix}C_8H_8''\\H_2\end{matrix}\right\}O_4$$

Soluble in all proportions in water, alcohol, and ether. Its solubility in ether distinguishes it from the analogous compounds of ethylene and propylene, which are but sparingly soluble in this liquid. (A. Wurtz.)

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Hydrate of Cadmium. *Vid.* Oxide of Cadmium.

Hydrate of Cajputene.

I.) *mono.*
$C_{20}H_{16}, HO$

II.) *bi.* Soluble in all proportions in alcohol, ether, and oil of turpentine. (Max. Schmidt.)
$C_{20}H_{16}, 2HO$

III.) *sex.* Sparingly soluble in cold, easily in boiling alcohol. (Max. Schmidt.)
$C_{20}H_{16}, 6HO$

Hydrate of Capricyl. Insoluble in water. Soluble in alcohol, ether, and the fatty oils. (Bouis, *Ann. Ch. et Phys.*, (3.) **48.** 102.) Insoluble in water. Miscible in all proportions with alcohol, and ether. (Stædeler.)

(*Hydrate of Capryl. Caprylic Aldehyde. Methyl Œnanthol.*)
$C_{16}H_{18}O_2 = \left.\begin{matrix}C_{16}H_{17}\\H\end{matrix}\right\}O_2$

Hydrate of Caproyl. Insoluble in water. (Faget.)

(*Caproic*, or *Capronic, Alcohol. Hydrate of Hexyl.*)
$C_{12}H_{14}O_2 = \left.\begin{matrix}C_{12}H_{13}\\H\end{matrix}\right\}O_2$

Hydrate of Capryl. *Vid.* Hydrate of Octyl, and Hydrate of Capricyl.

Hydrate of Cerium. *Vid.* Oxide of Cerium.

Hydrate of Ceryl. Insoluble in water. Easily soluble in absolute alcohol, in ether, and in benzin.

(*Cerotic Alcohol. Cerotin.*)
$C_{54}H_{55}O, HO$

Hydrate of Cetyl. Insoluble in water. Miscible in all proportions with alcohol, ether, and essential oils. Insoluble in alkaline solutions. Soluble, with combination, in concentrated sulphuric acid. Decomposed by hot nitric acid.

(*Ethal. Æthal.*)
$C_{32}H_{33}O, HO$

Hydrate of Chloral. *Vid.* Chloral (Hydride of *ter*ChlorAcetyl).

Hydrate of ChloroCumoyl. Decomposed by moist air; by strong sulphuric acid and by boiling potash-lye. Soluble in absolute alcohol. (Gerhardt & Cahours.)

(*ChloroCuminol. Hydride of ChloroCumyl. Isomeric with Chloride of Cumyl.*)
$C_{20}H_{11}ClO_2 = \left.\begin{matrix}C_{20}H_{10}Cl\\H\end{matrix}\right\}O_2$

Hydrate of *ter*ChloroToluenyl. *Vid. ter*ChloroToluenic Acid.

Hydrate of *quadri*ChloroToluenyl. Soluble in alcohol.

(*QuadriChloroToluenol. QuadriChloroBenzinol.*)
$C_{14}H_4Cl_4O_2 = C_{14}H_3Cl'_4O, HO$

Hydrate of Chromium. *Vid.* Oxide of Chromium.

Hydrate of Cobalt. *Vid.* Oxide of Cobalt.

Hydrate of Copper. *Vid.* Oxide of Copper.

Hydrate of Cresyl. Very sparingly soluble in water. Easily soluble in alcohol, ether, bisulphide of carbon, and strong acetic acid. Almost entirely insoluble in ammonia-water. Soluble, with combination, in concentrated sulphuric acid.

$C_{14}H_8O_2 = C_{14}H_7O, HO$

Hydrate of Cubebene. Insoluble in water. Soluble in alcohol, ether, and the essential oils. Sparingly soluble in a boiling concentrated solution of caustic potash. Soluble in concentrated sulphuric acid.

$C_{30}H_{24}, 2HO$

Hydrate of Cumicyl. Insoluble in water. Soluble in all proportions in alcohol, and ether. Decomposed by concentrated sulphuric and nitric acids. (Kraut, *Ann. Ch. u. Pharm.*, **92.** 68.)

$C_{20}H_{13}O, HO$

Hydrate of Ethyl. *Vid.* Alcohol.

Hydrate of *tetra*EthylAmmonium. Very deliquescent. Very soluble in water. Its salts, with the exception of the carbonate, are highly deliquescent. (Hofmann.)

$N(C_4H_5)_4O, HO$

Hydrate of *tri*EthylAmylAmmonium. Soluble in water.

$C_{22}H_{27}NO_2 = N\left\{\begin{matrix}(C_4H_5)_3\\C_{10}H_{11}\end{matrix}\right. . O, HO$

Hydrate of EthylBrucin. Readily soluble in water, alcohol, and ether. (Gunning.)

Hydrate of Ethyl*tri*CaproylAmmonium.

$C_{40}H_{45}NO_2 = N\}C_4H_5(C_{12}H_{13})_3O, HO$

Hydrate of EthylCodein. Highly soluble in water. (How, *J. Ch. Soc.*, **6.** 136.)

Hydrate of *di*EthylConiin. Soluble in water. (v. Planta & Kekulè, *Ann. Ch. u. Pharm.*, **89.** 146.)

(*BiEthylConiin.*)
$C_{24}H_{25}NO_2 = N\left\{\begin{matrix}C_{16}H_{14}''\\(C_4H_5)\end{matrix}\right. . O, HO$

Hydrate of Ethylene. *Vid.* Glycol.

Hydrate of EthylFurfurin. Sparingly soluble in water. Easily soluble in alcohol. (Davidson.)

$N_2\left\{\begin{matrix}(C_{10}H_4O_2'')_2\\C_{10}H_3(C_4H_5)O_2''\end{matrix}\right. . HO$

Hydrate of EthylMorphine. Readily soluble in cold water. Difficultly soluble in alcohol of 90%. (How, *J. Ch. Soc.*, **6.** 128.)

Hydrate of EthylNicotin. Soluble in water; the aqueous solution is decomposed by evaporation, and slowly by exposure to the air. The salts of ethylnicotin appear to be all soluble in water. (v. Planta & Kekulè, *Ann. Ch. u. Pharm.*, **87.** 5.)

Hydrate of Ethyl*tri*PhenylAmmonium. Difficultly soluble in water. Easily soluble in alcohol. When the aqueous solution is boiled, it deposits oily drops. The salts of ethyltriphenylammonium are deliquescent. (Gœssmann.)

(*EthylbiCinnammylamin.*)
$C_{40}H_{21}NO_2 = N\left\{\begin{matrix}C_4H_5\\(C_{12}H_5)_3\end{matrix}\right. . O, HO$

Hydrate of *tri*EthylPhenylAmmonium. Soluble in water. (Hofmann.)

$C_{24}H_{21}NO_2 = N\left\{\begin{matrix}C_{12}H_5\\(C_4H_5)_3\end{matrix}\right. . O, HO$

Hydrate of *tetr*EthylPhosphonium. Deliquescent. Soluble in water.

$C_{16}H_{21}PO_2 = P\{(C_4H_5)_4O, HO$

Hydrate of EthylPicolin. Deliquescent. Soluble in water; the solution undergoing decomposition when boiled. (Anderson.)

Hydrate of *di*EthylPiperylAmmonium. Very deliquescent. Soluble in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 98.)

Hydrate of EthylPyridin.

Hydrate of EthylQuinine. Easily soluble in water, and alcohol. Ether precipitates it from the alcoholic solution. (Strecker, *Ann. Ch. u. Pharm.*, **91.** 166.)

Hydrate of EthylQuinolein. Soluble in water, and alcohol. (Williams.)

(*EthylChinolin. VineChinolin.*)

Hydrate of EthylSalicyl. *Vid.* EthylSalicylic Acid.

Hydrate of EthylStrychnine. Permanent. Very easily soluble in water. Soluble in boiling, less soluble in cold absolute alcohol. Ether precipitates it from the alcoholic solution. (How.)

$C_{42}H_{21}(C_4H_5)N_2O_4, 2HO + 8Aq$

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Hydrate of *tri***EthylToluenyl(or Toluyl)Ammonium.** $C_{26}H_{23}NO_2 = N\left\{\begin{matrix}(C_4H_5)_3\\ C_{14}H_7\end{matrix}\right. .O, HO$ Soluble in water. (Morley & Abel, *J. Ch. Soc.*, **7.** 73.)

Hydrate of Glucina. *Vid.* Oxide of Glucinum.

Hydrate of Gold. *Vid.* Oxide of Gold.

Hydrate of Hexyl. *Vid.* Hydrate of Caproyl.

Hydrate of Iridium. *Vid.* Oxide of Iridium.

Hydrate of Iron. *Vid.* Oxide of Iron.

Hydrate of Lanthanum. *Vid.* Oxide of Lanthanum.

Hydrate of Laurel-Oil(of Guiana). $C_{20}H_{20}O_4 = C_{20}H_{16}, 4HO$ Insoluble in water. Soluble in alcohol. Decomposed by strong sulphuric acid. (Stenhouse.)

Hydrate of Lauricyl.
(*Lethal. Lauryl Alcohol.*)
$C_{24}H_{26}O_2 = \left.\begin{matrix}C_{24}H_{25}\\ H\end{matrix}\right\}O_2$

Hydrate of Lead. *Vid.* Oxide of Lead.

Hydrate of Lithium. *Vid.* Oxide of Lithium.

Hydrate of Magnesia. *Vid.* Oxide of Magnesium.

Hydrate of Manganese. *Vid.* Oxide of Manganese.

Hydrate of Mercury. *Vid.* Oxide of Mercury.

*Bi***Hydrate of Mesitylene.** $C_{18}H_{14}O_2$ Perhaps identical with Phorone. (Limpricht.)

Hydrate of Methyl. (*Wood-spirit. Pyroxilic-spirit. Wood-naphtha. Methyl alcohol. Methylic alcohol. BiHydrate of Methylene.*) $C_2H_4O_2 = \left.\begin{matrix}C_2H_3\\ H\end{matrix}\right\}O_2$ Mixes in all proportions with water, alcohol, ether, and the fatty and essential oils. Upon salts it exerts a solvent power similar to that of alcohol; and as a rule it resembles alcohol in solvent power.

Percentage of anhydrous wood-spirit (of sp. gr. 0.8136) in the aqueous solution at 15.5°.

Sp. Gr.	Per Cent.	Sp. Gr.	Per Cent.
0.8136	. 100.00	0.9008	. 69.44
0.8216	98.00	0.9032	68.50
0.8256	96.11	0.9060	67.56
0.8320	94.34	0.9070	66.66
0.8384	92.22	0.9116	65.00
0.8418	90.90	0.9154	63.30
0.8470	89.30	0.9184	61.73
0.8514	87.72	0.9218	60.24
0.8564	86.20	0.9242	58.82
0.8596	84.75	0.9266	57.73
0.8642	83.33	0.9296	56.18
0.8674	82.00	0.9344	53.70
0.8712	80.64	0.9386	51.54
0.8742	79.36	0.9414	50.00
0.8784	78.13	0.9448	47.62
0.8822	77.00	0.9484	46.00
0.8842	75.76	0.9518	43.48
0.8876	74.63	0.9540	41.66
0.8918	73.53	0.9564	40.00
0.8930	72.46	0.9584	38.46
0.8950	71.43	0.9600	37.11
0.8984	. 70.42	0.9620	. 35.71

(Ure, *Phil. Mag.*, (3.) **19.** 511; *Gmelin's Handbook*, **7.** 267.)

Sp. Gr. at 9°.	Per Cent of $C_2H_4O_2$.
0.8070	100
0.8371	90
0.8619	80
0.8873	70
0.9072	60
0.9232	50
0.9429	40
0.9576	30
0.9709	20
0.9751	10
0.9857	5

(H. Deville, *Ann. Ch. et Phys.*, (3.) **5.** 140.)

Hydrate of *tetra***Methylammonium.** $C_8H_{13}NO_2 = N\left\{(C_2H_3)_4 . O, HO\right.$ Deliquescent. Soluble in water. (Hofmann.)

Hydrate of MethylCinchonidin. Soluble in water.

Hydrate of MethylCinchonin. Soluble in water. Its salts are readily soluble in water, and alcohol. (Stahlschmidt, *Ann. Ch. u. Pharm.*, **90.** 220.)

Hydrate of Methylene. *Vid.* Oxide of Methyl.

*Bi***Hydrate of Methylene.** *Vid.* Hydrate of Methyl.

Hydrate of Methyl*tri***Ethylammonium.** $C_{14}H_{19}NO_2 = N\left\{C_2H_3(C_4H_5)_3O, HO\right.$ Soluble in water.

Hydrate of Methyl*di***EthylAmylammonium.** $NC_{20}H_{25}O_2 = N\left\{\begin{matrix}C_2H_3\\ (C_4H_5)_2\\ C_{10}H_{11}\end{matrix}\right. .O, HO$ Soluble in water. (Hofmann.)

Hydrate of MethylEthylAmylPhenylammonium. $C_{28}H_{25}NO_2 = N\left\{\begin{matrix}C_2H_3\\ C_4H_5\\ C_{10}H_{11}\\ C_{12}H_5\end{matrix}\right. .O, HO$ Soluble in water. (Hofmann.)

Hydrate of MethylEthylConiin. (*EthylMethylConiin.*) $C_{22}H_{23}NO_2 = \left\{\begin{matrix}C_{16}H_{14}{}''\\ C_2H_3\\ C_4H_5\end{matrix}\right. .O, HO$ Soluble in water. (v. Planta & Kekulè, *Ann. Ch. u. Pharm.*, **89.** 138.)

Hydrate of Methyl*di***EthylPhenylammonium.** $C_{22}H_{19}NO_2 = N\left\{\begin{matrix}C_2H_3\\ (C_4H_5)_2\\ C_{12}H_5\end{matrix}\right. .O, HO$

Hydrate of MethylNicotin. Soluble in water. Its salts are readily soluble in water. (Stahlschmidt, *Ann. Ch. u. Pharm.*, **90.** 223.)

Hydrate of MethylSalicyl. *Vid.* Methyl-Salicylic Acid.

Hydrate of Molybdenum. *Vid.* Oxide of Molybdenum.

Hydrate of Myricyl. (*Melissin. Hydrate of Melyl. Melissic Alcohol.*) $C_{60}H_{62}O_2 = C_{60}H_{61}O, HO$ Soluble in hot, less soluble in cold alcohol, and benzin. Soluble in ether.

Hydrate of Nickel. *Vid.* Oxide of Nickel.

Hydrate of *ter***NitroXylyl.**
$C_{16}H_7N_3O_{14} = \left.\begin{matrix}C_{16}H_6(NO_4)_3\\ H\end{matrix}\right\}O_2$

Hydrate of Octyl. (*Hydrate of Capryl. Caprylic Alcohol.*) $C_{16}H_{17}O, HO$ Insoluble in water. Soluble in alcohol, ether, and acetic acid. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 103.) Soluble in wood-spirit, and very readily in acetic acid.

Hydrate of Œnanthyl. $C_{14}H_{14}O_2, HO$ Insoluble in water. Soluble in alcohol, ether, and acetic acid. (Bussy.)

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HYDRATE OF OROSELONE. Sparingly soluble in cold, tolerably soluble in hot water. Easily soluble in alcohol, and ether. Readily soluble in a dilute solution of caustic potash, less easily soluble in ammonia-water. (S. & W.)

$C_{14}H_6O_4 = C_{14}H_5O_3, HO$

HYDRATE OF OSMIUM. *Vid.* Oxide of Osmium.

HYDRATE OF PALLADIUM. *Vid.* Oxide of Palladium.

HYDRATE OF PHENYL. *Vid.* Phenic Acid.

HYDRATE OF PHLORYL. *Vid.* Phloretol.

***Bi*HYDRATE OF PHOSPHIDE OF NITROGEN.** *Vid.* BiPhosphamid.

HYDRATE OF PLATINAMIN. *Vid.* Oxide of Platinamin.

HYDRATE OF PLATINUM. *Vid.* Oxide of Platinum.

HYDRATE OF POTASH. *Vid.* under *prot*Oxide of Potassium.

HYDRATE OF PROPYL. Miscible with water in all proportions: from this solution carbonate of potash causes it to separate. (Berthelot, *Ann. Ch. et Phys.*, (3.) **43.** 399.) Readily soluble in water, but not miscible with it in all proportions. (Chancel.)

(*Hydrate of Trityl*(of Gerhardt).
Propylic Alcohol.
Propionic do.
Metacetic do.
Metacetonic do.
Tritylic do.)
$C_6H_8O_2 = C_6H_7O, HO$

HYDRATE of PROPYLENE. Soluble in all proportions in water, and alcohol. Insoluble in a small quantity of ether, but dissolves completely in 10 or 12 times its volume of this liquid. (A. Wurtz.)

(*Hydrate of Tritylene.*
Propylic Glycol.)
$C_6H_8O_4 = \left.\begin{matrix}C_6H_6''\\H_2\end{matrix}\right\}O_4$

HYDRATE OF RHODIUM. *Vid.* Oxide of Rhodium.

HYDRATE OF RUTHENIUM. *Vid.* Oxide of Ruthenium.

HYDRATE OF RUTOYL. *Vid.* Hydride of Rutyl.

HYDRATE OF SODA. *Vid.* Oxide of Sodium.

HYDRATE OF STRONTIA. *Vid.* Oxide of Strontium.

HYDRATE OF SULPHOCARBONYLETHYLAMMONIUM. Slightly soluble in water. Soluble in all proportions in alcohol, and in ether. (Debus.) Soluble in water, and especially soluble in alcohol, and ether. Easily soluble, without decomposition, in concentrated sulphuric acid, from which water precipitates it. The sulphuric acid solution decomposes when heated or left to stand for some time. (Chancel, *Ann. Ch. et Phys.*, (3.) **35.** 468)

(*Ethyl SulphoCarbamid.*
Sulpho Carbamate of Ethyl.
Xanthamid. Xanthogenamid.
Urethane sulphuré.)
$C_6H_7NS_2O_2 = N\left\{\begin{matrix}C_2S_2''\\C_4H_5\\H\end{matrix}\right. . O, HO$

HYDRATE OF SULPHOCARBONYLETHYLAMMONIUM with *din*IODIDE OF COPPER.

I.) $N\left\{\begin{matrix}C_2S_2''\\C_4H_5\\H\end{matrix}\right. O, HO; Cu_2I$

II.) $2\left(N\left\{\begin{matrix}C_2S_2''\\C_4H_5\\H\end{matrix}\right. O, HO\right); Cu_2I$ Insoluble in water. Very easily soluble in cold alcohol, but the alcoholic solution is decomposed on boiling.

III.) $8\left(N\left\{\begin{matrix}C_2S_2''\\C_4H_5\\H\end{matrix}\right. O, HO\right); Cu_2I$ More readily soluble in alcohol than No. II.

HYDRATE OF SULPHOCARBONYLETHYLAMMONIUM with *di*SULPHOCYANIDE OF COPPER.

I.) $N\left\{\begin{matrix}C_2S_2''\\C_4H_5\\H\end{matrix}\right. O, HO; \left.\begin{matrix}Cu_2\\C_2N\end{matrix}\right\}S_2$

II.) $2\left(N\left\{\begin{matrix}C_2S_2''\\C_4H_5\\H\end{matrix}\right. O, HO\right); 8\left(\left.\begin{matrix}Cu_2\\C_2N\end{matrix}\right\}S_2\right)$

III.) $N\left\{\begin{matrix}C_2S_2''\\C_4H_5\\H\end{matrix}\right. O, HO; 10\left(\left.\begin{matrix}Cu_2\\C_2N\end{matrix}\right\}S_2\right)$ Insoluble in cold water or alcohol. [There are various other double compounds.]

HYDRATE OF TELLURIUM. *Vid.* Oxide of Tellurium.

HYDRATE OF TETRYL. *Vid.* Hydrate of Butyl.

HYDRATE OF THORIA. *Vid.* Oxide of Thorium.

HYDRATE OF THYMYL. *Vid.* Thymylic Acid.

HYDRATE OF TIN. *Vid.* Oxide of Tin.

HYDRATE OF TOLUENYL. Insoluble in water. Miscible in all proportions with alcohol, ether, bisulphide of carbon, and acetic acid. (Cannizzaro.)

(*Benzylic Alcohol. Benzoic Alcohol BenzAlcohol.*)
$C_{14}H_8O_2 = C_{14}H_7O, HO$

HYDRATE OF TRITYL. *Vid.* Hydrate of Propyl.

HYDRATE OF TURPENTINE-OIL.

I.) *Solid.*

a = "*Anhydrous Turpentine-Camphor.*" Hygroscopic. (List.)

(*Bi Hydrate of Oil of Turpentine*(of Deville).
TetraHydrate of Oil of Turpentine(of Berthelot).)
$C_{20}H_{20}O_4$

b = "*Crystallized Turpentine-Camphor.*" Crystallized turpentine-camphor is soluble in 200 pts. of cold water, and in 22 pts. of boiling water, crystallizing from the hot solution as it cools. (Buchner, List.) Soluble in 250 pts. of cold, and in 30 @ 36 pts. of boiling water (Voget); in 24 pts. of boiling water. (Trommsdorff.) Commercial oils of turpentine form hydrates of various degrees of solubility in water. (Berthelot, *Ann. Ch. et Phys.*, (3.) **40.** 40 [*Gm.*].) Soluble in 7 pts. of alcohol, of 85%, at 10°; in 10 @ 12 pts. of 86% alcohol, and in 5 @ 6 pts. of boiling alcohol. According to some statements the alcoholic solution becomes turbid when mixed with water, according to others it does not. Soluble in 8 @ 10 pts. of ether. (Voget.) Soluble in acetic acid. (Boissenot & Persot.) This solution is not rendered turbid by water (Brandes); when mixed with water, it deposits unaltered turpentine-camphor. (Trommsdorff.) Readily soluble in hot oils, whether fixed or volatile (Trommsdorff, Buchner); from the warm solution in oil of turpentine it does not separate on cooling (Hæfner, Brandes), but from a solution in poppy oil separation occurs. (Hæfner.) According to Voget, it is insoluble in oil of turpentine or oil of almonds. Soluble in hot ammonia-water. (Brandes.) Soluble in dilute aqueous solutions of the caustic alkalies, but when heated in concentrated solutions it melts without dissolving. (Trommsdorff.) Easily soluble in concentrated sulphuric acid with formation of terpinol. (List.)

(*Terpin*(of Berzelius, and List).
TriHydrate of Essence of Turpentine(of Deville.)
$C_{20}H_{20}O_4 \& + 2Aq = \left.\begin{matrix}C_{20}H_{19}O_2\\H\end{matrix}\right\}O_2 + 2Aq$

Soluble, without decomposition, in cold concentrated nitric acid; the solution undergoing decomposition when heated. (Trommsdorff, List.)

II.) *Liquid.* Soluble in alcohol, from which it is precipitated on the addition of water.
(*Liquid Turpentine-Camphor Mono-Hydrate of Oil of Turpentine*(of Deville). *BiHydrate of Oil of Turpentine* (of Berthelot).)
$C_{20}H_{18}O_2$

III.) "*MonoHydrate of Oil of Turpentine*"(of Berthelot, and Gerhardt). *Vid.* Terpinol.

HYDRATE OF URANIUM. *Vid.* Oxide of Uranium.

HYDRATE OF VANADIUM. *Vid.* Oxide of Vanadium.

HYDRATE OF *tetra*VINYLIUM. Very sparingly soluble in water, rather more soluble in cold than in warm water. Soluble in all proportions in alcohol. Insoluble in ether. Most of its salts are easily soluble in water, but insoluble in alcohol. (Heintz & Wislicenus.)
$C_{16}H_{12}NO, HO$

HYDRATE OF YTTRIUM. *Vid.* Oxide of Yttrium.

HYDRATE OF ZINC. *Vid.* Oxide of Zinc.

HYDRIDE OF ACETYL. Miscible in all proportions with water, alcohol, and ether. Insoluble in an aqueous solution of chloride of calcium.
(*Aldehyde. Acetyl Aldehyde. Hydrate of Acetoyl.*)
$C_4H_3O_2, H$

There are several other isomeric modifications; as,

α = *Metaldehyde.* Insoluble in water. Very soluble in alcohol, and ether.

β = *Paraldehyde.* Easily soluble in alcohol, and ether. Very slightly soluble in water.

γ = *Elaldehyde.* Soluble in water, alcohol, and ether.

HYDRIDE OF ACETYL*bromé, chloré, etc.* *Vid.* Hydride of Brom(Chlor, &c.)Acetyl.

HYDRIDE OF ACRYL. Soluble in about 40 pts. of water at 15°. Slowly decomposed when in contact with water. Soluble in spirit. More soluble in ether than in water, this being its best solvent. (Redtenbacher.) Soluble in all proportions in alcohol, ether, and essential oils. (Buchner.) Soluble in 2 or 3 pts. of water at 15°. (Geuther & Cartmell.)
(*Acrolein. Acrol. Pimelin.*)
$C_6H_4O_2 = \left.\begin{matrix}C_6H_3O_2\\H\end{matrix}\right\}$

HYDRIDE OF ALLYL.
(*Hydride of Propionoyl. Isomeric with Propylene.*)
$C_6H_6 = C_6H_5, H$

HYDRIDE OF AMYL. Insoluble in water. Soluble in alcohol, and ether. Water precipitates it from the alcoholic solution. (Frankland, *J. Ch. Soc.*, **3.** 41.)
$C_{10}H_{12} = \left.\begin{matrix}C_{10}H_{11}\\H\end{matrix}\right\}$

HYDRIDE OF ANGELICYL.
(*Angelic Aldehyde.*)
$C_{10}H_8O_2 = \left.\begin{matrix}C_{10}H_7O_2\\H\end{matrix}\right\}$

HYDRIDE OF ANISYL. Very sparingly soluble in water. Soluble in all proportions in alcohol, and ether. Soluble in concentrated sulphuric acid, from which it is precipitated on the addition of water. Insoluble in a cold aqueous solution of caustic potash, even when this is concentrated; but when boiled for a long time in this solution it dissolves, with decomposition. (Cahours, *Ann. Ch. et Phys.*, (3.) **14.** 484.)
(*Anisol Anisaldehyde. Anisylous Acid. Hydrate of Anisicyl*)
$C_{16}H_8O_4 = \left.\begin{matrix}C_{16}H_7O_4\\H\end{matrix}\right\}$, or $\left.\begin{matrix}C_{16}H_7O_2\\H\end{matrix}\right\} O_2$

HYDRIDE OF AZOANISYL. Insoluble in water. Soluble in hot, less soluble in cold alcohol, and ether. Soluble at a gentle heat in concentrated chlorhydric acid, from which it is deposited as the solution cools. (Cahours, *Ann. Ch. et Phys.*, (3.) **14.** 487.)
(*AzoAnisylamin. Trianisylbiamid.*)
$C_{48}H_{24}N_2O_6 = N_2\left\{\begin{matrix}(C_{16}H_7O_2)_3\\H_3\end{matrix}\right.$

HYDRIDE OF AZOBENZOYL. *Vid.* HydroBenzamid.

HYDRIDE OF AZOCINNAMYL. *Vid.* CinnamylHydramid.

HYDRIDE OF AZOSALICYL. Apparently insoluble in water. Very sparingly soluble in cold alcohol. Soluble in about 50 pts. of boiling alcohol. Unacted upon by dilute acids in the cold, but is decomposed on boiling.
(*Salhydramid. Salicylimid. Spiroylimid. Spirionid. TriSalicoylbiamid.*)
$C_{42}H_{18}N_2O_6 = N_2\left\{\begin{matrix}(C_{14}H_5O_2)_3\\H_3\end{matrix}\right.$

For its compounds, *vid.* AzoSalicylides.

HYDRIDE OF BENZOYL. Soluble in 30 pts. of cold water. Miscible in all proportions with alcohol, ether, and the fatty and essential oils. Soluble, without decomposition, in cold monohydrated sulphuric and in cold concentrated nitric acid. (Wœhler.)
(*Oil of Bitter-Almonds. Benzaldehyde. Benzaldide. Benzoilal. Hydrate of Benzoicyl. Laurel-Oil. Oxide of Picramyl. Essence d'amandes amères.*)
$C_{14}H_6O_2 = \left.\begin{matrix}C_{14}H_5O_2\\H\end{matrix}\right\}$

HYDRIDE OF BENZOYL*nitrosulphuré*. *Vid.* Hydride of NitroSulphoBenzoyl.

HYDRIDE OF BISMUTH?
BiH

HYDRIDE OF *ter*BROMACETYL. Very soluble in water, alcohol, and ether. (Lœwig.)
(*Bromal. Hydrure de Acetyl-tribromé. Oxyde de Bromethise.*)
a = $C_4HBr_3O_2 = \left.\begin{matrix}C_4Br_3O_2\\H\end{matrix}\right\}$

b = *hydrated.* Very soluble in water.
$C_4HBr_3O_2 + 4Aq$

HYDRIDE OF BROMAZOSALICYL. Resembles the corresponding chloro compound.
(*Bromo Salicylimid. Bromosamid. TriBromo Salicoylbiamid.*)
$C_{42}H_{15}Br_3N_2O_6 = N_2\left\{\begin{matrix}(C_{14}H_4BrO_2)_3\\H_3\end{matrix}\right.$

HYDRIDE OF BROMOCUMYL. *Vid.* Hydrate of BromoCumoyl.

HYDRIDE OF BROMOMETHYL. Scarcely at all soluble in water. 1 volume of water at 14° dissolves 0.07 @ 0.09 vol. of it. (Bæyer, *Ann. Ch. u. Pharm.*, **103.** 183.) Easily soluble in alcohol.
(*Isomeric with Bromide of Methyl.*)
$C_2H_3Br = \left.\begin{matrix}C_2H_2Br\\H\end{matrix}\right\}$

HYDRIDE OF BROMOPHENYL. Insoluble in dilute alkaline solutions. Soluble in concentrated sulphuric acid. (Couper.)
(*BromoBenzol. BromoPhenyl.*)
$C_{12}H_5Br = \left.\begin{matrix}C_{12}H_4Br\\H\end{matrix}\right\}$

HYDRIDE OF *bi*BROMOPHENYL. Soluble in ether. (Couper.)
(*BiBromoBenzin.*)
$C_{12}H_4Br_2 = \left.\begin{matrix}C_{12}H_3Br_2\\H\end{matrix}\right\}$

HYDRIDE OF *ter*BROMOPHENYL. Insoluble, or but sparingly soluble, in water. Very easily soluble in alcohol, and ether. (Lassaigne.)
(*TerBromoBenzine. BromoBenzid. BromoBenzinise. Bromide of diBromoPhenyl.*)
$C_{12}H_3Br_3 = \left.\begin{matrix}C_{12}H_2Br_3\\H\end{matrix}\right\}$

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Hydride of BromOpianyl. *Vid.* Bromo-Meconin.

Hydride of BromoSalicyl. *Vid.* Bromo-Salicylous Acid.

Hydride of BromoSulphoSalicyl. *Vid.* Sulphide of BromoSalicene.

Hydride of Butyl. Very sparingly soluble in water. Extremely soluble in absolute alcohol. Very sparingly soluble in concentrated sulphuric or chlorhydric acids, in a chlorhydric acid solution of dichloride of copper, or in bromine. (Berthelot, *Ann. Ch. et Phys.*, (3.) **51.** 71.) Soluble in alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **42.** 141.)

(*Hydride of Tetryl.*)
$\left.\begin{matrix} C_8 H_9 \\ H \end{matrix}\right\}$

Hydride of Butyryl. There are two modifications of this substance.

(*Butyral. Butyric Aldehyde. Butaldide. Butyraldehyde.*)
$C_8 H_8 O_2 = C_8 H_7 O_2, H$

a) **Butyral.** Sparingly soluble in water. Soluble in all proportions in alcohol, ether, wood-spirit, potato-spirit, and oils. (Chancel.) Butyral dissolves a little water.

β) **Butyraldehyde.** Very sparingly soluble in water. Soluble in all proportions in alcohol, and ether. (Guckelberger.)

Hydride of Capronyl.
(*Capral. Caproic Aldehyde.*)
$\left.\begin{matrix} C_{12} H_{11} O_2 \\ H \end{matrix}\right\}$

Hydride of Caproyl. Insoluble in water. Easily soluble in alcohol, and ether. (Wurtz.)

(*Hydride of Hexyl.*)
$\left.\begin{matrix} C_{12} H_{13} \\ H \end{matrix}\right\}$

"**Hydride of Capryl.**" *Vid.* Hydride of Octyl.

$\left.\begin{matrix} C_{16} H_{17} \\ H \end{matrix}\right\}$

Hydride of Capryl. *Vid.* Hydrate of Capricyl.

$C_{16} H_{16} O_2$

Hydride of ***ter*****ChlorAcetyl.**
(*Chloral. Hydrure d'Acetyl trichloré. Chlorure de Chloréthise.*)

$a = C_4 H Cl_3 O_2 = \left.\begin{matrix} C_4 Cl_3 O_2 \\ H \end{matrix}\right\}$ Very soluble in water, alcohol, and ether.

$b =$ "*Hydrate of Chloral.*" Soluble in water.
$C_4 H Cl_3 O_2 + 2 Aq$

There is another modification of chloral ("insoluble chloral") which is insoluble in cold, and only very sparingly soluble in boiling water; and is insoluble, or very difficultly soluble, in alcohol or ether. (Liebig, Dumas.)

Hydride of ChlorAzoSalicyl. Almost insoluble in water. (Piria.) Soluble in hot absolute alcohol. More soluble in ether, especially when this is warm. Absolute alcohol does not decompose it, but it is decomposed by warm spirit.

(*Chloro Salicylimid. Chlorosamid. TerChloro Salicoylbiamid.*)
$C_{42} H_{15} Cl_3 N_2 O_6$

Hydride of ChlorEthyl. Water absorbs about twice as much of it as it can of chloride of ethyl.

(*Isomeric with Chloride of Ethyl.*)
$C_4 H_5 Cl = \left.\begin{matrix} C_4 H_4 Cl \\ H \end{matrix}\right\}$

1 vol. of water absorbs 2 vols. of it. (Frankland & Kolbe.)

Hydride of ChloroBenzoyl. *Vid.* Chloride of Benzol.

Hydride of ChloroButyryl. Insoluble in water. Soluble in all proportions in alcohol, and ether. (Chancel.)

(*ChloroButyral. Butyralmonochloré.*)
$C_8 H_7 Cl O_2 = C_8 H_6 Cl O_2, H$

Hydride of ***bi*****ChloroButyryl.**
(*BiChloroButyral. Butyralbichloré.*)
$C_8 H_6 Cl_2 O_2 = C_8 H_5 Cl_2 O_2, H$

Hydride of ***quadri*****ChloroButyryl.** Insoluble in water. Soluble in alcohol, and ether. (Chancel.)

(*Quadri ChloroButyral. Butyral quadrichloré.*)
$C_8 H_4 Cl_4 O_2 = C_8 H_3 Cl_4 O_2, H$

Hydride of ***quadri*****ChloroCinnamyl.** Soluble in boiling alcohol, from which it separates on cooling. Unacted upon by boiling concentrated sulphuric acid. (Dumas & Peligot.)

(*Chlorocinnose. TetraCinnamyl. Hydrate of Quadri Chlorocinnamoyl.*)
$\left.\begin{matrix} C_{18} H_3 Cl_4 O_2 \\ H \end{matrix}\right\}$

Hydride of ChloroCumyl. *Vid.* Hydrate of ChloroCuminol; and also Chloride of Cumol ($C_{20} H_{12}''$).

Hydride of ChlorŒnanthyl. *Vid.* Chloride of Œnanthyl.

Hydride of ChloroMethyl. Very soluble in water, and alcohol. 1 vol. of water absorbs 2.6 vols. of it. (Bunsen.) More soluble in alcohol, but less soluble in ether.

(*Isomeric with Chloride of Methyl.*)
$C_2 H_3 Cl = \left.\begin{matrix} C_2 H_2 Cl \\ H \end{matrix}\right\}$

Hydride of ***ter*****ChloroPhenyl.** Insoluble in water. Easily soluble in alcohol, ether, and benzin. (Laurent.)

(*TerChloroBenzol. ChloroBenzide. Chlorophenise. Chloride of diChloro Phenyl. TerChloro Benzene.*)
$C_{12} H_3 Cl_3 = \left.\begin{matrix} C_{12} H_2 Cl_3 \\ H \end{matrix}\right\}$

Hydride of ChlorOpianyl. *Vid.* Chloro-Meconin.

Hydride of ***per*****ChloroPropionyl.**
$C_6 Cl_5 H O_2 = \left.\begin{matrix} C_6 Cl_5 O_2 \\ H \end{matrix}\right\}$ & $+ 8 Aq$

Hydride of ChloroSalicyl. *Vid.* Chloro-Salicylous Acid.

Hydride of ChloroToluenyl. Soluble in ether. (Deville.)

(*SexiChloro Toluene. SexiChloro Toluol. BenzoeneSexchloré. ChloroBenzoenyl. TolueneSexchloré.*)
$C_{14} H_2 Cl_6 = \left.\begin{matrix} C_{14} H Cl_6 \\ H \end{matrix}\right\}$

Hydride of Cinnamyl. Soluble in alcohol, and chlorhydric acid, in concentrated sulphuric acid with decomposition, and an aqueous solution of caustic potash. (Cahours.)

(*Cinnamic Aldehyde. Hydrate of Cinnamoyl. Oil of Cinnamon.*)
$C_{18} H_8 O_2 = \left.\begin{matrix} C_{18} H_7 O_2 \\ H \end{matrix}\right\}$

Hydride of Cinnamyl with Iodine & Iodide of Potassium. Decomposed by water. Soluble in alcohol, and ether. (Apjohn.)

$C_{18} H_8 O_2, 8 I, K I$

Hydride of Copper.
$Cu_2 H$

Hydride of Cumenyl. *Vid.* Cumene.

Hydride of Cumyl. Insoluble in water. Easily soluble in alcohol.

(*Hydrate of Cumoyl. Cuminol. Cuminaldehyde.*)
$C_{20} H_{12} O_2 = \left.\begin{matrix} C_{20} H_{11} O_2 \\ H \end{matrix}\right\}$

Hydride of CyanoBenzoyl. Insoluble in water. Sparingly soluble in boiling alcohol, and ether. (Laurent, Gregory.) Tolerably soluble in wood-spirit. (Laurent.) Decomposed by hot acids. Insoluble in cold chlorhydric acid, or in a solution of caustic potash.

(*Benzimid.*)
$C_{46} H_{18} N_2 O_4$

Connected with Hydride of CyanoBenzoyl are two compounds, designated as

I.) *α* **Hydride of CyanoBenzoyl.** Insoluble in water. Very sparingly soluble in cold alcohol. Readily soluble in ether.

(*Benzhydramid. BiToluenyl-Cyan Benzoylamid.*)
$C_{44} H_{18} N_2 O_2$

II.) *β* **Hydride of CyanoBenzoyl.** Almost

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(*ToluenylCyanoBenzoicylamin.*) $C_{30}H_{12}N_2$ insoluble in boiling alcohol. Insoluble in ether.

Hydride of Ethyl. (*Isomeric with Methyl.*) $C_4H_6 = \left.\begin{matrix}C_4H_5\\H\end{matrix}\right\}$. Nearly insoluble in water. 1 vol. of alcohol at 8.8° and 665.5mm. pressure, absorbs 1.22 vols. of it. (Frankland.) Tolerably soluble in absolute alcohol at ordinary temperatures; it is evolved on ebullition. Very sparingly soluble in a chlorhydric acid solution of dichloride of copper, in concentrated sulphuric acid or in bromine. (Berthelot, *Ann. Ch. et Phys.*, (3.) **51.** 68.) Neither absorbed by fuming sulphuric acid nor by perchloride of antimony. (Kolbe's *Lehrb.*, **1.** 233.)

1 vol. of water under a pressure of 0m.76 of mercury, at °C.	Dissolves (by experiment) of hydride of ethyl, vols. reduced to 0°C. and 0m.76 pressure of mercury.
2.0°	0.087576
6.2°	0.074754
8.3°	0.068751
15.5°	0.054888
21.5°	0.045589

From these results the following table is calculated by means of the formula: $C = 0.094556 - 0.0035324\,t + 0.00006278\,t^2$.

1 vol. of water, under a pressure of 0m.76 of mercury at °C.	Dissolves of hydride of ethyl, vols., reduced to 0°C. and 0m.76 pressure of mercury.
0°	0.0946
1°	0.0911
2°	0.0877
3°	0.0845
4°	0.0814
5°	0.0785
6°	0.0756
7°	0.0729
8°	0.0703
9°	0.0678
10°	0.0655
11°	0.0633
12°	0.0612
13°	0.0595
14°	0.0574
15°	0.0557
16°	0.0541
17°	0.0536
18°	0.0513
19°	0.0501
20°	0.0490
21°	0.0480
22°	0.0473
23°	0.0465
24°	0.0459

(Schickendantz, *Ann. Ch. u. Pharm.*, **109.** p. 116, and fig.)

Hydride of Guaiacyl. *Vid.* Pyroguaiacic Acid.

Hydride of *ter*IodAcetyl. (*Iodal.*) Insoluble in water. Soluble in alcohol, and wood-spirit. (Aimé.)

Hydride of IodOpianyl. *Vid.* IodoMeconin.

Hydride of Lauryl. (*Aldehyde of LauroStearic Acid.*) Not isolated.

Hydride of Mesityl. *Vid.* Mesitylene.

Hydride of Methyl. (*Light Carburetted Hydrogen. ProtoCarburetted Hydrogen. Marsh Gas. Formene.*) $\left.\begin{matrix}C_2H_3\\H\end{matrix}\right\}$ Soluble in 27 vols. of water. (Dalton, in his *New System*, **2.** 446.) Soluble in various organic liquids. (Gmelin's *Handbook.*) Very sparingly soluble in water, concentrated sulphuric acid, bromine, or a chlorhydric acid solution of dichloride of copper, although more soluble than either hydrogen or carbonic oxide [excepting as regards the dichloride of copper]. Somewhat soluble in alcohol. (Berthelot, *Ann. Ch. et Phys.*, (3.) **51.** 66.)

1 vol. of water, under a pressure of 0.m76 of mercury, at °C.	Dissolves of hydride of methyl (light carburetted hydrogen gas), vols., reduced to 0°C. and 0.m76 pressure of mercury.
0°	0.05449
1°	0.05332
2°	0.05217
3°	0.05104
4°	0.04993
5°	0.04885
6°	0.04778
7°	0.04674
8°	0.04571
9°	0.04470
10°	0.04372
11°	0.04275
12°	0.04180
13°	0.04088
14°	0.03997
15°	0.03909
16°	0.03823
17°	0.03739
18°	0.03657
19°	0.03577
20°	0.03499

(Bunsen's *Gasometry*, pp. 288, 128, 148.)

1 vol. of alcohol, under a pressure of 0m.76 of mercury, at °C.	Dissolves of hydride of methyl (light carburetted hydrogen gas), vols., reduced to 0°C. and 0m.76 pressure of mercury.
0°	0.52259
1°	0.51973
2°	0.51691
3°	0.51412
4°	0.51135
5°	0.50861
6°	0.50590
7°	0.50322
8°	0.50057
9°	0.49795
10°	0.49535
11°	0.49278
12°	0.49024
13°	0.48773
14°	0.48525
15°	0.48280
16°	0.48037
17°	0.47798
18°	0.47561
19°	0.47327
20°	0.47096
21°	0.46867
22°	0.46642
23°	0.46419
24°	0.46199

(Bunsen's *Gasometry*, pp. 288, 128, 149.)

Insoluble in caoutchin.

Hydride of Methyl*bromé, etc.*. *Vid.* Hydride of Bromo(*etc.*)Methyl.

Hydride of NitroBenzoyl. (*NitroBenzaldid.*) $C_{14}H_5NO_6 = \left.\begin{matrix}C_{14}H_4(NO_4)O_2\\H\end{matrix}\right\}$ Sparingly soluble in cold, tolerably easily soluble in boiling water. Readily soluble in alcohol, especially when this is warm. Tolerably soluble in ether. Easily soluble, without decomposition, in chlorhydric,

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sulphuric, and nitric acids. Its solubility in water is not augmented by the addition of alkaline carbonates, but the caustic alkalies dissolve it readily with decomposition. (Bertagnini, *Ann. Ch. et Phys.*, (3.) **33.** 468.)

Hydride of *ter*NitroMethyl. Tolerably readily soluble in water. (Schischkoff, *Ann. Ch. u. Pharm.*, **103.** 364.)
(*Nitroform. Hydride of Methyltrinitré.*)
$\left.\begin{matrix}C_2(NO_4)_3\\H\end{matrix}\right\}$

Hydride of *ter*NitroMethyl with Ammonia. *Vid.* *ter*NitroMethylide of Ammonium.

Hydride of NitrOpianyl. *Vid.* NitroMeconin.

Hydride of NitroPhenyl. Almost insoluble in water. Soluble in all proportions in alcohol, and ether. Easily soluble in concentrated sulphuric, and nitric acids, especially when these are warm. (Mitscherlich.)
(*NitroBenzin(e). NitroBenzol. NitroBenzene. NitroBenzid. NitroBenzinase. Essence de Mirbane.*)
$C_{12}H_5(NO_4) = \left.\begin{matrix}C_{12}H_4(NO_4)\\H\end{matrix}\right\}$

Hydride of *bi*NitroPhenyl Insoluble in water. Very readily soluble in warm alcohol. (Deville.)
(*BiNitroBenzin. BiNitroBenzol. DiNitroBenzol. BiNitroBenzene. BiNitroBenzid. Nitrobenzinese.*)
$C_{12}H_4(NO_4)_2 = \left.\begin{matrix}C_{12}H_3(NO_4)_2\\H\end{matrix}\right\}$

Hydride of NitroSalicyl. Sparingly soluble in water. Very soluble in alcohol, and ether.
(*Spiroilic Acid.*)
$C_{14}H_5NO_8 = C_{14}H_4(NO_4)O_4, H$

Hydride of NitroSulphoBenzoyl. Insoluble in water, even boiling. Insoluble in alcohol, or ether. Soluble, without decomposition, in warm, or even in cold, sulphuric acid from which water precipitates it. Decomposed by nitric acid. Soluble in an alcoholic solution of caustic potash, from which it is precipitated by water. (Bertagnini.)
(*Sulphide of NitroBenzylene. Hydrure de SulphoBenzoilnitré. Hydrure de Benzoile nitrosulfuré.*)
$C_{14}H_5NO_4S_2 = \left.\begin{matrix}C_{14}H_4(NO_4)S_2\\H\end{matrix}\right\}$

Hydride of NitroToluenyl. Insoluble in water. Very readily soluble in alcohol, and ether. Soluble in an aqueous solution of caustic potash, with decomposition (Deville); more readily soluble in an alcoholic solution of caustic potash. (Ritthausen.)
(*Nitro Toluene. Nitro Toluol. NitroBenzoene. NitroBenzoenase. Nitro Dracyl. Nitro Toluide. Nitro Tole.*)
$C_{14}H_7(NO_4) = \left.\begin{matrix}C_{14}H_6(NO_4)\\H\end{matrix}\right\}$

Hydride of *bi*NitroToluenyl. Sparingly soluble in water; or in water acidulated with nitric acid. Soluble in alcohol; and in an aqueous solution of caustic potash, with decomposition.
(*BiNitro Toluene. BiNitro Toluol. BiNitroBenzoene. NitroBenzoenese.*)
$C_{14}H_6(NO_4)_2 = \left.\begin{matrix}C_{14}H_5(NO_4)_2\\H\end{matrix}\right\}$

Hydride of Octyl.
(*Hydride of Capryl.*)
$\left.\begin{matrix}C_{16}H_{17}\\H\end{matrix}\right\}$

Hydride of Œnanthyl.
(*Œnanthol. Œnanthal. Œnanthylic Aldehyde.*)
a = $\left.\begin{matrix}C_{14}H_{13}O_2\\H\end{matrix}\right\}$ Very sparingly soluble in water. Soluble in all proportions in alcohol, and ether.

It combines with concentrated sulphuric acid, forming a copulate acid, the baryta, lead, and lime salts of which are soluble. (Bouis.)

b = *hydrated.* Insoluble in water. Soluble in alcohol, and in acetic acid. (Bussy & Lecanu.)
$\left.\begin{matrix}C_{14}H_{13}O_2\\H\end{matrix}\right\}HO$

Hydride of Opianyl. *Vid.* Meconin.

Hydride of Palmityl. Soluble in alcohol, and ether.
(*Cetylic Aldehyde.*)
$C_{32}H_{32}O_2 = C_{32}H_{31}O_2, H$

Hydride of Pelargyl. Not isolated.
$\left.\begin{matrix}C_{18}H_{17}O_2\\H\end{matrix}\right\}$

Hydride of Phenyl. Insoluble in water. (Regnault.) Very sparingly soluble in water. (Mitscherlich.) More readily soluble in alcohol than most of the other hydrocarbons; from this solution it is precipitated by water. Soluble in wood-spirit. Very sparingly soluble in ether. Readily soluble in acetone. (Mansfield.) Insoluble in very dilute alcohol. Benzin dissolves the fatty and essential oils, wax, caoutchouc, gutta-percha, and small quantities of sulphur, phosphorus, and iodine.
(*Benzin(e). Benzol. Benzon. Benzene. Phene. BiCarburet of Hydrogen.*)
$C_{12}H_6 = \left.\begin{matrix}C_{12}H_5\\H\end{matrix}\right\}$

Hydride of Phosphorus. *Vid.* Phosphuretted Hydrogen [No. I.(solid)].

Hydride of Propionyl. Miscible in all proportions with water, alcohol, and ether.
(*Propionic, or Propylic, Aldehyde. Isomeric with Acetone, Propylal, and Hydrate of Allyl.*)
$C_6H_6O_2 = \left.\begin{matrix}C_6H_5O_2\\H\end{matrix}\right\}$

Hydride of Propyl. Very sparingly soluble in water, bromine, concentrated sulphuric acid, or a chlorhydric acid solution of dichloride of copper. Extremely soluble in absolute alcohol. (Berthelot, *Ann. Ch. et Phys.*, (3.) **51.** 70.)
(*Hydride of Trityl.*)
$C_6H_8 = \left.\begin{matrix}C_6H_7\\H\end{matrix}\right\}$

Hydride of Rutyl. Soluble in cold concentrated sulphuric acid, from which it is precipitated by water. Soluble in 1 pt. of alcohol, of 0.85 sp. gr.
(*Capric Aldehyde. Caprol. Oil of Rue. Hydrate of Rutoyl.*)
$\left.\begin{matrix}C_{20}H_{19}O_2\\H\end{matrix}\right\}$

Hydride of Salicyl. *Vid.* Salicylous Acid.

Hydride of Suberyl.
(*Suberone.*)
$C_{14}H_{12}O_2$

Hydride of SulphAcetyl. Sparingly soluble in water. Soluble in alcohol, and ether. Soluble in concentrated sulphuric acid, from which it is precipitated by water. Unacted upon by solutions of caustic potash or ammonia.
(*Acetyl (or Acetylic) Mercaptan. SulphAldehyde. Sulphydrate of Acetoyl*(C_4H_3).)
$\left.\begin{matrix}C_4H_3S_2\\H\end{matrix}\right\}$

Hydride of SulphAcetyl with Nitrate of Silver. Soluble in water; the solution undergoing decomposition when evaporated. Soluble in boiling, less soluble in cold, absolute alcohol; more readily soluble in dilute spirit. (Weidenbusch.)
$3C_4H_4S_2; 2(AgO, NO_5)$

Hydride of SulphAcetyl with Sulphydric Acid. Sparingly soluble in water. Very soluble in alcohol, and ether. Miscible with the fatty and volatile oils.
$6C_4H_4S_2, 2HS$

Hydride of SulphAnisyl. Insoluble, or but sparingly soluble, in alcohol. (Cahours.)
(*SulphAnisylous Acid. Thianisiol.*)
$\left.\begin{matrix}C_{16}H_7O_2S_2\\H\end{matrix}\right\}$

Hydride of SulphAzoBenzoyl. Very abundantly soluble in cold alcohol. Slowly decomposed by boil-
(*ThioBenzaldin.*)
$\left.\begin{matrix}C_{42}H_{18}NS_4\\H\end{matrix}\right\}$

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ing with alcohol. Soluble in 20 @ 30 pts. of boiling ether. (Laurent.)

HYDRIDE OF SULPHOBENZOYL. (*Sulphide of Stilbene.*) [*Isomeric, not identical with Sulphide of Benzol.* (Gerhardt.)] $\left.\begin{matrix}C_{14}H_5S_2\\ H\end{matrix}\right\}$ Insoluble in water, or alcohol. Decomposed by boiling with hydrated alcohol. Sparingly soluble in ether. (Laurent.)

HYDRIDE OF SULPHOBENZOYL*nitre*. *Vid.* Hydride of NitroSulphoBenzoyl.

HYDRIDE OF SULPHOCINNAMYL. (*Thiocinnol.*) $C_{18}H_8S_2$

HYDRIDE OF SULPHOCUMYL. (*Sulpho Cumol.*) $C_{20}H_{12}S_2$

HYDRIDE OF SULPHOCYANOBENZOYL. (*Sulpho Cyanide of Benzoyl. Sulpho CarbonylBenzoicylamid.*) $C_{16}H_5NS_2 = N\left\{\begin{matrix}C_2S_2''\\ C_{14}H_5\end{matrix}\right.$ Insoluble in water. Soluble, with decomposition, in alcohol, and ether. (Quadrat.)

HYDRIDE OF SULPHOSALICYL. (*Thio Salicol.*) $C_{14}H_6O_2S_2$

HYDRIDE OF TETRYL. *Vid.* Hydride of Butyl.

HYDRIDE OF THYMYL. *Vid.* Cymene.

HYDRIDE OF TOLUENYL. (*Toluene. Toluol. Hydride of Tolyl. Retinaphtha. Dracyl. Benzoene. Heptacarbure quadrihydrique*(of Courbe).) $C_{14}H_8 = \left.\begin{matrix}C_{14}H_7\\ H\end{matrix}\right\}$ Insoluble in water. Sparingly soluble in alcohol; more soluble in ether. (Glénard & Boudault; Deville.) Soluble in fixed and volatile oils. (Pelletier & Walter; Glénard & Boudault.)

HYDRIDE OF TRITYL.. *Vid.* Hydride of Propyl.

HYDRIDE OF VALERYL. (*Valeral. Valeraldide. Valerianic Aldehyde. Myaldid. AmylAldehyde.*) $C_{10}H_{10}O_2 = \left.\begin{matrix}C_{10}H_9O_2\\ H\end{matrix}\right\}$ Insoluble in water. Soluble in all proportions in alcohol, ether, and the volatile oils. (Chancel.) Miscible with oil of vitriol. (Gaultier de Claubry.)

HYDRIDE OF XYLYL. *Vid.* Xylene.

HYDRINDIN. $C_{64}H_{22}N_4O_8 + 2\,Aq$ Insoluble in water. Sparingly soluble in boiling, less soluble in cold alcohol. Soluble in concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water. (Laurent.)

HYDRINDIN with POTASH. $C_{64}H_{21}KN_4O_8 + 6\,Aq$ Decomposed by much water. Soluble in boiling alcohol, from which it is precipitated on the addition of a small quantity of water. (Laurent.)

HYDRIODIC ACID. *Vid.* Iodhydric Acid.

HYDRIODIC ETHER. *Vid.* Iodide of Ethyl.

HYDROALOETATE OF TIN. $C_{14}H_4Sn_2N_2O_{17}$

HYDROBENZAMID. (*Hydride of AzoBenzoyl. Nitride of Picramyl. TriBenzoicylbiamin.*) $C_{42}H_{18}N_2 = N_2\left\{\begin{matrix}(C_{14}H_5)_3\\ H_3\end{matrix}\right.$ Insoluble in water. Easily soluble in hot alcohol, and ether. The alcoholic solution is decomposed by long-continued boiling. Decomposed by acids. (Laurent.)

HYDROBENZAMID*nitré*. *Vid.* *ter*NitroHydroBenzamid.

HYDROBENZIL. $C_{28}H_{12}O_2$ Insoluble in water. Easily soluble in alcohol, and ether. Easily soluble in concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water. Soluble in an alcoholic solution of potash. (Zinin.)

HYDROBROMIC ACID. *Vid.* Bromhydric Acid.

HYDROBROMIC ETHER. *Vid.* Bromide of Ethyl..

HYDROBRYORETIN. $C_{42}H_{37}O_{16}$ Easily soluble in alcohol. Insoluble in ether.

HYDROCARBIDE OF BROMINE. *Vid.* Iodide of *bi*BromoMethyl.

HYDROCAROTIN. $C_{36}H_{30}O_2$ Insoluble in water. Abundantly soluble in boiling alcohol. More soluble in ether, bisulphide of carbon, benzin, essential oils, and chloroform than in alcohol. Also soluble in fatty oils, even in the cold. After having been melted it is much less soluble in benzin, and especially in bisulphide of carbon, than when in the crystalline state. This amorphous modification is, however, about as soluble as the crystalline in alcohol, and ether. (Husemann, *Ann. Ch. u. Pharm.*, 1861, **117**. pp. 206, 203.)

HYDROCHINONE. *Vid.* HydroKinone.

HYDROCHLORIC ACID. *Vid.* Chlorhydric Acid.

HYDROCHRYSAMID. (*Isomeric with NitroBenzamid.*) $C_{14}H_6(NO_4)NO_2 = N\left\{\begin{matrix}C_{14}H_4(NO_4)O_2\\ H_2\end{matrix}\right.$ Insoluble in boiling water. Sparingly soluble in boiling alcohol. Soluble in concentrated sulphuric acid, from which it is precipitated on the addition of water. Soluble in a boiling aqueous solution of caustic potash, less soluble in a cold solution. Also soluble in solutions of the alkaline carbonates. (Schunck.)

HYDROCINNAMID. *Vid.* CinnamylHydramid.

HYDROCYANALDIN. $C_{18}H_{12}N_4$ Tolerably soluble in boiling, sparingly soluble in cold water. Easily soluble in alcohol. Sparingly soluble in ether. (Strecker, *Ann. Ch. u. Pharm.*, **91**. 350.)

HYDROCYANHARMALIN. *Vid.* Cyanhydrate of Harmalin.

HYDROCYANIC ACID. *Vid.* Cyanhydric Acid.

HYDROCYANIC ETHER. *Vid.* Cyanide of Ethyl.

HYDROCYANONITROHARMALIN. *Vid.* Cyanhydrate of NitroHarmalin.

HYDROFERROCYANIC ACID. *Vid.* FerroCyanhydric Acid.

HYDROFLUORIC ACID. *Vid.* Fluorhydric Acid.

HYDROGEN. H Almost entirely insoluble in all known solvents. (Berthelot.) Soluble in 150 pts. of water. 1 vol. of water absorbs 0.016 vol. of hydrogen at the ordinary temperature.

Recently boiled water absorbs 1.53% of it. (Henry, *Phil. Trans.*, 1803, p. 274 [T.].) 100 vols. of water at 18° absorb 4.6 vols. of it. 100 vols. of alcohol, of 0.84 sp. gr., at 18° absorb 5.1 vols. of it. (Th. de Saussure, *Gilbert's Ann. Phys.*, 1814, **47**. 167.)

1 vol. of water, under a pressure of 0m.76 of mercury, at °C.	Dissolves of hydrogen gas, — vols., reduced to 0°C. and 0m.76 pressure of mercury.
At all temperatures from 0° to 24° . . .	0.01930

(Bunsen's *Gasometry*, pp. 286, 128, 145.)

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1 vol. of alcohol, under a pressure of $0^m.76$ of mercury, at °C.	Dissolves of hydrogen gas, — vols., reduced to 0°C. and $0^m.76$ pressure of mercury.
0°	0.06925
1°	0.06910
2°	0.06896
3°	0.06881
4°	0.06867
5°	0.06853
6°	0.06839
7°	0.06826
8°	0.06813
9°	0.06799
10°	0.06786
11°	0.06774
12°	0.06761
13°	0.06749
14°	0.06737
15°	0.06725
16°	0.06713
17°	0.06701
18°	0.06690
19°	0.06679
20°	0.06668
21°	0.06657
22°	0.06646
23°	0.06636
24°	0.06626

(Bunsen's *Gasometry*, pp. 286, 128, 145.)

HydroKinone. (*Hydrochinone. Hydroquinone. Arctuvin. Colorless Hydrokinone. Pyro Quinol.*) $C_{12}H_6O_4$ Readily soluble in water, especially when this is hot. Readily soluble in alcohol, and ether. (Wœhler.)

Green HydroKinone. *Vid.* Hydrokinone with Kinone.

HydroKinone*bromée*(*etc.*) *Vid.* Bromo(*etc.*) HydroKinone.)

HydroKinone with Kinone. (*GreenHydrokinone.*) $C_{12}H_6O_4$; $C_{12}H_4O_4$ Sparingly soluble in cold, more soluble in warm water. Easily soluble in alcohol, and ether. Soluble in ammonia-water. (Wœhler.)

HydrOleic Acid. Insoluble in water. Readily soluble in alcohol, and ether.

HydroMargaritic Acid[" Mixture!"(Gerhardt)]. Insoluble in water. Soluble in alcohol, and ether.

HydroMellone. *Vid.* Mellonhydric Acid.

HydroQuinone. *Vid.* HydroKinone.

HydroQuinone*chlorée*, *etc.* *Vid.* Chlor(*etc.*)-HydroKinone.

HydroSelenic Acid. *Vid.* Selenhydric Acid.

HydroSelenic Ether. *Vid.* Selenide of Ethyl.

HydroSelenoCyanic Acid. *Vid.* Selenio-Cyanhydric Acid.

HydroSulphate of Ethyl. *Vid.* Sulphydrate of Ethyl.

*Bi*HydroSulphate of Lithia. *Vid.* Sulphydrate of Lithium.

HydroSulphate of Methylene. *Vid.* *proto*Sulphide of Methyl.

HydroSulphite of Ammonia. *Vid.* *penta*-Sulphide of Ammonium.

HydroSulphocyanic Acid. *Vid.* Sulpho-Cyanhydric Acid.

Hydro*per*SulphoCyanic Acid. *Vid.* *per*-SulphoCyanhydric Acid.

HydroSulphoMellonic Acid. *Vid.* SulphoMellonic Acid.

HydroSulphuric Acid. *Vid.* Sulphydric Acid.

HydroSulphuric Ether. *Vid.* Sulphide of Ethyl.

HydroSulphuricMethylEther. *Vid.* *proto*-Sulphide of Methyl.

HydroSulphurous Acid. *Vid.* *per*Sulphide of Hydrogen.

HydroTelluric Ether. *Vid.* Telluride of Ethyl.

HydroThioCyanic Acid. (*ThioCyanhydric Acid.*) $C_{10}H_6S_{12}N_5O_2 = C_{10}H_4S_{12}N_5, 2HO$ Scarcely soluble in 1000 pts. of cold water; but dissolves in 42 pts. of boiling water. Soluble in 25 pts. of cold, and in 7 pts. of boiling alcohol (Parnell); in 500 pts. of alcohol. (Vœlckel.) Water precipitates it from the concentrated alcoholic solution. About as soluble in wood-spirit as in alcohol. Soluble in concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water. Also slightly soluble in chlorhydric acid. Easily soluble in solutions of the caustic alkalies. (Parnell.)

HydroThioCyanate of Ammonia. Soluble in water.

HydroThioCyanate of Baryta. Soluble in water.

HydroThioCyanate of Copper. Ppt.

HydroThioCyanate of Iron. Soluble in water.

HydroThioCyanate of Lead. Ppt.

HydroThioCyanate of Lime. Soluble in water.

HydroThioCyanate *of protoxide* of Mercury. Ppt.

HydroThioCyanate of Manganese. Soluble in water.

HydroThioCyanate of Nickel. Soluble in water.

HydroThioCyanate *of protoxide* of Platinum. Ppt.

HydroThioCyanate of Potash. Soluble in water.

HydroThioCyanate of Silver. Insoluble in water or ammonia-water.

HydroThioCyanate of Soda. Soluble in water.

HydroThioCyanate of Tin. Ppt.

HydroThioCyanate of Zinc. Soluble in water.

HydroThioMellon. *Vid.* SulphoMellonic Acid.

HydroThioSulphoCyanic Acid. *Vid.* SulphoCarbamic Acid.

HydroThioSulphoPrussic Acid. *Vid.* SulphoCarbamic Acid.

HydrOxalic Acid. *Vid.* Saccharic Acid.

HydroXanthic Acid. *Vid.* *per*SulphoCyanhydric Acid.

Hydruret of *X.* *Vid.* Hydride of *X.*

Hydurilic Acid(of Schlieper). $C_{12}H_5N_2O_{11}$? [Laurent doubts its existence.] Nearly insoluble in cold, sparingly and slowly

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soluble in hot water. Insoluble in alcohol. Soluble, with decomposition, in concentrated sulphuric acid. (Schlieper.)

Hyduralate of Ammonia.

I.) $C_{12} H_8 (N H_4)_2 N_2 O_{11}$ Tolerably soluble in water. Very easily soluble in ammonia-water.

II.) *acid.* Insoluble in dilute acids.

Hyduralate of Potash. Soluble in water. Insoluble in alcohol.

Hyduralate of Silver. Ppt.
$C_{12} H_3 Ag_2 N_3 O_{11}$

Hyduralate of Soda.
$C_{12} H_3 Na_2 N_3 O_{11} + 5 Aq$

Hyocholalic Acid. Insoluble in water. Soluble in alcohol, and ether.
$C_{50} H_{40} O_8$

Hyocholalate of Baryta.
$C_{50} H_{39} Ba O_8$

Hyocholic Acid. Very sparingly soluble in water. Easily soluble in alcohol, in cold concentrated sulphuric and nitric acids, without change, and in alkaline solutions. Insoluble in ether.
(*Hyoglycocholic Acid.*)
$C_{54} H_{43} N O_{10}$

Hyocholate of Ammonia. Very soluble in water. Very sparingly soluble in concentrated aqueous solutions of the ammoniacal salts. Its solutions are decomposed on ebullition.
$C_{54} H_{42} (N H_4) N O_{10} + Aq$

Hyocholate of Baryta. Slightly soluble in cold, tolerably soluble in hot water. Very soluble in alcohol.
$C_{54} H_{42} Ba N O_{10} + Aq$

Hyocholate of Lead. Slightly soluble in water. Readily soluble in spirit, from which it is precipitated by ether.

Hyocholate of Lime. Sparingly soluble in water. Very soluble in alcohol.
$C_{54} H_{42} Ca N O_{10} + Aq$

Hyocholate of Magnesia. Ppt.

Hyocholate of Potash. Soluble in water, and in absolute alcohol; less soluble in ether. [Insoluble in a solution of sulphate of potash?]
$C_{54} H_{42} K N O_{10} + Aq$

Hyocholate of Silver. Very sparingly soluble in water. Tolerably easily soluble in alcohol.
$C_{54} H_{42} Ag N O_{10}$

Hyocholate of Soda. Permanent. Easily soluble in water and in absolute alcohol. Insoluble in ether. [Insoluble in a solution of sulphate of soda?] (Strecker, *Ann. Ch. et Phys.*, (3.) **22.** 42.) It is precipitated from the aqueous solution on the addition of soda salts.
$C_{54} H_{42} Na N O_{10} + Aq$

Hyodyslysin. Insoluble in water. Sparingly soluble in boiling alcohol. Tolerably soluble in ether. Insoluble in aqueous solutions of caustic potash or ammonia.
$C_{50} H_{36} O_6$

Hyoscyamin (from *Hyoscyamus niger*, *etc.*). Permanent. Tolerably soluble in water.

Soluble in 500 pts. of cold water; the saturated solution containing 0.2% of it. Readily soluble in alcohol, and ether. Soluble in olive-oil. It is easily decomposed when in solution. Decomposed by warm mineral acids. Its salts are soluble in water, and alcohol.

Hyper. See *per*, as prefix, under the generic name of the substance sought for.

HyperIodic Acid. *Vid.* PerIodic Acid.

HyperOxyMuriatic Acid. *Vid.* Chloric Acid.

HyperSpiroilic Acid. *Vid.* Salicylic Acid.

HypoAntimonious Acid. *Vid. ter*Oxide of Antimony.

HypoAntimonite of Ammonia. Sparingly soluble in water. (Berzelius.)

HypoAntimonite of Potash. Sparingly soluble in water. Somewhat soluble in a boiling solution of caustic potash. (Berzelius.) Soluble, without decomposition, in 425 pts. of boiling water. (Brandes.) More soluble in dilute than in a strong solution of caustic potash.

HypoAntimonite of Soda. Water dissolves out most of the soda.

HypoBenzoylous Acid. Insoluble in water. Readily soluble in alcohol, and ether. (Lœwig & Weidmann.)
$C_{14} H_6 O_{2\frac{1}{2}}$ (?)

HypoBenzoylite of Baryta. Ppt.

HypoBenzoylite *of sesquioxide* **of Iron** Ppt.

HypoBenzoylite of Lead. Ppt.
$C_{14} H_5 Pb O_{2\frac{1}{2}}$

HypoBenzoylite of Lime. Ppt.

HypoBenzoylite of Mercury. Ppt.

HypoBenzoylite of Potash.

HypoBenzoylite of Silver. Ppt.

HypoBromous Acid.

HypoBromite of Baryta.

HypoBromite of Lime.

HypoBromite of Magnesia. Known only in solution.

HypoBromite of Potash.

HypoBromite of Silver.

HypoBromite of Soda.

HypoBromite of Strontia.

HypoChloric Acid. 1 vol. of water absorbs 20 vols. of the gas at 4° [by error "40°" in Otto's *Lehrbuch*], at a lower temperature the water freezes. When water at 0° is poured upon liquid hypochloric acid, a solid hydrate is formed. (Millon, *Ann. Ch. et Phys.*, (3.) **7.** 308.) Water absorbs more than 7 times its volume of the gas. (Stadion.) The aqueous solution remains undecomposed in the dark, but decomposes in a few hours when exposed to direct sunlight, and in the course of a few months by exposure to diffused daylight. (Stadion; Millon, *loc. cit.*, p. 331.)
(*Chloric oxide. Oxide of Chlorine. perOxide of Chlorine.*)
$Cl O_4$

HypoChlorate of Ammonia. Soluble in water. (Soubeiran, *Ann. Ch. et Phys.*, **48.** 140.)

HypoChlorate of Potash. Deliquesces in moist air.

HypoChlorous Acid.
$Cl O$

α = liquid. Slowly soluble in water. (Pelouze, *Ann. Ch. et Phys.*, (3.) **7.** 180.)

β = gas. 1 volume of water at 0° dissolves at least 200 vols. of the gas. Or, 100 pts. of water dissolve 77.364 pts. of it, i. e. more than $\frac{3}{4}$ of its weight. The aqueous solution is decomposed by acids and alkalies, and by many other substances. (Pelouze, *Ann. Ch. et Phys.*, (3.) **7.** pp. 183, 184.) Water absorbs it very quickly, probably taking up more than 100 volumes. (Balard.) Balard prepared the gas by adding dry nitrate of lime to the aqueous solution, but according to Gay-Lussac (*Ann. Ch. et Phys.*, (3.) **5.** 278) this process yields an impure product. Very soluble in water, the statement of Balard that 1 vol. of water can dissolve more than 100 vols. of it being probably

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correct. Although when in aqueous solution it is more stable than when in the gaseous state, the solution, nevertheless, gradually undergoes decomposition. This decomposition is much more rapid in sunlight, especially when the solution is concentrated. The concentrated aqueous solution is also decomposed when heated on a boiling water bath, but with more dilute solutions the decomposition is less marked. (Gay-Lussac, *Ann. Ch. et Phys.*, (3.) **5.** 281.)

The hypochlorites are very instable compounds, undergoing decomposition even in the cold. At the temperature of boiling water the decomposition is rapid. (Gay-Lussac, *Ibid.*, pp. 291, 299.)

HypoChlorite of Ammonia. Known only in solution.

HypoChlorite of Baryta. Known only in solution.

HypoChlorite of Copper. Known only in solution. (Balard.)

HypoChlorite of Lead. $Pb O, Cl O$ Known only in aqueous solution, and this soon undergoes decomposition. (Berzelius's *Lehrb.*)

HypoChlorite of Lime. $Ca O, Cl O$ Soluble in water, the solution undergoing decomposition on boiling.

HypoChlorite of Magnesia. Known only in solution.

HypoChlorite of Potash. $K O, Cl O$ Known only in solution.

HypoChlorite of Silver.

HypoChlorite of Soda. Soluble in water.

HypoChlorite of Zinc. Known only in solution.

HypoChloroSulphuric Compound of Millon. $S_2 O_3 Cl_2$ *Vid.* OxyChloride of Sulphur.

Hypocyanic Acid. *Vid.* Cyamelid.

Hypogeic Acid. $C_{32} H_{30} O_4 = C_{32} H_{29} O_3, H O$ Insoluble in water. Readily soluble in alcohol, and ether. (Gœssmann & Scheven, *Ann. Ch. u. Pharm.*, **94.** 232.)

Hypogeate of Baryta.

I.) $C_{32} H_{29} Ba O_4$ Soluble in hot, very sparingly soluble in cold alcohol.

II.) *basic.* Insoluble in hot alcohol. (G. & S., *loc. cit.*)

Hypogeate of Copper. $C_{32} H_{29} Cu O_4$ Tolerably soluble in alcohol. (G. & S., *loc. cit.*)

Hypogeate of Ethyl. $C_{32} H_{29} (C_4 H_5) O_4$ Insoluble in water. Sparingly soluble in alcohol. (G. & S., *loc. cit.*)

Hypogeate of Lead. Soluble in ether. (G. & S., *loc. cit.*)

HypoHydroSulphite of Ammonia. *Vid.* *hepta*Sulphide of Ammonium.

*Sub***HypoIodic Acid**(?)(of Millon). $I_5 O_{19}$ Permanent. Slowly decomposed by cold water; otherwise its comportment with solvents resembles that of hypoiodic acid, *q. v.* (Millon, *Ann. Ch. et. Phys.*, (3.) **12.** 359.)

HypoIodic Acid. $I O_4$ Permanent. Insoluble in cold, rapidly decomposed by boiling water. Insoluble in alcohol. Insoluble in cold, soluble, with combination, in warm concentrated sulphuric acid; the resulting compound ($I O_4, 2 S O_3, H O$) separates out as the solution cools. Decomposed by solutions of the caustic alkalies. (Millon, *Ann. Ch. et Phys.*, (3.) **12.** 356.)

HypoNitric Acid. $N O_4$ (Regarded by most as a mixture of Nitric and Nitrous acids.) Decomposed by much water; when treated with a smaller quantity of water some hyponitric acid remains undecomposed. Soluble in concentrated nitric acid.

HypoNitrate of Lead.

I.) *di.* $2 Pb O, N O_4 + Aq$ Soluble in 85 pts. of cold water (Bromeis); in 80 pts. of water at 25°, and in 10.6 pts. of boiling water. (Chevreul.) Soluble in cold strong acetic acid.

II.) *tetra.* $4 Pb O, N O_4 + 2 Aq$ Soluble in 1250 pts. of cold, and in 34 pts. of boiling water. (Peligot.)

HypoNitroMeconic Acid. *Vid.* Meconin-HypoNitric Acid.

HypoNitrous Acid. *Vid.* Nitrous Acid.

HypoPhosphorous Acid(hydrated). $P O + 3 H O$ Very soluble in water. Soluble in alcohol.

Most of the salts of hypophosphorous acid are permanent when dry (H. Rose), those of the alkalies are very deliquescent. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **7.** 37.) They are all soluble in water, and several are soluble in alcohol also. (H. Rose.)

HypoPhosphite of Alumina. $2 Al_2 O_3, 3 H O, 3 P O$ Permanent. Soluble in water. (H. Rose.)

HypoPhosphite of Ammonia. $N H_4 O, 2 H O, P O$ Deliquescent. Very soluble in water and in absolute alcohol. (Dulong.) Less deliquescent than the potash salt. (Wurtz, *Ann. Ch. et Phys.*, (3.) **16.** 193.)

HypoPhosphite of Baryta. $Ba O, 2 H O, P O + Aq$ Permanent. Soluble in water. Insoluble in alcohol. (H. Rose.) Soluble in 3.5 pts. of cold, and in 3 pts. of boiling water. Insoluble in alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **7.** 40.)

HypoPhosphite of Cadmium. $Cd O, 2 H O, P O$ Very soluble in water. (H. Rose.)

HypoPhosphite of Cadmium & of Lime.

HypoPhosphite of Chromium. $Cr_2 O_3, 3 H O, 2 P O + 4 Aq$ Soluble in water. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **16.** 196.)

HypoPhosphite of Cobalt. $Co O, 2 H O, P O + 6 Aq$ Effloresces in dry air. Very easily soluble in water. ·(H. Rose.)

HypoPhosphite of Cobalt & of Lime. $2 (Ca O, 2 H O, P O) ; Co O, 2 H O, P O + 2 Aq$ Deliquescent. Soluble in water. (H. Rose.)

HypoPhosphite of Copper. $Cu O, 2 H O, P O$ Soluble in water; the solution is readily decomposed. (A. Wurtz, *loc. cit.*, 199.)

HypoPhosphite of Glucina. $Gl_2 O_3, P O$ Soluble in water. (H. Rose.)

HypoPhosphite *of protoxide* **of Iron.** $Fe O, 2 H O, P O + 6 Aq$ Soluble in water.

HypoPhosphite *of sesquioxide* **of Iron.** $2 Fe_2 O_3, 3 H O, 3 P O$ When gelatinous it is somewhat, though difficultly, soluble in water. When boiled with water it is decomposed to the soluble salt of the protoxide, and to an insoluble basic salt of the sesquioxide. Sparingly soluble in hypophosphorous acid.

Freely soluble in chlorhydric, and hypophosphorous acids. (Parrish's *Pharm.*, p. 501.)

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HypoPhosphite *of sesquioxide* **of Iron & of Lime.** Soluble in water. (H. Rose.)

HypoPhosphite of Lead.

I.) $PbO, 2HO, PO$ Difficultly soluble in cold, easily soluble in hot water. Insoluble in alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) 7. 43.)

II.) *basic*(of H. Rose) was *tri*Phosphite of Lead, *q. v.* (A. Wurtz, *loc. cit.*, p. 44.)

HypoPhosphite of Lime. $CaO, 2HO, PO$ Permanent. Soluble in 6 pts. of cold water; not much more soluble in hot water. (H. Rose; Wurtz, *Ann. Ch. et Phys.*, (3.) 7. 38.) Insoluble in alcohol of 0.835 sp. gr., and but slightly soluble in dilute alcohol.

HypoPhosphite of Magnesia. $MgO, 2HO, PO + 6Aq$ Efflorescent. Easily soluble in water. (H. Rose.)

HypoPhosphite of Manganese. $MnO, 2HO, PO + Aq$ Permanent. Very soluble in water. (H. Rose.)

HypoPhosphite of Nickel. $NiO, 2HO, PO + 6Aq$ Efflorescent. Easily soluble in water. (H. Rose.)

HypoPhosphite of Potash. $KO, 2HO, PO$ More deliquescent than chloride of calcium. Very soluble in water, and alcohol. (Dulong.) Abundantly soluble in alcohol. (Gmelin.) Very deliquescent. Very soluble in water and in weak alcohol; less soluble in absolute alcohol. Insoluble in ether. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) 16. 192.)

The aqueous solution gradually absorbs oxygen when exposed to the air, phosphorous acid being formed. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) 7. 37.)

HypoPhosphite of Quinine. Soluble in 60 pts. of water at 15.5°. Very soluble in hot water. (Lawrence Smith, *Parrish's Pharm.*, p. 502.)

HypoPhosphite of Soda. $NaO, 2HO, PO$ Very deliquescent, though less so than the potash-salt. Very soluble in water. Very readily soluble in absolute alcohol.

The aqueous solution gradually absorbs oxygen when exposed to the air, phosphorous acid being formed. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) 7. 37.)

HypoPhosphite of Strontia. $SrO, 2HO, PO$ Very soluble in water. (Dulong.) Permanent. Very soluble in water. Insoluble in alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) 16. 194.)

HypoPhosphite of Sulphide of Mercury. HgS, PS *Vid.* HypoSulphoPhosphite of Mercury.

HypoPhosphite of Zinc. $ZnO, 2HO, PO + Aq$ Very easily soluble in water.

It occurs as octahedrons, which are very efflorescent, and in rhombohedrons, which are permanent. Soluble in water. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) 16. 195.)

HypoPicroToxic Acid(from the husks of $C_{22}H_{13}O_6$ Cocculus-grains). Insoluble in water, even when this is boiling. Soluble in alcohol. Insoluble in ether. Readily soluble in alkaline solutions. (Pelletier & Courbe.)

HypoSulphAmylic Acid. *Vid.* AmylSulphurous Acid.

HypoSulphArsenious Acid. AsS_3 *Vid.* *bi*Sulphide of Arsenic.

HypoSulphArsenite of Ammonium. Difficultly soluble in water.

HypoSulphArsenite of Barium. Insoluble in water. (Berzelius.)

HypoSulphArsenite of Calcium. CaS, AsS_3 Insoluble in water. (Berzelius.)

HypoSulphArsenite of Cerium. Insoluble in water.

HypoSulphArsenite of Magnesium.

HypoSulphArsenite of Manganese. Ppt.

HypoSulphArsenite of Potassium.

I.) *mono.* KS, AsS_3 Partially soluble in water which contains no sulpharseniate of potassium, a basic salt ($3KS, AsS_3$?) being dissolved out.

II.) *di.* $2KS, AsS_3$ Completely insoluble in water. Soluble in an aqueous solution of caustic potash. (Berzelius, *Lehrb.*, 3. 201.)

HypoSulphArsenite of Sodium.

I.) *mono.* }
II.) *di.* } Precisely similar to the corresponding compounds of potassium. (Berzelius.)
III.) *tri.* }

HypoSulphArsenite of Strontium.

HypoSulphArsenite of Zinc.

HypoSulphArsenite of Zirconium. $Zr_2S_3, 3AsS_3$ Insoluble in water. (Berzelius.)

HypoSulphuric Acid.

monosulfuré. *Vid. tri*Thionic Acid.
bisulfuré. *Vid. tetra*Thionic Acid.
trisulfuré. *Vid. penta*Thionic Acid.

HypoSulphuric Acid. (*DiThionic Acid.*) $S_2O_5 + xAq$ Soluble in water. The aqueous solution may be concentrated until it is of 1.347 sp. gr., but decomposes if it be further evaporated. The dilute aqueous solution is also decomposed by boiling. (Heeren, *Pogg. Ann.*, 1826, 7. 66.) All the normal salts of hyposulphuric acid are soluble in water (*Ibid.*, p. 68); but insoluble, or only sparingly soluble in alcohol. (Gmelin.) Like the solution of the acid, solutions of several of the hyposulphates are decomposed when boiled. (Heeren, *Ibid.*, p. 66.)

HypoSulphate of Alumina. $Al_2O_3, 3S_2O_5$ Soluble in water, but undergoes decomposition when evaporated. (Heeren, *Pogg. Ann.*, 1826, 7. 180.)

HypoSulphate of Ammonia. $NH_4O, S_2O_5 + Aq$ Permanent. Soluble in 0.79 pt. of water at 16°, with considerable reduction of temperature. Insoluble in absolute alcohol. The aqueous solution is not decomposed by boiling. (Heeren, *Pogg. Ann.*, 1826, 7. 171.)

HypoSulphate of Argent*bi*amin. (*Ammonio HypoSulphate of Silver.*) $N_2\left\{H_6 . AgO, S_2O_5 + Aq\right.$ Soluble in water. (Rammelsberg.)

HypoSulphate of Baryta.

I.) $BaO, S_2O_5 + 2Aq$ Permanent. Soluble in 7.17 pts. of water at 8.14° (Gay-Lussac); in 4.04 pts. at 18°, and in 1.1 pts. of boiling-water. Insoluble in alcohol. (Heeren, *Pogg. Ann.*, 1826, 7. 172.)

II.) $BaO, S_2O_5 + 4Aq$ Effloresces, losing half its water of crystallization. (Heeren, *Ibid.*, p. 177.)

HypoSulphate of Cadmium. CdO, S_2O_5 Quickly deliquesces in moist air. Easily soluble in water. (Heeren, *Ibid.*, p. 183.)

HypoSulphate of Cadmium*bi*amin. Decom-

(*Ammonio Hypo Sulphate of Cadmium.*) $N_2 \{ H_6 . Cd\ O, S_2 O_5$ posed by alcohol. Soluble in ammonia-water, but the solution is decomposed when heated.

HypoSulphate of Cerium. Permanent. $Ce\ O, S_2 O_5$ Soluble in water. (Heeren, *Pogg. Ann.*, 1826, **7.** 181.)

HypoSulphate *of sesquioxide* **of Chromium.** $Cr_2 O_3, 3\ S_2 O_5$ Soluble in water. (Berlin.)

HypoSulphate of Cinchonin. Almost as difficultly soluble as the sulphate in cold water; more soluble in hot water. (Heeren, *Pogg. Ann.*, 1826, **7.** 193.)

HypoSulphate of Cobalt. Permanent. $Co\ O, S_2 O_5 + 6\ Aq$ Very easily soluble in water. (Heeren, *Pogg. Ann.*, 1826, **7.** 190.)

HypoSulphate of Copper.

I.) *mono.* Slightly efflorescent in dry air. $Cu\ O, S_2 O_5 + 4\ Aq$ Easily soluble in water. Insoluble in alcohol. (Heeren, *Pogg. Ann.*, **7.** 187.)

II.) *tetra.* Very difficultly soluble in water. $4\ Cu\ O, S_2 O_5 + 4\ Aq$ (Heeren, *Pogg. Ann.*, **7.** 188.)

HypoSulphate of Cupr(*ic*)*bi***amin.** (*Ammonio Hypo Sulphate of Copper.*) $N_2 \{ H_6 . Cu\ O, S_2 O_5$ Permanent. Rather difficultly soluble in cold water. (Heeren, *Pogg. Ann.*, 1826, **7.** 189.)

HypoSulphate *of protoxide* **of Iron.** $Fe\ O, S_2 O_5 + 5\ Aq$ Exceedingly easily soluble in water; the solution being decomposed by boiling. Insoluble in alcohol. (Heeren, *Pogg. Ann.*, 1826, **7.** 181.)

HypoSulphate *of sesquioxide* **of Iron.**

I.) *normal.* Soluble in water. $Fe_2 O_3, 3\ S_2 O_5$ (Berzelius, *Lehrb.*)

II.) *basic.* Insoluble in water or alcohol. $3\ Fe_2 O_3, S_2 O_5 + 20\ Aq$ Easily soluble in chlorhydric acid. (Heeren, *Pogg. Ann.*, 1826, **7.** 182.)

HypoSulphate of Lead.

I.) *mono.* Permanent. Very easily soluble in $Pb\ O, S_2 O_5 + 4\ Aq$ water. (Heeren, *Pogg. Ann.*, **7.** 183.)

II.) *di.* Soluble in water; much more so than $2\ Pb\ O, S_2 O_5 + 2\ Aq$ No. III. (Heeren, *Ibid.*, p. 186.)

III.) *deca.* Somewhat soluble in water. $10\ Pb\ O, S_2 O_5 + 25\ Aq$ (Heeren, *Ibid.*, p. 186.)

HypoSulphate of Lime. Permanent. $Ca\ O, S_2 O_5 + 4\ Aq$ Soluble in 2.46 pts. of water at 19°, and in 0.8 pt. of boiling water. Insoluble in alcohol, which only removes some of its water of crystallization. (Heeren, *Pogg. Ann.* **7.** 179.)

HypoSulphate of Lithia. Somewhat hygroscopic. $Li\ O, S_2 O_5 + 2\ Aq$ Easily soluble in water. Insoluble in alcohol. (Rammelsberg.)

HypoSulphate of Magnesia. Permanent. $Mg\ O, S_2 O_5 + 6\ Aq$ Soluble in 0.85 pt. of water at 13°; the solution is not decomposed by boiling. (Heeren, *Pogg. Ann.*, 1826, **7.** 179.)

HypoSulphate of Manganese. Deliquescent. $Mn\ O, S_2 O_5$ Easily soluble in water. (Welter & Gay-Lussac.)

HypoSulphate *of dinoxide* **of Mercury.** $Hg_2 O, S_2 O_5$ Sparingly soluble in cold, decomposed by boiling water. Easily soluble in nitric acid. (Rammelsberg.)

HypoSulphate *of protoxide* **of Mercury.**

I.) *basic.* Easily soluble in chlorhydric acid. $2 (Hg\ O, S_2 O_5) ; 3\ Hg\ O$ (Rammelsberg.)

HypoSulphate of Nickel. Soluble in $Ni\ O, S_2 O_5 + 6\ Aq$ water. (Rammelsberg.)

HypoSulphate of Nickel*ter***amin.** (*Ammonio Hypo Sulphate of Nickel.*) $N_3 \{ H_9 . Ni\ O, S_2 O_5$ Decomposed by water. Soluble in warm, less soluble in cold ammonia-water. (Rammelsberg.)

HypoSulphate of Potash. Permanent. $K\ O, S_2 O_5$ Soluble in 16.5 pts. of water at 16°, and in 1.58 pts. of boiling water.* (Heeren, *Pogg. Ann.*, 1826, **7.** 72.) Insoluble in alcohol. (Heeren, *Ibid.*) Soluble in 2.65 pts. of water at 16°. Soluble in alcohol. (Dumas, *Tr.*, **6.** 219.)

HypoSulphate of Quinine. Almost as difficultly soluble as the sulphate in cold water; more readily soluble in hot water. (Heeren, *Pogg. Ann.*, 1826, **7.** 193.)

HypoSulphate of Silver. Permanent. $Ag\ O, S_2 O_5 + 2\ Aq$ Soluble in 2 pts. of water at 16°. (Heeren, *Pogg. Ann.*, **7.** 191.)

HypoSulphate of Soda. Permanent. $Na\ O, S_2 O_5 + 2\ Aq$ Soluble in 2.1 pts. of water at 16°, and in 1.1 pts. of boiling water. Insoluble in alcohol. When the hot aqueous solution is cooled it is very liable to form a supersaturated solution. (Heeren, *Pogg. Ann.*, 1826, **7.** pp. 76, 77.)

HypoSulphate of Strontia. Permanent. $Sr\ O, S_2 O_5 + 4\ Aq$ Soluble in 4.5 pts. of water at 16°, and in 1.5 pts. of boiling water. Insoluble in alcohol. (Heeren, *Pogg. Ann.*, **7.** 177.)

HypoSulphate *of protoxide* **of Tin.** Known only in solution. (Bouquet.)

HypoSulphate of Yttria. Permanent. $Y\ O, S_2 O_5$ Soluble in water. (Berlin.)

HypoSulphate of Zinc. Permanent. Very $Zn\ O, S_2 O_5 + 6\ Aq$ soluble in water, the solution undergoing decomposition when boiled. (Heeren, *Pogg. Ann.*, **7.** 183.)

HypoSulphate of Zinc*bi***amin.** (*Ammonio Hypo Sulphite of Zinc.*) $N_2 \{ H_6 . Zn\ O, S_2 O_5$ Decomposed by water. Soluble in warm, less soluble in cold ammonia-water. (Rammelsberg.)

HypoSulphEthylic Acid. *Vid.* EthylSulphurous Acid.

HypoSulphIndigotic Acid. Hygroscopic. Readily soluble in water. Its alkaline salts are soluble in alcohol of 0.84 sp. gr.

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* As with the other hyposulphates, this solubility was determined by placing a known weight of the salt in a tared flask with narrow throat, and dissolved in water; the solution obtained was then boiled down until crystals began to separate, when the whole was allowed to cool. On now weighing the flask and contents, the amount of water necessary to dissolve the salt taken was obtained. The solution being then left to itself in a cool place for about twelve hours, a portion of it was filtered off, weighed, and evaporated to dryness, and from the weight of the residue the solubility of the salt for the lower temperature determined. (Heeren, *loc. cit.*, p. 72, *note.*)

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HypoSulphIndigotate of Alumina. Readily soluble in water.

HypoSulphIndigotate of Ammonia. Soluble in water, and alcohol.

HypoSulphIndigotate of Baryta. Readily soluble in pure water.

HypoSulphIndigotate of Lead.

I.) Slowly, but completely soluble in water. Sparingly soluble in alcohol. (Berzelius.)

II.) *basic.* Ppt.

HypoSulphIndigotate of Lime.

I.) *normal.* Readily soluble in water, and alcohol.

II.) *acid.*

HypoSulphIndigotate of Magnesia. Permanent Readily soluble in water, and alcohol. It is not precipitated from the aqueous solution by an excess of solution of a magnesia salt.

HypoSulphIndigotate of Potash. } Readily soluble in water, from which they are precipitated on the addition of a very small quantity of sulphuric acid, and by solutions of various salts. Soluble in alcohol of 0.84 sp. gr.
HypoSulphIndigotate of Soda. }

HypoSulphurous Acid. Not known in the free state. All the alkaline hyposulphites are soluble in water, the baryta salt, however, but slightly. They are all insoluble, or but sparingly soluble, in alcohol.
(*Sulphuretted Sulphurous Acid. Dithionous Acid. Oxide of Sulphur.*)
$S_2 O_2$

The hyposulphites, with one or two exceptions, are easily soluble in water. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 10.)

HypoSulphite of Ammonia.

I.) $N H_4 O, S_2 O_2$ Exceedingly easily soluble in water. Insoluble, or very sparingly soluble, in alcohol. (Arppe, *Ann. Ch. u. Pharm.*, **96.** 114.)

II.) $3 (N H_4 O, S_2 O_2) + Aq$ Deliquescent. Soluble in water. (Rammelsberg.)

HypoSulphite of Ammonia & of Lead.
$2 (N H_4 O, S_2 O_2); Pb O, S_2 O_2 + 3 Aq$ Easily soluble in cold water; but after a while a portion of the lead salt is deposited from the solution. (Rammelsberg.)

Hyposulphite of Ammonia & of Magnesia.
$N H_4 O, S_2 O_2; Mg O, S_2 O_2 + 6 Aq$ Very deliquescent. Soluble in water. (Kessler.)

HypoSulphite of Ammonia & of Mercury.
$4 (N H_4 O, S_2 O_2); Hg O, S_2 O_2 + 2 Aq$ Soluble in cold, decomposed by boiling water. (Rammelsberg.)

HypoSulphite of Ammonia & of Silver.

I.) $N H_4 O, S_2 O_2; Ag O, S_2 O_2$ (?) Extremely insoluble in water. Readily and abundantly soluble in ammonia-water, from which it is reprecipitated unchanged on the addition of an acid. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 399.)

II.) $2 (N H_4 O, S_2 O_2); Ag O, S_2 O_2$ Very readily soluble in water; somewhat soluble in alcohol, although precipitated thereby from the saturated aqueous solution. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 398.)

HypoSulphite of Baryta. Very sparingly
$Ba O, S_2 O_2 + Aq$ soluble in water; but soluble in water containing an excess of acid. (Dumas, *Tr.*) Less soluble in alcohol than in water. (Rammelsberg.) Far from being insoluble in water. Insoluble, or very sparingly soluble, in dilute alcohol. (Fordos & Gélis, *Ann. Ch. et Phys.*, (3.) **6.** 489.) Slightly, but perceptibly soluble in cold water. 1 pt. of it could not be dissolved in 2000 pts. of water. But when the solutions from which it is to be precipitated are mixed in a somewhat dilute state, as in the case of a solution containing $\frac{1}{20}$ hyposulphite of lime, some minutes elapse before any cloudiness commences. Soluble in dilute chlorhydric acid without decomposition, no sulphur being separated. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 20.) Dilute alcohol precipitates it from the aqueous solution. (Sobrero & Selmi, *Ann. Ch. et Phys.*, (3.) **28.** 211.)

HypoSulphite of Baryta & of Gold. Slightly soluble in water. Insoluble in alcohol. (Fordos & Gélis.)

HypoSulphite of Baryta & of Lead. Insoluble in water.

HypoSulphite of Baryta & of Mercury ($Hg O$).

HypoSulphite of Brucin. Soluble in 105 pts. of cold water. (How.)
$N_2 \left\{ C_{46} H_{26} O_8^{vi}, H O, S_2 O_2 + 5 Aq \right.$

HypoSulphite of Cadmium. Very easily
$Cd O, S_2 O_2$ soluble in water, and alcohol. When the solution is evaporated to a syrup, decomposition occurs. (Berzelius, *Lehrb.*)

HypoSulphite of Cinchonidin (of Pasteur). Rather difficultly soluble in water. Easily soluble in spirit. (Leers, *Ann. Ch. u. Pharm.*, **82.** 159.)

HypoSulphite of Cinchonin. Soluble in
$N_2 \left\{ C_{40} H_{24} O_{2\,vii}, H O, S_2 O_2 + Aq \right.$ 205 pts. of cold, more easily soluble in hot water. (How.) Very sparingly soluble in cold water. (Winkler.)

HypoSulphite of Cobalt. Soluble in water.
$Co O, S_2 O_2 + 6 Aq$ (Rammelsberg.)

HypoSulphite of Codein. Soluble in 18
$N \left\{ \begin{matrix} C_{36} H_{20} O_6'' \\ H \end{matrix} \right., H O, S_2 O_2 + 5 Aq$ pts. of cold water, and still more easily in hot water, and in alcohol. (How.)

HypoSulphite *of dinoxide* of Copper.

I.) $Cu_2 O, S_2 O_2$ Soluble in water. (Herschel.)

II.) $Cu_2 O, 3 S_2 O_2 + 2 Aq$ Soluble, with combination, in a warm aqueous solution of chloride of ammonium. (v. Hauer.)

HypoSulphite *of protoxide* of Copper & of Lead.

HypoSulphite *of dinoxide* of Copper & *dinoxide* of Mercury.
$5 (Cu_2 O, S_2 O_2); 3 (Hg_2 O, S_2 O_2)$ Insoluble, or very sparingly soluble in cold, decomposed by boiling water. (Rammelsberg.)

HypoSulphite *of dinoxide* of Copper & of Potash.

I.) $Cu_2 O, S_2 O_2; K O, S_2 O_2 + 2 Aq$ Difficultly soluble in water. Decomposed by boiling with water. Easily soluble in an aqueous solution of hyposulphite of potash.

II.) $Cu_2 O, S_2 O_2; 3 (K O, S_2 O_2) + 3 Aq$ More soluble in water than No. I., and the solution is not decomposed by boiling. (Rammelsberg.)

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HypoSulphite *of dinoxide* of Copper & of Soda.

I.) $Cu_2 O, S_2 O_2 ; 3 (Na O, S_2 O_2) + 2 Aq$ Insoluble in alcohol. (C. Lenz.)

II.) $3 (Cu_2 O, S_2 O_2) ; 2 (Na O, S_2 O_2) + 5 Aq$ Sparingly soluble in water. Easily soluble in an aqueous solution of hyposulphite of soda, and in ammonia-water. Insoluble in alcohol. (Lenz.)

HypoSulphite of Ethylene. *Vid.* Sulphite of Sulphide of Ethyl.

HypoSulphite *of protoxide* of Gold & of Soda. $Au O, S_2 O_2 ; 3 (Na O, S_2 O_2) + 4 Aq$ Very easily soluble in water; but the solution undergoes decomposition when heated. Alcohol precipitates it from the aqueous solution. (Fordos & Gélis.)

HypoSulphite *of teroxide* of Gold & of Soda. Soluble in water.

HypoSulphite *of protoxide* of Iron.

I.) $2 (Fe O, S_2 O_2) + 5 Aq$ Hygroscopic. Very easily soluble in water, and alcohol. (Kœne.)

II.) Insoluble even in boiling water; slowly soluble in carbonic acid water. (A. Vogel.)

HypoSulphite of Lead. Very sparingly $Pb O, S_2 O_2$ soluble, requiring not less than 3266 pts. of water to prevent its precipitation. Somewhat soluble in aqueous solutions of the hyposulphites, especially of hyposulphite of ammonia. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 24.) Easily soluble in aqueous solutions of the alkaline hyposulphites. (Rammelsberg.)

HypoSulphite of Lead & of Lime. Partially soluble, $Pb O, S_2 O_2 ; 2 (Ca O, S_2 O_2) + 4 Aq$ with decomposition, in water. Insoluble in alcohol. (Rammelsberg.)

HypoSulphite of Lead & of Potash. Water $Pb O, S_2 O_2 ; 2 (K O, S_2 O_2) + 2 Aq$ dissolves out the potash salt, leaving the lead salt undissolved. Soluble, without decomposition, in a solution of hyposulphite of potash.

HypoSulphite of Lead & of Silver (?). (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 400.)

HypoSulphite of Lead & of Soda. Sparingly $Pb O, S_2 O_2 ; 2 (Na O, S_2 O_2)$ soluble in water. Freely soluble in aqueous solutions of acetate and of hyposulphite of soda. (Lenz.) Insoluble in alcohol.

HypoSulphite of Lead & of Strontia. Soluble in water; from which it is precipitated as a syrup on the addition of alcohol. (Rammelsberg.)

HypoSulphite of Lime. Permanent. Very $Ca O, S_2 O_2 + 6 Aq$ soluble in water. Soluble in about 1 pt. of water at 2.7°, the temperature falling to — 0.5°. The aqueous solution saturated at 10° is of 1.300 sp. gr. A solution of 1.11437 sp. gr. at 15.5° contains 0.2081 of its weight of the salt. The aqueous solution undergoes decomposition when heated. Insoluble in alcohol of 0.8234 sp. gr. (Herschel, *Edin. Phil. Journ.*, **1.** 15.)

HypoSulphite of Lime & *of protoxide* of Mercury. Ppt. Slightly soluble in an aqueous solution of hyposulphite of lime. (Herschel, *Edin. Phil. Journ.*, **1.** 28.)

HypoSulphite of Lime & of Silver.

I.) $Ca O, S_2 O_2 ; Ag O, S_2 O_2$ (?) Very difficultly soluble in water. Readily and abundantly soluble in ammonia-water. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 400.)

II.) $2 (Ca O, S_2 O_2) ; Ag O, S_2 O_2$ (?) Easily soluble in water; less soluble in alcohol. After having been dried in vacuo, it is no longer completely soluble in water. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 399.)

HypoSulphite of Lithia. Readily soluble in water. (Persoz, *Chim. Moléc.*, p. 197.)

HypoSulphite of Magnesia. Permanent. $Mg O, S_2 O_2 + 6 Aq$ Very soluble in water, much more readily in hot than in cold. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 21.) Alcohol precipitates it from concentrated aqueous solutions.

HypoSulphite of Magnesia & of Potash. $Mg O, S_2 O_2 ; K O, S_2 O_2 + 6 Aq$ Deliquescent. Easily soluble in water, though less so than hyposulphite of potash. (Rammelsberg.)

HypoSulphite of Manganese. Soluble in $Mn O, S_2 O_2$ water, from which it is precipitated on the addition of strong alcohol. (Berzelius.)

HypoSulphite *of protoxide* of Mercury & of Potash. $Hg O, S_2 O_2 ; K O, S_2 O_2$ Soluble in 10 pts. of water at 15°, and in 0.5 pt. of boiling water. Alcohol precipitates it from the aqueous solution. (Kirchoff.)

HypoSulphite *of protoxide* of Mercury & of Soda. $Hg O, S_2 O_2 ; Na O, S_2 O_2$ Soluble in water. Insoluble, or but sparingly soluble in alcohol. (Rammelsberg.)

HypoSulphite *of protoxide* of Mercury & of Strontia. Similar to the compound of mercury and baryta.

HypoSulphite of Morphine. Soluble in $N \left\{ \begin{matrix} C_{34} H_{18} O_6'' \\ H \end{matrix} \right. \cdot H O, S_2 O_2 + 4 Aq$ 32 pts. of water; and in 1050 pts. of ordinary alcohol. (How.)

HypoSulphite of Nickel. Permanent. Soluble $Ni O, S_2 O_2 + 6 Aq$ in water; more readily than sulphite of nickel. (Rammelsberg.)

HypoSulphite of Nickel*bi*amin. (*Ammonio Hypo Sulphite of Nickel.*) $N_2 \left\{ H_6 \right. . Ni O, S_2 O_2 + 6 Aq$ Soluble in ammonia-water. Insoluble in alcohol. (Rammelsberg.)

HypoSulphite of Potash.

I.) $3 (K O, S_2 O_2) + Aq$ Very deliquescent. Exceedingly easily soluble in water. Insoluble in alcohol. (Rammelsberg, in *Berzelius's Lehrb.*, **3.** 121.) Very deliquescent. Readily soluble in water. (Herschel, *Edin. Phil. Journ.*, **1.** 19.) Insoluble in commercial acetate of ethyl. (Casaseca, *C. R.*, 1850, **30.** 821.)

II.) $3 (K O, S_2 O_2) + 5 Aq$ Soluble in water, with great reduction of temperature. More soluble in water than No. I.

HypoSulphite of Potash & of Silver. Sparingly soluble in water. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** pp. 27, 398.)

HypoSulphite of Quinine. Soluble in 300 $C_{40} H_{24} N_2 O_4, H O, S_2 O_2 + 2 Aq$ pts. of cold water. (How.) Very sparingly soluble in cold water. (Winkler.) Soluble in warm, less soluble in cold alcohol. (Wetherill, *Ann. Ch. u. Pharm.*, 1848, **66.** 151.)

HypoSulphite of Silver. Slightly soluble $Ag O, S_2 O_2$ in water. Soluble in aqueous solu-

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tions of the alkaline hyposulphites; from which solutions alcohol precipitates double salts. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 26.)

HypoSulphite of Silver & of Soda.

I.) $AgO, S_2O_2; NaO, S_2O_2 + 2 Aq$ Not very soluble in water. (Herschel, *Edin. Phil. Journ.*, **1.** 398.) Slightly soluble in water; the solution being decomposed by boiling. Soluble in an aqueous solution of hyposulphite of soda, and in ammonia-water. (Lenz.)

II.) $AgO, S_2O_2; 2(NaO, S_2O_2) + 2 Aq$ Permanent. Easily soluble in water; the solution being decomposed by long-continued ebullition. (Herschel.) Easily soluble in ammonia-water; also to a certain extent in alcohol, especially if this be dilute and warm. (Lenz.)

HypoSulphite of Silver & of Strontia. Nearly insoluble in water. Very slightly, if at all, soluble in an aqueous solution of hyposulphite of strontia. Easily soluble in ammonia-water. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 400.)

HypoSulphite of Soda.

a = anhydrous.

NaO, S_2O_2

Soluble in 2.01 pts. of water at 0°
" 1.44 " 20°
" 0.96 " 40°
" 0.52 " 60°

(Kremers, *Pogg. Ann.*, **99.** 50.) Insoluble in commercial acetate of ethyl. (Casaseca, *C. R.*, 1850, **30.** 821.)

b = crystallized.

$NaO, S_2O_2 + 6 Aq$ Extremely deliquescent. Readily soluble in water. When heated, it melts in its water of crystallization. Totally insoluble in alcohol of 0.8234, which precipitates it as a thick syrup from the aqueous solution. (Herschel, *Edin. Phil. Journ.*, **1.** 19.) Soluble in less than 1 pt. of water, but the aqueous solution decomposes after a time.

"$NaO, S_2O_2 + 5 Aq$" is soluble in 0.585 pt. of water at 19.5°; or, 100 pts. of water at 19.5° dissolve 171 pts. of it; or, the aqueous solution saturated at 19.5° contains 63.5% of it, or 45.8% of the anhydrous salt, and is of 1.3875 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 350.) The hydrated salt ($NaO, S_2O_2 + 6 Aq$) melts in its water of crystallization at about 48°. (Kremers, *loc. cit.*, **99.** 50.) When melted in its water of crystallization it deposits a white powder as soon as some of the water has been driven off; — if now the whole be sealed up in a tube, and exposed to a higher temperature, the powder redissolves, and if the solution thus obtained be cooled down gradually, a supersaturated solution will be formed, which may even contain so much as 1 pt. of the anhydrous salt in 0.46 pt. of water at 0°. (Kremers, *Pogg. Ann.*, **94.** 261.)

An aqueous solution of sp. gr. (at 19°)	Contains (by experiment) per cent. of $NaO, S_2O_2 + 5 Aq$.
1.0338	6.32
1.0674	12.64
1.1030	18.96
1.1396	25.28
1.2170	37.92
1.3434	56.88

From these results Schiff calculates the following table by means of the formula: $D = 1 + 0.005131\ p + 0.00001528\ p^2$; in which D = the sp. gr. of the solution and p the percentage of substance in the solution.

Sp. gr. (at 19°.)	Per cent of $NaO, S_2O_2 + 5 Aq$.	Per cent of anhyd. NaO, S_2O_2
1.0052	1	0.637
1.0105	2	1.274
1.0158	3	1.911
1.0211	4	2.584
1.0264	5	3.185
1.0317	6	3.822
1.0370	7	4.459
1.0423	8	5.096
1.0476	9	5.734
1.0529	10	6.371
1.0584	11	7.008
1.0639	12	7.645
1.0695	13	8.282
1.0751	14	8.919
1.0807	15	9.556
1.0863	16	10.193
1.0919	17	10.830
1.0975	18	11.467
1.1031	19	12.105
1.1087	20	12.742
1.1145	21	13.379
1.1204	22	14.016
1.1263	23	14.653
1.1322	24	15.290
1.1381	25	15.927
1.1440	26	16.564
1.1499	27	17.201
1.1558	28	17.838
1.1617	29	18.475
1.1676	30	19.113
1.1738	31	19.750
1.1800	32	20.387
1.1862	33	21.024
1.1924	34	21.661
1.1986	35	22.298
1.2048	36	22.935
1.2110	37	23.572
1.2172	38	24.209
1.2234	39	24.846
1.2297	40	25.484
1.2362	41	26.121
1.2427	42	26.758
1.2492	43	27.395
1.2558	44	28.032
1.2624	45	28.669
1.2690	46	29.306
1.2756	47	29.943
1.2822	48	30.580
1.2888	49	31.218
1.2954	50	31.855

(H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 188.)

HypoSulphite of Strontia. Permanent. $SrO, S_2O_2 + 6 Aq$ Soluble in 6 pts. of cold water. (Gay-Lussac); in about 4 pts. of water at 7.2°, and in 1.75 pts. of boiling water. Insoluble in alcohol, unless very dilute. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 21.) 100 pts. of water at 10° dissolve 16.6 pts. of it. (Ure's *Dict.*)

HypoSulphite of Strychnine. Soluble in $N_2\left\}\right. C_{42} H_{22} O_4{}^{VI}, HO, S_2O_2 + 8 Aq$ 114 pts. of water. (How.)

HypoSulphite *of protoxide* of Tin. Soluble SnO, S_2O_2 in water.

HypoSulphite of Zinc. Easily soluble in ZnO, S_2O_2 water, and alcohol.

Soluble in water, and alcohol. The solutions are very easily decomposed. (Fordos & Gélis, *Ann. Ch. et Phys.*, (3.) **8.** 350.)

HypoSulphite of Zincammonium. Soluble $N_2\left\{\begin{matrix}H_3\\Zn\end{matrix}\right. O, S_2O_2$ in ammonia-water, from which it is precipitated on the addition of alcohol. Decomposed by water. (Rammelsberg.)

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HypoSulphoCœrulic Acid. *Vid.* Hypo-SulphIndigotic Acid.

HypoSulphoGlutic Acid. With a small quantity of water it forms a viscid, glutinous paste. Readily soluble in water, from which it is precipitated as a paste on the addition of sulphuric or chlorhydric acid. Soluble in nitric acid, and is decomposed on boiling therewith. The salts of hyposulphoglutic acid are slightly soluble in cold, more abundantly soluble in warm water. Soluble in alcohol; less soluble in ether. (Berzelius.)

HypoSulphoGlutate of Ammonia. Soluble in water, from which it is precipitated for the most part on the addition of ammonia-water, or carbonate of ammonia. (Berzelius.)

HypoSulphoGlutate of Baryta. Soluble in warm water, from which it is precipitated on cooling. Also soluble in warm alcohol. (Berzelius.)

HypoSulphoGlutate of Lead. Soluble in warm water, from which it is precipitated on cooling. Soluble in warm alcohol. (Berzelius.)

HypoSulphoGlutate of Potash. Soluble in water, from which it is precipitated for the most part on the addition of caustic potash. (Berzelius.)

HypoSulphoGlutate of Soda. Soluble in water, from which it is precipitated for the most part on the addition of caustic soda. (Berzelius.)

HypoSulphoMethylic Acid. *Vid.* Methyl-Sulphurous Acid.

HypoSulphoPhosphoric Acid. *Vid. proto-*Sulphide of Phosphorus.

HypoSulphoPhosphorous Acid. *Vid. di-*Sulphide of Phosphorus.

HypoSulphoPhosphite *of protosulphide* **of Copper.** Insoluble in dilute chlorhydric acid. Slightly soluble in hot concentrated chlorhydric acid, from which it is entirely precipitated on the addition of water. (Berzelius.)

CuS, PS

HypoSulphoPhosphite *of disulphide* **of Copper.**

I.) *mono.* Ppt.

Cu_2S, PS

II.) *di.*

$2\,Cu_2S, PS$

HypoSulphoPhosphite *of protosulphide* **of Iron.**

HypoSulphoPhosphite of Manganese. Insoluble in water. Decomposed by chlorhydric acid. (Berzelius, *Lehrb.*)

MnS, PS

HypoSulphoPhosphite *of protosulphide* **of Mercury.**

I.) HgS, PS

II.) $2\,HgS, PS$

HypoSulphoPhosphite of Silver.

I.) *normal.* Only very slightly acted upon by warm nitric acid of 1.22 sp. gr. (Berzelius, *Lehrb.*)

AgS, PS

II.) *basic.* Decomposed by nitric acid, which dissolves out half of the sulphide of silver. (*Ibid.*)

$2\,AgS, PS$

HypoSulphoPhosphite of Zinc with SulphoPhosphite of Zinc. Decomposed by chlorhydric acid.

$ZnS, PS;\ ZnS, P_2S$

HypoVanadiate of Ammonia.

HypoVanadiate of Potash. Insoluble in aqueous solutions of potash, ammonia, or carbonate of ammonia, but soluble in solutions of carbonate of potash and carbonate of soda. (Berzelius.)

Hypoxanthin. Soluble in 1090 pts. of cold, and in 180 pts. of boiling water. Sparingly soluble in boiling alcohol. Soluble in concentrated sulphuric acid, from which it is not precipitated by water. Almost insoluble in cold, and only sparingly soluble in warm chlorhydric acid. Easily soluble in solutions of caustic potash or ammonia. Insoluble in solutions of the alkaline carbonates. Soluble, with decomposition, in warm nitric acid. (Scherer.)

$C_{10}H_4N_4O_2$

I.

Ichthidin. Soluble in water. (Fremy.)

Ichthin. Insoluble in water, alcohol, or ether. Soluble in chlorhydric acid. Easily soluble in dilute acetic and phosphoric acids, and in the other strong acids. Insoluble in ammonia-water. Slowly soluble in solutions of potash and soda. (Fremy, *Ann. Ch. et Phys.*, (3.) **50.** 150.)

Ichthulin. Insoluble in water, alcohol, or ether. Soluble in acetic, phosphoric, and chlorhydric acids. (Fremy.)

Ichthyocoll. Soluble in cold concentrated chlorhydric acid. Slowly and partially soluble in solutions of the caustic alkalies. (Caventou, *Ann. Ch. et Phys.*, (3.) **8.** 329.)

Idrialin. Insoluble in boiling water. Scarcely at all soluble in boiling alcohol, or ether. Its best solvent is boiling oil of turpentine. Soluble, with combination, in concentrated sulphuric acid. (Dumas.)

$C_{84}H_{28}O_2$

Idryl.

$n\,C_6H_2$

α) Very soluble in alcohol, ether, oil of turpentine, and acetic acid.

β) Much less soluble than α. (Bœdeker.)

Igasuric Acid. Said to be identical with Lactic Acid. Very soluble in water, and alcohol. Most of its salts are soluble in water, and alcohol.

Igasurate of Ammonia. Very sparingly soluble in water.

Igasurate of Baryta. Readily soluble in water.

Igasurate of Copper. Sparingly soluble in water.

Igasurate of Lead. Insoluble in water.

Igasurate of Lime. Soluble in water.

Igasurate of Magnesia. Soluble in boiling, less soluble in cold water.

Igasurate of Zinc. Soluble in water. (Pelletier & Caventou.)

Igasurin (from *Nux vomica.*) Rapidly soluble in 200 (100 ?) pts. of boiling water, separating out again quickly as the solution cools; being but sparingly soluble in water at 20°. Igasurin is much more soluble in water than either brucin or strychnine, the last being the least soluble of the three. Readily soluble in alcohol [Soluble in weak alcohol (Parrish's *Pharm.*, p. 410)], chloroform, and the fatty and essential oils. Sparingly soluble in ether. Easily soluble in dilute acids. Somewhat soluble in solutions of the alkalies, especially in a solution of potash. Most of its salts are soluble in water.

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Ilexic Acid. Easily soluble in water. Most of its salts appear to be soluble in water.

Ilexate of Baryta. Soluble in water.

Ilexate of Lime. Easily soluble in water. Insoluble in alcohol. (Moldenhauer, *Ann. Ch. u. Pharm.*, **102.** 348.)

Ilicin (from *Ilex aquifolium*). Hygroscopic. Readily soluble in water. Soluble in absolute alcohol. Insoluble in ether.

Permanent. Soluble in water, and alcohol. (Lebourdais, *Ann. Ch. et Phys.*, (3.) **24.** 62.)

b = (from *Ilex opaca*). Soluble in water, and alcohol. Freely soluble in ether. (Pancoast, in Parrish's *Pharm.*, p. 421, from *Amer. J. Pharm.*, **28.** 312.)

Ilixanthin. $C_{32}H_{22}O_{22}$ Almost entirely insoluble in cold water; tolerably easily soluble in hot water. Soluble in alcohol. Insoluble in ether. Easily soluble in concentrated chlorhydric acid. With oxide of lead it forms a compound insoluble in water, but soluble in acetic acid. (Moldenhauer, *Ann. Ch. u. Pharm.*, **102.** 348.)

Imabenzil. $C_{28}H_{11}NO_2 = N\left\{\begin{matrix}C_{28}H_9O_2\\H_2\end{matrix}\right.$ Insoluble in water. Somewhat soluble in a boiling mixture of ether and alcohol, from which it separates on cooling. Insoluble in boiling alcohol, or ether. (Laurent.)

Imasatin. $C_{32}H_{11}N_3O_6$ Insoluble in water or alcohol. Very sparingly soluble in boiling alcohol. Soluble in a solution of caustic potash. When freshly precipitated it is soluble in ammonia-water; but after having been dried, it is insoluble therein. Unacted upon by boiling chlorhydric acid. (Laurent.)

ImeChlorIsatinase. *Vid.* ChlorImesatin.

Imesatin. $C_{16}H_6N_2O_2$ Insoluble in water. Tolerably soluble in boiling alcohol. Very difficultly soluble in ether. (Laurent.) [Insoluble in ether. (Gmelin's *Handbook.*)]

Imid. *Hypothetical.*
NH

Imperatorin. *Vid.* Peucedamin.

Indelibrome. (*BiBromIsamic Acid.*) $C_{32}H_8Br_4N_2O_8$ Insoluble in water. Almost insoluble in alcohol or ether. Unacted upon by a boiling solution of caustic potash, by ammonia-water, or concentrated chlorhydric acid. (Laurent.)

Indican. $C_{52}H_{33}NO_{36}$ Deliquescent. Soluble in water, alcohol, and ether. Decomposed by strong boiling acids, with formation of indigo-blue. (Schunck, *Phil. Mag.*, (4.) **10.** 84.)

Indigo-Blue. (*Indigotin. Oxidized Indigo.*) $C_{16}H_5NO_2$ Insoluble in water, alcohol, ether, fatty or essential oils, weak acids, or alkaline solutions. Soluble, with combination, in concentrated sulphuric acid; also, in fuming sulphuric acid, with evolution of heat.

Hot alcohol dissolves small quantities of indigo-blue, but this separates out almost completely as the solution cools, unless some indigo-red be present in the solution, in which case some indigo-blue will remain dissolved in cold alcohol. (Chevreul.) Sparingly soluble in boiling oil of turpentine, from which it separates on cooling. (Crum.) Insoluble in cold, but pretty readily soluble in hot, carbolic acid; a small portion of alcohol may be mixed with this solution, but the indigo is precipitated on the addition of a large quantity of alcohol.

Soluble in creosote. (Reichenbach.) Soluble in fatty acids at temperatures exceeding 100°; on cooling these solutions it separates out. (Weston, *Brandes's Archiv.*, **36.** 371; in Gmelin's *Handbook*, **13.** 45.) Liquid anhydrous sulphuric acid does not act upon indigo-blue (Bussy); nor is it acted upon by phosphoric or by concentrated chlorhydric acids. (Dœbereiner.) Indigo-blue dissolves in cold concentrated sulphuric acid at first with a yellow color which subsequently changes to green, and finally to blue. (Hausmann, *J. de Phys.*, 1788.) While the solution is still yellow, undecomposed indigo-blue may be precipitated by adding water to the solution. It is only as the action of the sulphuric acid progresses that sulphophenic and sulphindigotic acids are gradually formed, and the solution turns blue. This solution is much more complete when effected at 100°. Indigo is more readily soluble in fuming sulphuric acid, in proportion as this contains more anhydrous SO_3; 1½ times as much of the strongest oil of vitriol is required as of the fuming acid.

Indigo-Brown. (*Resinous Indigo-Green.*) Slightly soluble in water; more readily soluble in acids. Soluble in concentrated sulphuric acid. Readily soluble in alcohol, even in the cold. It combines with acids, forming compounds which are slightly soluble in water; also with alkalies forming compounds soluble in water. Soluble in solutions of caustic and carbonated ammonia. When treated with acetic acid it forms two compounds, one of which is soluble, the other insoluble in water.

Indigo-Brown with Baryta. Difficultly soluble in water.

Indigo-Brown with Lime. Insoluble in water.

Indigogene. *Vid.* Indigo-White.

Indigo-Green. Readily soluble in water, and in absolute alcohol. (Berzelius.)

Indigo-Purple. *Vid.* SulphoPhœnicic Acid.

Indigo-Red.

I.) *properly so called.* Insoluble in water. Very readily soluble in alcohol, and ether. It is precipitated from the alcoholic solution on the addition of sulphuric acid.

Slightly soluble in alcohol; more abundantly soluble in ether. (Berzelius.) Very slightly soluble in acetic acid. (Henry.) Soluble in cold creosote. (Reichenbach.) Slightly soluble in solutions of caustic potash and ammonia. Insoluble in hot concentrated solutions of the caustic alkalies, or in dilute acids. Soluble in concentrated sulphuric acid, and the solution thus obtained is miscible with water. Insoluble in concentrated chlorhydric acid, by the action of which, however, it becomes black.

II.) *colorless or deoxidized Indigo-Red.* Insoluble in water, or in aqueous solutions of the caustic alkalies, even when these are highly concentrated and boiling. Very slightly soluble in acetic acid, the solution obtained being miscible with water. Slowly soluble in alcohol and ether. Very slowly, and but partially soluble in concentrated sulphuric acid; in this solution water produces a precipitate. Traces of it are dissolved by concentrated chlorhydric acid, and the solution obtained is miscible with water. Soluble in fuming nitric acid, with conversion to indigo-red (No. I.) and subsequent decomposition.

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Indigotic Acid. *Vid.* NitroSalicylic Acid.

Indigotate of Methylene. *Vid.* MethylNitroSalicylic Acid.

Indigotic Ether. *Vid.* EthylNitroSalicylic Acid.

Indigo-White. Entirely insoluble in water. Soluble in alcohol, and ether; the solutions being decomposed by contact with the air. Insoluble in such acids as do not decompose it, — as a rule, insoluble in dilute acids. Soluble, with decomposition, in concentrated sulphuric acid. Readily soluble in aqueous solutions of the alkalies, alkaline earths, alkaline carbonates, and carbonate of ammonia. (Berzelius, Liebig.)
(*Indigotin. Indigogene. Reduced Indigo.*)
$C_{16}H_8NO_2$

Indigo-White with **Alumina.** Ppt.

Indigo-White with **Cobalt.** Ppt.

Indigo-White with *protoxide of* **Iron.** Ppt.

Indigo-White with *sesquioxide of* **Iron.** Ppt.

Indigo-White with **Lead.** Ppt.

Indigo-White with **Lime.**
I.) *normal.* Readily soluble in water.

II.) *basic.* Almost insoluble in water. Very sparingly soluble in water. (Berzelius.)

Indigo-White with **Magnesia.** Very sparingly soluble in water.

Indigo-White with **Manganese.**
Indigo-White with **Silver.**
Indigo-White with **Tin.**
Indigo-White with **Zinc.**
} Ppts.

Indigo-Yellow. *Vid.* SulphoFlavic Acid.

Indihumin. Insoluble in boiling alcohol. Soluble in caustic alkalies. (Schunck.)

Indin. Insoluble in water. Very sparingly soluble in boiling alcohol, and ether. Soluble in concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water. (Laurent.)
$C_{32}H_{10}N_2O_4$

Indin with **Potassium.** Hygroscopic. Insoluble, or very sparingly soluble in cold, absolute alcohol.
$C_{32}H_9KN_2O_4$

Indiretin. Soluble in alcohol, and in ammonia-water. (Schunck.)

Indirubin. Soluble in alcohol. Insoluble in solutions of the caustic alkalies. (Schunck.)

Inosic Acid. Readily soluble in water. (Liebig.) Almost insoluble in alcohol. Insoluble in ether.
(*Inosinic Acid.*)
$C_{10}H_7N_2O_{11} = C_{10}H_6N_2O_{10}, HO$

Its alkaline salts are easily soluble in water; they crystallize out when alcohol is added to the concentrated aqueous solution. All the other salts are sparingly soluble in water. (Parrish's *Pharm.*, p. 381.)

Inosate of Baryta. Effloresces in dry air. Soluble in 400 pts. of water at 15°, and more readily in hot water; but is less soluble in water at 100° than at 70°; if a solution saturated at 70° be boiled, a portion of the salt will be precipitated, with partial alteration. If a quantity of the salt which would dissolve in a certain quantity of water at 60° @ 70° be heated to the boiling-point with the same quantity of water, a portion of the salt will remain undissolved, and by continued boiling will even lose its power of dissolving in water of a lower temperature. (Liebig.) Insoluble in alcohol.
$C_{10}H_6BaN_2O_{11} + 7Aq$

Inosate of Copper. Almost insoluble in water. Insoluble in acetic acid. Soluble in ammonia-water. (Liebig.)

Inosate of Potash. Readily soluble in water. Insoluble in alcohol.
$C_{10}H_6KN_2O_{11} + 7Aq$

Inosate of Soda. Very easily soluble in water. Insoluble in alcohol.

Inosate of Silver. Sparingly soluble in water; less soluble in an aqueous solution of nitrate of silver. Readily soluble in ammonia-water and in nitric acid. (Liebig.)

Inosinic Acid. *Vid.* Inosic Acid.

Inosite. Efflorescent. Soluble in 6.5 pts. of water at 24°; more soluble in hot water. Soluble in boiling dilute spirit; insoluble in cold spirit, or in ether. (Cloetta, *Ann. Ch. u. Pharm.*, **99.** 291.) Easily soluble in water, and in weak alcohol. Difficultly soluble or insoluble in absolute alcohol, or ether. After the water of crystallization has been removed by drying, the substance is less readily soluble in water, until by taking up water it regains its original properties. Soluble in cold concentrated sulphuric acid; but is partially decomposed if this solution is heated. (Vohl, *Ann. Ch. u. Pharm.*, **99.** 126.)
(*Phaseomannite.*)
$C_{12}H_{12}O_{12} + 4Aq$

Inosite with **Oxide of Lead.** Insoluble in water, or spirit. (Cloetta, *loc. cit.*)
$C_{12}H_{12}O_{12}; 5PbO$

Insolinic Acid. Almost entirely insoluble in cold, sparingly soluble in boiling-water. Insoluble in alcohol. (Persoz.) Almost insoluble in alcohol. (Hofmann.) Insoluble in ether. Soluble in cold and in boiling concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water. (Hofmann.) Insoluble in concentrated sulphuric acid, but after having been boiled with it for a few minutes it becomes soluble in water. (Persoz.)
(*Cumino Cyminic Acid.*)
$C_{18}H_8O_8 = C_{18}H_6O_6, 2HO$

Insolinate of Ammonia. Soluble in water.

Insolinate of Baryta. Insoluble, or but sparingly soluble, in cold water.
$C_{18}H_6Ba_2O_8$

Insolinate of Copper. Ppt.
$C_{18}H_6Cu_2O_8; CuO, HO$

Insolinate of Lime. Insoluble, or but sparingly soluble, in water.
$C_{18}H_6Ca_2O_8 + 6Aq$

Insolinate of Potash.
I.) *normal.* Soluble in water. Insoluble, or but sparingly soluble, in strong alcohol.
$C_{18}H_6K_2O_8$

II.) *acid.* Soluble in hot water.
$C_{18}H_7KO_8$

Insolinate of Potash & of Soda. Soluble in water, from which it is precipitated on the addition of alcohol.
$C_{18}H_6KNaO_8$

Insolinate of Silver. Ppt.
$C_{18}H_6Ag_2O_8$

Inulin. Sparingly soluble in cold, readily soluble in hot water. It forms no paste with water. Insoluble in alcohol. Decomposed by hot dilute acids. Soluble in an aqueous solution of caustic potash.
(*Dahlin. Alantin. Elecampin. Helenine. Menyanthin. Datiscin.*)
$C_{12}H_{10}O_{10}$ & $+ 8Aq$

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Soluble in 600 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) Soluble in 200 pts. of water at 10°. Abundantly soluble in water at 66°. When the aqueous solution is heated for a long time to a temperature approaching 100°, the inulin is gradually converted into fruit-sugar. (Dubrunfaut, in *Wittstein's Handw.*)

IodAcetic Acid. Soluble in water.
$C_4 H_3 I O_4 = C_4 H_2 I O_3, H O$

IodAcetate of Ammonia. Permanent. Very soluble in water.

IodAcetate of Amyl. Insoluble, or but sparingly soluble in water.

IodAcetate of Baryta. Moderately soluble
$C_4 H_2 I Ba O_4$ in water, from which it is precipitated by alcohol.

IodAcetate of Ethyl. Insoluble, or but sparingly soluble in water. Soluble in alcohol.

IodAcetate of Lead. Soluble in water.

IodAcetate of Potash. Permanent. Very soluble in water. (Perkin & Duppa.)

IodAcetyl. *Vid.* Iodide of Acetyl; and also IodEthylene.

Iodal. Insoluble in water.

IodAmyl. *Vid.* Iodide of Amyl.

IodAnilin. Very sparingly soluble in water,
$C_{12} H_6 I N = N \left\{ \begin{matrix} C_{12} H_4 I \\ H_2 \end{matrix} \right.$ though more soluble in hot than in cold. Soluble in alcohol, ether, wood-spirit, acetone, bisulphide of carbon, and the fatty and essential oils. (Hofmann, *J. Ch. Soc.*, **1.** 275.) Its salts are generally less soluble than those of anilin. (Hofmann.)

IodAnisic Acid. Almost insoluble in water.
$C_{16} H_7 I O_6 = C_{16} H_6 I O_5, H O$ Easily soluble in alcohol, and ether. (Griess.)

IodAnisate of Silver. Ppt.
$C_{16} H_6 I Ag O_6$

IodArseniate of *X*. *Vid.* Iodide of Arsenic with Iodide of *X*.

Iodic Acid.

a = anhydrous. Permanent, but deliquesces in
$I O_5$ moist air. (H. Davy.) Very soluble in pure water; less soluble in water acidulated with sulphuric or nitric acids.

Somewhat soluble in dilute alcohol, but is almost entirely precipitated from the aqueous solution by adding concentrated alcohol and allowing the mixture to stand for some time. (Sérullas, *Ann. Ch. et Phys.*, (2.) **45.** 281.) Tolerably readily soluble in alcohol of 35° B.; insoluble in absolute alcohol. (Millon, *Ann. Ch. et Phys.*, (3.) **9.** pp. 405, 406.) Soluble in ether. (Graham's *Elements.*) Soluble in concentrated sulphuric acid. (Millon.)

b = monohydrated. Soluble in all proportions
$I O_5, H O$ in water. Insoluble in absolute alcohol; very soluble in alcohol of 35° B., which dissolves nearly half its weight. (Millon, *Ann. Ch. et Phys.*, (3.) **9.** pp. 405, 406.)

c = trihydrated. Soluble in water. (Millon,
$3 I O_5, H O$ *loc. cit.*) Very sparingly soluble in alcohol. (Sérullas.) Insoluble in absolute alcohol; almost insoluble at ordinary temperatures in alcohol of 35° B.; only faint traces are dissolved by boiling alcohol. (Millon, *Ann. Ch. et Phys.*, (3.) **9.** pp. 405, 406.) Most of the metallic iodates are insoluble, or but sparingly soluble, in water. According to Dumas [*Tr.*], they are all insoluble in water, excepting the potash and soda salts. They are also all insoluble or very sparingly soluble in alcohol. (Gmelin's *Handbook.*)

Iodate of Alumina. Deliquescent. (Ber-
$Al_2 O_3, 3 I O_5$ zelius, *Lehrb.*, **3.** 479.)

Iodate of Ammonia. Soluble in 38.5 pts. of
$N H_4 O, I O_5$ water at 15°, and in 6.9 pts. at the temperature of boiling. (Rammelsberg.)

Iodate of Ammonia & of Cobalt. Decomposed by water. Insoluble in alcohol. (Rammelsberg.)

Iodate of Baryta. Permanent. Very diffi-
$Ba O, I O_5 + Aq$ cultly soluble either in hot or in cold water. Soluble in 3333 pts. of water at 18°, and in 625 pts. of boiling water. (Gay-Lussac); in 1746 pts. of water at 15°, and in 600 pts. at the boiling temperature. (Rammelsberg.) The anhydrous salt is soluble in 3018 pts. water at 13.5°, and in 681 pts. at 100°. (Kremers, *Pogg. Ann.*, **94.** 271.) Insoluble in alcohol. Readily soluble in chlorhydric acid; difficultly soluble in warm nitric acid. (Filhol.)

Iodate of Bismuth. Insoluble in water.
$Bi O_3, I O_5$ Difficultly soluble in nitric acid.

Iodate of Brucin. Soluble in water, and alcohol. (Sérullas, *Ann. Ch. et Phys.*, 1830, (2.) **45.** pp. 275, 276). On adding an excess of strong iodic acid to a concentrated aqueous solution of iodate or chlorate of brucin a very acid iodate of brucin separates out, and may be entirely precipitated by adding strong alcohol; this acid salt undergoes alteration after a time, when exposed to the air. (*Ibid.*, pp. 277, 280.)

Iodate of Cadmium. Very sparingly soluble
$Cd O, I O_5$ in water; more readily soluble in ammonia-water, and nitric acid. Soluble in an aqueous solution of acetate of cadmium.

Iodate *of sesquioxide* of Chromium. Insoluble in water. (Berlin.)

Iodate of Cinchonin. Readily soluble in
$C_{40} H_{24} N_2 O_2, H O, I O_5$ water, and alcohol. (Regnault.) Soluble in water, and alcohol. (Sérullas, *Ann. Ch. et Phys.*, 1830, (2.) **45.** pp. 274, 276.) On adding an excess of strong iodic acid to a concentrated aqueous solution of iodate or chlorate of cinchonin, a very acid iodate of cinchonin separates out, and may be entirely precipitated by adding strong alcohol; this acid salt undergoes alteration after a time when exposed to the air. (*Ibid.*, pp. 277, 280.)

Iodate of Cobalt. Soluble in 148 [140] pts.
$Co O, I O_5 + Aq$ of water at 15°, and in 90 pts. at the temperature of boiling. (Rammelsberg.) Soluble in ammonia-water, from which alcohol precipitates a basic salt.

Iodate of Codein. Very soluble in pure water; less soluble in water acidulated with iodic acid. (Pelletier.)

Iodate of Copper. Soluble in 302 pts. of
$Cu O, I O_5 + \frac{1}{2} Aq$ water at 15°, and in 154.5 pts. at the boiling temperature. Easily soluble in ammonia-water, and in chlorhydric acid, with evolution of chlorine. (Rammelsberg.) Millon describes several other iodates of copper, as follows: —

1*st modification* (*probably hydrated*). Easily changed. Tolerably soluble in water. It undergoes a change and is precipitated on heating the solution. (Millon, *loc. cit.*, p. 424.)

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2d modif. Completely insoluble in water. CuO, IO_5, HO

3d modif. Insoluble in water. $3\,CuO, IO_5, 2\,HO$

4th modif. Insoluble in water. $6\,CuO, 8\,IO_5, HO$ (Millon, *Ann. Ch. et Phys.*, (3.) **9.** pp. 424–430.)

Iodate of Cupr(*ic*)*bi*amin. $N_2\left\{H_6.Cu, I + 3\,Aq\right.$ Soluble in ammonia-water. Partially soluble in water. Insoluble in alcohol. (Rammelsberg.)

Iodate of Gold (AuO_3). Soluble in much water. (Pleischl.)

Iodate *of protoxide* of Iron. FeO, IO_5 Sparingly soluble in water. Readily soluble in an aqueous solution of protosulphate of iron; the solution undergoing decomposition when boiled. (Geiger.)

Iodate *of sesquioxide* of Iron.

I.) *normal.* Soluble in 500 pts. of cold water. $Fe_2O_3, 3\,IO_5$ On boiling the aqueous solution decomposition ensues, and a basic salt is precipitated. Readily soluble in an aqueous solution of sesquichloride of iron. (Geiger.)

II.) *bi.* Sparingly soluble in nitric acid. $Fe_2O_3, 2\,IO_5 + 8\,Aq$ (Rammelsberg.)

III.) *basic.* Soluble, with decomposition, in $3\,Fe_2O_3, 5\,IO_5 + 12\,Aq$ nitric and chlorhydric acids.

Iodate of Lead. PbO, IO_5 Very sparingly soluble in water. Difficultly soluble in nitric acid. (Rammelsberg.)

Iodate of Lime.

I.) *anhydrous.* 100 pts. of water dissolve 0.22 CaO, IO_5 pt. of it at 18°, and 0.98 pt. at 100°, i. e. 1 pt. of the salt is soluble in 454.5 pts. of water at 18°, and in 102 pts. at 100°. (Gay-Lussac, in *Dumas's Traité*, **6.** 275.) Very sparingly soluble in water. (Sérullas, *Ann. Ch. et Phys.*, 1830, (2.) **45.** 279.) Readily soluble in chlorhydric acid.

II.) *hydrated.* Efflorescent. Soluble in 253 $CaO, IO_5 + 5, \text{or } 6, Aq$ pts. of water at 15°, and in 75 pts. at the boiling temperature; it is much more readily soluble in nitric acid. (Rammelsberg.) Alcohol precipitates it from the aqueous solution. (O. Henry.)

Iodate of Lithia. LiO, IO_5 Soluble in 2 pts. of cold water; it is not much more soluble in hot water. Insoluble in spirit. (Rammelsberg.)

Iodate of Magnesia. $MgO, IO_5 + 4\,Aq$ Soluble in 9.43 pts. of water at 15°, and in 3.04 pts. at 100°. (Berzelius, *Lehrb.*, **3.** 444.) Very sparingly soluble in water. (Sérullas, *Ann. Ch. et Phys.*, 1830, (2.) **45.** pp. 279, 281, 275.) Very soluble in water. When heated to 240° @ 250° the salt passes into another modification, which is completely insoluble in water. By long-continued boiling with water, however, the insoluble modification itself undergoes change, and the salt is slowly dissolved. (Millon, *Ann. Ch. et Phys.*, (3.) **9.** 423.)

Iodate of Manganese. $MnO, IO_5 + Aq$ Soluble in 200 pts. of water. (Rammelsberg.)

Iodate *of dinoxide* of Mercury. Hg_2O, IO_5 Insoluble in water, and is not altered by boiling water. (Lefort.)

Very slightly soluble in water. Soluble in dilute chlorhydric, nitric, and iodic acids. (Pleischl.)

Iodate *of protoxide* of Mercury. HgO, IO_5 Entirely insoluble in water or alcohol. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 367.) Soluble in water. (Berzelius, *Lehrb.*, **3.** 901.) Soluble in dilute chlorhydric acid. (Rammelsberg.)

Iodate of *tetra*Methylammonium. $N(C_2H_3)_4O, IO_5$ Soluble in water. (Weltzien.)

Iodate of Nickel. $NiO, IO_5 + Aq$ Soluble in 120.3 pts. of water at 15°, and in 77.35 pts. at the boiling temperature. (Rammelsberg.)

Iodate of Nickel*bi*amin. (*Ammonio Iodate of Nickel.*) $N_2\left\{H_6.NiO, IO_5\right.$ Soluble in ammonia-water. Insoluble in alcohol. (Rammelsberg.)

Iodate of Nicotine.

I.) *acid.* Soluble in water. Nearly insoluble in alcohol. (Henry & Boutron.)

Iodate of Palladium.

Iodate *of binoxide* of Platinum. Somewhat soluble in water. (Pleischl.)

Iodate of Potash.

I.) KO, IO_5 Permanent. 1 pt. of the anhydrous salt is soluble in 13 [13.45 (T.)] pts. of water at 14°. (Gay-Lussac.)

Soluble in	19.02	pts. of water at	+ 0.5°
"	14.85	"	9.4°
"	10.97	"	22.2°
"	5.95	"	45.8°
"	3.67	"	69.2°

(Kremers, *Pogg. Ann.*, **94.** 271.)

	I.	II.	III.		
Soluble in	19.17	21.11	21.22	pts. of water at	0°
"	11.65	12.29		"	20°
"	6.88	7.76		"	40°
"	4.37	5.40		"	60°
"		4.02		"	80°
"		3.10		"	100°

The results in column I. were determined immediately after the solution had fallen to the given temperatures. Those in column II. represent another series of experiments, in which the solutions were allowed to stand for an hour at the temperatures indicated, being frequently agitated the while; like the 1st series, they were cooled down from higher temperatures. Column III. is another series of experiments, in which the solutions stood at the given temperatures during 10 hours. The saturated aqueous solution boils at 102°. (Kremers, *Pogg. Ann.*, **97.** 5.) 100 pts. of water at 14° dissolve 7.43 pts. of it. (T.) 100 pts. of water at 15.5° dissolve 7.7 pts. of it. (Ure's *Dict.*) An aqueous solution of 1.0741 sp. gr. at 19.5°, contains 9.08 pts. of KO, IO_5 for every 100 pts. of water. (Kremers, *Pogg. Ann.*, **95.** 121.) More soluble in an aqueous solution of iodide of potassium than in water. Insoluble in alcohol of 0.81 sp. gr. Soluble, without decomposition of the iodic acid, in warm sulphuric acid. (Berzelius, *Lehrb.*)

II.) *bin.* Soluble in 75 pts. of water at 15°. $KO, HO, 2\,IO_5$ Insoluble in alcohol. (Sérullas.)

III.) *ter.* Soluble in 25 pts. of water at 15°. $KO, HO, 3\,IO_5$ (Sérullas.)

IV.) *basic.* Soluble in water. (Berzelius, *Lehrb.*, **3.** 150.)

*Bin*Iodate of Potash with *bi*Sulphate of Potash. $KO, 2\,IO_5;\ KO, 2\,SO_3 + 2\,Aq$ More soluble in water than the biniodate of potash. (Sérullas.)

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Iodate of Quinine. Tolerably easily soluble in water. Also soluble in alcohol. (Sérullas, *Ann. Ch. et Phys.*, 1830, (2.) **45.** pp. 274, 276.) On adding an excess of strong iodic acid to a concentrated aqueous solution of iodate, chlorate or acid-sulphate of quinine, a very acid iodate of quinine separates out, and may be entirely precipitated by adding strong alcohol; this acid salt undergoes alteration after a time when exposed to the air. (*Ibid.*, pp. 277, 280, 282.)

Iodate of Silver. Insoluble in water. Sparingly soluble in nitric acid. (Benckiser.) Easily soluble in ammonia-water. (Gay-Lussac.)
$Ag\,O, I\,O_5$

Iodate of Soda.

I.) *anhydrous.*
$Na\,O, I\,O_5$

Soluble in	39.75	pts. of water at	0°
"	11.03	"	20°
"	6.95	"	40°
"	4.79	"	60°
"	3.61	"	80°
"	2.95	"	100°

The saturated aqueous solution boils at 102°. (Kremers, *Pogg. Ann.*, **97.** pp. 5, 8.) 100 pts. of water at 14° dissolve 7.3 pts. of it. [T.] It is the most soluble of any of the iodates. (Millon, *Ann. Ch. et Phys.*, (3.) **9.** 418.) An aqueous solution of 1.0698 sp. gr., at 19.5°, contains 8.13 pts. of it for every 100 pts. of water. (Kremers, *Pogg. Ann.*, **99.** 444.) Less soluble than chloride of sodium in water. (Duflos, *Schweig.*, **62.** 390.) Insoluble in alcohol. Soluble in dilute acetic acid.

II.) *hydrated.* Millon (*loc. cit.*) thinks it probable that the following hydrates have different degrees of solubility.

$a = Na\,O, I\,O_5 + 2\,Aq$

$b = Na\,O, I\,O_5 + 6\,Aq$

$c = Na\,O, I\,O_5 + 10\,Aq$ Soluble in 13.8 pts. of water at 14.5°. Insoluble in alcohol. (Gay-Lussac.)

III.) *bi.* Soluble in water. The acid iodates of soda are extremely soluble in water. (Millon, *Ann. Ch. et Phys.*, (3.) **9.** 421.)
$Na\,O, 2\,I\,O_5$

Iodate of Soda with Iodide of Sodium.

I.) $Na\,O, I\,O_5; Na\,I + 20\,Aq$
II.) $2\,Na\,O, I\,O_5; 8\,Na\,I + 88\,Aq$
} Soluble in cold water. Decomposed by hot water and by cold alcohol, which dissolves out the iodide. (Mitscherlich; Penny.)

Iodate of $\frac{2}{3}$ StannEthyl. Less soluble in alcohol than the iodide.

Iodate of $\frac{4}{3}$ StannMethyl. Similar to the salt of $\frac{2}{3}$.

Iodate of Strontia.

I.) *anhydrous.* Readily soluble in chlorhydric acid. (Rammelsberg.)
$Sr\,O, I\,O_5$

II.) *hydrated.* So difficultly soluble in water

$a = Sr\,O, I\,O_5 + Aq$ that it is precipitated, even from hot solutions, when solutions of iodate of soda and chloride of strontium are mixed. (Berzelius, *Lehrb.*, **3.** 389.) Soluble in 4 pts. of cold, and in 1.3[?] pts. of boiling water. (Wittstein's *Handw.*, **1.** 723.) 100 pts. of water at 15.5° dissolve 24 pts. of it. (Ure's *Dict.*)

$b = Sr\,O, I\,O_5 + 6\,Aq$ Soluble in 416 pts. of water at 15°, and in 138 pts. of boiling water (Gay-Lussac); in 342 pts. of water at 15°, and in 110 pts. at the boiling temperature. Difficultly soluble in warm nitric acid. (Rammelsberg.)

Iodate of Strychnine. Very soluble in water. Also soluble in alcohol. (Sérullas, *Ann. Ch. et Phys.*, 1830, (2.) **45.** pp. 275, 276.) On adding an excess of strong iodic acid to a concentrated aqueous solution of iodate or chlorate of strychnine a very acid iodate of strychnine separates out, and may be entirely precipitated by adding strong alcohol; this acid salt undergoes alteration after a time when exposed to the air. (*Ibid.*, pp. 277, 280.)

Iodate *of protoxide* **of Tin.** Soluble in an aqueous solution of protochloride of tin. Insoluble in an aqueous solution of iodate of soda.
$Sn\,O, I\,O_5$

Iodate *of binoxide* **of Tin.**

Iodate *of protoxide* **of Uranium.** Insoluble in water; soluble in an aqueous solution of protochloride of uranium.

Iodate *of sesquioxide* **of Uranium.** Difficultly soluble in water. (Pleischl.) Insoluble in water. Difficultly soluble in nitric acid. (Berzelius, *Lehrb.*, **3.** 1111.)
$Ur_2\,O_3, I\,O_5 + 5\,Aq$

Iodate of Veratrin. Soluble in water, and alcohol. (Sérullas, *Ann. Ch. et Phys.*, (2.) **45.** pp. 275, 276.) On adding an excess of strong iodic acid to a concentrated aqueous solution of iodate or chlorate of veratrin a very acid iodate of veratrin separates out, and may be entirely precipitated by adding strong alcohol; this acid salt undergoes alteration after a time when exposed to the air. (*Ibid.*, pp. 277, 280.)

Iodate of Yttria. Soluble in 190 pts. of water. (Berlin.)

Iodate of Zinc. Soluble in 114 pts. of water at 15°, and in 76 pts. at the temperature of boiling. (Rammelsberg.) Soluble in nitric acid and in ammonia-water.
$Zn\,O, I\,O_5 + 2\,Aq$

IodAuric Acid. *Vid. ter*Iodide of Gold.

IodAurate of Ammonium. Deliquescent.

IodAurate of Barium. Soluble in an aqueous solution of iodide of barium.

IodAurate of Iron. Soluble in an aqueous solution of protiodide of iron.

IodAurate of Potassium. Soluble, with partial decomposition, in water. Soluble, in a dilute aqueous solution of iodide of potassium and in iodhydric acid. (Johnston.)
$K\,I, Au\,I_3$

IodAurate of Sodium. Deliquescent. Soluble in water. (Johnston.)
$Na\,I, Au\,I_3 + x\,Aq$

IodAurate of Strontium.

***Bin*IodEthylamin.** Soluble in alcohol, and ether. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **40.** 478.)
$N_2\left\{\begin{matrix} C_4\,H_3\,I_2 \\ H_3 \end{matrix}\right.$

IodEthylene. Insoluble in water. Very soluble in alcohol, and ether. (E. Kopp.) Unacted on by cold sulphuric, chlorhydric, or nitric (fuming) acids.
(*Iodide of Aldehydene. Iodide of Acetyl. IodAcetyl. Ethylene iodé.*)
$C_4\,H_3\,I$

Iodhydric Acid. Very soluble in water. As soluble as chlorhydric acid in water. (*Ot. Gr.*) Soluble in alcohol.
(*Hydriodic Acid.*)
$H\,I$

"**Iodhydrate of Amylene.**" *Vid.* Iodide of Amyl.

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Iodhydrate of AmylFurfurin. Difficultly soluble in water. (Davidson.)
$N_2 \left\{ C_{30} H_{11} (C_{10} H_{11}) O_6, H I \right.$

Iodhydrate of AmylLepidin. Sparingly soluble in water.
$C_{20} H_8 (C_{10} H_{11}) N, H I$

Iodhydrate of AmylPiperidin. Soluble in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 99.)
$C_{20} H_{21} N, H I$

Iodhydrate of AmylQuinolein. *Vid.* Iodide of AmylQuinolein.

Iodhydrate of Anilin. Exceedingly soluble in water, and in alcohol; somewhat less soluble in ether. (Hofmann, *J. Ch. Soc.*, **1.** 271.)
$C_{12} H_7 N, H I$

Iodhydrate of Anisamic Acid. Soluble in water.
$C_{16} H_9 O_6, H I$

Iodhydrate of Aricin. Very sparingly soluble in water. More soluble in alcohol, especially if this be warm.
$C_{46} H_{26} N_2 O_8, H I$

Iodhydrate of Benzylene. *Vid.* Iodide of Toluenyl.

Iodhydrate of Bismuth. Decomposed by water. Soluble in an aqueous solution of iodide of potassium.
$Bi I_3, H I + 8 Aq$

Iodhydrate of Brucin. Sparingly soluble in cold, more soluble in warm water. More soluble in alcohol than in water.
$C_{46} H_{26} N_2 O_8, H I + 4 Aq$

Iodhydrate of Cajputene.

I.) *anhydrous.* Soluble in alcohol, and ether. Is not altered by boiling with an aqueous solution of caustic potash. (Max. Schmidl.)
$C_{20} H_{16}, H I$

II.) *hydrated.* Very deliquescent. Insoluble in water, and is not decomposed thereby. Very soluble in alcohol, and ether. (Schmidl.)
$C_{20} H_{16}, H I + Aq$

Iodhydrate of Caoutchin.

Iodhydrate of Caprylamin. *Vid.* Iodhydrate of Octylamin.

" *Proto*Iodhydrate of Carbon "(of Sérullas). *Vid.* Iodide of Methylene.

Iodhydrate of *di*CetylAnilin. Soluble in alcohol.

Iodhydrate of *α*Cinchonin. Soluble in boiling water; much less soluble in water than the chlorhydrate. Readily soluble in cold alcohol.
$C_{40} H_{24} N_2 O_2, H I + 2 Aq$

Iodhydrate of *β*Cinchonin. Easily soluble in water, and alcohol. (W. Schwabe, *Kopp & Will's J. B., für* 1860, p. 364.)

Iodhydrate of Cinebene. Insoluble, or but sparingly soluble, in water. (Hirzel.)
$2 C_{20} H_{16}, H I$

Iodhydrate of Codein. Soluble in about 60 pts. of cold water, much more soluble in hot water.
$C_{36} H_{21} N O_6, H I + 2 Aq$

Iodhydrate of Coniin. Very soluble in water, alcohol, and ether. (Blyth, *J. Ch. Soc.*, **1.** 353.)

Iodhydrate of Coniin with *prot*Iodide of Mercury. Insoluble in water or chlorhydric acid. (v. Planta.)

Iodhydrate of Cotarnin. Insoluble in cold, readily soluble in boiling water. (How.)
$N \left\{ C_{26} H_{13} O_6''', H I \right.$

Iodhydrate of Cumidin. Is the most soluble of all the salts of cumidin. (Nicholson, *J. Ch. Soc.*, **1.** 9.)

Iodhydrate of CyanAnilin. Soluble in water, and alcohol; the solutions undergo decomposition when evaporated.

Iodhydrate of EthylAcetosamin. Soluble in water. (Natanson.)

Iodhydrate of Ethylamin.

Iodhydrate of Ethylamin, } with *prot*Iodide of Mercury.
Iodhydrate of *di*Ethylamin,
Iodhydrate of *tri*Ethylamin,

All these compounds are extremely soluble in alcohol, and ether. They are decomposed by water. (Sonnenschein.)

Iodhydrate of Ethyl*bi*BromAllylamin. Soluble in warm water. (Simpson.)

Iodhydrate of EthylBrucin. Insoluble in water. Readily soluble in boiling alcohol.
$N_2 \left\{ C_{46} H_{25} (C_4 H_5) O_8, H I + Aq \right.$

Iodhydrate of EthylCaprylamin. *Vid.* Iodhydrate of EthylOctylamin.

Iodhydrate of EthylCodein. Readily soluble in cold water, less soluble in alcohol. (How, *J. Ch. Soc.*, **6.** 134.)
$C_{36} H_{20} (C_4 H_5) N O_6, H I$

Iodhydrate of EthylConiin.

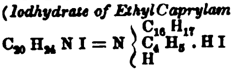
Iodhydrate of EthylFurfurin. Soluble in alcohol. (Davidson.)

Iodhydrate of EthylLepidin.

Iodhydrate of EthylMorphine. Permanent. Readily soluble in boiling, less soluble in cold water. Difficultly soluble in absolute alcohol, more easily soluble in ordinary alcohol. (How, *J. Ch. Soc.*, **6.** 128.)
$C_{34} H_{18} (C_4 H_5) N O_6, H I + Aq$

Iodhydrate of EthylNaphthylamin. About as soluble as the bromhydrate. (Schiff.)

Iodhydrate of EthylOctylamin.
(Iodhydrate of EthylCaprylamin.)



$$C_{20} H_{24} N I = N \left\} \begin{matrix} C_{16} H_{17} \\ C_4 H_5 . H I \\ H \end{matrix} \right.$$

Iodhydrate of *tri*EthylPhosphin.

Iodhydrate of EthylPhthalidin. Soluble in water. (Dusart, *Ann. Ch. et Phys.*, (3.) **45.** 338.)

Iodhydrate of EthylPicolin. *Vid.* Iodide of EthylPicolin.

Iodhydrate of EthylQuinine. Easily soluble in boiling, sparingly soluble in cold water. Soluble in alcohol. Insoluble in ether. Soluble in ammonia-water; but insoluble in potash-lye. (Strecker, *Ann. Ch. u. Pharm.*, **91.** 163.)
$N_2 \left\{ C_{40} H_{23} (C_4 H_5) O_4^{vi} \right\}, H I$

Iodhydrate of EthylQuinolein. *Vid.* Iodide of EthylQuinolein.

Iodhydrate of EthylStrychnine. Permanent. Soluble in about 170 pts. of water at 15°, and in from 50 to 60 pts. of boiling water. Soluble in alcohol. Less soluble in alkaline solutions than in pure water. (How.)
$N_2 \left\{ C_{42} H_{21} (C_4 H_5) O_4^{vi}, H I \right.$

Iodhydrate of EthylThioSinamin. Soluble in water, alcohol, and ether. (Weltzien, *Ann. Ch. u. Pharm.*, **94.** 104.)
$C_{12} H_{12} N_2 S_2, H I$

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Iodhydrate of EthylToluidin.
$N\left\{\begin{matrix}C_{14}H_7\\C_4H_5\\H\end{matrix}\right\}HI$

Iodhydrate of *di*EthylToluidin. $C_{22}H_{17}N, HI$ Extremely soluble in water. Apparently decomposed by alcohol. Soluble in iodide of ethyl. (Morley & Abel, *J. Ch. Soc.*, **7.** 72.)

Iodhydrate of Guanin. $8(C_{10}H_5N_5O_2, HI) + 7Aq$ Sparingly soluble in pure water. Easily soluble in water acidulated with iodhydric acid.

Iodhydrate of Harmin.

Iodhydrate of IodAnilin. Soluble in water, and alcohol; more so than the chlorhydrate or bromhydrate. (Hofmann, *J. Ch. Soc.*, **1.** 276.)

Iodhydrate of Lophin. $C_{42}H_{16}N_2, HI$ More soluble in alcohol, and ether, than the chlorhydrate. Very easily soluble in iodide of ethyl. (Gœssmann & Atkinson.)

Iodhydrate of MelAnilin. $C_{26}H_{13}N_3, HI$ Soon undergoes decomposition when exposed to the air. Soluble in boiling, less soluble in cold water. Soluble in alcohol. (Hofmann, *J. Ch. Soc.*, **1.** 294.)

Iodhydrate of MeNaphthalamin. Very soluble in alcohol.

Iodhydrate of Mesitylene. *Vid.* Iodide of Mesityl.

Iodhydrate of MetAcrolein. Insoluble in water.

Iodhydrate of Methylamin. $N\left\{\begin{matrix}C_2H_3\\H_2\end{matrix}\right., HI$ Very deliquescent. Very soluble in water, and alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 460.)

Iodhydrate of *di*Methylamin.

Iodhydrate of *tri*Methylamin. $N(C_2H_3)_3, HI$ Soluble in water. Somewhat soluble in alcohol. (Saenz-Diez, *Ann. Ch. u. Pharm.*, **90.** 301.)

Iodhydrate of MethylCinchonidin. $N_2\left\{C_{40}H_{22}(C_2H_3)O_2''', HI\right.$ Soluble in boiling, less soluble in cold water. (Stahlschmidt, *Ann. Ch. u. Pharm.*, **90.** 221.)

Iodhydrate of MethylCinchonin. $N_2\left\{C_{40}H_{22}(C_2H_3)O_2''', HI\right.$ Easily soluble in boiling, less soluble in cold water. (Stahlschmidt, *Ann. Ch. u. Pharm.*, **90.** 219.)

Iodhydrate of Methylene. *Vid.* Iodide of Methyl.

Iodhydrate of MethylLepidin.

Iodhydrate of MethylLutidin. Very easily soluble in water, and alcohol. Nearly insoluble in ether. (Williams.)

Iodhydrate of MethylMorphine. $C_{34}H_{18}(C_2H_3)NO_6, HI + 2Aq$ Readily soluble in hot, less soluble in cold water. Its properties are similar to those of the ethyl salt. (How, *J. Ch. Soc.*, **6.** 130.)

Iodhydrate of MethylPiperidin. $C_{12}H_{13}N, HI$ Soluble in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 92.)

Iodhydrate of MethylQuinine. $N_2\left\{C_{40}H_{23}(C_2H_3)O_4''', HI\right.$ Soluble in water, especially if this be hot. Soluble in ammonia-water. Insoluble in potash-lye. "Similar to the iodhydrate of ethylquinine." (Strecker.)

Iodhydrate of MethylThialdin. $C_{14}H_{15}NS_4, HI$ Soluble in water, and alcohol. Insoluble in ether.

Iodhydrate of Morphine. $C_{34}H_{19}NO_6, HI + 3Aq?$ Tolerably soluble in water. (Winckler.)

Iodhydrate of Narcotin.

Iodhydrate of Nicotin with *prot*Iodide of Mercury. $C_{20}H_{14}N_2; 2(HI, HgI)$ Sparingly soluble in cold, decomposed by boiling water. Sparingly soluble in alcohol.

Iodhydrate of NitroHarmalin.

Iodhydrate of NitroHarmin.

Iodhydrate of Octylamin. $N\left\{\begin{matrix}C_{16}H_{17}\\H_2\end{matrix}\right., HI$ Very soluble in water, especially if this be warm. (Cahours.)

Iodhydrate of Papaverin. $C_{40}H_{21}NO_8, HI$ Readily soluble in boiling water. Somewhat soluble in alcohol, though only sparingly soluble in boiling absolute alcohol.

Iodhydrate of Phosphuretted Hydrogen.
PH_3, HI Soluble in water, with decomposition.

Iodhydrate of Picolin. Readily soluble in water, alcohol, and ether. Its solution is decomposed by evaporation, an acid salt being formed. (Unverdorben.)

Iodhydrate of Piperidin. $C_{10}H_{11}N, HI$ Soluble in water, and alcohol.

Iodhydrate of Platinum. PtI_2, HI *Vid.* IodoPlatinic Acid.

Iodhydrate of Platosamin. *Vid.* Iodide of Platin(*ous*)ammonium.

Iodhydrate of Propylamin. Soluble in water.

Iodhydrate of Quinidin.
I.) *mono.* Soluble in 1250 pts. of cold water.
II.) *acid.* Soluble in 90 pts. of water at 15°.

Iodhydrate of Quinine.
I.) *normal.* $C_{40}H_{24}N_2O_4, HI$ Very sparingly soluble in cold, more soluble in boiling water. Readily soluble in alcohol.
II.) *acid.*
$C_{40}H_{24}N_2O_4, 2HI + 5Aq$

Iodhydrate of Silicon. $Si_2I_3; 2HI$ Slowly decomposed by water. Soluble, without decomposition, in a large quantity of bisulphide of carbon. (Buff & Wœhler, *Ann. Ch. u. Pharm.*, **104.** 99.)

Iodhydrate of Strychnine. $C_{42}H_{22}N_2O_4, HI$ One of the least soluble of the salts of strychnine. Much more soluble in alcohol than in water. (Abel & Nicholson, *J. Ch. Soc.*, **2.** 246.)

Iodhydrate of Tellurium. Decomposed by water.

Iodhydrate of Terebene.
I.) *mono.*
(*BiIodhydrate of Terebene*(of Deville).)
$C_{20}H_{16}, HI$
II.) *basic.*
(*MonoIodhydrate of Terebene*(of Deville).)
$2C_{20}H_{16}, HI$

Iodhydrate of Turpentine-Oil.
(*Iodhydrate of Camphene.*)
$C_{20}H_{16}, HI$

Iodhydrin. $C_{12}H_{11}IO_6$ Insoluble in water; but dissolves ½ of its own volume of water.
Insoluble in water. Soluble in al-

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cohol, even when this is weak, and especially soluble in ether. (Berthelot & De Luca, *Ann. Ch. et Phys.*, (3.) **43.** 280.)

Iodides. Almost all of the metallic iodides are soluble in water excepting those of mercury, lead, silver, bismuth, and copper ($Cu_2 I$). (Persoz, *Chim. Moléc.*, p. 463.)

Iodide of "Acetyl" (Acetoyl). *Vid.* Iod-
$C_4 H_3 I$ Ethylene.

Iodide of Acetyl. Instantly decomposed by
$C_4 H_3 O_2 I$ water and by alcohol. (Guthrie, *Ann. Ch. u. Pharm.*, **103.** 336.)

Iodide of Aldehydene. *Vid.* IodEthylene.

Iodide of Allyl. Insoluble in water. Soluble in alcohol, and ether. (Berthelot & De Luca, *Ann. Ch. et Phys.*, (3.) **43.** 266.)
(*IodoPropylene. Tritylene-iodé. Allylhydriodic Ether.*)
$C_6 H_5 I$

*Bin*Iodide of Allyl. Almost insoluble in
$C_6 H_5 I_2$ cold, sparingly soluble in boiling ether. (Berthelot & De Luca.)

Iodide of *tetr*Allylium. Soluble in water,
$N (C_6 H_5)_4 I$ and alcohol.

Iodide of Aluminum. Known only in solution. (Dumas, *Tr.*)

Iodide of Ammonium. Extremely deliques-
$N H_4 I$ cent. Very soluble in water, and alcohol.

Iodide of Ammonium & of Cadmium. De-
$N H_4 I, Cd I + 2 Aq$ liquescent. (Croft.)

Iodide of Ammonium & of Lead. Decomposed by much water. (Boullay, *Ann. Ch. et Phys.*, (2.) **34.** 372.)

Iodide of Ammonium & of Silver. Deli-
$2 N H_4 I; Ag I$ quescent. Decomposed by water. (Poggiale.)

Iodide of Ammonium & of Mercury.

I.) $N H_4 I, Hg I$ Known only in solution.

II.) $N H_4 I, 2 Hg I + 2 Aq$ Permanent. Decomposed by water, which dissolves out No. I. while protiodide of mercury is precipitated. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** 355.) Soluble, without decomposition, in alcohol, and ether.

Iodide of Ammonium & of Tin. When
$N H_4 I, 2 Sn I$ treated with a small quantity of water, iodide of ammonium is dissolved out, leaving iodide of tin, but in a larger quantity of water it dissolves completely. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** 376.)

Iodide of Ammonium & of Zinc. Extremely
$N H_4 I, Zn I$ deliquescent. (Rammelsberg.)

Iodide of Amyl. Sparingly soluble in water. Easily miscible with alcohol, and ether.
(*Amylohydric Ether.*)
$C_{10} H_{11} I$

Iodide of *tetr*Amylammonium. Sparingly
$N (C_{10} H_{11})_4 I$ soluble in water.

Iodide of AmylLepidin. Difficultly soluble
$N \begin{cases} C_{20} H_9''' \\ C_{10} H_{11} \end{cases} . I$ in water.

Iodide of AmylNicotin. Soluble in water, and spirit. (Stahlschmidt, *Ann. Ch. u. Pharm.*, **90.** 226.)

Iodide of AmylQuinolein.
$N \begin{cases} C_{18} H_7''' \\ C_{10} H_{11} \end{cases} . I$

*Ter*Iodide of Antimony. Decomposed by
$Sb I_3$ water, with formation of an oxyiodide and iodhydric acid. It is also decomposed by alcohol of 80%. Soluble in iodhydric acid. Soluble in chlorhydric acid, from which it is precipitated on the addition of water.

*Ter*Iodide of Antimony with *ter*Sulphide
$Sb I_3 ; Sb S_3$ of Antimony. Decomposed by water, alcohol, and ether.

Iodide of Argentammonium.
$N \begin{cases} H_3 \\ Ag \end{cases} . I$

Iodide of Arsen*tetr*Allylium.

Iodide of Arsen*di*Ethyl. Insoluble in water. Readily soluble in alcohol, and ether. (Landolt, *Ann. Ch. u. Pharm.*, **89.** 322.)
(*Iodide of Ethyl Cacodyl.*)
$(C_4 H_5)_2 As, I$

Iodide of Arsen*tri*Ethyl. Deliquescent.
$(C_4 H_5)_3 As, I_2$ Readily soluble in water, and spirit. Very sparingly soluble in ether. Soluble in warm chlorhydric acid; separating out unchanged as the solution cools. Decomposed by nitric, and sulphuric acids. (Landolt, *Ann. Ch. u. Pharm.*, **89.** 329.)

Iodide of Arsen*tri*Ethyl & of ZincEthyl.
$(C_4 H_5)_3 As, I_2 ; (C_4 H_5) Zn, I$

Iodide of ArsenEthylium. Readily solu-
$As (C_4 H_5)_4, I$ ble in water and in common alcohol. Very sparingly soluble in pure ether, or in alcohol containing ether. It is, however, soluble to a considerable extent in ether which contains certain obscure arsenic compounds, which occur in its preparation. (Landolt, *Ann. Ch. u. Pharm.*, **89.** pp. 311, 316, 331.)

Iodide of ArsenEthylium & *teriodide* of
$(C_4 H_5)_4 As I ; As I_3$ Arsenic.

Iodide of ArsenEthylium & of Zinc.
$As (C_4 H_5)_4 I, Zn I$

*Ter*Iodide of Arsenic. Soluble, without
$As I_3$ residue, in a large quantity of water; but a small quantity of cold water decomposes it to a soluble acid, and a nearly insoluble basic, salt. (Plisson.) Soluble in boiling alcohol, from which a portion of it separates out again as the solution cools; but the alcohol retains in combination most of that which it has dissolved.

*Quinqui*Iodide of Arsenic? Soluble in water. (Plisson.)

*Ter*Iodide of Arsenic with Iodide of Ar-
$(C_4 H_3)_4 As I ; As I_3$ senMethylium.

Iodide of ArsenMethyl. Scarcely at all
$C_2 H_3 As, I_2$ soluble in water. Easily soluble in alcohol, and ether.

Iodide of Arsen*tri*Methyl.
$As \begin{cases} (C_2 H_3)_3 \end{cases} . I_2$

Iodide of ArsenMethylAmylium.
$As \begin{cases} (C_2 H_3)_2 \\ (C_{10} H_{11})_2 \end{cases} . I$

Iodide of ArsenMethylEthylium.
$As \begin{cases} (C_2 H_3)_2 \\ (C_4 H_5)_2 \end{cases} . I$

Iodide of ArsenMethylium. Soluble in ab-
$As \begin{cases} (C_2 H_3)_4 \end{cases} . I$ solute alcohol (Cahours); and in a mixture of alcohol and iodide of methyl. (Cahours & Riche.)

Iodide of ArsenMethylium & of Cad-
$(C_2 H_3)_4 As I; Cd I$ mium. Tolerably readily soluble in boiling alcohol. (Cahours.)

Iodide of ArsenMethylium & of Zinc.
$(C_2 H_3)_4 As I, Zn I$ Tolerably readily soluble in boiling alcohol. (Cahours.)

Iodide of Barium. Very deliquescent. (O.
$Ba I$ Henry.) Slightly deliquescent. (Dumas,

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Tr.) Not deliquescent. (Gay-Lussac.) Decomposed by the carbonic acid of the air. (Berzelius, *Lehrb.*) Very soluble in water. (Gay-Lussac.) Easily soluble in alcohol. (O. Henry.)

1 pt. of the anhydrous salt is

soluble in 0.59	pt. of water at	0°
“ 0.48	“	19.5°
“ 0.44	“	30°
“ 0.43	“	40°
“ 0.41	“	60°
“ 0.37	“	90°
“ 0.35	“	106°

(Kremers, *Pogg. Ann.*, **103.** 66.)

A solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.2157	27.0
1.4099	53.8
1.6186	85.8
1.7953	115.6
1.9535	146.0

(Kremers, *Pogg. Ann.*, **103.** 67.)

Iodide of Barium & of Mercury (Hg I).

I.) $Ba I; Hg I$ Soluble in water, without decomposition. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** 352.)

II.) $Ba I; 2 Hg I$ Incompletely precipitated by water, No. I. remaining in solution while protiodide of mercury separates out. (*Ibid.*)

Iodide of Barium & of Tin (Sn I). “Very soluble.” (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** 376.)

Iodide of Barium & of Zinc. Very deliquescent.
$Ba I; 2 Zn I$

Iodide of Bismuth.

I.) *normal.* While yet moist it is decomposed by warm water, which abstracts iodhydric acid, while an insoluble basic salt separates out. But after having become dry it is much more difficultly and less completely decomposed by boiling water. Soluble in nitric and in iodhydric acids, from which it is reprecipitated when the acid is diluted with water or alcohol. (Berzelius, *Lehrb.*) Partially decomposed by water. Soluble in aqueous solutions of iodide of potassium and of caustic potash. (Rammelsberg.)
$Bi I_3$

II.) *acid.* Decomposed by water, with separation of a basic salt. (Arppe.)
$Bi I_3, H I + 8 Aq$

III.) *basic.* *Vid.* OxyIodide of Bismuth.

Iodide of Bismuth & of BismuthEthyl. Sparingly soluble in water. Easily soluble in alcohol, and ether.
$Bi I_3; (C_4 H_5)_3 Bi_2, I_2$

Iodide of Bismuth & of Potash.

I.) $2 K I; Bi I_3 + 4 Aq$ Soluble in a small quantity of water, without cloudiness, but is decomposed by much water.

II.) $4 K I; Bi I_3$ Ppt.

III.) $4 K I; H I; Bi I_3$ Completely soluble in a small quantity of water, but is decomposed by much water. (Arppe.)

Iodide of Bismuth*ter*amin. Decomposed by water. (Rammelsberg.)
(*AmmonioIodide of Bismuth*)
$N_3 \left\{ H_9 . Bi, I_3 \right.$

Iodide of BismuthEthyl. Scarcely at all soluble in water. Easily soluble in alcohol. Difficultly soluble in ether. (Duenhaupt.)
$C_4 H_5 Bi, I_2$

Iodide of Bismuth*tri*Ethyl. Scarcely at all soluble in water. Easily soluble in alcohol. Difficultly soluble in ether.
$Bi \left\{ (C_4 H_5)_3, I_2 \right.$

Iodide of Benzoyl. Insoluble in water; by which, however, it is very slowly decomposed. Soluble in alcohol. (Liebig & Wœhler.)
$C_{14} H_5 O_2, I$

Iodide of Benzyl. *Vid.* Iodide of Toluenyl.

Iodide of BisMethyl. Soluble in alcohol, with subsequent decomposition.

Iodide of *bi*BromoMethyl. Sparingly soluble in water. (Sérullas.)
(*BromIodoform.*)
$C_2 H Br_2, I$

Iodide of Brucin.
(*IodoBrucin.*)

$a = N_2 \left\{ C_{46} H_{26} O_8^{vi}, I_2 \right.$ Soluble in boiling alcohol, but does not separate out on cooling.

$b = 2(N \left\{ C_{46} H_{26} O_8^{vi}), I_2 \right.$ Ppt., in alcohol. (Pelletier.)

Iodide of Butyl. Insoluble, or nearly insoluble, in water.
(*Iodide of Tetryl. ButylIodhydric Ether.*)
$C_8 H_9 I$

Iodide of Butyryl.
$C_8 H_7 O_2, I$

Iodide of Cacodyl.

I.) $(C_2 H_3)_2 As, I$ Insoluble in water. Easily soluble in alcohol, and ether. (Bunsen.)

II.) *basic.* Sparingly soluble in water. Very readily soluble in alcohol, especially when this is hot. (Bunsen.)
$3 C_4 H_6 As I; C_4 H_6 As O$

Iodide of Cacoplatyl.
$\left.\begin{matrix} C_2 H_3 \\ C_2 H_2 Pt \end{matrix}\right\} As, I + 2 Aq$

Iodide of Cadmiumammonium. Decomposed by water. (H. Rose.)
$N \left\{ \begin{matrix} H_3 \\ Cd \end{matrix} \right., I$

Iodide of Cadmium. Permanent. Readily soluble in water, and alcohol. Very sparingly soluble in boiling ether. (Stromeyer.)
$Cd I$

Soluble in 1.08	pts. of water at	20°
“ 1.00	“	40°
“ 0.93	“	60°
“ 0.86	“	80°
“ 0.75	“	100°

(Kremers, *Pogg. Ann.*, **104.** 162.)

An aqueous solution of sp. gr. at (19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.1681	21.4
1.3286	43.7
1.6139	88.5

(Kremers, *Pogg. Ann.*, **104.** 156.)

Iodide of cadmium which has been prepared at ordinary temperatures is readily soluble, with combination (to $N H_3 Cd I$), in warm ammonia-water. But after having been heated to 130°, it is no longer soluble therein, combining, however, to form ($Cd I, 3 N H_3$).

Iodide of Cadmium & of Ethyl. Decomposed by water.
$Cd I; C_4 H_5 I$

Iodide of Cadmium & of Mercury. Very soluble in water. (Berthemot.)

Iodide of Cadmium & of Potassium. Deliquescent. Very easily soluble in water. Slightly soluble in alcohol, and wood-spirit; less so than iodide of cadmium. (Croft.)
$Cd I, K I + 2 Aq$

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Iodide of Cadmium & of Sodium.
$Cd I; Na I + 6 Aq$

Iodide of Cadmium & of Strontium. Deliquesces in moist air, but effloresces in dry air. (Croft.)
$Cd I; Sr I + 8 Aq$

Iodide of Cadmium*ter*amin. Decomposed by water. (H. Rose.)
$N_3 \left\{ H_9 . Cd, I \right.$

Iodide of Cadmiumammonium. Decomposed by water. Soluble in warm, less soluble in cold, ammonia-water. (Rammelsberg.)
$N \left\{ \begin{matrix} H_3 \\ Cd \end{matrix} \right. , I$

Iodide of Calcium. Deliquescent. Very soluble in water. Soluble in absolute alcohol. (Gay-Lussac, *Ann. de Chim.*, **91.** 57, [*T*.].)
$Ca I$

1 pt. of the anhydrous salt is
soluble in 0.52 pt. of water at 0°
" 0.49 " 20°
" 0.44 " 40°
" 0.35 " 43°
" 0.23 " 92°
(Kremers, *Pogg. Ann.*, **103.** 65.)

An aqueous solution of sp. gr. at (19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.1854	24.3
1.3786	52.7
1.5558	82.4
1.6845	106.6
2.0065	190.4

(Kremers, *Pogg. Ann.*, **103.** 67; & **106.** 587.)

***Bin*Iodide of Calcium.** Resembles the potassium compound.
$Ca I_2$

Iodide of Calcium & of Mercury ($Hg I$).

I.) $Ca I; Hg I$ Soluble in water. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** 353.)

II.) $Ca I; 2 Hg I$ Incompletely precipitated by water, which dissolves No. I., and leaves insoluble protiodide of mercury. (*Ibid.*)

Iodide of Capryl. *Vid.* Iodide of Octyl.

Iodide of Carbon. *Vid.* Iodide of *bin*IodoMethyl.

***Din*Iodide of Carbon.** Insoluble in water, acids, or alkaline solutions. Soluble in alcohol, and ether.
$C_2 I$

***Ter*Iodide of Carbon.** Sparingly soluble in water.
$C_2 I_6$

Iodide of *tri*CaproylEthylammonium. Easily soluble in alcohol, and ether. (Petersen, *Ann. Ch. u. Pharm.*, **102.** 314.)
$N \left\{ \begin{matrix} (C_{12} H_{13})_3 \\ C_4 H_5 \end{matrix} \right. . I$

Iodide of Cerium.

Iodide of Cetyl. Insoluble in water. Tolerably soluble in boiling, less soluble in cold alcohol. Readily soluble in ether. (Fridau.)
$C_{32} H_{33} I$

Iodide of *bi*ChlorMethyl. Sparingly soluble in water. Miscible with chloride of ethylene. (Sérullas.)
(*ChlorIodoform.*)
$C_2 H Cl_2 I$

Iodide of ChloroNitroHarmadin or Harmin. Soluble in alcohol, — more so than the iodide of nitroharmin. Soluble in naphtha. (Fritzsche.)
$N_2 \left\{ C_{26} H_{10} Cl (N O_4) O_2^{vi}, I_2 \right.$

***Sesqui*Iodide of Chromium.**

I.) *normal.* Soluble in water. When the solution is evaporated to dryness the residue does not dissolve in cold water, but is very easily soluble in warm water, and does not separate out again on cooling. (Berlin, in *Berzelius's Lehrb.*, **3.** 1071.)
$Cr_2 I_3$

II.) *tris.* Soluble in water. (Ordway, *Am. J. Sci.*, **26.** 203.)

***Ter*Iodide of Chromium** (?) Decomposed by water, to $Cr O_3$ and $H I$. (Giraud.)
$Cr I_3$ (?)

Iodide of Cinnamyl. Insoluble in water, but is decomposed thereby. Soluble, without decomposition, in alcohol, and ether. (Despan.)

Iodide of Cobalt. Deliquescent. Soluble in water. (Rammelsberg.) Soluble in alcohol. (Erdmann.)
$Co I$

Iodide of Cobalt*bi*amin. Soluble, with decomposition, in water. (Rammelsberg.) Soluble in ammonia-water.
$N_2 \left\{ H_6 . Co, I \right.$

Iodide of Cobalt*ter*amin. Insoluble in ammonia-water.
$N_3 \left\{ H_9 . Co, I \right.$

***Ter*Iodide of Codein.** *Vid.* IodoCodein.

***Din*Iodide of Copper.** Insoluble in water or alcohol. (Berthemot.) Very sparingly soluble in chlorhydric acid. (Buchner.) Sparingly soluble in ammonia-water when in contact with the air. Soluble in an aqueous solution of iodide of potassium. (Rammelsberg.)
$Cu_2 I$

***Din*Iodide of Copper & of Potassium.**

***Din*Iodide of Copper with Xanthogenamid.** *Vid.* Hydrate of SulphoCarbonylEthylammonium with *din*Iodide of Copper.

Iodide of Cupr(*eous*)*bi*amin.
(*AmmoniodinIodide of Copper.*)
$N_2 \left\{ H_6 . Cu_2, I \right.$

Iodide of Cupr(*ic*)*bi*amin. Sparingly soluble in cold water; the solution subsequently undergoing decomposition. Decomposed at once by boiling water. (Berthemot.) Decomposed by water. (Rammelsberg.) Insoluble in cold alcohol or ether; decomposed by boiling alcohol. Soluble in warm ammonia-water. (Berthemot.)
(*AmmonioprotIodide of Copper.*)
$N_2 \left\{ H_6 . Cu, I + Aq \right.$

Iodide of Cyan*ter*amin.
$N_3 \left\{ H_9 . C_2 N, I \right.$

Iodide of Cyanammonium.
(*AmmonioIodide of Cyanogen.*)
$N \left\{ \begin{matrix} H_3 \\ C_2 N \end{matrix} \right. . I$

Iodide of Cyanogen. Easily soluble in water; more soluble in alcohol (Sérullas); and still more soluble in ether, and the volatile oils, like oil of turpentine; also soluble in the fixed oils. Soluble, without decomposition, in dilute sulphuric, nitric, and chlorhydric acids. (Wœhler, Van-Dyk.)
$I Cy = N C_2 I$

Iodide of Ethyl. Sparingly soluble in water. Very soluble in alcohol, from which it is precipitated by water. Easily soluble in ether. (Gay-Lussac.)
$C_4 H_5 I$

Iodide of *tetra*Ethylammonium. Readily soluble in water. Soluble in alcohol. Insoluble in ether or in alkaline solutions. (Hofmann.)
$N (C_4 H_5)_4 I$

***Ter*Iodide of *tetra*Ethylammonium.** Difficultly soluble in cold, readily soluble in boiling spirit. Soluble in aqueous solutions of the iodides of potassium, sodium, and ammonium; also in solutions of the ethylammoniums. (Weltzien, *Ann. Ch. u. Pharm.*, **91.** 37.)
$N (C_4 H_5)_4 I_3$

*Quinqui*Iodide of *tetra*Ethylammonium. Soluble in boiling alcohol.
$N(C_4H_5)_4I_5$

Iodide of *tetra*Ethylammonium & of Mercury(Hg I).

I.) $N(C_4H_5)_4I;\ 2\,Hg\,I$ Sparingly soluble in water; more easily soluble in hot alcohol, from which it separates on cooling. (H. Risse.)

II.) $N(C_4H_5)_4I;\ 3\,Hg\,I$ Not decomposed by water. Tolerably readily soluble in alcohol. (R. Mueller.)

III.) $N(C_4H_5)_4I;\ 5\,Hg\,I$ Insoluble in water, alcohol, or ether. (Sonnenschein.)

Iodide of *tri*EthylAmylammonium. Readily soluble in water, and alcohol. Insoluble in ether.
$N\left\{\begin{array}{l}C_{10}H_{11}\\(C_4H_5)_3\end{array}\right.\cdot I$

Iodide of *tri*EthylAmylPhosphonium. Soluble in alcohol, from which it is precipitated on the addition of ether.
$P\left\{\begin{array}{l}C_{10}H_{11}\\(C_4H_5)_3\end{array}\right.\cdot I$

Iodide of EthylCacodyl. *Vid.* Iodide of ArsenEthyl.

Iodide of EthylCollidin.
$N\left\{\begin{array}{l}C_{16}H_{11}'''\\C_4H_5\end{array}\right.\cdot I$

Iodide of *di*EthylConiin. Very readily soluble in water, and alcohol; less soluble in ether. (v. Planta & Kekulè, *Ann. Ch. u. Pharm.*, **89.** 146.)

Iodide of Ethylene. Insoluble in water, acids, or alkaline solutions. Soluble in alcohol, but less readily than the chloride or bromide. (Regnault.) Also soluble in ether, and oils.
(*Iodide of Elayl. IodEtherin. Hydriodate of AcetylicIodide.) Faraday's Iodide of Hydrocarbon.)*
C_4H_4'', I_2

Iodide of Ethyl*di*Ethylene*di*Phenyl*bi*ammonium. Less soluble than the corresponding methyl compound in boiling water.
$C_{36}H_{28}N_2I = N_2\left\{\begin{array}{l}C_4H_5\\(C_4H_4'')_2\\(C_{12}H_5)_2\end{array}\right.\cdot I$

Iodide of EthylLepidin.
$C_{24}H_{14}NI = N\left\{\begin{array}{l}C_{20}H_9'''\\C_4H_5\end{array}\right.\cdot I$

Iodide of EthylNaphtylammonium.
$N\left\{\begin{array}{l}C_{20}H_6''\\C_4H_5\\H\end{array}\right.\cdot I$

Iodide of EthylNicotin. Deliquesces in moist air. Extremely soluble in water. Sparingly soluble in alcohol or ether, though more soluble in hot than in cold. (v. Planta & Kekulè, *Ann. Ch. u. Pharm.*, **87.** 4.)
$N\left\{\begin{array}{l}C_{10}H_7'''\\C_4H_5\end{array}\right.\cdot I$

Iodide of Ethyl*tri*Phenylammonium. Soluble in alcohol.

Iodide of *tri*EthylPhenylammonium.

Iodide of *tetra*EthylPhosphonium. Very soluble in water; less soluble in alcohol. Insoluble in ether. Sparingly soluble in an aqueous solution of caustic potash. (Hofmann & Cahours.)
$P(C_4H_5)_4I$

Iodide of EthylPhthalamin. Soluble in water, and alcohol.
$NC_{20}H_{13}O_4, I$

Iodide of EthylPicolin. Very readily soluble in water, and alcohol. Sparingly soluble in ether. (Anderson.)
$C_{16}N_{12}NI = N\left\{\begin{array}{l}C_{12}H_7'''\\C_4H_5\end{array}\right.\cdot I$

Iodide of *di*EthylPiperylammonium. Deliquescent. Soluble in all proportions in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 97.)
$N\left\{\begin{array}{l}C_{10}H_{10}''\\(C_4H_5)_2\end{array}\right.\cdot I$

Iodide of EthylPyridin. Slightly deliquescent. Readily soluble in water, alcohol, and ether.
$N\left\{\begin{array}{l}C_{10}H_5'''\\C_4H_5\end{array}\right.\cdot I$

Iodide of EthylQuinolein. More soluble in water than in alcohol. (Gr. Williams.)
$N\left\{\begin{array}{l}C_{18}H_7'''\\C_4H_5\end{array}\right.\cdot I$

Iodide of *tri*EthylToluenylammonium. Soluble in water.
$N\left\{\begin{array}{l}C_{14}H_7\\(C_4H_5)_3\end{array}\right.\cdot I$

*Per*Iodide of Formyl. *Vid.* Iodide of *bin*IodoMethyl.

Iodide of Glucinum. Soluble in water, with evolution of much heat. (Wœhler.)
Gl_2I_3

*Prot*Iodide of Gold. Insoluble in water. (Dumas, *Tr.*) Insoluble in cold, and only very difficultly soluble in boiling water. (Berzelius's *Lehrb.*) Unacted upon by cold water, but is decomposed by boiling water. (Pelletier; Fordos.) Slowly decomposed by alcohol. Partially soluble in aqueous solutions of iodide of potassium, and iodide of iron, also in hot iodhydric acid. Neither sulphuric nor nitric acids have any action upon this compound in the cold, but decompose it on boiling; — as is the case with boiling water, this decomposition is entirely due to the heat. (Pelletier; Fordos.) Only slightly acted upon by ammonia-water or by a solution of chloride of sodium even at 35°. (Fordos.) Instantly decomposed by a solution of caustic potash.
$Au\,I$

*Ter*Iodide of Gold. Insoluble in water. It is only decomposed to a trifling extent when washed with water. (Berzelius, *Lehrb.*) Soluble in aqueous solutions of iodide of potassium, and of the more soluble metallic iodides, like iodide of barium or of strontium. While yet moist it is soluble in iodhydric acid, from which solution a detonating compound is precipitated on the addition of ammonia-water. (Johnston.) Decomposed by alkaline solutions.
$Au\,I_3$

Iodide of HydrargAllyl, &c. *Vid.* Iodide of MercurAllyl, &c.

Iodide of HydroCarbon(*liquid*). *Vid.* Iodide of *bi*ChlorMethyl(ChlorIodoform).

*Bin*Iodide of Hydrogen. Soluble in water; the solution slowly decomposing.
(*HydrIodous Acid.*)
$H\,I_2$

Iodide of *bin*IodoMethyl. Not perceptibly soluble in water, dilute acids, or alkaline solutions. Very readily soluble in alcohol, from which it is partially precipitated on the addition of water. Soluble in 80 pts. of cold alcohol, and in 25 pts. of alcohol of 23° B. at 35° C. (Sérullas.) Soluble in 7 pts. of ether; also readily soluble in the fixed and volatile oils. (Sérullas.) Soluble in chloroform. (Bouchardat.) Soluble in bisulphide of carbon.
(*Iodide of Formyl. Iodoform. Iodide of Methyl biiodé.*)
C_2HI_2, I

*Bin*Iodide of Iridium. Insoluble in water or in acids. (Lassaigne.)
$Ir\,I_2$

*Prot*Iodide of Iron. Exceedingly deliquescent. When recently prepared, it is freely and completely soluble in water; but by keeping it is partially decomposed. It is also soluble in an aqueous solution of sugar; and the solution thus prepared is much more stable than the aqueous solution. Freely soluble
$Fe\,I,$ & $+ 4\,Aq$

in glycerin. (Parrish's *Pharm.*, pp. 236, 520.) Soluble in alcohol. (Gmelin's *Handbook.*)

*Sesqui***Iodide of Iron.** $Fe_2 I_3$ Soluble in water.

The basic salts which contain five equivalents or less of sesquioxide of iron to one of iodhydric acid may be obtained dissolved in water. (Ordway, *Am. J. Sci.*, (2.) **26.** 202.)

*Prot***Iodide of Iron & of Mercury.** Very deliquescent. Decomposed by much water. Soluble in alcohol and in strong acetic acid. (Berthemot.)

Iodide of Lead.

I.) *normal.* $Pb I$ Completely soluble in water. (Brandes.) Rather easily and completely soluble in boiling, much less soluble in cold water. (Joss, *J. pr. Ch.*, 1834, **1.** 137.) Soluble in 187 pts. of boiling water. (Berthemot); in 1235 pts. of water at the ordinary temperature, and in 125 [194–196] pts. of boiling water (Denot); in 579 pts. of cold and in 254 pts. of boiling water; the saturated cold solution containing 0.17% of it, and the saturated boiling solution 0.39%. (M. R. & P.) Soluble in 2400 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) In spite of the assertion of Henry, the addition of acetic acid does not increase its solubility in water at the ordinary temperature. (Denot.) Very sparingly soluble in cold water, easily soluble in boiling water, in acetic acid, and in alcohol, (Parrish's *Pharm.*, p. 540.) It appears to be slightly soluble in alcohol. (O. Henry.) Decomposed by boiling ether. (A. Vogel.)

Soluble in concentrated aqueous solutions of the iodides of potassium, sodium, barium, strontium, calcium, and magnesium; from these solutions it is precipitated on the addition of water. (Berthemot.) Soluble in an aqueous solution of chloride of ammonium, even in the cold, but the lead may be reprecipitated from this solution by adding an excess of caustic ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 97, 99.) Very soluble in an aqueous solution of iodide of potassium, which, however, does not appear to be capable of dissolving more than 2 equivs. of it for 1 equiv. of K I. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** 367.) Abundantly soluble in a warm aqueous solution of iodide of ammonium, apparently with combination; crystals separate as the solution cools. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** 365.) It is not precipitated when in presence of citrate of soda. (Spiller.) Soluble in an aqueous solution of caustic potash. (Berzelius, *Lehrb.*) By ammonia-water it is converted into a basic iodide. Soluble in alkaline liquids. (Melsens, *Ann. Ch. et Phys.*, (3.) **26.** 224.) Insoluble in cold, soluble, with decomposition, in boiling chlorhydric acid. (Labouré.)

II.) *basic.* *Vid.* OxyIodide of Lead.

III.) *acid.* $Pb I, 2 H I$ Very easily decomposed when exposed to the air. (Guyot.) Decomposed by water.

Iodide of Lead & of Potassium.

I.) $K I ; 2 Pb I$ Permanent. Completely decomposed when washed with water, iodide of lead remaining undissolved. Hot water precipitates only a portion of the iodide of lead, a compound K I, Pb I going into solution; on cooling this solution, the original salt K I, 2 Pb I crystallizes out. Unacted upon by cold alcohol; but hot alcohol decomposes it like hot water. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** 369.)

II.) $2 K I ; Pb I$ Decomposed by water. Insoluble in alcohol. (Boullay, *Ibid.*)

Iodide of Lead & of Sodium.

$2 Pb I ; Na I$

Iodide of Lithium. $Li I + 6 Aq$ Very deliquescent, and soluble in water. (Rammelsberg.)

The anhydrous salt is

soluble in	0.66 pt.	of water at	0°
"	0.61	"	19°
"	0.56	"	40°
"	0.50	"	59°
"	0.38	"	75°
"	0.23	"	80°
"	0.21	"	99°
"	0.17	"	120°

(Kremers, *Pogg. Ann.*, **103.** 65.)

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.1611	23.4
1.1756	25.9
1.3171	49.3
1.3507	56.5
1.4700	78.3
1.5319	93.4
1.6278	112.5
1.6709	125.9
1.7495	142.1

(Kremers, *Pogg. Ann.*, **104.** pp. 155, 158.)

Iodide of LuteoCobalt. $6 N H_3 . Co_2, I_3$ Difficultly soluble in cold, readily soluble in hot water. (Gibbs & Genth, *Smithson. Contrib.*, Vol. **9.**)

Iodide of Magnesium. $Mg I$ Deliquescent. Very soluble in water.

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.1121	14.2
1.2185	28.5
1.3563	48.6
1.4945	70.6
1.6623	100.5
1.9098	151.4

(Kremers, *Pogg. Ann.*, **104.** 156; & **106.** 587.)

The aqueous solution cannot be evaporated to dryness without losing some iodhydric acid.

Iodide of Magnesium & of Mercury (Hg I).

I.) $Mg I ; Hg I$ Soluble in water. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** 353.)

II.) $Mg I ; 2 Hg I$ Decomposed by water, which dissolves out No. I., and leaves insoluble protiodide of mercury. (*Ibid.*)

Iodide of Manganese. $Mn I$ Deliquescent. Readily soluble in water. (Lassaigne.)

Iodide of Mercur(*ous*)Allyl. $C_6 H_5 Hg_2, I$ Nearly insoluble in water. Sparingly soluble in cold, more soluble in hot alcohol. Easily soluble in hot ether. (Zinin.)

Iodide of Mercur(*ic*)ammonium.

$N \left\{ \begin{matrix} H_3 \\ Hg \end{matrix} \right. . I$

Iodide of Mercur(*ic*)ammonium & of Mercury. $N \left\{ \begin{matrix} H_3 \\ Hg \end{matrix} \right. . I ; Hg I$ Decomposed by water, and by dilute acids. (Caillot & Corriol.)

Iodide of *di*Mercur(*ous*)ammonium. $N \left\{ \begin{matrix} H_2 \\ 2 (Hg_2) \end{matrix} \right. . I$ Soluble in an aqueous solution of iodide of potassium. Tolerably

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soluble in warm chlorhydric acid. (Rammelsberg.)

IODIDE OF MERCURAMYL.
(*Iodide of HydrargAmyl.*)

IODIDE OF MERCUR(*ous*)ETHYL. Scarcely at
$C_4H_5Hg_2, I$ all soluble in water. Soluble in alcohol, and ether. Soluble in ammonia-water; also in a solution of caustic potash, with partial decomposition. (Strecker, *Ann. Ch. u. Pharm.*, **92.** 78.)

IODIDE OF MERCUR(*ous*)METHYL. Insoluble
$C_2H_3Hg_2, I$ in water. Tolerably soluble in alcohol. Very soluble in ether and in iodide of methyl.

*Din*IODIDE OF MERCURY. Very slightly soluble in cold water.
(*Protiodide of Mercury. Green Iodide of Mercury.*)
Hg_2I

Insoluble in water, alcohol, or an aqueous solution of chloride of sodium. Soluble in ether. (Parrish's *Pharm.*, p. 560.) Soluble in more than 2375 pts. of water. (Saladin.) Somewhat soluble in aqueous solutions of iodide of potassium and of nitrate of dinoxide of mercury. (Berzelius's *Lehrb.*) Easily soluble in an aqueous solution of nitrate of protoxide of mercury. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 317.) Partially soluble in ammonia-water. (Wittstein.) Soluble in a hot or warm aqueous solution of chloride of ammonium, though less completely than protiodide of mercury. Nitrate of ammonia dissolves it less readily than chloride of ammonium. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.) Partially soluble, with separation of metallic mercury and formation of the protiodide, in a cold aqueous solution of iodide of potassium, and in hot solutions of the iodides of sodium, calcium, barium, strontium, magnesium, zinc, and ammonium, also in iodhydric acid, in warm solutions of the chlorides of potassium, sodium, and ammonium, and slowly in hot chlorhydric acid. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** pp. 358, 359, 360, 364, 365.) Decomposed to a slight extent, with formation of protochloride of mercury (Hg Cl), by aqueous solutions of the alkaline chlorides; this decomposition is greater in hot than in cold solutions, but the diniodide is one of the compounds of mercury which is least readily acted upon by the alkaline chlorides. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 177.) More readily acted upon by chlorhydric acid than by solutions of the alkaline chlorides. (Mialhe, *Ibid.*, p. 185.)

*Prot*IODIDE OF MERCURY. Insoluble in water.
(*Biniodide of Mercury. Red Iodide of Mercury.*)
Hg I

(Ot. Gr.) Not sensibly soluble in water. (Dumas, *Tr.*) Water only dissolves traces of it. (Wittstein.) Soluble in 150 pts. of water at 15°. (Saladin, cited by Kremers, *Pogg. Ann.*, **85.** 248.) Soluble in hot alcohol. Soluble in 36 pts. of alcohol (Saladin); from the alcoholic solution water precipitates it. (N. E. Henry.) Soluble in 120 pts. of cold, and in 12 pts. of boiling alcohol. Very easily soluble in an aqueous solution of iodide of potassium. (Wittstein's *Handw.*) Very easily soluble in alcohol. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 389.) Sparingly soluble in ether. Soluble in 77 pts. of ether. (Saladin.) Soluble in fixed oils. (Parrish's *Pharm.*, p. 635.) Freely soluble in glycerin. (*Ibid.*, p. 236.) Insoluble in cold, soluble in hot caoutchin. (Himly.) Soluble in warm caprylene.

Insoluble in strong acetic acid. (Berthemot.) Soluble in chlorhydric, and nitric acids, with partial decomposition. Abundantly soluble in iodhydric acid, especially when this is hot; a portion of the iodide is precipitated from this solution on the addition of water, but an abundance of it still remains dissolved, no matter how large a quantity of water may have been added. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** 340.) Soluble in many dilute acids, as chlorhydric, iodhydric, &c.; also soluble in aqueous solutions of many ammoniacal salts, and in a solution of chloride of potassium. (Wittstein.) Easily soluble in an aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 316.) Speedily dissolved by a lukewarm aqueous solution of chloride of ammonium; also soluble in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.) Readily soluble in aqueous solutions of the alkaline chlorides, especially when these are hot. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 181.) Soluble in hot aqueous solutions of carbonate, and sulphate, of ammonia and in cold solutions of succinate and nitrate of ammonia, and chloride of ammonium.

Soluble in aqueous solutions of the iodides of potassium and of sodium; more readily in hot than in cold. When the solution of the alkaline iodide is concentrated 1 equivalent of it in hot solution can dissolve 3 equivalents of Hg I, but a portion of this separates immediately when the solution is cooled. Alcohol retards this precipitation, so that if a liquor containing more than 2 Hg I to 1 equiv. of alkaline iodide is poured into warm alcohol no precipitate forms on cooling until after the lapse of considerable time, and the spontaneous evaporation of a portion of the alcohol. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** pp. 346, 347, 350.) Solutions of the iodides of barium and strontium also dissolve protiodide of mercury more readily when hot than when cold, probably taking up 3 equivs. of Hg I in the former case. (*Ibid.*, p. 352.) Solutions of the iodides of calcium and magnesium also dissolve it, more abundantly when hot than when cold. (*Ibid.*, p. 253.) Abundantly soluble in a cold solution of iodide of zinc, and still more abundantly in a hot solution, 2 equivs. of Hg I to 1 equiv. of Zn I being dissolved in the last case. (*Ibid.*, p. 353.) Soluble in a cold solution of iodide of ammonium, and more abundantly in a hot solution, about 3 equivs. of Hg I being dissolved by 2 equivs. of NH_4I in the last case. (*Ibid.*, p. 354.) Abundantly soluble in hot aqueous solutions of the chlorides of potassium, sodium, and ammonium, but separates out again almost completely on cooling, and the trace of iodide which remains dissolved may be precipitated by diluting the solution with water. By direct experiment a solution containing 2 grms. of K Cl dissolved 1.166 grms. of Hg I. Also soluble in hot chlorhydric acid, and in a hot solution of protochloride of mercury (Hg Cl) with combination. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** pp. 346, 360, 364, 365.) Soluble in aqueous solutions of iodide of potassium, protochloride of mercury, and nitrate of protoxide of mercury. (Warington, *Ann. Ch. et Phys.*, (3.) **7.** 416.) Soluble in hot chlorhydric acid, and in a boiling aqueous solution of protochloride of mercury (Hg Cl). (Colin.) Somewhat soluble in an aqueous solution of protochloride of mercury (Hg Cl), and very easily soluble in an alcoholic solution thereof. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 389.) Soluble in aqueous solutions of the salts of protoxide of mercury as the nitrate, and acetate, or protochloride of mercury. Soluble in an aqueous solution of iodide of stibmethylium ($Sb(C_2H_3)_4I$), — the red modification being converted into the yellow before entering into solution.

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Very sparingly soluble in an aqueous solution of citrate of soda. (Spiller.) Soluble in an aqueous solution of hypochlorite of lime, the solution undergoing decomposition when boiled. (Rammelsberg.) Soluble in an aqueous solution of caustic potash. (Melsens, *Ann. Ch. et Phys.*, (3.) **26.** 222.) A solution of one grain of iodide of potassium in 6000 grains of water affords a manifest red precipitate on the addition of protochloride of mercury, but when dissolved in 10000 grains of water no cloudiness occurred. (Brandes, in *Berzelius's Lehrb.*)

II.) *acid.* Decomposed by water, with formation of *b*.

$a = HgI, 2HI$

$b = HgI, 4HI$ Soluble in water.

$c = HgI, 8HI$(?) Decomposed by water, with separation of some insoluble iodide of mercury. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** pp. 340 – 342.)

III.) *basic.* *Vid.* OxyIodide of Mercury.

*Bin*IODIDE OF MERCURY. HgI_2 Soluble in a warm aqueous solution of chloride of sodium, from which it crystallizes on cooling. (Hunt, in *Berzelius's Lehrb.*)

*Din*IODIDE with *protiodide* OF MERCURY. (*Yellow Iodide of Mercury.*) $Hg_2I; 2HgI = Hg_4I_3$ Insoluble in water or alcohol. Partially soluble in an aqueous solution of iodide of potassium, passing first to the diniodide which is then decomposed; in boiling solutions of the chlorides of sodium and ammonium, but more slowly than the diniodide, and in hot chlorhydric acid, though very slowly. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** pp. 360 – 363.)

*Prot*IODIDE OF MERCURY & OF *tetra*METHYLAMMONIUM.

I.) $N(C_2H_3)_4I; 2HgI$ Tolerably soluble in cold alcohol.

II.) $N(C_2H_3)_4I; 3HgI$ Decomposed by boiling water. Soluble in hot alcohol. (Risse.)

*Prot*IODIDE OF MERCURY & OF NICOTIN. $C_{20}H_{14}N_2, 2HI, 2HgI$ Sparingly soluble in cold, decomposed by hot water. Sparingly soluble in alcohol. (Bœdeker.)

*Prot*IODIDE OF MERCURY & OF POTASSIUM.

I.) $KI; HgI$(?) Soluble in water. After having been evaporated to dryness, and then treated with water, a small quantity of Hg I separates out at first, but this soon redissolves on agitation. (Boullay, *Ann. Ch. et Phys.*, (2.) **34.** 349.) [Compare No. II.]

II.) $KI; 2HgI + 3Aq$ Deliquescent. Soluble in alcohol. (v. Bonsdorff, *Pogg. Ann.*, 1829, **17.** 266.) Permanent in dry air. Decomposed by water, which retains in solution a compound of one equivalent of each of the iodides (= K I, Hg I), while one equivalent of Hg I separates. (Boullay.) This solution is rather one of the salt K I, 2 Hg I in iodide of potassium, for when evaporated it yields crystals of each of these salts. (Souville, *J. Pharm.*, **26.** 475; Labouré, *Ibid.*, (2.) **4.** 300. [Gm.].) Soluble, without alteration, in alcohol, and ether. Decomposed by acids. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** pp. 347 – 349.) Decomposed by water. Soluble in strong alcohol, and ether, without decomposition, and in strong acetic acid. (Berthemot.)

*Prot*IODIDE OF MERCURY & OF SODIUM.

I.) $NaI; HgI$ Deliquescent. Soluble in water, and alcohol. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** pp. 350, 351.) Soluble in ether.

II.) $NaI; 2HgI$ Soluble, with partial decomposition, in water. Also soluble in alcohol. (*Ibid.*) Soluble in ether.

IODIDE OF MERCURY & OF STIBETHYLIUM.

$a = Sb\{(C_4H_5)_4I; 3HgI$

$b = 2Sb\{(C_4H_5)_4I; 8HgI$

Insoluble in water or ether. Difficultly soluble in boiling alcohol.

IODIDE OF MERCURY & OF STIBMETHYL*tri*ETHYLIUM.

I.) $Sb\left\{\begin{matrix} C_2H_3 \\ (C_4H_5)_3 \end{matrix}\right. I; 2HgI$ Insoluble in water. Difficultly soluble in alcohol.

II.) $Sb\left\{\begin{matrix} C_2H_3 \\ (C_4H_5)_3 \end{matrix}\right\} I; 8HgI$ Insoluble in water. Sparingly soluble in alcohol, and ether. (Friedlænder.)

IODIDE OF MERCURY & OF STRONTIUM.

I.) $HgI; SrI$ Soluble in water, without decomposition. (Berthemot; Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** 352.)

II.) $SrI; 2HgI$ Incompletely precipitated by water, which dissolves out No. I., leaving protiodide of mercury. (Boullay, *Ibid.*)

IODIDE OF MERCURY & OF ZINC. Deliquescent. (Bonsdorff, *Pogg. Ann.*, **17.** 267.) Decomposed by water. (Boullay, *Ann. Ch. et Phys.*, (2.) **34.** 353.)

*Prot*IODIDE OF MERCURY with NICOTIN. $C_{20}H_{14}N_2; 2HgI$

*Prot*IODIDE OF MERCURY with NITRATE *of protoxide* OF MERCURY.

I.) $HgI; HgO, NO_5$ Decomposed by water and by alcohol. (Souville.)

II.) $2HgI; HgO, NO_5$ Permanent. Decomposed by boiling water, the nitrate being dissolved out. (Liebig.)

*Prot*IODIDE OF MERCURY with *proto*SULPHATE OF MERCURY. $HgI; HgO, SO_3$ Decomposed by water. Insoluble in alcohol. (Souville.)

*Prot*IODIDE OF MERCURY with STRYCHNINE. Difficultly soluble in water. (Abel & Nicholson, *J. Ch. Soc.*, **2.** 262.)

*Prot*IODIDE OF MERCURY with SULPHIDE OF ETHYL.

I.) $HgI; C_4H_5S$ Sparingly soluble in boiling, less soluble in cold alcohol. (Lori.)

*Prot*IODIDE OF MERCURY with SULPHIDE OF MERCURY. $HgI; 2HgS$ Insoluble.

*Prot*IODIDE OF MERCURY with SULPHIDE OF METHYL. $HgI; C_2H_3S$

IODIDE OF MESITYL. (*Iodhydrate of Mesitylene.*) C_6H_5I(?) Insoluble in water. (Kane.)

IODIDE OF METHYL. (*Methylic Iodide. Hydriodic Methyl-ether. Iodhydrate of Methylene.*) C_2H_3I Insoluble, or but sparingly soluble, in water. Easily soluble in wood-spirit, alcohol, and ether.

IODIDE OF METHYL*bromé*, &c. *Vid.* Iodide of BromoMethyl, &c.

*Prot*IODIDE OF *tetra*METHYLAMMONIUM. $N(C_2H_3)_4I$ Sparingly soluble in cold, more soluble in hot water. Much less soluble than its ethylic homologue. Almost insoluble in absolute alcohol. Insoluble in ether. Less soluble in alkaline liquors than in pure water.

*Ter*Iodide of *tetra*Methylammonium. Somewhat more readily soluble in spirit than the quinquiodide. (Weltzien.)
$N(C_2H_3)_4 . I_3$

*Quinqui*Iodide of *tetra*Methylammonium. Decomposed by boiling with water. Soluble in dilute alcohol. (Weltzien, *Ann. Ch. u. Pharm.*, **91**. 41.)
$N(C_2H_3)_4 . I_5$

*Dec*Iodide of *tetra*Methylammonium.
$N(C_2H_3)_4 . I_{10}$

*Ter*Iodide of *tri*MethylAmylammonium. Nearly insoluble in water. Easily soluble in alcohol. (R. Mueller.)
$N\left\{\begin{matrix}C_{10}H_{11}\\(C_2H_3)_3\end{matrix}\right. . I_3$

Iodide of *tri*MethylAmylPhosphonium. Extremely soluble in water; somewhat less soluble in alcohol, and still less soluble in ether.
$P\left\{\begin{matrix}C_{10}H_{11}\\(C_2H_3)_3\end{matrix}\right. . I$

Iodide of Methylene. Insoluble, or but sparingly soluble, in water. Soluble in alcohol. It is not attacked by potash-lye or by moderately concentrated boiling nitric acid. (Boutlerow, *Ann. Ch. et Phys.*, (3.) **53**. pp. 314 – 318.)
(*Protohydriodure de carbone*(of Sérullas).)
C_2H_2'', I_2

Iodide of Methyl*tri*Ethylammonium. Very soluble in water. Insoluble in alkaline liquors. (Hofmann.)
$N\left\{\begin{matrix}(C_2H_3)\\(C_4H_5)_3\end{matrix}\right. . I$

*Ter*Iodide of Methyl*tri*Ethylammonium.
$N\left\{\begin{matrix}C_2H_3\\(C_4H_5)_3\end{matrix}\right. . I_3$

Iodide of *di*Methyl*di*Ethylammonium. Easily soluble in water, and alcohol. (Petersen.)
$N\left\{\begin{matrix}(C_2H_3)_2\\(C_4H_5)_2\end{matrix}\right. . I$

*Ter*Iodide of *tri*MethylEthylammonium. Decomposed by water. Soluble in hot, less soluble in cold alcohol. (R. Mueller.)
$N\left\{\begin{matrix}(C_2H_3)_3\\C_4H_5\end{matrix}\right. . I_3$

*Quinqui*Iodide of *tri*MethylEthylammonium. [Soluble in water?]
$N\left\{\begin{matrix}(C_2H_3)_3\\C_4H_5\end{matrix}\right. . I_5$

Iodide of Methyl*di*EthylAmylammonium. Readily soluble in water.
$N\left\{\begin{matrix}(C_2H_3)\\(C_4H_5)_2\\C_{10}H_{11}\end{matrix}\right. . I$

Iodide of MethylEthylAmylPhenylammonium. Soluble in water. (Hofmann.)

Iodide of MethylEthylConiinammonium. Readily soluble in water, and alcohol; much more soluble in these liquids when they are hot than when cold. Insoluble in ether or cold alkaline liquors. Soluble in a boiling solution of caustic potash, with partial decomposition; from this solution it is deposited on cooling. (v. Planta & Kekulè, *Ann. Ch. u. Pharm.*, **89**. 187.)
$N\left\{\begin{matrix}C_{16}H_{14}''\\C_2H_3\\C_4H_5\end{matrix}\right. . I$

Iodide of Methyl*di*Ethylene*di*Phenyl*bi*ammonium. Soluble in boiling water, and in dilute spirit.
$C_{34}H_{21}N_2I = N_2\left\{\begin{matrix}C_2H_3\\(C_4H_4)_2\\(C_{12}H_5)_2\end{matrix}\right. . I$

Iodide of Methyl*tri*EthylPhosphonium.
$P\left\{\begin{matrix}C_2H_3\\(C_4H_5)_3\end{matrix}\right. . I$

Iodide of *tri*MethylEthylPhosphonium. Readily soluble in boiling, less soluble in cold water.
$P\left\{\begin{matrix}(C_2H_3)_3\\C_4H_5\end{matrix}\right. . I$

Iodide of MethylLepidin.
$C_{22}H_{12}NI = N\left\{\begin{matrix}C_{20}H_9'''\\C_2H_3\end{matrix}\right. . I$

Iodide of MethylLutidin. Extremely soluble in water, and alcohol. Almost insoluble in ether.
$N\left\{\begin{matrix}C_{14}H_9'''\\C_2H_3\end{matrix}\right. . I$

Iodide of MethylNicotin. Very easily soluble in water; less easily soluble in alcohol. Nearly insoluble in ether. (Stahlschmidt, *Ann. Ch. u. Pharm.*, **90**. 223.)
$N\left\{\begin{matrix}C_{10}H_7'''\\C_2H\end{matrix}\right. . I$

Iodide of *tetra*MethylPhosphonium. Readily soluble in alcohol.
$P(C_2H_3)_4 . I$

Iodide of *di*MethylPiperylammonium. Soluble in alcohol. (Cahours.)
$N\left\{\begin{matrix}C_{10}H_{10}''\\(C_2H_3)_2\end{matrix}\right. . I$

Iodide of MethylQuinolein.
$N\left\{\begin{matrix}C_{18}H_7'''\\C_2H_3\end{matrix}\right. . I$

Iodide of MethylSelenious Acid.
$C_2H_4ISe_2O_5 = Se_2(C_2H_3)O_4, I + Aq$

Iodide of MethylThialdin. Soluble in water, and alcohol. Insoluble in ether. Ether precipitates it from the alcoholic solution; and it separates from the aqueous solution in the cold, on addition of a solution of caustic potash. (Hofmann, *J. Ch. Soc.*, **10**. 195.)
$N\left\{\begin{matrix}C_{12}H_{12}S_4'''\\C_2H_3\end{matrix}\right. . I$

Iodide of MethylTungsten. Insoluble in water. Tolerably soluble in alcohol; and still more soluble in ether. (Riche, *Ann. Ch. et Phys.*, (3.) **50**. 74.)
$8(C_2H_3)W, I$

*Prot*Iodide of Molybdenum(*hydrated*). Similar to the soluble protochloride. (Berzelius.)
MoI

*Bin*Iodide of Molybdenum(*hydrated*). Perfectly soluble in water. (Berzelius.)
MoI_2

Iodide of Nickel.

I.) NiI, & $+ 6 Aq$ Very deliquescent. Soluble in water. (Erdmann.)

II.) *basic*. Insoluble in water.

Iodide of Nickel*bi*amin.
$N_2\left\{H_6 . Ni, I\right.$

Iodide of Nickel*ter*amin. Very difficultly soluble in water. Soluble in ammonia-water, in which solution alcohol produces a precipitate. (Erdmann.)
(*AmmonioIodide of Nickel.*)
$N_3\left\{H_9 . Ni, I\right.$

*Prot*Iodide of Nitrogen.

I.) NI Deliquescent. Soluble in water. Slowly soluble in absolute alcohol; more readily soluble in spirit. (Erdmann.) "Iodide of nitrogen" is readily soluble in an aqueous solution of ethylamin; this solution becomes turbid when treated with a small quantity of water, but clears up again when a large amount of water is added. (Gilm.)

II.) $NI + 6 Aq$ Deliquescent. Soluble in water. The solution is capable of dissolving much iodine. (Erdmann.)

*Ter*Iodide of Nitrogen. Gradually soluble, with decomposition, in water.
NI_3

Iodide of NitroHarmin. Almost insoluble in cold water, alcohol, or ether.
$N_2\left\{C_{26}H_{11}(NO_4)O_2^{vi}\right\}I_2$

Iodide of Octyl. Insoluble in water. Sparingly soluble in cold, more soluble in boiling alcohol. (Bouis, *Ann. Ch. et Phys.*, (3.) **44**. 131.)
(*Iodide of Capryl. IodCapryl. CaprylIodhydricEther.*)
$C_{16}H_{17}, I$

Iodide of Pallad(*ious*)*bi*amin. Decomposes in the air. Easily soluble in water.
$N_2\left\{H_6 . Pd', I\right.$

Iodide of Pallad(*ious*)ammonium. Permanent when dry.
$N\left\{\begin{matrix}H_3\\Pd'\end{matrix}\right., I$

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Iodide of Palladium. Insoluble in water, $Pd\,I$ alcohol, ether, or an aqueous solution of iodide of potassium. (Lassaigne.) Partially soluble in an aqueous solution of iodide of potassium. (H. Rose, *Tr.*) 1 pt. of iodide of potassium, when added to chloride of palladium, in presence of 5000 pts. of water, produces an immediate precipitate; with 50000 pts. of water a few flakes of Pd I separate after a while; with 500000 pts. of water no precipitate is produced (Baumann); with 400000 pts. of water a brown coloration is produced at once, and black flakes separate when the mixture is allowed to stand during 20 hours. (Lassaigne.) Permanent. Insoluble in water. Slightly soluble in solutions of various salts (as chloride of sodium, chloride of magnesium, chloride of calcium, etc.). Insoluble in dilute chlorhydric acid. (Fresenius, *Quant.*, p. 165.) Sparingly soluble in hot concentrated nitric acid. Soluble in aqueous solutions of sulphurous acid, chlorine, bromine, iodine, and cyanogen; also in solutions of cyanhydric acid and the metallic cyanides. Insoluble in dilute sulphuric, chlorhydric, phosphoric, nitric, or acetic acids, or in the normal potash, soda, or ammonia salts of these acids. Insoluble in aqueous solutions of the chlorides of calcium or zinc or of acetate of lead. Insoluble in an aqueous solution of bromide of sodium, excepting when heated therewith in presence of a free mineral acid, but not in presence of acetic acid. Insoluble in solutions of sugar, starch, uric acid, alcohol, ether, or oil of lemon. Somewhat soluble in urine. Easily soluble in ammonia-water, even dilute, with evolution of heat and decomposition. (Kersten, *Ann. Ch. u. Pharm.*, **87.** pp. 28, 32.)

Iodide of Palladium & of Potassium. (*IodoPalladite of Potassium.*) Deliquescent.

Iodide of Phenyl.
$C_{12}\,H_5, I$

Iodide of Phosphorus.

I.) $P\,I_2$ Decomposed by water. Easily soluble in bisulphide of carbon. (Corenwinder, *Ann. Ch. et Phys.*, (3.) **30.** 245.) "Iodide of phosphorus" is sparingly soluble in caoutchin. (Himly.)

II.) $P\,I_3$ Very deliquescent. Decomposed by water, with solution. Very soluble in bisulphide of carbon. (Corenwinder, *loc. cit.*, p. 249.)

Iodide of Piperin. Soluble in alcohol.
$C_{68}\,H_{38}N_2\,I_2\,O_{12} = 2\left(N\left\{\begin{matrix}C_{10}\,H_{10}'' \\ C_{34}\,H_9\,O_6\end{matrix}\right.\right), I_2$

Iodide of Platin(*ous*)*bi*amin. (*Iodhydrate of diPlatosobiamin. Ammonio protIodide of Platinum.*) $N_2\left\{H_6 . Pt'_2, I\right.$ Soluble in water, but the solution is decomposed on boiling, iodide of platin(*ous*)ammonium being deposited. (Reiset, *Ann. Ch. et Phys.*, (3.) **11.** 425.)

Iodide of Platin(*ous*)ammonium. (*Iodide of Platosammonium.*) *yellow modif.* $N\left\{\begin{matrix}H_3 \\ Pt\end{matrix}\right., I$ Very sparingly soluble in water. Easily soluble in ammonia-water, with formation of iodide of platin(*ous*)*bi*amin. (Reiset, *Ann. Ch. et Phys.*, (3.) **11.** 425.)

***Prot*Iodide of Platinum.** Permanent. Insoluble $Pt\,I$ in water or alcohol. A cold aqueous solution of iodhydric acid of 1.038 sp. gr. gradually decomposes it, biniodide of platinum being dissolved out and metallic platinum left behind. A hot aqueous solution of iodide of potassium acts upon it in a similar manner. It is not acted upon by concentrated sulphuric, chlorhydric, or nitric acids, but is gradually decomposed by solutions of the caustic alkalies. (Lassaigne, *Ann. Ch. et Phys.*, 1832, (2.) **51.** pp. 118–121.)

***Sesqui*Iodide of Platinum?** Unacted upon $Pt_2\,I_3$ by water, alcohol, or ether; or by cold sulphuric, chlorhydric, or nitric acids. Soluble in iodhydric acid and in an aqueous solution of iodide of potassium, also in a solution of caustic potash; and in aqua-regia, with decomposition. (Kane.)

***Bin*Iodide of Platinum.**

I.) *normal.* Insoluble in cold or hot water. $Pt\,I_2$ Slightly soluble in alcohol of 88%, but the alcoholic solution is decomposed by evaporation. Neither dissolved nor decomposed by acids, but is slowly converted into the bichloride by the action of aqua-regia and of chlorine-water. Also dissolved by iodhydric acid, and by aqueous solutions of the basic iodides, with combination. (Lassaigne, *Ann. Ch. et Phys.*, 1832, (2.) **51.** pp. 122–129.)

II.) *acid.* Hygroscopic. Very easily soluble $Pt\,I_2, H\,I$ in water. (Lassaigne, *loc. cit.*) When diluted with a very large quantity of water, and especially if the dilute solution be exposed to sunlight, biniodide of platinum is deposited after a while.

***Bin*Iodide of Platinum with Iodide of *X*.** *Vid.* IodoPlatinate of *X*.

***Bin*Iodide of Platinum with Oxide of Platin(*ic*)*bi*amin.** $Pt\,I_2 ; N_2\left\{H_6 . Pt, O_2\right.$ Insoluble in water. (Kane, *Phil. Trans.*, 1842, p. 299.)

Iodide of Plumbammonium. (*AmmonioIodide of Lead.*) $N\left\{\begin{matrix}H_3 \\ Pb\end{matrix}\right. I$ Decomposed by water. (Laboure.)

Iodide of $\frac{3}{2}$ PlumbEthyl. Soluble in ether, the solution undergoing decomposition on being evaporated.

Iodide of Potassium. Deliquesces in very $K\,I$ moist air. Very easily soluble in water, with reduction of temperature.

Soluble in	0.735	pt. of water at	12.5°	
"	0.709	"	16°	(Baup.)
"	0.700	"	18°	
"	0.450	"	120°	(boiling-point of the saturated aqueous solution.) (Gay-Lussac.)

Or, 100 pts. of water at	12.5°	dissolve	136	pts. of it.	
"	16°	"	141	"	(Baup.)
"	18°	"	148	"	
"	120°	"	221	"	(Gay-Lussac. [*T.*].)

Soluble in	0.79	pts. of water at	0°
"	0.70	"	20°
"	0.63	"	40°
"	0.57	"	60°
"	0.53	"	80°
"	0.51	"	100°

the saturated aqueous solution boiling at 119°. (Kremers, *Pogg. Ann.*, **97.** pp. 15, 20.) Soluble in 0.727 pt. of water, at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, from Canstatt's *Jahresbericht, für* 1854, p. 76.)

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An aqueous solution of sp. gr., at 19.5°, (sp. gr. of water at 19.5° = 1)	Contains per cent of K I	Contains Pts. of K I dissolved in 100 pts. of water.
1.1494	18.073	22.06
1.2916	31.586	46.17
1.4480	43.529	77.08
1.5960	52.855	112.11
1.7105	58.996	143.88

(Kremers, *Pogg. Ann.*, **95.** 120. The second column is from Gerlach's *Sp. Gew. der Salzlœsungen*, p. 33.)

An aqueous solution of sp. gr. (at 21°)	Contains (by experiment) per cent of K I.
1.0380	5.005
1.0789	10.01
1.1232	15.01
1.1713	20.02
1.2786	30.02
1.4829	45.04

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 340.)

From these results Schiff calculates the following table by means of the formula

$$D = 1 + 0.007513\, p + 0.0000342\, p^2 + 0.0000008231\, p^3 ;$$

in which D = the sp. gr. of the solution and p the percentage of substance in the solution.

An aqueous solution of sp. gr. (at 21°)	Contains per cent of K I.	An aqueous solution of sp. gr. (at 21°)	Contains per cent of K I.
1.0075	1	1.2899	31
1.0151	2	1.3017	32
1.0227	3	1.3138	33
1.0305	4	1.3262	34
1.0384	5	1.3389	35
1.0464	6	1.3519	36
1.0545	7	1.3653	37
1.0627	8	1.3791	38
1.0710	9	1.3933	39
1.0793	10	1.4079	40
1.0877	11	1.4224	41
1.0962	12	1.4371	42
1.1048	13	1.4520	43
1.1136	14	1.4671	44
1.1226	15	1.4825	45
1.1318	16	1.4982	46
1.1412	17	1.5142	47
1.1508	18	1.5305	48
1.1605	19	1.5471	49
1.1705	20	1.5640	50
1.1807	21	1.5810	51
1.1911	22	1.5984	52
1.2016	23	1.6162	53
1.2122	24	1.6343	54
1.2229	25	1.6528	55
1.2336	26	1.6717	56
1.2445	27	1.6911	57
1.2556	28	1.7109	58
1.2699	29	1.7311	59
1.2784	30	1.7517	60

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 75.)

Soluble in 5.5 pts. of alcohol of 0.85 sp. gr. at 12.5°, and in 39 @ 40 pts. of absolute alcohol at 13.5°; a much larger quantity is dissolved by hot alcohol, from which solution it is deposited in needles on cooling. (Baup.) Soluble in commercial acetate of ethyl. (Casaseca, *C. R.*, 1850, **30.** 821.) Insoluble in strong acetic acid. (Berthemot.) Freely soluble in glycerin. (Parrish's *Pharm.*, p. 236.) An aqueous solution of iodide of potassium is capable of dissolving a considerable amount of iodine. (See under Iodine.)

Iodide of Potassium & of Silver.

I.) $KI; AgI$ Soluble in hot alcohol, from which it crystallizes on cooling. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** 379.)

II.) $2KI; AgI$ Decomposed by water, which dissolves out iodide of potassium, leaving iodide of silver. (Boullay, *Ibid.*, 377.)

Iodide of Potassium & of Tin. $KI; 2SnI$ When treated with a small quantity of water iodide of potassium dissolves, while iodide of tin remains; but when added in larger quantity, water dissolves it completely. More soluble in warm than in cold alcohol. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** 374.)

Iodide of Potassium & of Zinc. $KI, 2ZnI$ Very deliquescent.

Iodide of Potassium with Oil of Cinnamon and Iodine. $6C_{18}H_8O_2; 3I, KI$ Easily soluble in cold water. (Oswald.) Decomposed by water at ordinary temperatures, more slowly at 0°. (Apjohn, Despau.) Easily soluble in alcohol, and ether. (Apjohn, Oswald.)

Iodide of Propylene.
(*Iodide of Tritylene.*)
C_6H_6'', I_2

Iodide of Pteleyl. *Vid. ter*IodoMesitylene.

*Sesqui***Iodide of Ruthenium.** Ru_2I_6 Ppt. (Claus, *Beiträge*, p. 32.)

Iodide of Salicyl. *Vid.* IodoSalicylous Acid.

Iodide of SelenEthyl. $C_4H_5\dot{Se}, I$ Readily soluble in ammonia-water.

Iodide of Silver. AgI When prepared in the moist way, it is insoluble in water or in dilute nitric acid, and scarcely at all soluble in ammonia-water. Somewhat difficultly decomposed by hot concentrated nitric or sulphuric acid. (Fresenius, *Quant.*, p. 165.) Soluble in concentrated aqueous solutions of the chlorides of potassium and sodium; of nitrate of protoxide of mercury. (Preuss; Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 317); and of nitrate of silver, if it be hot and concentrated. Very slightly soluble in ammonia-water. (H. Rose.) Soluble in 2510 pts. of ammonia-water of 0.96 sp. gr. (Martini.) Soluble in an aqueous solution of cyanide of potassium. (Liebig.) Completely soluble, with combination, in a cold, and still more readily in a hot, aqueous solution of iodide of potassium; but one equivalent of the alkaline iodide does not appear to be capable of dissolving more than a single equivalent of it. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** 377.) Abundantly soluble in aqueous solutions of the iodides of the alkalies and alkaline earths. (Wittstein's *Handw.*) Only very sparingly soluble in aqueous solutions of the soluble hyposulphites. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 397.) Soluble in a tolerably concentrated aqueous solution of nitrate of silver. (Bineau, *Ann. Ch. et Phys.*, (3.) **7.** 267.) Easily soluble in iodhydric acid when this is not too dilute. When the solution is concentrated by evaporation, 4 equivs. of iodine to 1 equiv. of the acid may be contained in it. This solution is decomposed by boiling and when diluted with water. (Bineau, *Ibid*, pp. 267, 274.) Decomposed by concentrated sulphuric and nitric acids. Insoluble in dilute sulphuric, phosphoric (Brandes), or nitric acids. Readily soluble in an aqueous solution of caustic potash, especially if it be hot; from this solution

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it is precipitated on the addition of water or alcohol. Sparingly soluble in [an aqueous solution of ?] pyrophosphate of ethyl. ($2\,C_4H_5O, PO_5$). A precipitate is formed when iodide of potassium is added to the solution of a silver salt, even when 30000 pts. of water are present. (Harting.)

Iodide of Silver with **Nitrate** *of protoxide* **of Mercury.** Decomposed by water. (Preuss.)
$2\,AgI; 2(HgO, NO_5) + Aq$

Iodide of Silver with **Nitrate of Silver.** Decomposed by water. Neither decomposed nor dissolved by absolute alcohol. Its only solvent appears to be a concentrated aqueous solution of nitrate of silver. (Preuss; compare Weltzien, *Ann. Ch. u. Pharm.*, **95.** 127.)
$AgI; 2(AgO, NO_5)$

Iodide of Sodium.

a = anhydrous. Deliquesces in moderately moist air. 100 pts. of water dissolve 173 pts. of it at 14°. (Dumas, *Tr.*, **6.** 228.)
NaI

Soluble in	pt. of water at
0.63	0°
0.56	20°
0.48	40°
0.39	60°
0.33	80°
0.32	100°
0.31	120°
0.30	140°

(Kremers, *Pogg. Ann.*, **97.** 14.) The saturated aqueous solution boils at 141°. (*Ibid.*, p. 20.)

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.1752	24.5
1.3362	50.2
1.4962	79.4
1.6659	115.6
1.8047	149.7

(Kremers, *Pogg. Ann.*, **103.** 67.) Very sparingly soluble in alcohol. (Gmelin.) Soluble in dilute alcohol. (Girault.) Soluble in alcohol. (Parrish's *Pharm.*, p. 481; Berzelius's *Lehrb.*, **3.** 215.) Soluble in commercial acetate of ethyl. (Casaseca, *C. R.*, 1850, **30.** 821.)

b = hydrated. Effloresces in dry air; deliquesces like the anhydrous salt in moist air. The crystals dissolve in 0.6 pt. of cold water. (Gay-Lussac.)
$NaI + 4\,Aq$

***Bin*Iodide of Sodium.** Soluble in water; this solution gives off iodine more readily than that of biniodide of potassium.
NaI_2

Iodide of Sodium & of Tin. Very soluble. When treated with a small quantity of water the iodide of sodium dissolves out, leaving the iodide of tin; but in a larger quantity of water it dissolves completely. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** 375.)
$NaI, 2\,SnI$

Iodide of Sodium & of Zinc. Deliquescent.
$NaI, ZnI + 8\,Aq$

Iodide of Spiroyl. *Vid.* IodoSalicylous Acid.

Iodide of Stann(*ous*)*bi*Amin.
(*AmmonioprotIodide of Tin.*)
$N\left\{H_6 . Sn, I\right.$

Iodide of StannAmyl.

Iodide of *bi*StannAmyl.

Iodide of $\frac{2}{3}$ StannAmyl.

Iodide of $\frac{3}{2}$ StannAmyl.

Iodide of $\frac{4}{2}$ StannAmyl. Soluble in ether.
$(C_{10}H_{11})_4Sn_2I$

Iodide of StannEthyl. Sparingly soluble in cold, decomposed by boiling water. More soluble in cold alcohol, and still more soluble in ether. It is readily soluble in boiling alcohol. (Frankland.)
C_4H_5SnI

***Din*Iodide of StannEthyl.**
$Sn_2(C_4H_5)_2 . I$

Iodide of *di*StannEthyl. Sparingly soluble in water.
$C_4H_5Sn_2I$

Iodide of *di*Stann*tri*Ethyl. Very sparingly soluble in water. Readily soluble in dilute spirit. Miscible in all proportions with alcohol, and ether.
$(C_4H_5)_3Sn_2I$

Iodide of *tetra*Stann*quinqui*Ethyl. Similar to the $\frac{3}{2}$ compound.
$(C_4H_5)_5Sn_4I$

Iodide of *tetra*Stann*tri*Ethyl. Insoluble in water. Readily soluble in alcohol, and ether; less easily, however, than the $\frac{4}{4}$ compound. (Lœwig.)
$(C_4H_5)_3Sn_4I$

Iodide of *tetra*StannEthyl. Completely insoluble in water. Easily soluble in alcohol, and ether. (Lœwig.)
$C_4H_5Sn_4I$

Iodide of StannMethyl. Tolerably soluble in water. More soluble in alcohol. Soluble in all proportions in ether. It is much more soluble in all these vehicles than its ethylic homologue. (Cahours & Riche.)
C_2H_3SnI

Iodide of *di*StannMethyl.
$(C_2H_3Sn)_2I$

Iodide of Stib*tri*Amyl. Insoluble in water. Soluble in alcohol, and ether.
$(C_{10}H_{11})_3Sb . I_2$

Iodide of Stib*tri*Ethyl.

I.) $(C_4H_5)_3Sb . I_2$ Soluble in water, without decomposition. Easily soluble in alcohol, and ether. (Lœwig & Schweizer.)

II.) (*Merck's iodide.*) Permanent. Soluble in water, and alcohol. (Merck.)
$(C_4H_5)_3Sb . I$

Iodide of Stib*tri*Ethyl & of ZincEthyl. Soluble in water, and alcohol. (J. P. Cooke, *Mem. Amer. Acad.*, 1855, (N. S.) **5.** 345.)
$Sb(C_4H_5)_3 . I; 2(Zn(C_4H_5) . I)$

Iodide of StibEthylium.

I.) $Sb\left\{(C_4H_5)_4I, \& + 8\,Aq, \& 1\tfrac{1}{2}\,Aq\right.$ Easily soluble in water, and alcohol. (Landolt.) 100 pts. of water at 20° dissolve 19.01 pts. of the anhydrous salt; or, 1 pt. of it is soluble in 5.26 pts. of water at 20°; still more easily soluble in absolute alcohol, but less easily soluble in ether. (Lœwig.)

Iodide of StibMethyl*tri*Ethylium. Soluble in 2 pts. of water at 20°. Easily soluble in alcohol. Insoluble in ether. (Friedlænder.)
$Sb\left\{\begin{matrix}C_2H_3\\(C_4H_5)_3\end{matrix}\right. . I$

Iodide of StibMethylium. Soluble in 3.3 pts. of water at 23°. Very soluble in alcohol. Sparingly soluble in ether. (Landolt.)
$Sb\left\{(C_2H_3)_4 . I\right.$

Iodide of Strontium. Readily soluble in water. (Gay-Lussac.)
SrI

Soluble in	pt. of water at
0.61	0°
0.56	20°
0.51	40°
0.40	70°
0.27	100°

(Kremers, *Pogg. Ann.*, **103.** 66.)

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An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.2160	27·5
1.4329	58.4
1.6269	89.9
1.8349	127.9
1.9725	156.9

(Kremers, *Pogg. Ann.*, **103.** 67.)

Iodide of Strontium & of Tin (Sn I). "Very soluble." (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** 376.)

Iodide of Sulphur. Insoluble in water. Decomposed by alcohol, which dissolves out the iodine. Sparingly soluble in cold caoutchin, the solution decomposing when boiled.

Freely soluble in glycerin. (Parrish's *Pharm.*, p. 236.)

Iodide of TellurEthyl. Sparingly soluble in water. Readily soluble in hot alcohol. Soluble in ammonia-water.
$C_4 H_5 Te, I$

*Prot***Iodide of Tellurium.** Unacted upon by water, even when this is boiling. (Berzelius.)
$Te I$

*Bin***Iodide of Tellurium.**
(*Iodotelluric Acid.*)

I.) $Te I_2$ Scarcely at all acted upon by cold water. Partially soluble, with decomposition, in boiling water, and in alcohol, even absolute. Soluble in iodhydric acid; but only slightly soluble in aqueous solutions of the alkaline iodides. (Berzelius.)

II.) *basic.* Insoluble in water, and does not appear to be decomposed thereby. (Berzelius's *Lehrb.*)

*Ter***Iodide of Tellurium.** Slowly and sparingly soluble in water.

*Bin***Iodide of Tellurium** with **Iodide of** *X*. *Vid.* IodoTellurate of *X*.

Iodide of TellurMethyl. Sparingly soluble in cold, much more soluble in warm water. Readily soluble in boiling, less soluble in cold alcohol. (Wœhler & Dean, *Ann. Ch. u. Pharm.*, **93.** 237.)
$C_2 H_3 Te I$

Iodide of Tetryl. *Vid.* Iodide of Butyl.

*Prot***Iodide of Tin.** Sparingly soluble, without decomposition, in water. (Henry.) More soluble in hot than in cold water; also soluble in aqueous solutions of protochloride of tin and of the iodides of potassium, sodium, ammonium, barium, and strontium, with combination, forming easily soluble salts. (Boullay, *Ann. Ch. et Phys.*, 1827, (2.) **34.** pp. 372-376.) Insoluble in an aqueous solution of iodide of potassium. Readily soluble in chlorhydric acid, and in an aqueous solution of caustic potash. (H. Rose, *Tr.*)
(*Iodo Stannous Acid.*)
$Sn I$

*Bin***Iodide of Tin.** Decomposed by water. (Henry.) Soluble in absolute alcohol; from which solution water precipitates it. (Dœbereiner.)
(*Iodo Stannic Acid.*)
$Sn I_2$

Iodide of Toluenyl.
(*Iodide of Benzyl. Iodhydrate of Benzylene. Iodhydrate of Benzene.*)
$C_{14} H_7 I$

Iodide of Tritylene. *Vid.* Iodide of Propylene.

*Prot***Iodide of Uranium.** Soluble in water. (Rammelsberg.)
$Ur I$

Iodide of Valeryl.
$C_{10} H_9 O_2, I$

*Bin***Iodide of Vanadium.** Soluble in water.
$V I_2$

Iodide of Yttrium. Deliquescent. Very soluble in water, with evolution of heat. Slightly soluble in alcohol. (Berlin.)
$Y I$

Iodide of Zinc. Very deliquescent. Soluble in water, and alcohol. Soluble in an aqueous solution of carbonate of ammonia. (Parrish's *Pharm.*, p. 533.)
$Zn I$

An aqueous solution of sp. gr. (at 19.5°)	Contains pts. of the anhydrous salt dissolved in 100 pts. of water.
1.1715	21.5
1.3486	46.4
1.5780	85.0
1.7815	126.3
1.9906	177.9
2.1853	232.0

(Kremers, *Pogg. Ann.*, **104.** 156; & **106.** 587.)

II.) *basic.* *Vid.* OxyIodide of Zinc.

Iodide of Zinc with **Nitrate of Potash.** Permanent. Easily soluble in water. Insoluble in alcohol. (Anthon, in *Berzelius's Lehrb.*, 3. 676.)

Iodide of Zinc*bi***amin.** Decomposed by water. Readily soluble in ammonia-water. (Rammelsberg.)
(*AmmonioIodide of Zinc.*)
$N_2 \} H_6 . Zn, I$

Iodide of Zinc*ter***amin.** Decomposed by water. Soluble in ammonia-water.
$N_3 \} H_9 . Zn, I$

Iodine. Very slightly soluble in water. (Gay-Lussac, *Ann. de Chim.*, **91.** 7. [T.].) Soluble in 7000 pts. of water. In 3800 pts. of water at 15° (Basse, assistant of Otto, see *Otto's Lehrb.*); in 500 pts. of water at 20° (Jacquelain); in 7196.4 pts. at 18.75° (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.)
I

Soluble in 10 @ 12 pts. of alcohol. (Wittstein's *Handw.*) Readily and abundantly soluble in alcohol. (Vauquelin.) The alcoholic solution gradually undergoes decomposition (Colin, Le Royer); iodine is precipitated from it on the addition of water. (Vauquelin.) Very soluble in ether, and chloroform; also in bromoform.

Soluble in wood-spirit (Playfair); abundantly in fusel-oil (hydrate of amyl). (Pelletan, Trantwein); and very readily in caprylic alcohol (hydrate of capryl). (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 103.) Abundantly soluble in hot, less soluble in cold naphtha. (Pelletier & Walter.) Soluble in about 8 pts. of hot rock-oil (from Amiano). (De Saussure.) Sparingly soluble in cold, more soluble in hot benzin. (Mansfield.) Readily soluble in benzin. (Moride, *Ann. Ch. et Phys.*, (3.) **39.** 452.) Readily soluble in cold oil of turpentine (Deville); but a violent explosion soon occurs. (Walker.) Soluble in oil of mandarin (Luca); in oil of arnica-root. (Zeller.) Very soluble in bisulphide of carbon; in lignone; in furfurol (Stenhouse); in hydride of valeryl (Trautwein); in caprylene (Bouis). Readily soluble in glycerin, without decomposition. (Pelouze.) Soluble in aldehyde (Liebig); in chloral; in warm retinole; in toluene, and in salicylous acid, without decomposition (Lœwig); in nitrate of ethyl; in salicylate of methyl; in butylic mercaptan (butylsulphydric acid); in cold sulphocarbamate of amyl (Johnson); largely in sulphydrate of ethyl (Zeise). Abundantly soluble in iodide of allyl (Berthelot & De Luca); in xanthic ether (disulphocarbonate of ethyl); in "protochloride

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of carbon" ($C_4\ Cl_4$) at ordinary temperatures (Faraday); in chloride of sulphur (Solly); in chloride of iodine "to a certain extent" (Pelouze & Fremy, *Tr.*); in Gladstone's sulphoperChloride of Phosphorus ($P\ S_4\ Cl_5$); in ($P\ H\ Cl_5,\ 2\ S\ O_2$) (Pelouze & Fremy); in pentasulphide of hydrogen; and in chlorochromic acid, without causing this to decompose. (Walter.) Readily soluble in valerate of amyl; and in valerianic acid, from which it is precipitated on the addition of water. (Trautwein.) Readily soluble in cold creosote. (Reichenbach.) Soluble in warm butyric acid; separating out again as the solution cools. (Pelouze & Gélis, *Ann. Ch. et Phys.*, (3.) **10.** 450.) Easily soluble in anilin, with subsequent decomposition. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 162.) Also soluble in ("leukol") quinolein. (*Ibid.*, p. 175.) Soluble, without alteration, in methylsalicylic acid. (Lœwig?) Soluble in oil of winter-green (methylsalicylic acid). (Cahours, *Ann. Ch. et Phys.*, (3.) **10.** 330.) Iodine is quickly soluble in the essential oils of dill (*oleum anethi*); of peppermint (*ol. menthæ crispæ* & *ol. menthæ piperitæ*); of sassafras (*ol. sassafras cort.*); and of tansy (*ol. tanaceti*); slowly soluble in oil of cinnamon (*ol. cassiæ*); oil of cloves (*ol. caryophylli*); oil of cajeput (*ol. cajeputi*); and oil of rue (*ol. rutæ*); it is decomposed by most of the other essential oils. (Parrish's *Pharm.*, p. 347.) Of the "empyreumatic oils," oil of amber (*ol. succini*) dissolves it slowly, as does also *oleum asphalti*; it is insoluble in *oleum petræ*. (*Ibid.*, p. 346.) Abundantly soluble, with combination, in caoutchin. (Himly.)

Soluble in iodhydric acid, even when this is dilute; and in aqueous solutions of those metallic iodides which are soluble in water. A solution of iodide of potassium, containing one part of the iodide in every one or two parts of water, can dissolve 2 parts of iodine, on adding more water to this solution some iodine is precipitated. On exposure to the air iodine is slowly evolved from these solutions, and when heated they readily give off iodine. (Baup.) Much more soluble in water charged with bromhydric acid than in pure water; but nevertheless, 10-hydrated bromhydric acid only dissolves 3 @ 4 % of it. (Bineau, *Ann. Ch. et Phys.*, (3.) **7.** 265.) Slightly soluble in chlorhydric acid.

Soluble in a dilute aqueous solution of sulphurous acid, with formation of iodhydric and sulphuric acids, water being decomposed; but when only a small quantity of water is present this solution does not occur, concentrated solutions of iodhydric acid and sulphuric acid mutually decomposing each other, with precipitation of iodine and evolution of sulphurous acid. Even when the solution of iodine in sulphurous acid is simply concentrated by evaporation iodine may be reprecipitated, while sulphurous acid is again formed and evolved. (Selmi, *L'Institut* (Section I.), 1844, **12.** 7.) As a rule, water which contains in solution salts, like chloride of ammonium or nitrate of ammonia, dissolves much more iodine than pure water.

Soluble, without alteration, in an aqueous solution of normal croconate of potash. (L. Gmelin.) When an excess of iodine is boiled in a very dilute aqueous solution of protochloride of mercury, a quantity of it dissolves; and on cooling this solution crystals separate out, the mother liquor from which still contains much iodine. (Selmi, *L'Institut* (Section I.), 1844, **12.** pp. 6, 412.) When a mixture of iodine and powdered arsenious acid is boiled with much water, the iodine dissolves, together with the arsenious acid, iodhydric and arsenic acids being formed. On concentrating this solution iodine is set free; and on the addition of chlorhydric acid iodine is precipitated. If, on the other hand, concentrated syrupy solutions of arsenic acid and of iodhydric acid are mixed, iodine is precipitated at once, and arsenious acid formed; but if this mixture is now turned into a large quantity of water the iodine rapidly dissolves, a solution behaving like that first mentioned being obtained. Hence, in presence of a small quantity of water, arsenic and iodhydric acids decompose each other; while in presence of much water they are recomposed. The precipitation of iodine by chlorhydric acid in the foregoing experiment appears to depend upon the affinity of the acid for water, the latter being thus removed, and the solution, as it were, rendered more concentrated. (Selmi, *loc. cit.*, p. 7.) A solution prepared by dissolving 6 pts. of tartar-emetic in 176 pts. of water is capable of dissolving 2.75 pts. of iodine, iodhydric acid being formed and tartrate of antimonous acid; if a solution of 6 pts. of tartar-emetic in 378 pts. of water be employed 4.12 pts. of iodine may be dissolved, the quantity of iodine dissolved being the amount which is necessary to transform the oxide of antimony into antimonous acid by the decomposition of water. When this solution is evaporated iodine is set free. (Selmi, *loc. cit.*, p. 7.)

Most metallic iodides are readily soluble in water. Several of them are soluble in ether.

"Iodous Acid." *Vid.* HypoIodic Acid.
$I\ O_4$

"Iodite of Ammonia"[?] Less efflorescent than the iodate. Soluble in a little more than half the quantity of water required to dissolve the iodate. (Sementini, *Phil. Mag.*, 1834, (3.) **4.** 393.)

Iodite of Soda. *Vid.* Iodate of Soda with Iodide of Sodium.

IodoBenzoic Acid. Very difficultly soluble
$C_{14}\ H_5\ I\ O_4 = C_{14}\ H_4\ I\ O_3,\ H\ O$ in boiling water, and separates out again almost completely as the solution cools. Exceedingly easily soluble in alcohol, and ether. (Griess, in *Kolbe's Lehrb.*, **2.** 77.)

IodoBenzoate of Silver. Ppt. (*Ibid.*)
$C_{14}\ H_4\ I\ Ag\ O_4$

IodoBrucin. *Vid.* Iodide of Brucin.

IodoCamphor. Insoluble in water. Easily soluble in alcohol, and ether. (Claus.)

IodoCaoutchin. Nearly insoluble in water. Easily soluble in alcohol, and ether. (Himly.)

IodoChloroNitroHarmin. More soluble in
(*Iodide of ChloroNitroHarmin.*)
$N_2\ C_{26}\ H_{10}\ Cl\ (N\ O_4)\ O_2\ .\ I_2$
alcohol than iodonitroharmin; also soluble in naphtha. Largely soluble in warm, less soluble in a cold concentrated alcoholic solution of cyanhydric acid. (Fritsche.)

IodoCinchonin. Insoluble in cold, very sparingly soluble in boiling water.
(*Iodide of Cinchonin.*)
$N_2\ C_{40}\ H_{24}\ O_2,\ I$
Soluble in alcohol, and ether. Less soluble in alcohol than the iodhydrate of cinchonin.

IodoCinnamic Acid. Easily soluble in hot
$C_{18}\ H_7\ I\ O_4$ water, and in alcohol. (Herzog.)

***Bin*IodoCodein.** Insoluble in water. Read-
$C_{36}\ H_{19}\ I_2\ N\ O_6$ ily soluble in boiling, less soluble in cold alcohol. Soluble in chlorhydric acid. (Brown.)

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IodoCodein. Insoluble in water, or ether. Soluble in alcohol. Insoluble in cold, soluble in warm, concentrated sulphuric acid. Slowly attacked by hot nitric acid. Decomposed by a boiling solution of caustic potash.

(*TerIodide of Codein. TerIodoCodein.*)
$2\,N\,C_{36}\,H_{21}\,N\,O_6, 3\,I_2$

Iodoform. *Vid.* Iodide of *bin*IodoMethyl.

IodoMecone. Insoluble in water or chlorhydric acid, even boiling. Soluble in alcohol, especially when boiling, and in ether. (Brown, *Phil. Mag.*, (4.) 8. 206.)

$C_6\,H_4\,I_3\,O_6$

IodoMeconin. Scarcely at all soluble in water; more readily soluble in alcohol, and ether. Soluble in concentrated sulphuric acid. (Anderson.)

(*IodOpianyl.*)
$C_{20}\,H_9\,I\,O_8$

***Bin*IodoMelAnilin.** Soluble in alcohol. (Hofmann, *J. Ch. Soc.*, 1. 303.)

$$C_{26}\,H_{11}\,I_2\,N_3 = N_3 \left\{ \begin{matrix} C_{12}\,H_4\,(C_2\,N) \\ C_{12}\,H_3\,I_2 \\ H_4 \end{matrix} \right.$$

IodoMercurate of *X*. *Vid. prot*Iodide of Mercury with Iodide of *X*.

***Ter*Iodide of Mesitylene.** Insoluble in water. Soluble in ether. (Kane.)

(*Iodide of Ptelcyl.*)
$C_{18}\,H_9\,I_3$

***Bin*IodoMethylamin.** Insoluble in water. Soluble, apparently with decomposition, in alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) 30. 455.)

$$N \left\{ \begin{matrix} C_2\,H\,I_2 \\ H_2 \end{matrix} \right.$$

IodoMethylSelenious Acid. Easily soluble in iodhydric acid and in an aqueous solution of iodide of potassium. Soluble in alcohol. (Wœhler & Dean, *Ann. Ch. u. Pharm.*, 97. 8.)

$C_2\,H_3\,I\,Se_2\,O_4 + Aq$

IodoMorphine. Insoluble in cold acids or alkaline liquors; but dissolves in them easily when heated.

$2\,(N\,C_{34}\,H_{19}\,O_6), I_3$

IodoNicotin. Decomposed when boiled with water. Soluble in alcohol. Decomposed by a cold solution of caustic potash.

$N_2\,C_{20}\,H_{14}, I_3$

IodoNitroHarmin. Almost insoluble in cold water, alcohol, ether, or coal-tar oil; and only sparingly soluble in these liquids when warm. Decomposed by boiling with alcohol, or dilute sulphuric acid. Soluble in hot concentrated acetic acid. Easily soluble in an alcoholic solution of cyanhydric acid, with combination. Soluble in chlorhydric acid, apparently with combination.

$C_{26}\,H_{11}\,(N\,O_4)\,N_2\,O_2, I_2$

***Bin*IodoNitroPhenic Acid.**

$C_{12}\,H_3\,I_2\,(N\,O_4)\,O_2$

***Ter*IodoPapaverin.** Insoluble in water. Soluble in boiling, less soluble in cold alcohol. Insoluble in dilute acids. Decomposed by ammonia-water and by an aqueous solution of potash.

$N\,C_{40}\,H_{21}\,O_8\,I_3$

***Quinqui*IodoPapaverin.** More soluble than teriodopapaverin in alcohol. Decomposed by ammonia-water.

$N\,C_{40}\,H_{21}\,O_8, I_5$

IodoPhenylamin. *Vid.* IodAnilin.

IodoPhenylCitraconimid. Sparingly soluble in water, though more soluble in hot than in cold water. Readily soluble in spirit. (Gottlieb.)

(*CitraconIodAnil.*)

$$C_{22}\,H_8\,I\,N\,O_4 = N \left\{ \begin{matrix} C_{10}\,H_4\,O_4'' \\ C_{12}\,H_4\,I \end{matrix} \right.$$

IodOpianyl. *Vid.* IodoMeconin.

IodoPlatinic Acid. *Vid. bin*Iodide of Platinum.

IodoPlatinate of Ammonium. Permanent. Sparingly soluble in water. Insoluble in alcohol. (Lassaigne, *Ann. Ch. et Phys.*, 1832, (2.) 51. 128.)

$N\,H_4\,I\,;\,Pt\,I_2$

IodoPlatinate of Barium. Deliquescent; though less so than the soda salt which it resembles in other respects. (Lassaigne, *Ann. Ch. et Phys.*, (2.) 51. 127.)

$Ba\,I, Pt\,I_2$

IodoPlatinate *of protoxide* **of Iron.** Deliquescent. Soluble in water.

IodoPlatinate of Potassium. Permanent. Soluble in water. Insoluble, or at least only very slightly soluble, in alcohol of 38°. Unacted upon by cold concentrated sulphuric acid. (Lassaigne, *Ann. Ch. et Phys.*, (2.) 51. 126.)

$K\,I, Pt\,I_2$

IodoPlatinate of Sodium. Deliquescent. Very soluble in water, and alcohol. (Lassaigne, *Ann. Ch. et Phys.*, (2.) 51. 127.)

$Na\,I\,;\,Pt\,I_2$

IodoPlatinate of Zinc. Deliquescent. Very soluble in water. (Lassaigne, *Ann. Ch. et Phys.*, (2.) 51. 127.)

$Zn\,I\,;\,Pt\,I_2$

IodoPropylene. *Vid.* Iodide of Allyl.

IodoPyroMeconic Acid. Sparingly soluble in cold, more readily soluble in hot water. Sparingly soluble in cold, readily soluble in hot alcohol. The presence of acids or alkalies increases its solubility in water. (Brown, *Phil. Mag.*, (4.) 8. 203.)

$C_{10}\,H_3\,I\,O_6$

IodoPyroMeconate of Baryta. Sparingly soluble in water, and alcohol, either hot or cold. (Brown, *loc. cit.*)

$C_{10}\,H_2\,I\,Ba\,O_6 + Aq$

IodoPyroMeconate of Lead. Sparingly soluble in water, and alcohol. Insoluble in acetic acid. (Brown.)

$C_{10}\,H_2\,I\,Pb\,O_6$

IodoQuinine. Permanent. More soluble in water than sulphate of quinine. Very easily soluble in alcohol. Also soluble in ether.

$N_2\,C_{40}\,H_{24}\,O_4, I$

IodoSalicylic Acid. Difficultly soluble in hot water. Easily soluble in alcohol, and ether. (Lautemann, in *Kolbe's Lehrb.*, 2. 268.)

$C_{14}\,H_5\,I\,O_6 = C_{14}\,H_3\,I\,O_4, 2\,H\,O$

IodoSalicylate of Baryta.

I.) *acid.* Soluble in water.

$C_{14}\,H_4\,I\,Ba\,O_6$

II.) *normal.* Less soluble in water than the acid salt.

IodoSalicylate of Soda.

I.) *acid.* Easily soluble in water.

***Bin*IodoSalicylic Acid.** Difficultly soluble in water. Soluble in alcohol. (Lautemann, *Ibid.*)

$C_{14}\,H_4\,I_2\,O_6 = C_{14}\,H_2\,I_2\,O_4, 2\,H\,O$

***Bin*IodoSalicylate of Baryta.**

I.) *acid.* Difficultly soluble in water.

$C_{14}\,H_3\,I_2\,Ba\,O_6$

II.) *normal.* Still more difficultly soluble than the acid salt.

IodoSalicylate of Soda.

I.) *acid.* Soluble in water.

***Ter*IodoSalicylic Acid.** Insoluble in water. Difficultly soluble in alcohol. (Lautemann, *Ibid.*)

$C_{14}\,H_3\,I_3\,O_6 = C_{14}\,H\,I_3\,O_4, 2\,H\,O$

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*Ter*IodoSalicylate of Soda.

I.) *acid.* Soluble in water.

IodoSalicylous Acid. Insoluble in water. Readily soluble in alcohol, and ether. (Lœwig.)
(*Hydride of Iodo Salicyl. Iodide of Spiroyl. Iodide of Salicyl. Iodo Salicyl. Iodo Spiroyl.*)
$C_{14} H_5 I O_4$

IodoStrychnine. Insoluble in cold, and nearly insoluble in boiling water. Readily soluble in hot alcohol of 36° B. Insoluble in ether, or in a cold aqueous solution of bicarbonate of potash. Unacted upon in the cold; decomposed by boiling with dilute acids.
(*Iodide of Strychnine.*)
$2 (C_{42} H_{22} N_2 O_4), I_3$

IodoSulphide of Antimony. Decomposed by water, alcohol, and ether. (O. Henry.)
$Sb S_3 I_3 (?)$

IodoTellurate of Ammonium. Soluble in water, and in absolute alcohol. (Berzelius.)

IodoTellurate of Potassium. Easily soluble in water; partially decomposed by a large excess of water.

IodoTellurate of Sodium. Deliquesces in moist air. Very easily soluble in water, and alcohol. (Berzelius.)

IodoToluylic Acid. Difficultly soluble in water. Easily soluble in alcohol, and ether. (Griess, in *Kolbe's Lehrb.*, **2.** 220.)
$C_{16} H_7 I O_4 = C_{16} H_6 I O_3, H O$

IodoToluylate of Silver. Ppt.
$C_{16} H_6 I Ag O_4$

Ioduretted Hydriodic Acid. *Vid.* Hydriodous Acid.

Ipecacuanic Acid. Soluble in ether; more soluble in water, and alcohol.
$C_{28} H_{43} O_{14}$

Ipomic Acid. Sparingly soluble in cold, readily soluble in boiling water. Readily soluble in alcohol, and ether. (Mayer.) Its alkaline salts are soluble in water.
(*Isomeric, and perhaps identical with Sebacic Acid.*)
$C_{20} H_{18} O_8$

Ipomate of Baryta. Sparingly soluble in water, and alcohol.

Ipomate of Lime. Almost insoluble.

Ipomate of Silver. Insoluble in water; very difficultly soluble in alcohol, and ether. The other salts resemble the corresponding sebates.
$C_{20} H_{16} Ag_2 O_8$

Iridic Acid.
(*Teroxide of Iridium.*)
$a = Ir O_3$
$b =$ *ditto, hydrated.* While still moist it is easily soluble in chlorhydric acid. Somewhat soluble in alkaline solutions. (Berzelius.)

Iridiate of Potash.

I.) *basic.* Soluble in water and in chlorhydric acid. (Claus.)

II.) *acid.* Insoluble in water. Soluble in chlorhydric acid. (Claus.)

IridiCyanide of Potassium. Permanent. Easily soluble in water. Difficultly soluble in strong spirit. (Claus, *Beiträge*, p. 94.)
$C_{12} N_6 Ir_2 K_3 = 3 K Cy, Ir_2 Cy_3$

IridioCyanide of Potassium. Readily soluble in water. Insoluble in alcohol. Chlorhydric acid does not precipitate the aqueous solution. (Wœhler & Booth.)
$2 K Cy, Ir Cy$

Iridium. After having been strongly ignited it is insoluble in acids. When only gently heated, aqua-regia dissolves traces of it, and if it contains platinum or other metals a considerable amount of it is dissolved with these by aqua-regia. When prepared in the moist way as a fine powder, it is easily soluble in aqua-regia. (Berzelius, *Lehrb.*)
Ir

Iron. Permanent in dry air; it is not readily acted upon even in moist air, but oxidizes easily whenever, being exposed to the air, water is deposited upon it as a liquid. Unacted upon at the ordinary temperature by water free from air. Readily soluble in chlorhydric and dilute sulphuric acids, and in most other acids.
Fe

When treated with pure concentrated nitric acid of 1.512 @ 1.419 sp. gr., iron soon becomes covered with a bluish or black coating, apparently protoxide of iron, and when thus covered, the iron is no longer attacked by nitric acid of any strength, either dilute or concentrated, at the ordinary temperature, or at the temperature of a freezing mixture; but an action occurs when the acid is heated. Nor is iron attacked at the ordinary temperature by nitric acid of 0.401 sp. gr., or even that which is a little weaker, though an action commences at once when the acid is heated. By very dilute nitric acid iron is attacked at the ordinary temperature (Millon, *Ann. Ch. et Phys.*, (3.) **6.** 100), the solution containing nitrate of ammonia and nitrate of protoxide of iron.

The action of nitric acid upon iron is curiously influenced by the presence of bichloride of platinum. If nitric acid containing 4.5 equivalents of water is weakened with 2 or 3 vols. of water, and then poured upon iron-turnings, the metal dissolves immediately with evolution of abundant nitrous fumes and production of a persalt of iron; but if to the same dilute acid a drop of bichloride of platinum be added, it no longer disengages nitrous gas, but hydrogen, when acting upon iron, while nitrate of protoxide of iron and nitrate of ammonia are formed. (Millon, *C. R.*, 1845, **21.** 47.)

Iron-turnings dissolve with tolerable rapidity in a mixture of 1 pt. monohydrated sulphuric acid and 12 pts. of water, and the addition of a few drops of a solution of bichloride of platinum renders the action extremely intense. The addition of arsenious acid, on the contrary, arrests completely the action of sulphuric acid on iron; the metal may even be preserved in this manner for months in sulphuric acid of the above-mentioned strength. When the iron has been well cleansed, a few drops of an aqueous solution of arsenious acid are sufficient to preserve it from the action of the sulphuric acid. Tartar emetic and protochloride of mercury (Hg Cl) diminish the force of the action of sulphuric acid on iron, but do not arrest it. Sulphate of copper strongly accelerates the action; sulphate of silver also accelerates it, but to a less extent. The addition of small quantities of metallic solutions to chlorhydric acid influences in a similar manner its action upon iron; and this influence may even be observed in the case of a tolerably concentrated acid, it being only necessary to dilute the fuming acid with 2 or 3 volumes of water. In some cases the addition of a small quantity of sulphate of copper suspended to a notable extent the action of chlorhydric acid upon iron, the latter becoming covered with metallic copper and remaining for several hours without evolving any hydrogen. But the reaction is not always like this, and it is not clear whether the difference depends upon the iron or acid. The addition of arsenious acid stops the action of chlorhydric acid completely. Weak acetic acid acts only very slowly upon iron; the addition of bichloride of platinum increases this action, while arsenious acid stops it completely; other metallic solutions appear to exert no influence. The action of tartaric and racemic acids is influenced alike, viz., increased action on the addition of bichloride of platinum, prevention of action if arsenious acid is added, and almost entire indifference on the part of other metallic solutions. When treated with a solution of oxalic acid, mixed with a few drops of bichloride of platinum, iron becomes covered, as in the preceding cases, with a black coating of platinum, but, instead of dissolving more rapidly, the iron is preserved precisely as if arsenious acid had been added, — the latter exerting its conservative influence in this as in the previous instances. Solutions of binoxalate and quadroxalate of potash, to which a little bichloride of platinum has been added, behave towards iron like the corresponding solution of oxalic acid. This exception, presented by oxalic acid and its compounds, is the only one which is encountered in studying the influence of bichloride of platinum upon the solution of iron and all the other metals. Saline solutions, and even distilled water, can dissolve iron, with evolution of hydrogen, when they are mixed with a small quantity of bichloride of platinum; but these actions are slow, and much less readily observed upon iron than upon zinc. (Millon, *C. R.*, 1845, **21.** pp. 45–47.) In connection with Millon's observations compare the remarks of Barreswil (*C. R.*, **21.** 292), who urges that these reactions may all be explained by reference to galvanic action: when the deposited metal forms an open, porous, spongy coating, decomposition is increased, the contact of the two metals forming a voltaic couple; but when, on the contrary, the deposited metal forms an adherent impermeable varnish upon the metal to be dissolved, the latter is completely protected from the influence of the acid, and further action ceases.

Soluble, with evolution of hydrogen, in concentrated aqueous solutions of the alkaline bicarbonates. (Berzelius, *Lehrb.*, 3. 626.)

Isæthionic Acid. *Vid.* IsEthionic Acid.

Isamic Acid. (*Imasatic Acid. Rubindinic Acid. Isatinamic Acid. Isaminic Acid.*) $C_{32} H_{13} N_3 O_8$ Sparingly soluble in boiling water. Soluble in hot alcohol. Tolerably soluble in ether. Soluble in concentrated sulphuric acid, from which it is precipitated on the addition of water; also soluble in strong chlorhydric acid. (Laurent.)

Isamate of Alumina. Ppt.

Isamate of Ammonia. $C_{32} H_{12} (N H_4) N_3 O_8$ Decomposed by warm water. Soluble in boiling alcohol.

Isamate of Baryta. $C_{32} H_{12} Ba N_3 O_8$ Soluble in water.

Isamate of Lead. Ppt.

Isamate of Lime. Appears to be soluble in water.

Isamate of Magnesia. Appears to be soluble in water.

Isamate of Mercury (Hg O). Ppt.

Isamate of Potash.

Isamate of Silver. $C_{32} H_{12} Ag N_3 O_8$ Ppt.

Isamid. (*Isamamid. Amasatin. Isaminamid.*) $C_{32} H_{14} N_4 O_6$ Insoluble in cold water; but is decomposed when boiled for some time with water. Very slightly soluble in alcohol. Almost insoluble in ether. Very readily soluble, with decomposition, in concentrated sulphuric acid. Readily soluble in cold nitric acid, probably with decomposition. (Laurent.)

Isatan. $C_{32} H_{12} N_2 O_6$ Very sparingly soluble in boiling, less soluble in cold alcohol. (Laurent.)

Isatic Acid. $C_{16} H_6 N O_5, H O$ Soluble in cold water; the solution undergoes decomposition when heated. (Erdmann.) *

Isatate of Ammonia. Known only in solution, and this is decomposed by evaporation.

Isatate of Baryta. $C_{16} H_6 Ba N O_6$ Sparingly soluble in water. Almost insoluble in alcohol. (Laurent.)

Isatate of Copper. Sparingly soluble in water.

Isatate of Lead. Ppt. Incompletely soluble in boiling water. (Erdmann.)

Isatate of Potash. $C_{16} H_6 K N O_6$ Soluble in water, and alcohol.

Isatate of Silver. $C_{16} H_6 Ag N O_6$ Soluble in boiling water, with slight decomposition; a portion of the salt separates out as the solution cools.

Isathyde. $C_{16} H_6 N O_4$ Scarcely at all soluble in water. Very sparingly soluble in boiling alcohol or ether. (Laurent.)

Isatilim. $C_{48} H_{16} N_4 O_{10}$ Soluble in boiling alcohol, separating out as the solution cools. Readily soluble in a solution of caustic potash. (Laurent.)

Isatimid. $C_{48} H_{17} N_5 O_8$ Insoluble in water. Almost insoluble in boiling alcohol or ether. Tolerably readily soluble in a boiling alcoholic solution of ammonia. Also soluble in a boiling mixture of chlorhydric acid and alcohol. (Laurent.)

Isatin. (*Isatylamid.*) $N \left\{ \begin{matrix} C_{16} H_4 O_4'' \\ H \end{matrix} \right. = C_{16} H_5 N O_4$ Permanent. Sparingly soluble in cold, more soluble in boiling water. Readily soluble in alcohol, less soluble in ether. Largely soluble, without decomposition, in concentrated nitric acid, when this is gently heated; it is deposited again as the solution cools, but on boiling the solution decomposition occurs. Soluble in a cold aqueous solution of caustic potash, without decomposition at first, but after a time (immediately on boiling) the solution undergoes decomposition. Soluble, with combination, in ammonia-water. Soluble in Nordhausen sulphuric acid.

Isatin with Ammonium. (*Isatide of Ammonia.*)

Isatin with Argentammonium. $C_{16} H_4 (N H_3 Ag) N O_4$ Ppt.

Isatin with Cupr(*ic*)ammonium. $C_{16} H_4 (N H_3 Cu) N O_4$ Ppt.

Isatin with Potassium. $C_{16} H_4 K N O_4$ Soluble in water; the solution undergoing decomposition when boiled.

Isatin with Silver. $C_{16} H_4 Ag N O_4$ Ppt.

IsatoSulphurous Acid. $C_{16} H_7 N S_2 O_{16}$ Not known in a free state.

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* No precipitate is produced when an aqueous solution of isatate of potash is added to solutions of the chlorides of calcium, strontium, magnesium, cadmium, cobalt, nickel, protochloride of mercury or protochloride of tin, of alum, or the salts of zinc; — on the other hand, precipitates are produced in solutions of nitrate of sesquioxide of uranium, acetate of lead, sesquichloride of iron, and nitrate of dinoxide of mercury.

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IsatoSulphite of Ammonium. Slightly sol-
$C_{16}H_6(NH_4)NO_6, 2SO_2$ uble in cold, very easily soluble in boiling water. (Laurent.)

IsatoSulphite of Potash. Tolerably read-
$C_{16}H_6KNO_6, 2SO_2 + 6 Aq$ ily soluble in water. Tolerably soluble in boiling, but very sparingly soluble in cold alcohol. (Laurent.)

IsEthionic Acid. Soluble in water. The
(*EthylHypoSulphuric Acid. Isomeric with EthylSulphuric Acid.*)
$C_4H_6S_2O_8 = C_4H_5S_2O_7, HO$
salts of isethionic acid are more readily soluble in water than the ethylsulphates.

IsEthionate of Ammonia. Easily soluble in
$C_4H_5(NH_4)S_2O_8$ spirit. (Strecker, *Ann. Ch. u. Pharm.*, **91.** 100.)

IsEthionate of Baryta. Readily soluble in
$C_4H_5BaS_2O_8$ water; more slowly in alcohol, though more soluble than ethionate of baryta in this menstruum. Less soluble in cold than in boiling alcohol. (Magnus.)

IsEthionate of Copper. Permanent. Sol-
$C_4H_5CuS_2O_8 + 2 Aq$ uble in water. (Liebig.)

IsEthionate of Lead. Soluble in water.
$C_4H_5PbS_2O_8$ (Blondeau.)

IsEthionate of Lime. Soluble in water.
$C_4H_5CaS_2O_8$ (Blondeau.)

IsEthionate of Potash. Permanent. Easily
$C_4H_5KS_2O_8$ soluble in water. Rather easily soluble in boiling; somewhat less soluble in cold alcohol. (Liebig.)

IsoCajputene. Insoluble in water or alcohol.
$C_{20}H_{16}$ Miscible in all proportions with ether, and oil of turpentine. (Max. Schmidl.)

Isocetamid.
(*Isocetinamid.*)
$C_{30}H_{31}NO_2$

Isocetic Acid. Soluble in alcohol.
(*Isomeric, or identical with Behenic Acid.*)
$C_{30}H_{30}O_4$

Isocetate of Ethyl.
$C_{30}H_{29}(C_4H_5)O_4$

Isocetate of Silver. Sparingly soluble in water. Readily soluble in boiling alcohol.

IsoCyanuric Acid. Permanent. Readily
(*Fulminuric Acid.*) soluble in water, alcohol, and
$C_6H_3N_3O_6$ ether. (Schischkoff.)

IsoCyanurate of Ammonia. Sparingly sol-
$C_6H_2(NH_4)N_3O_6$ uble in cold, readily soluble in boiling water. Insoluble in alcohol or ether. (Liebig, *Ann. Ch. u. Pharm.*, **95.** 286.)

IsoCyanurate of Anilin. Soluble in water, and alcohol.

IsoCyanurate of Baryta. Sparingly solu-
$C_6H_2BaN_3O_6 + 2 Aq$ ble in boiling water. (Liebig.)

IsoCyanurate of Cupr(*ic*)*bi*amin. Per-
$C_6H_2(N_2H_6Cu)N_3O_6$ manent. Almost insoluble in water. Very sparingly soluble in ammonia-water. (Schischkoff.)

IsoCyanurate of Ethyl. Slightly soluble in water. Soluble in alcohol.

IsoCyanurate *of protoxide* of Iron.

IsoCyanurate of Lead.
I.) *basic.* Soluble in boiling, less soluble in
$C_6H_2PbN_3O_6; PbO$ cold water. (Liebig.)

IsoCyanurate of Lime. Soluble in water, and alcohol. (Liebig.)

IsoCyanurate of Lithia. Soluble in water, and alcohol. (Liebig.)

IsoCyanurate of Magnesia. Soluble in water, and alcohol. (Liebig.)

IsoCyanurate of Potash. Soluble in 10
$C_6H_2KN_3O_6$ pts. of cold water, and in a much smaller quantity of hot water. Insoluble in alcohol or ether. (Schischkoff.) Still less soluble than the ammonia salt in cold water, but equally soluble with this in boiling water. (Liebig.)

IsoCyanurate of Potash with *proto*xide of Mercury. Soluble in hot water.

IsoCyanurate of Silver. Very sparingly
$C_6H_2AgN_3O_6$ soluble in cold, tolerably easily soluble in boiling water. (Schischkoff.)

IsoCyanurate of Soda. More soluble than the potash salt in water. Soluble in alcohol. (Schischkoff.)

IsoCyanurate of Urea.

IsoNitroPhenic Acid. Very easily soluble
(*Isomeric with NitroPhenic Acid.*)
$C_{12}H_5NO_6 = C_{12}H_4(NO_4)O, HO$
in water, alcohol, and ether.

IsoNitroPhenate of Baryta.
I.) *normal.*
$C_{12}H_4BaNO_6 + 8 Aq$
II.) *acid.*
$C_{12}H_4BaNO_6; C_{12}H_5NO_6 + 4 Aq$

IsoNitroPhenate of Ethyl. Almost in-
$C_{12}H_4(C_4H_5)NO_6$ soluble in water. Easily soluble in ether; less soluble in alcohol.

IsoNitroPhenate of Silver.
I.) *normal.*
$C_{12}H_4AgNO_6; + 2 Aq$
II.) *acid.*
$C_{12}H_4AgNO_6; C_{12}H_5NO_6 + 2 Aq$
III.) "*purple.*"
$5(C_{12}H_4AgNO_6); C_{12}H_5NO_6$

Isoprene.
$C_{10}H_8$

IsoTartaric Acid. Very deliquescent. Sol-
(Formerly "*Tartralic Acid*" (by Fremy). *IsoTartric Acid.*)
$C_8H_6O_{12}$
uble in water, and alcohol. (Fremy.) Its salts, of the metallic oxides, are insoluble in alcohol; they are decomposed by boiling water.

IsoTartrate of Ammonia. Deliquescent. Ammonia precipitates it. (Laurent & Gerhardt.)

IsoTartrate of Baryta. ("Impure," according to Laurent & Gerhardt.) Insoluble in water. (Fremy, *Ann. Ch. et Phys.*, (3.) **31.** 351.)

IsoTartrate of Copper. Alcohol precipi-
$C_8H_5CuO_{12}$ tates it. (Laurent & Gerhardt.)

IsoTartrate of Lead. Insoluble in water; by which, however, it is soon decomposed. (Laurent & Gerhardt.)

IsoTartrate of Lime. Very soluble in cold
$C_8H_5CaO_{12}$ water; entirely insoluble in cold alcohol. (Laurent & Gerhardt.)

IsoTartrate of Potash. Deliquescent. In-
$C_8H_5KO_{12}$ soluble in alcohol. (Laurent & Gerhardt.)

IsoTartrate of Silver. Sparingly soluble in water. (Laurent & Gerhardt.)

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ISOTARTRATE OF STRONTIUM. Insoluble in water. (Fremy, *Ann. Ch. et Phys.*, (3.) **31.** 351.)

ISOTARTRIDIC ACID. *Vid.* Tartaric Acid, (Anhydrous, — Soluble modification).

ISOTEREBENTHENE.
$C_{20} H_{16}$

ITACONAMIC ACID. More soluble than citraconimid in water.
$C_{10} H_7 N O_6$

ITACONAMATE OF AMMONIA. Very soluble in water.

ITACONANILIC ACID. *Vid.* PhenylItaconamic Acid.

ITACONANILID. *Vid.* PhenylItaconamid.

Itaconanilide quintinitrée. *Vid.* NitroPhenylItaconamid.

ITACONIC ACID. Soluble in 17 pts. of water at 10°, and in 12 pts. at 20°. Its solubility augments rapidly as the temperature is increased. (Baup.) "More soluble than citraconic acid in water." (Baup.) [This statement has been called in question! it is, moreover, contradicted by Baup's own figures.]
(*PyroAconitic Acid. Para PyroCitric Acid. Citricic Acid. PyroCitric Acid*(of Lassaigne).)
$C_{10} H_6 O_8$

Less soluble than citraconic acid in water. (Crasso.) Soluble in 4 pts. of alcohol of 88% at 15°. Also soluble in ether. (Baup.) Its salts are, in general, soluble in water, alcohol, and ether.

ITACONATE OF AMMONIA.
I.) *normal.* Soluble in water.
$C_{10} H_4 (N H_4)_2 O_8$
II.) *acid.*
$a = C_{10} H_5 (N H_4) O_8$ Permanent. Soluble in 1.25 pts. of water at 12°. (Baup.)
$b = C_{10} H_5 (N H_4) O_8 + 2 Aq$ Efflorescent.

ITACONATE OF BARYTA.
I.) *normal.* More soluble than the lime salt.
$C_{10} H_4 Ba_2 O_8 + 2 Aq$ (Baup.)
II.) *acid.* Permanent. Readily soluble in water; more in hot than in cold. (Baup.)
$C_{10} H_5 Ba O_8 + Aq$

ITACONATE OF COPPER. Sparingly soluble in water. (Baup.)
$C_{10} H_4 Cu_2 O_8$

ITACONATE OF ETHYL. Scarcely at all soluble in water, but is slowly decomposed by contact therewith. Soluble in all proportions in alcohol, and ether.
(Said to be identical with citraconate of ethyl.)
$C_{10} H_4 (C_4 H_5)_2 O_8$

ITACONATE OF LEAD. Soluble in aqueous solutions of nitrate of lead and of alkaline itaconates. (Baup.)
$C_{10} H_4 Pb_2 O_8 + 2 Aq$

ITACONATE OF LIME.
I.) *normal.* Soluble in 45 pts. of water at 18°. No more soluble in hot than in cold water. Insoluble in alcohol. (Baup.)
$C_{10} H_4 Ca_2 O_8 + 2 Aq$
II.) *acid.* Permanent. Soluble in 13 pts. of water at 12°. (Baup.)
$C_{10} H_5 Ca O_8 + 2 Aq$

ITACONATE OF MAGNESIA.
I.) *normal.*
II.) *acid.* Very soluble in water. (Baup.)

ITACONATE *of dinoxide* OF MERCURY. Ppt.

ITACONATE OF MANGANESE. Very soluble in water. (Baup.)

ITACONATE OF NICKEL. Very soluble in water. (Baup.)

ITACONATE OF POTASH.
I.) *normal.* Deliquescent. Soluble in water. Insoluble in alcohol. (Baup.)
$C_{10} H_4 K_2 O_8$
II.) *acid.* Permanent. Very soluble in water.
$C_{10} H_5 K O_8$

ITACONATE OF SILVER.
I.) *normal.* Almost insoluble in boiling water. Very soluble in ammonia-water. (Crasso.) Insoluble in itaconic acid. (Gottlieb.)
$C_{10} H_4 Ag_2 O_8$

ITACONATE OF SODA.
I.) *normal.* Deliquescent.
II.) *acid.* Very soluble in water. (Baup.)

ITACONATE OF STRONTIA.
I.) *normal.* Readily soluble in water. (Baup.)
$C_{10} H_4 Sr_2 O_8 + 2 Aq$
II.) *acid.* Permanent. Easily soluble in water. (Baup.)
$C_{10} H_5 Sr O_8$

J.

"JALAPIN." *Vid.* Convolvulin.

JALAPIN(resin from *Convolvulus Orizabensis*). Very sparingly soluble in water. Very readily soluble in alcohol, ether, wood-spirit, benzin, oil of turpentine, and in acetic acid, without decomposition. Soluble, with decomposition, in aqueous solutions of the caustic alkalies and alkaline earths, especially when these are warm. Slowly soluble, with decomposition, in concentrated sulphuric acid. Sparingly soluble in cold dilute chlorhydric and nitric acids; it is decomposed when heated therewith. (Mayer, *Ann. Ch. u. Pharm.*, **95.** 135.)
(*Resin of fusiform Jalap.*)
$C_{68} H_{56} O_{32}$

JALAPIC ACID. Very hygroscopic. Readily soluble in water. Soluble in alcohol, and ether. (Mayer.) Soluble in alcohol, and in aqueous solutions of the alkalies. Slightly soluble in ether. (Parrish's *Pharm.*, p. 190.) Decomposed after a time by concentrated chlorhydric acid; also by sulphuric acid. Its salts are mostly soluble in water.
$C_{68} H_{60} O_{36}$

JALAPATE OF BARYTA.
I.) *mono.*
$C_{68} H_{58} Ba O_{35}$
II.) *tri.*
$C_{68} H_{56} Ba_3 O_{35}$
III.) $C_{68} H_{58} Ba O_{35} ; 8 (C_{68} H_{57} Ba_3 O_{35})$
IV.) $C_{68} H_{57} Ba_2 O_{35} ; 8 (C_{68} H_{58} Ba O_{35})$
All are soluble in water. (Mayer.)

JALAPATE OF LEAD.
I.) Easily soluble in water, from which it is precipitated by alcohol.
II.) Less soluble in water.
III.) *very basic.* Insoluble in water. Very difficultly soluble in spirit. (Mayer.)

JALAPINOL. Insoluble in cold, very sparingly soluble in boiling water. Readily soluble in alcohol, and ether.
$C_{32} H_{31} O_7$

JALAPINOLIC ACID. Soluble in hot, very sparingly soluble in cold spirit, or ether. Soluble in ammonia-water, with combination.
$C_{32} H_{30} O_6$

JALAPINOLATE OF AMMONIA. Soluble in water.
$C_{32} H_{29} (N H_4) O_6 ; C_{32} H_{30} O_6$

JALAPINOLATE OF BARYTA. Very difficultly soluble in boiling, and almost insol-
$C_{32} H_{29} Ba O_6$

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uble in cold water. Most readily soluble in a boiling mixture of water and spirit.

Jalapinolate of Copper. Insoluble in water; almost insoluble in spirit.

Jalapinolate of Lead. $C_{32} H_{29} Pb O_6$ Insoluble in water or dilute spirit.

Jalapinolate of Potash. Soluble in water, and spirit. (Mayer, *Ann. Ch. u. Pharm.*, **95.** 149.)

Jamaicin (*Jamaicinin. Cabbagin.*) (from the bark of *Geoffroya Jamaicensis* (*Andira inermis*)). Soluble in water. Sparingly soluble in alcohol.

Japonic Acid. $C_{24} H_{10} O_{10}$ Insoluble in cold; soluble in boiling water. (Svanberg.) Insoluble in alcohol.

Japonate of Alumina. Ppt. Insoluble in cold dilute nitric acid.

Japonate of Baryta. Ppt. Insoluble in cold dilute nitric acid.

Japonate of Copper. Ppt.

Japonate of Glucina. Ppt. Insoluble in cold dilute nitric acid.

Japonate of Lime. Ppt. Insoluble in cold dilute nitric acid.

Japonate of Potash. Soluble in water. Insoluble in alcohol.

Japonate of Silver.

I.) *mono.*

II.) *bi.* $C_{24} H_8 Ag_2 O_{10}$ Decomposed by a solution of caustic potash, but not by chlorhydric acid.

Japonate of Yttria. Ppt. Insoluble in cold dilute nitric acid. (Svanberg.)

Jelly from Pine-needles (*Pinus sylvestris*). $C_{16} H_{10} O_{10}$ Insoluble in water, alcohol, or ether. Soluble only in dilute alkaline liquors. (Kawalier.)

Jelly from Pine-bark (*Pinus sylvestris*), *and from the green parts of Thuja occidentalis.* $C_{16} H_{12} O_{14}$ Soluble in alkaline liquors. (Kawalier.)

Jervin. (*Barytin.*) $C_{60} H_{46} N_2 O_6$ Almost insoluble in water. Soluble in alcohol. Very sparingly soluble in ammonia-water. Some of its salts are soluble in water; most of them are soluble in alcohol.

Juglandin (from *Juglans regia*). Insoluble in water or alcohol.

K.

K. See also C.

Kæmpferid (from various species of *Kæmpferia*). Scarcely at all soluble in water. Soluble in 25 pts. of ether at 15°. Soluble in 50 pts. of cold, more soluble in hot alcohol. Soluble in warm acetic acid; in ammonia-water, and aqueous solutions of carbonate of potash and caustic potash.

Kakodyl. *Vid.* Cacodyl.

Katechin. *Vid.* Catechin.

Kermes-Mineral. *Vid.* Antimonite of Potash, with *ter*Sulphide of Antimony.

Kinic Acid. (*Quinic Acid. Chinasæure.*) $C_{28} H_{22} O_{22} + 2 Aq$ Becomes soft and sticky when exposed to the air. Slowly soluble in 2.5 pts. of water at 9°, and in much less boiling water. Very sparingly soluble in absolute alcohol; but readily soluble in ordinary alcohol. Almost entirely insoluble in cold ether. Most of its metallic salts are soluble in water, but insoluble in absolute alcohol.

Kinate of Ammonia. Deliquescent.

Kinate of Baryta. $C_{28} H_{20} Ba_2 O_{22} + 12 Aq$ Permanent. Very soluble in water. Very sparingly soluble in alcohol of 83%.

Kinate of Cinchonidin (of Pasteur). Easily soluble in water, and spirit. (Leers, *Ann. Ch. u. Pharm.*, **82.** 161.)

Kinate of Cinchonin. Soluble in 0.5 pt. of water at 15°. Soluble in alcohol. When treated with warm alcohol, in quantity insufficient to dissolve the whole of it, it is decomposed; as this alcoholic solution cools another salt crystallizes out, which is permanent and very soluble in water. (Baup, *Ann. Ch. et Phys.*, 1832, (2.) **51.** 70.)

Kinate of Copper.

I.) *normal.* $C_{28} H_{20} Cu_2 O_{22} + 10 Aq$ Efflorescent. Soluble in about 3 pts. of water at the ordinary temperature; the solution soon decomposes, especially if it be heated, the less soluble basic salt (No. 2) separating out. (Baup, *Ann. Ch. et Phys.*, 1832, (2.) **51.** 65.)

II.) *basic.* $C_{28} H_{20} Cu_2 O_{22}, 2 Cu O + 8 Aq$ Permanent. Soluble in 1150 @ 1200 pts. of water at 18°; more readily soluble in boiling water. (Baup, *loc. cit.*, p. 66.)

Kinate *of sesquioxide* **of Iron.** Soluble in water.

Kinate of Lead.

I.) *normal.* $C_{28} H_{20} Pb_2 O_{22} + 4 Aq$ Extremely soluble in water. Soluble in alcohol.

II.) *basic.* $C_{28} H_{18} Pb_4 O_{22}, 4 Pb O$ Insoluble in boiling water. Soluble in an aqueous solution of subacetate of lead. (Compare Baup, *Ann. Ch. et Phys.*, (2.) **51.** 68.)

Kinate of Lime. $C_{28} H_{20} Ca_2 O_{22} + 20 Aq$ Permanent. Soluble in 6 pts. of water at 16°; its solubility augments rapidly with the temperature. (Baup, *Ann. Ch. et Phys.*, (2.) **51.** 62.) Soluble in about 5 pts. of water at 12.7° [T.] 100 pts. of water at 15.5° dissolve 20 pts. of it. (Ure's *Dict.*) Almost insoluble in alcohol.

Kinate of Magnesia. Very soluble in water.

Kinate of Manganese.

Kinate *of protoxide* **of Mercury.** Sparingly soluble in water.

Kinate of Nickel. Very soluble in water.

Kinate of Potash. Deliquescent.

Kinate of Quinine. Readily soluble in water; less soluble in alcohol.

Soluble in 3.5 pts. of water at 11°; and in 8 pts. of alcohol of 88%, at 11°. (Baup, *Ann. Ch. et Phys.*, 1832, (2.) **51.** 71.)

Kinate of Silver.

$C_{28} H_{20} Ag_2 O_{22} + 2 Aq$

Kinate of Soda. $C_{28} H_{20} Na_2 O_{22} + 8 Aq$ Soluble in 0.5 pt. of water at 15°. (Baup, *Ann. Ch. et Phys.*, (2.) **51.** 61.)

Kinate of Strontia. $C_{28} H_{20} Sr_2 O_{22} + 20 Aq$ Efflorescent. Soluble in 2 pts. of water at 12°; and in much less hot water. (Baup, *Ann. Ch. et Phys.*, 1832, (2.) **51.** 64.)

Kinate of Yttria. Soluble in water.

Kinate of Zinc.

Kinhydrone. *Vid.* HydroKinone with Kinone.

Kinonamid. Soluble in water; the solution being readily decomposed. (Woskresensky.)
(*Quinonamid. Chinonamid.*)
$N \left\{ \begin{matrix} C_{12} H_4 O_2'' \\ H \end{matrix} \right.$

Kinonic Acid. *Vid.* Melanic Acid.

Kinone. Very sparingly soluble in cold, abundantly soluble in boiling water; more easily soluble in alcohol, and ether. Soluble in dilute chlorhydric, and nitric acids; also with decomposition in alkaline solutions. (Woskresensky.)
(*Chinone. Chinoyl. Quinone. Quinoile.*)
$C_{12} H_4 O_4$

Quinone chloré. *Vid.* Chlorokinone, &c.

KinoTannic Acid. Hygroscopic. Easily soluble in water. Soluble in alcohol, and ether. More soluble than gallotannic acid in dilute acids. Its alkaline salts are insoluble in ether.
(*QuinoTannic Acid. Chinagerbsæure.*)
$C_{28} H_{18} O_{18} + Aq$

Kinonic Acid. Almost insoluble in cold water, and only very sparingly soluble in boiling water. Readily soluble in strong alcohol. Tolerably soluble in ether, and in the fatty and essential oils. Soluble in aqueous solutions of the caustic alkalies and in concentrated sulphuric acid.
(*Quinovic Acid. Quinovatic Acid. Chinovin. Quinova Bitter. Chinovasæure. Esculic Acid. Saponic Acid. Sapogenin. Chicoccic Acid.*)
$C_{48} H_{38} O_{11}$

Kinovate of Ammonia. Soluble in water, and alcohol.

Kinovate of Baryta. Insoluble in water. Soluble in spirit.

Kinovate of Copper. Insoluble in water. Soluble in spirit.

Kinovate of Lead. Sparingly soluble in water. Soluble in spirit.

Kinovate of Lime. Insoluble in water. Soluble in spirit.

Kinovate of Magnesia. Soluble in water.

Kinovate of Potash. Soluble in water, and alcohol.

Kinovate of Silver.

Kinovate of Soda. Soluble in water; less ? soluble in alcohol.

Kinovate of Strontia. Insoluble in water. Soluble in spirit.

Klumene. Soluble in 1 vol. of water at the ordinary temperature. (E. Davy.)
(*Acetylene.*)
$C_4 H_2$

Korksæure. *Vid.* Suberic Acid.

Kossein. Insoluble, or but sparingly soluble in water. Soluble in alcohol, ether, and acids. (St. Martin.)

Krameric Acid(from *Krameria triandra*). Permanent. Soluble in water.
(*Ratanhiaic Acid.*)

Kramerate of Ammonia.

Kramerate of Baryta.

I.) Soluble in 600 pts. of boiling water. Insoluble in alcohol.

II.) *basic.* Soluble in 450 pts. of [boiling?] water.

Kramerate of Lime. Soluble in 450 @ 500 pts. of boiling water.

Kramerate of Potash. Permanent. Very soluble in water.

Kramerate of Soda. Efflorescent.

Kramerate of Strontia. Permanent. Sparingly soluble in water.

Kratinin. *Vid.* Creatinin.

Kreatin. *Vid.* Creatin.

Kreatinin. *Vid.* Creatinin.

Krystallin. *Vid.* Anilin.

Kyanethin. *Vid.* Cyanethin.

Kyanol. *Vid.* Anilin.

Kynurenic Acid. Insoluble in water. Insoluble in alcohol. Its pyro-acid is easily soluble in alcohol. Insoluble in ether. Soluble in chlorhydric acid. Readily soluble in boiling chlorhydric acid and in dilute sulphuric, and nitric acids, not appearing to be decomposed by the latter. Soluble, without decomposition, in cold concentrated sulphuric acid, the solution undergoing decomposition when heated. Readily soluble, with combination, in cold solutions of the caustic alkalies, and in hot solutions of the alkaline carbonates; also soluble in baryta-water and lime-water. (Liebig, *J. Ch. Soc.*, **6**. 113.)
(*Kyanurenic Acid. Cyanurenic Acid.*)

Kynurenate of Baryta. Sparingly soluble in water.

Kynurenate of Lime. Sparingly soluble in water.

Kynurenate of Silver. Insoluble in boiling water. (Liebig, *loc. cit.*)

L.

Lactamic Acid. Not isolated.
$C_{12} H_{12} N O_{10} - N \left\{ \begin{matrix} (C_6 H_5 O_4)_2 \\ H_2 \end{matrix} \right. . O, H O$

Lactamate of Ammonia. Readily soluble in water. Abundantly soluble in alcohol. (Pelouze.)
"*Lactamide*"(of Pelouze).
$C_{12} H_{12} (N H_4) N O_{10}$

"Lactamid"(of Pelouze). *Vid.* Lactamate of Ammonia.

Lactamid. Very soluble in water, and alcohol.
$C_6 H_7 N O_4 = N \left\{ \begin{matrix} C_6 H_5 O_4 \\ H_2 \end{matrix} \right.$

Lactic Acid(Anhydrous). Almost insoluble in water. Very soluble in alcohol, and ether. By long-continued ebullition in water, or by prolonged contact with cold water or moist air, it is converted into ordinary lactic acid; this transformation occurs instantly in solutions of the alkalies and alkaline earths. (Pelouze, *Ann. Ch. et Phys.*, (3.) **13**. 258.) Soluble in all proportions both in hydrated and absolute alcohol. (Engelhardt.)
(*Lactic Anhydride. Lactidic Acid.*)
$C_{12} H_{10} O_{10}$

Lactic Acid. Hygroscopic. Soluble in all proportions in water (Scheele), and alcohol. Sparingly soluble in ether. (Berzelius.) Soluble in all proportions in water, alcohol, and ether. (Engelhardt & Maddrell, *Ann. Ch. u. Pharm.*, 1847, **63**. pp. 88, 85.) Soluble in all proportions in water, and alcohol. (Pelouze, *Ann. Ch. et Phys.*, (3.) **13**. 258.) Easily soluble in ether, which even removes it from the aqueous solution. (Kolbe's *Lehrb.*, **1**. 790.)
$C_{12} H_{12} O_{12} = C_{12} H_{10} O_{10}, 2 H O$

Most of the salts of lactic acid are difficultly soluble in cold water, and alcohol. Only a few of them are easily and abundantly soluble in boiling alcohol, but, in general, boiling water dissolves them very readily. They are all absolutely insoluble in ether. (Engelhardt & Maddrell, *loc. cit.*, p. 88.) All those which crystallize are permanent in the air.

Certain differences have been observed in the solubility, &c. of several salts of lactic acid, according as the acid contained in them has been obtained from animal fluids (juice of flesh, &c.) [" α lactic acid," called also *para-* or *sarco*-lactic acid], or been produced by the fermentation of sugar [" β lactic acid"], although the acids themselves, whether prepared from flesh or sugar, exhibit no differences when isolated. (Engelhardt, *Ann. Ch. u. Pharm.*, 1848, **65.** 360.)

LACTATE OF ALUMINA. A permanent gum. (Braconnot.) Hydrate of alumina is almost insoluble in lactic acid; but on decomposing a solution of sulphate of alumina with lactate of baryta, a solution containing much alumina is obtained. (Engelhardt & Maddrell, *Ann. Ch. u. Pharm.*, 1847, **63.** 101.)

LACTATE OF AMMONIA. Deliquescent. Soluble in water, and alcohol. (Pelouze.) Very soluble in water, the solution undergoing decomposition when warmed. Insoluble in ether. (Engelhardt & Maddrell, *loc. cit.*, p. 116.) Soluble in less than 6 pts. of cold alcohol of 30° B. (Erdmann & Marchand.)

LACTATE OF AMMONIA & OF MAGNESIA. Permanent. Soluble in water. (Berzelius.)

LACTATE OF ANTIMONY. Oxide of antimony is scarcely at all soluble in lactic acid, but when boiled with lactate of potash a considerable quantity dissolves. (Engelhardt & Maddrell, *loc. cit.*, p. 100.)

LACTATE OF BARYTA.

I.) *normal.* Permanent. Easily soluble in water and in ordinary alcohol, especially when these are warm. Insoluble in cold, and only very slightly soluble in boiling absolute alcohol. Absolutely insoluble in ether. (Engelhardt & Maddrell, *loc. cit.*, pp. 116, 99.)

II.) *acid.* Permanent. Tolerably easily soluble in water. May be washed with ordinary alcohol, in which it is not very soluble. $C_{12}H_{11}BaO_{12}$ (Engelhardt & Maddrell, *loc. cit.*, p. 117.) Soluble in 21 pts. of cold water. (Braconnot.)

LACTATE OF BISMUTH.

I.) $BiO_3, C_{12}H_{10}O_{10}$ Only slightly soluble in cold water, but much of it is dissolved by boiling water. Less soluble in very dilute alcohol than in water. Insoluble in ether. The hot aqueous solution deposits nothing on cooling; but on evaporating it crystalline crusts are formed, which are soluble in a small quantity, the solution becoming cloudy when more water is added. It would appear that by the action of boiling water, an acid, soluble salt is formed since the undissolved residue behaves like No. II. (Engelhardt, *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 368 – 370.)

II.) $2BiO_3, C_{12}H_{10}O_{10}$ Insoluble in cold or boiling water, and is not decomposed by water. Insoluble in alcohol or ether. Difficultly soluble in lactic acid. (Engelhardt, *loc. cit.*, pp. 367 – 370.)

LACTATE OF CADMIUM. Permanent. The β salt is $C_{12}H_{10}Cd_2O_{12}$ soluble in 10 pts. of cold, and 8 pts. of boiling water. Insoluble in cold or boiling alcohol, or ether. (Engelhardt & Maddrell, *loc. cit.*, p. 94.) Soluble in 8 @ 10 pts. of cold, and in 4 pts. of boiling water. (Lepage.)

LACTATE *of sesquioxide* OF CHROMIUM. Easily soluble in water. (Gay-Lussac & Pelouze; Engelhardt & Maddrell, *loc. cit.*, p. 101.)

LACTATE OF COBALT. Permanent. Soluble $C_{12}H_{10}Co_2O_{12} + 6\,Aq$ in 38 pts. of cold water. (Braconnot.) 100 pts. of water at 15.56° dissolve 2.6 pts. of it. (Ure's *Dict.*) The β salt is almost insoluble in cold, but tolerably easily soluble in boiling water. Insoluble in cold or boiling alcohol or ether. (Engelhardt & Maddrell, *loc. cit.*, pp. 106, 105.)

LACTATE OF COPPER.

I.) *normal.* Permanent. The α salt is soluble $C_{12}H_{10}Cu_2O_{12} + 8\,Aq(\alpha)\ \&\ 4\,Aq(\beta)$. in 1.95 pts. of cold, and in 1.24 pts. of boiling water; and much more easily in alcohol. (Engelhardt, *loc. cit.*, **65.** 365.)

The β salt is soluble in 6 pts. of cold, and 2.2 pts. of boiling water; in 115 pts. of cold, and 26 pts. of boiling alcohol. (Engelhardt & Maddrell, *loc. cit.*, **63.** 92.)

II.) *basic.* Extremely difficultly soluble either $C_{12}H_{10}Cu_2O_{12}, 2\,CuO$ in cold or boiling water. (Engelhardt & Maddrell, *loc. cit.*, p. 93.)

LACTATE OF ETHYL. Miscible in all propor- $C_{12}H_{10}(C_4H_5)_2O_{12}$ tions with water, alcohol, and ether. It is, however, partially decomposed by water. (Strecker, *Ann. Ch. u. Pharm.*, **91.** 357.)

LACTATE *of protoxide* OF IRON. Permanent. $C_{12}H_{10}Fe_2O_{12} + 6\,Aq$ The β salt is difficultly soluble in cold, tolerably easily soluble in boiling water, and alcohol. Insoluble in ether. (Engelhardt & Maddrell, *loc. cit.*, p. 102.) Sparingly soluble in water. (Pelouze.) Soluble in 48 pts. of water at 10°, and in 12 pts. of boiling water (Wittstein); in 30 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) Very sparingly soluble in weak, and not at all soluble in strong alcohol. (Wittstein.)

LACTATE *of sesquioxide* OF IRON. Deliquescent. Soluble in water. Insoluble in alcohol. (Berzelius.) Easily soluble in water. Soluble in alcohol. (Engelhardt & Maddrell, *loc. cit.*, pp. 100, 102.)

LACTATE *of protoxide & of sesquioxide* OF IRON. $C_{12}H_{10}Fe_2O_{12};\ C_{108}H_{90}(Fe_2{}''')_6O_{108} + 24\,Aq$ Slowly deliquescent. Very easily soluble in water. (Wittstein.)

LACTATE OF LEAD.

I.) *normal.* Very soluble in water. Easily sol- $C_{12}H_{10}Pb_2O_{12}$ uble in ordinary alcohol, especially when this is warm. Insoluble in cold, and only slightly soluble in boiling absolute alcohol. Insoluble in ether. (Engelhardt & Maddrell, *loc. cit.*, p. 99.)

II.) *polybasic.* Sparingly soluble in cold, more easily soluble in boiling water. (Berzelius.)

LACTATE OF LIME.

I.) *normal.* Permanent. Both salts are soluble in all proportions in boiling water, and ordinary alcohol; but the α salt requires 12.4 pts. of cold water for its solution, while

(*When crystallized from alcohol, both salts contain* 10 *equivalents of water.*)
$C_{12}H_{10}Ca_2O_{12} + 8\,Aq(\alpha), \&\ 10\,Aq(\beta)$

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the β salt dissolves in 9.5 pts. of cold water. (Engelhardt, *loc. cit.*, **65.** 361.) The β salt is soluble in all proportions in boiling ordinary alcohol, and water, since it melts in its water of crystallization at this temperature. Completely insoluble in cold spirit and apparently at all temperatures below the boiling-point of the spirit, at least only traces of it were dissolved at 50° in spirit. Insoluble in absolute alcohol. Insoluble in ether. (Engelhardt & Maddrell, *loc. cit.*, **63.** pp. 111, 85, 87.)

The 10 Aq. salt is soluble in 21 pts. of cold water (Braconnot); in 17.4 pts. of water at 24°, and in all proportions in boiling water. (Wackenroder.) Soluble at 20° in 490 pts. of 85% alcohol, and in 1.2 pts. at the temperature of boiling.

Lactate of lime is sparingly soluble in water. Abundantly soluble in alcohol, from which it is precipitated on the addition of ether. (Pelouze, *Ann. Ch. et Phys.*, (3.) **13.** 266.) Sparingly soluble in boiling absolute alcohol. (Corriol.)

II.) *acid.* Permanent. Soluble in water. Soluble in boiling, less soluble in cold, absolute alcohol. Insoluble in ether. (Engelhardt & Maddrell, *loc. cit.*, p. 118.)

$C_{12}H_{11}CaO_{12} + 2Aq$

LACTATE OF LIME & OF POTASH. Slowly soluble in cold, easily soluble in hot water. (Strecker, *Ann. Ch. u. Pharm.*, **91.** 353.)

$C_{12}H_{10}KCaO_{12}$

LACTATE OF LIME & OF SODA. Soluble in water. (Strecker, *Ann. Ch. u. Pharm.*, **91.** 354.)

$C_{12}H_{10}CaNaO_{12} + 2Aq$

LACTATE OF MAGNESIA. Permanent. The α salt is much more easily soluble in water, and spirit than the β salt. (Engelhardt, *loc. cit.*, **65.** p. 362.) The β salt is soluble in 28 pts. of cold, and in 6 pts. of boiling water. It is insoluble either in warm or cold, ordinary or absolute, alcohol. Also insoluble in ether. (Engelhardt & Maddrell, *loc. cit.*, **63.** pp. 109, 85.) The β salt is soluble in 30 pts. of cold water (Gay-Lussac & Pelouze); in 25 pts. of cold water. (Braconnot.)

$C_{12}H_{10}Mg_2O_{12} + 8Aq\ (\alpha),\ \&\ 6Aq\ (\beta)$

LACTATE OF MANGANESE. Permanent. Tolerably soluble in cold, and easily soluble in boiling water. Insoluble in cold, more easily soluble in boiling alcohol. Insoluble in ether. (Engelhardt & Maddrell, *loc. cit.*, p 107.) Soluble in 12 pts. of cold water. (Braconnot.)

$C_{12}H_{10}Mn_2O_{12} + 6Aq$

LACTATE *of dinoxide* OF MERCURY.

I.) *normal.* Permanent. Difficultly soluble in cold, or boiling water. It is decomposed by boiling. Insoluble in cold, and difficultly soluble in boiling alcohol; being decomposed by the latter. (Engelhardt & Maddrell, *loc. cit.*, p. 95.) Readily soluble in water. (Braconnot.)

$C_{12}H_{10}Hg_4O_{12} + 4Aq$

LACTATE *of protoxide* OF MERCURY.

I.) *tetra.* Permanent. Very easily soluble both in cold and boiling water. Difficultly soluble in cold or boiling spirit, and is not decomposed by boiling. (Engelhardt & Maddrell, *loc. cit.*, p. 97.)

$C_{12}H_{10}Hg_2O_{12}, 2HgO$

II.) Insoluble in water. (*Idem.*)

LACTATE OF NICKEL. Permanent. Almost insoluble in cold, but tolerably easily soluble in boiling water. Insoluble in cold or boiling alcohol or in ether. (Engelhardt & Maddrell, *loc. cit.*, p. 105.) Soluble in 30 pts. of cold water, and much more readily in boiling water. (Braconnot.)

$C_{12}H_{10}Ni_2O_{12} + 6Aq$

LACTATE OF POTASH. Hygroscopic. Soluble in water, and alcohol. (Scheele; Engelhardt & Maddrell, *loc. cit.*, p. 116.) Insoluble in ether. (E. & M.)

LACTATE OF POTASH & OF ZINC. Soluble in water. (Strecker, *Ann. Ch. u. Pharm.*, **91.** 355.)

LACTATE OF QUININE. More soluble than sulphate of quinine in water.

LACTATE OF SILVER. Permanent. Soluble in 20 pts. of cold water. (Braconnot.) Almost completely insoluble in cold, easily soluble in warm alcohol. Partially decomposed by long-continued boiling of the aqueous or alcoholic solution. Insoluble in ether. (Engelhardt & Maddrell, *loc. cit.*, p. 89.)

$C_{12}H_{10}Ag_2O_{12} + 4Aq$

LACTATE OF SODA. Deliquescent. Soluble in water, and alcohol. (Scheele.)

LACTATE OF SODA & OF ZINC. Readily soluble in water. (Strecker, *Ann. Ch. u. Pharm.*, **91.** 354.)

$C_{12}H_{10}NaZnO_{12} + 2Aq$

LACTATE OF STRONTIA. Soluble in 8 pts. of cold water. (Braconnot.) Its properties are similar to those of the lime salt. (E. & M., *loc. cit.*, p. 115.)

$C_{12}H_{10}Sr_2O_{12} + 6Aq$

LACTATE *of protoxide* OF TIN.

I.) *basic.* Permanent. Absolutely insoluble in cold water, but boiling water dissolves traces of it. Absolutely insoluble in cold or boiling alcohol. Easily soluble in chlorhydric acid, but acetic acid dissolves it only after long-continued boiling. (Engelhardt & Maddrell, *loc. cit.*, p. 97.)

$C_{12}H_{10}Sn_2O_{12}, 2SnO$

LACTATE *of binoxide* OF TIN. Soluble in water. (E. & M., *loc. cit.*, p. 99.)

LACTATE *of sesquioxide* OF URANIUM. Abundantly soluble both in cold and boiling water. The aqueous solution is decomposed by sunlight, with subsequent deposition of oxide of uranium. Absolutely insoluble in cold or boiling alcohol. (Engelhardt & Maddrell, *loc. cit.*, p. 99.)

$2Ur_2O_3, C_{12}H_{10}O_{10}$

LACTATE OF UREA. Slowly deliquescent. Easily soluble in water, and alcohol; less soluble in ether. (Cap & Henry.)

Does not exist, according to Pelouze. (*Ann. Ch. et Phys.*, 1842, (3.) **6.** 65.)

LACTATE OF ZINC. Permanent. The α salt is soluble in 5.7 pts. of cold, and 2.88 pts. of boiling water; while the β salt is soluble in 58 pts. of cold and 6 pts. of boiling water. The α salt is soluble in 2.23 pts. of cold, and in almost as much boiling alcohol; while the β salt is almost insoluble in alcohol, either cold or boiling. (Engelhardt, *Ann. Ch. u. Pharm.*, 1848, **65.** 363; and E. & Maddrell, *Ibid.*, **63.** 103.) The β salt is soluble in more than 50 pts. of cold water, and in less hot water. (Braconnot.) Lactate of zinc is sparingly soluble in water. (Pelouze, *Ann. Ch. et Phys.*, (3.) **13.** 266.)

$C_{12}H_{10}Zn_2O_{12} + 4Aq\ (\alpha),\ \&\ 6Aq\ (\beta)$

LACTID. Very sparingly soluble in cold water; more soluble in boiling water, by

(*Improperly "Anhydrous Lactic Acid."*)
$C_{12}H_8O_8$

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which it is converted into lactic acid. Readily soluble in acetone. (Gay-Lussac & Pelouze.) Much more readily converted into lactic acid by exposure to moist air or contact with water, than anhydrous lactic acid. Very soluble in lactone. (Pelouze, *Ann. Ch. et Phys.*, (3.) **13.** pp. 263, 266.)

Lactine. Soluble in 5 @ 6 pts. of cold, and in 2.5 pts. of boiling water. The saturated aqueous solution contains 4.7% of it. (Mussembrock, cited in *Ann. de Chim.*, **28.** 291.) Insoluble in cold alcohol or ether. More soluble in acid, and alkaline, solutions than in pure water. Acids convert it into [Pasteur's Lactose, then into] glucose, even in the cold, but especially when heated.
(*Milk Sugar. Lactose.*)
$C_{10}H_{10}O_{10}, 2HO$

Soluble in water, with elevation of temperature. Water which has been saturated at 10° by prolonged contact with an excess of it contains 0.1455 of its weight of the sugar, and the sp. gr. of the solution is 1.055. When this saturated solution is allowed to evaporate spontaneously in dry air at the temperature of 10°, it does not begin to deposit crystals until the sp. gr. of the solution has become equal to 1.063, in which case the water contains 0.2164 of its weight of the sugar, modified by solution. This fact, analogous to the phenomena of supersaturation which are so common among inorganic salts, corresponds to different powers of rotating light which are exhibited by sugar of milk recently dissolved, and by that which has been in solution for some time. Regarding the original crystallized sugar as normal, and that which has been some time in solution as modified, the solubility of the modified sugar is to that of the ordinary sugar as 3 : 2. (Dubrunfaut, *C. R.*, **42.** 229; also cited by Berthelot, *Ann. Ch. et Phys.*, (3.) **47.** 302, *note.*)

Lactin with **Ammonia.**

Lactin with **Baryta.**

Lactin with **Lead.**

I.) Soluble in water.

II.) Insoluble in water.

Lactin with **Lime.** Insoluble in alcohol.

Lactin with **Potash.** Very soluble in water. Insoluble in alcohol.

Lactin with **Soda.** Very soluble in water. Insoluble in alcohol.

LactoCaramel. Easily soluble in water. Insoluble in alcohol. (Lieben.)
$C_{12}H_{10}O_{10}$

LactoCaramel with **Copper.**
$C_{12}H_9CuO_{10} + 2Aq$

Lactone? Very sparingly soluble in water.
$a = C_{20}H_{16}O_8$
$b = C_{20}H_{16}O_8, 2HO$ Tolerably easily soluble in water. (Pelouze, *Ann. Ch. et Phys.*, (3.) 13. 262.)

Lactose(of Pasteur). Crystallizes more readily than lactin.
(*Altered Lactin.*)
$C_{12}H_{12}O_{12}$

Lactucin. Soluble in 60 @ 80 pts. of cold water. Easily soluble in alcohol; less soluble in ether. More soluble in acetic acid than in water. (Buechner.)

Lactucone. Insoluble in water. Readily soluble in hot alcohol, from which a portion separates as the solution cools. Readily soluble in ether, and the fatty and essential oils. (Lenoir.)
$C_{80}H_{64}O_6$

LævoRacemic Acid. *Vid. left*Tartaric Acid.

LævoTartaric Acid. *Vid. left*Tartaric Acid.

"**Lampic Acid.**" Was a mixture of Aldehyde and Acetic Acid.

Lantanuric Acid(of Schlieper). Easily soluble in water, and alcohol. (Schlieper, *Am. J. Sci.*, (2.) **6.** 373.)
(*Probably identical with Allanturic Acid.*)
$C_6H_4N_2O_6$

Lantanurate of Lead.

I.) $C_6N_2H_2Pb_2O_6$ Insoluble in cold, sparingly soluble in hot water. Insoluble in alcohol. Easily soluble in acetic acid, and in an aqueous solution of basic acetate of lead. (Schlieper, *loc. cit.*)

II.) *bi.* Easily soluble in water. Insoluble in alcohol. (Schlieper, *loc. cit.*)

Lantanurate of Potash.

I.) *normal.* Soluble in water. Alcohol precipitates it from the aqueous solution.

II.) *hyper acid.* Soluble in 8 @ 10 pts. of cold water. Much more readily soluble in hot water. The aqueous solution is rendered milky by the addition of alcohol. Insoluble in strong alcohol. (Schlieper, *loc. cit*, p. 371.)
$C_6N_2H_3KO_6, HO; C_6N_2H_4O_6 + 4Aq$

Lantanurate of Silver. Insoluble in boiling water. (Schlieper, *Am. J. Sci.*, (2.) **6.** pp. 366 - 373.)

Lanthanum. Slowly oxidized by cold, rapidly by hot water. (Mosander.)
La

Laricin. Forms a paste with boiling water. Easily soluble in alcohol, and in oil of turpentine. (Th. Martius.)
$C_{14}H_{12}O_4$

Lauric Acid. Readily soluble in strong alcohol; still more soluble in ether.
(*Lauro Stearic Acid. Pickurino Stearic Acid.*)
$C_{24}H_{23}O_3, HO$

Laurate of Baryta. Soluble in 10864 pts. of water at 17.5°, and in 1982 pts. of boiling water; in 1468 pts. of ordinary alcohol at 15.5°, and in 24 pts. of the same alcohol at the boiling temperature.
$C_{24}H_{23}BaO_4$

Laurate of Ethyl. Almost entirely insoluble in water. Difficultly soluble in spirit. Soluble in all proportions in ether. (Delffs.)
$C_{24}H_{23}(C_4H_5)O_4$

Laurate of Glyceryl. Very sparingly soluble in cold water, or alcohol. Tolerably soluble in boiling absolute alcohol. Readily soluble in ether.
(*Lauro Stearin.*)
$C_{54}H_{52}O_{10} = C_6H_5O_3, HO, 2C_{24}H_{23}O_3$

Laurate of Lead.
$C_{24}H_{23}PbO_4$

Laurate of Lime.

Laurate of Silver. Easily soluble in ammonia-water.
$C_{24}H_{23}AgO_4$

Laurate of Soda. Easily soluble in water, and alcohol.
$C_{24}H_{23}NaO_4$

Laurin. Insoluble in water. Readily soluble in cold alcohol and in ether. Insoluble in solutions of the caustic alkalies.
$C_{44}H_{30}O_6$

Laurone. Soluble in alcohol.
(*Lauro Stearone.*)
$C_{46}H_{46}O_2 = \left.\begin{matrix}C_{24}H_{23}\\C_{22}H_{23}\end{matrix}\right\}O_2$

LauroStearin. *Vid.* Laurate of Glyceryl.

Lauryl Alcohol. *Vid.* Hydrate of Lauricyl.

Lead. Permanent in dry air. Insoluble in water free from air. Rapidly dissolved by oxidizing acids. Unacted upon to any ex-
Pb

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tent by dilute sulphuric acid. Acetic acid dissolves it when in contact with the air.

When in contact with distilled water, exposed to the air, but protected from carbonic acid, it becomes covered with crystalline scales of hydrate of lead; this reaction occurs only when the water is perfectly pure, for the presence of a trace of saline impurity prevents the formation of the hydrate, the nitrates alone being an exception, a very large quantity of any of these being necessary in order to prevent the formation of the hydrate. Almost completely insoluble in cold chlorhydric acid, and is only very feebly attacked by this acid when boiling. Completely soluble in nitric acid, especially when this is not too concentrated, but if the nitric acid contains sulphuric or chlorhydric acid, its solvent power is very slight. (H. Rose, *Tr.*) Granulated lead disengages hydrogen, in tolerable abundance, when treated with concentrated chlorhydric acid; and if a small quantity of a solution of bichloride of platinum is added, the reaction becomes very energetic; by means of this addition an evolution of hydrogen may even be excited with dilute chlorhydric acid, which by itself would have no action upon lead. (Millon, *C. R.*, 1845, **21.** 49; compare Barreswil, *Ibid.*, p. 292.) Cold concentrated sulphuric acid has little or no action upon it; when hot and very concentrated this acid slowly dissolves it with evolution of sulphurous acid, but the action is slight. Scarcely at all acted upon by boiling concentrated chlorhydric acid. Soluble in aqua-regia. Nitric acid is its best solvent, but in a mixture of nitric and sulphuric acid it is as good as insoluble; the presence of chlorhydric acid also diminishes the solvent power of nitric acid. (Berzelius, *Lehrb.*) Unacted upon by highly concentrated nitric acid. (*Gm.*) Alkaline solutions oxidize it when in contact with the air.

Unacted upon by perfectly pure water; but is very rapidly corroded by water containing nitrous acid, or nitrites, in solution; or ammonia or nitrogenous organic matter, from the decomposition of which nitrous acid may result. (Medlock, *Phil. Mag.*, (4.) **14.** 209.)

Those of the lead salts which are insoluble in water are, for the most part, soluble in nitric acid.

Lead & Potassium (alloy of). Slowly decomposed by water. (Sérullas.)

Lecanoric Acid. (*Lecanorin. Alpha Orsellic Acid. Beta Orsellic Acid.*) $C_{32}H_{14}O_{14}$ Very sparingly soluble in cold water. Less soluble than orsellic acid in water. (Schunck.) Soluble in 2500 pts. of boiling water, in 150 pts. of alcohol of 80% at 15.5°, and in 5.5 pts. of the same alcohol at boiling (Schunck); in 45 pts. of boiling alcohol (Schunck, in *Gmelin's Handbook*); in 80 pts. of ether at 15.5°. (Schunck.) Easily soluble, without alteration, in boiling, less soluble in cold acetic acid. Easily soluble in cold lime- or baryta-water. Decomposed by warm concentrated sulphuric acid. The alkaline lecanorates are soluble in water.

Lecanorate of Baryta. $C_{32}H_{13}BaO_{14}$ Much less soluble than orsellate of baryta in water. Soluble in boiling alcohol. (Stenhouse.)

Lecanorate of Copper. Ppt.

Lecanorate *of protoxide* of Iron. Appears to be soluble in water.

Lecanorate *of sesquioxide* of Iron. Ppt.

Lecanorate of Lead. Somewhat soluble in alcohol.

Lecanorate of Lime. Sparingly soluble in water, being much less soluble therein than orsellate of lime. Sparingly soluble in alcohol.

Lecanorate of Methyl. *Vid.* Orsellate of Methyl.

Lecanorate of Silver. Ppt.

Lecanoric Ether. *Vid.* Orsellate of Ethyl.

Lecanorin. *Vid.* Lecanoric Acid.

Legumin. (*Vegetable Casein. Amandin.*) Largely soluble in cold, but insoluble in hot water, being coagulated when the solution is heated nearly to the temperature of ebullition. Insoluble in alcohol or ether. Soluble in ordinary acetic acid. In contact with concentrated acetic acid it swells up to a mass which is readily soluble in boiling water, and the residue obtained on evaporating this solution is capable of being redissolved by water. Soluble in ammonia-water. Soluble in concentrated chlorhydric acid. Slowly and sparingly soluble in concentrated sulphuric acid. Soluble, with decomposition, in strong nitric acid. Soluble in aqueous solutions of the caustic alkalies. (Dumas & Cahours, *Ann. Ch. et Phys.*, (3.) **6.** 433; compare p. 424, *et seq.*) Insoluble in cold, partially decomposed by hot water. Not "soluble in water," as stated by Dumas. (Lœwenberg and others.) Insoluble in boiling alcohol or ether. Easily soluble in cold aqueous solutions of potash, soda, and ammonia; on boiling the solution obtained by potash or soda, decomposition ensues. With solutions of caustic lime, or baryta, it forms compounds insoluble in water; it is, however, decomposed when boiled with an excess of these bases. The alkaline solution of legumin is coagulated by all the acids; but when added in excess, the acids redissolve this precipitate. Easily soluble in tartaric, oxalic, malic, and citric acids, in concentrated chlorhydric and sulphuric acids, also, with decomposition, in nitric acid. From its aqueous solution it is precipitated, like casein, by acetic and phosphoric acids. Insoluble in concentrated acetic acid.

Leinœlic Acid. *Vid.* Olinic Acid.

Lepargic Acid. }
Lepargylic Acid. } Identical with Anchoic Acid, *q. v.*

Lepidin (of Leroux), (*from several species of Lepidium*). Permanent. Easily soluble in water, and alcohol. Sparingly soluble in oils. Insoluble in ether. (Leroux, *Wittstein's Handw.*)

Lepidin (of Williams).

$C_{20}H_9N = N\left\{C_{20}H_9'''\right.$

Leptandrin. [*Impure resinoid from Leptandra Virginica.*] Soluble in alcohol when recently prepared, becoming less so by age. Soluble in aqueous solutions of caustic ammonia and potash. (Parrish's *Pharm.*, p. 192.)

Lethal. *Vid.* Hydrate of Lauricyl.

LeucAzolitmin.

Leucic Acid. $C_{12}H_{12}O_6 = C_{12}H_{11}O_5, HO$ Soluble in water. Easily soluble in alcohol, and ether.

Leucate of Ammonia. Soluble in water.

Leucin. (*Aposepedin. Thymin.*) $C_{12}H_{13}NO_4$ Sparingly soluble in cold water, but readily soluble in water at 60°. (Proust.) Soluble in 14 pts. of water at 22° (Braconnot); in 27.7 pts. of water at 17.5° (Mulder.) More soluble than tyrosin in cold water.

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Very sparingly soluble in boiling alcohol. (Braconnot.) Sparingly soluble in ordinary alcohol, and very sparingly soluble in absolute alcohol. (Bopp.) Very sparingly soluble in absolute alcohol; soluble in 658 pts. of cold alcohol of 0.828 sp. gr.; the hot solution becomes turbid on cooling. (Mulder.) Soluble in 1040 pts. of cold alcohol of 96%, and in 800 pts. of warm alcohol of 98%. (Zollikofer.) Insoluble in ether, even when this is hot. (Proust; Mulder.) Insoluble in chloroform. The presence of acetate of potash or of acetic acid increases its solubility both in water and in alcohol. (Bopp.) Soluble, with combination, in weak acids.

Soluble in concentrated sulphuric acid (Mulder); readily soluble in dilute sulphuric acid, and the solution may be evaporated at a temperature of 100° without undergoing decomposition. (Bopp.) More readily soluble in chlorhydric acid than in water. (Braconnot.) Readily soluble, with combination, in nitric acid; also soluble in a solution of caustic potash. (Proust.) More soluble in ammonia-water than in water.

Leucin with Copper. Readily soluble in a
$C_{12}H_{12}CuNO_4$ warm aqueous solution of leucin, from which it is deposited on cooling.

Leucin with Lead.
I.) $C_{12}H_{12}PbNO_4$ Soluble in water.
II.) $C_{12}H_{12}PbNO_4, 3 PbO$
III.) Insoluble in water.

Leucin with Mercury. Readily soluble in
$C_{12}H_{12}HgNO_4$ an aqueous solution of leucin. (Gœssmann.)

LeucoNitric Acid. *Vid.* Nitrate of Leucin.

LeucOrcein.

LeucOrcein with Zinc. Insoluble in water.
$C_{18}H_{12}NO_8, 3 ZnO + 2 Aq$

Leucoturic Acid. Generally admitted to be
$C_6H_3N_2O_6$ identical with Allanturic Acid; but according to Schlieper it is insoluble in cold water. Soluble in hot water.

Leukol. *Vid.* Quinolein.

LevoRacemic Acid. *Vid.* *left*Tartaric Acid.

Lichenic Acid. *Vid.* Fumaric Acid.

Lichenin. Sparingly soluble in cold water;
(*Starch of Moss.*) decomposed by long-continued
$C_{12}H_{10}O_{10}$ boiling with water. Insoluble in alcohol or ether. Decomposed by boiling dilute acids.

Lichen-Red. *Vid.* Orcein.

LichenStearic Acid. Insoluble in water.
$C_{28}H_{24}O_6$ Easily soluble in alcohol, especially if this be warm. Soluble in ether and in volatile and fatty oils. Easily soluble in ammonia-water, and in solutions of the caustic alkalies. (Knop & Schnedermann.)

LichenStearate of Ammonia.
I.) *acid.* Soluble in water.
II.) *basic.* Insoluble in water.

LichenStearate of Baryta. Ppt.
$C_{28}H_{23}BaO_6$

LichenStearate of Lead.
$C_{28}H_{23}PbO_6$

LichenStearate of Potash. Soluble in pure water, and in boiling absolute alcohol.

LichenStearate of Soda.

LichenStearate of Silver.

Light-Carburetted Hydrogen. *Vid.* Hydride of Methyl.

Lignone. Miscible in all proportions with
(*Xylit. Formesal.*) water, alcohol, oil of turpentine, and ether; from the latter water separates it. (Leopold Gmelin.)

Ligulin (coloring matter of *Ligustrum vulgare*). Soluble in water, alcohol, and a mixture of alcohol and ether. Not altered by boiling for forty-eight hours with water, nor by digestion during six weeks with sulphurous acid. Insoluble in ether. (J. Nicklès, *Am. J. Sci.*, (2.) **29.** 326; *Rép. Chim. pure*, **1.** 496.)

Ligustrin (from *Ligustrum vulgare*). Easily soluble in water and in dilute spirit. Insoluble in absolute alcohol, or in ether. (Polex.)

Lilacin. *Vid.* Syringin.

Limacin. Somewhat soluble in cold, more soluble in warm water. Soluble in boiling alcohol, in concentrated chlorhydric acid, and easily in alkaline liquors. (Braconnot, *Ann. Ch. et Phys.*, (3.) **16.** 319.)

Lime. *Vid.* Oxide of Calcium.

Limettic Acid. Sparingly soluble in water.
$C_{22}H_8O_{12} = C_{22}H_6O_{10}, 2 HO$ Readily soluble in alcohol. (Vohl.)

Limettate of Silver. Sparingly soluble in
$C_{22}H_6Ag_2O_{12}$ water.

Limonin. Very sparingly soluble in water,
$C_{44}H_{26}O_{14}$ ammonia-water, or ether; somewhat more soluble in mineral acids. Easily soluble in alcohol, and acetic acid; still more readily soluble in solutions of the caustic alkalies. Soluble in concentrated sulphuric acid, from which it is precipitated by water. Soluble in boiling nitric acid, without decomposition.

Linin (from *Linum catharticum*). Insoluble in water, or oil of turpentine. Tolerably easily soluble in ether; but most easily soluble in alcohol, and in concentrated acetic acid. Insoluble in dilute acids. Soluble in concentrated sulphuric and nitric acids, and in alkaline solutions.

LinOleic Acid. Insoluble in water. Solu-
$C_{32}H_{28}O_4$ ble in alcohol, and ether. (Schueler, *Ann. Ch. u. Pharm.*, **101.** 256.)

LinOleate of Baryta. Sparingly soluble in alcohol. Easily soluble in ether. (Schueler.)

LinOleate of Lime. Insoluble in water. Sparingly soluble in alcohol. Soluble in ether. (Schueler, *loc. cit.*)

Lipic Acid. Tolerably soluble in cold water,
$C_{10}H_8O_8$ being more soluble therein than pimelic or adipic acids.

100 pts. of water at 18° dissolve 10.56 pts. of it. (Wirz, *Ann. Ch. u. Pharm.*, **104.** 280.) Soluble in boiling alcohol, and in ether. (Laurent.)

Lipate of Ammonia. Soluble in water.

Lipate of Copper.
$C_{10}H_6Cu_2O_8$

Lipate of Lime. Soluble in water. (Wirz.)
$C_{10}H_6Ca_2O_8 + 2 Aq$

Lipate of Silver.
$C_{10}H_6Ag_2O_8$

Lipate of Soda. Efflorescent. Soluble in
$C_{10}H_6Na_2O_8 + 12 Aq$ water. (Wirz.)

Liriodendrin (from *Liriodendron tulipifera*). Sparingly soluble in water. Very soluble in alcohol, and ether. Insoluble in dilute acids, or

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dilute alkaline solutions. Unacted upon by concentrated nitric acid; decomposed by concentrated sulphuric, and chlorhydric acids. (Emmet.)

Lithia. *Vid.* Oxide of Lithium.

Lithium. The salts of lithium are exceedingly Li deliquescent and soluble in water, being in general more soluble than the corresponding potash salts. (Troost.)

LithiumEthyl with **ZincEthyl.**

Lithic Acid. *Vid.* Uric Acid.

Lithofellic Acid. (*Bezoaric Acid.*) $C_{40}H_{36}O_8 = C_{40}H_{35}O_7, HO$ Insoluble in water. Soluble in 29.4 pts. of absolute alcohol at 20°, and in 6.5 pts. at the temperature of boiling; in 444 pts. of ether at 20°, and in 47 pts. of boiling ether. Readily soluble in concentrated acetic acid, and in concentrated sulphuric acid. But in general acids precipitate it from its soluble salts. Readily soluble in solutions of caustic or carbonated ammonia, and on evaporating these solutions the acid is left free from ammonia. Also soluble in solutions of the fixed caustic alkalies.

The alkaline lithofellates are soluble in water, alcohol, and ether.

Lithofellate of Ammonia. Soluble in water, but is decomposed when the solution is evaporated.

Lithofellate of Baryta. Soluble in water.

Readily soluble in alcohol. (Heumann.)

Lithofellate of Lead.

I.) *basic.* Sparingly soluble in water; somewhat more soluble in alcohol.

Lithofellate of Lime. Soluble in water.

Lithofellate of Potash. Soluble in water, alcohol, and ether. Insoluble in an aqueous solution of chloride of sodium.

Lithofellate of Silver. Soluble in alcohol. $C_{40}H_{35}AgO_8$

Lithofellate of Soda. Soluble in water, alcohol, and ether. Insoluble in an aqueous solution of chloride of sodium.

Litmus, according to Gélis, contains

α

β Insoluble in water. Easily soluble in alcohol, ether, and alkaline solutions.

γ

δ Insoluble in water, alcohol, or ether. Soluble in solutions of the alkalies.

Lobelin(from *Lobelia inflata*). Gradually dissolves in water. Very soluble in alcohol, and ether; the latter removes it from the aqueous solution. Soluble in the fixed and volatile oils. Soluble in dilute acids, with combination. (Parrish's *Pharm.*, p. 417.)

Lobelate of Lobelin.

Lophin. (*Lophyl. PyroAmarin. PyroBenzolin.*) $C_{42}H_{16}N_2 = N_2\left\{\begin{matrix}C_{28}H_8''\\C_{14}H_6''\\H_2\end{matrix}\right.$ Very sparingly soluble in water. Sparingly soluble in ether; more readily soluble in alcohol. (Atkinson & Gœssmann, *Ann. Ch. u. Pharm.*, **97.** 286.) Insoluble in boiling water. Very sparingly soluble in hot alcohol, ether, naphtha, or oil of turpentine, and still less soluble in these liquids when they are cold. (Laurent.) Insoluble in water, acids, or aqueous solutions of the alkalies. Sparingly soluble in cold, more readily soluble in hot alcohol. (Fownes.)

Its best solvent is a boiling concentrated alcoholic solution of caustic potash, in which it dissolves without alteration. Easily soluble in iodide of ethyl. Most of its salts are insoluble in water; they are sparingly soluble in alcohol.

Lophin with **Nitrate of Silver.**

I.) $C_{42}H_{16}N_2; AgO, NO_5$ Soluble, without decomposition, in cold alcohol. Decomposed by boiling alcohol.

II.) $2C_{42}H_{16}N_2; 3(AgO, NO_5)$ Sparingly soluble in alcohol.

III.) $2C_{42}H_{16}N_2; AgO, NO_5$ Easily soluble in alcohol. (Gœssmann & Atkinson, *Ann. Ch. u. Pharm.*, **97.** 292.)

Lophyl. *Vid.* Lophin.

Luchonin. *Vid.* Glairin.

Lupinin(from *Lupinus albus*). Deliquescent. Easily soluble in water and in dilute spirit. Insoluble in alcohol or ether. (Cassola.)

Lupulin. (*Humulin. Bitter principle of Hops.*) Soluble in 20 pts. of hot water. Easily soluble in alcohol. Insoluble in ether.

LuteoCobalt. $6NH_3.Co_2O_3$ Its salts are in general more soluble in water than the corresponding compounds of roseocobalt; they are very stable in the presence of most acids. Neutral or alkaline solutions are readily decomposed by boiling.

Luteolin. (*Luteolic Acid.*) $C_{40}H_{14}O_{16}$ Soluble in 14000 pts. of cold, and in 5000 pts. of boiling water; in 37 pts. of alcohol; and in 625 pts. of ether.

Almost entirely insoluble in dilute acids, especially in the cold. Tolerably easily soluble in concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water. Very sparingly soluble in concentrated chlorhydric acid. Soluble in hot, sparingly soluble in cold, concentrated acetic acid. Soluble, with decomposition, in warm nitric acid. Soluble in aqueous solutions of the caustic and carbonated alkalies, and in ammonia-water. (F. Moldenhauer, *Ann. Ch. u. Pharm.*, **100.** 186.)

Luteolin with **Baryta.** Soluble in water, from which it is precipitated on the addition of alcohol.

Luteolin with **Copper.** Ppt.

Luteolin with **Lead.**

Luteolin with **Potash.**

Lutidin. (*Isomeric with Toluidin.*) $N\left\{C_{14}H_9'''\right.$ Sparingly soluble in cold, less soluble in hot water. Its salts are mostly very soluble in water. (Anderson.)

Lycoresin. $C_{36}H_{33}O_4$ Insoluble in cold, exceedingly sparingly soluble in boiling water. Abundantly soluble in alcohol, and ether. Very sparingly soluble in cold solutions of the caustic or carbonated alkalies; these solutions are decomposed on heating. (Kamp, *Ann. Ch. u. Pharm.*, **100.** 303.)

LycoStearone. (*Isomeric with Behenic Acid.*) $C_{30}H_{30}O_4$ Insoluble in cold, somewhat soluble in boiling water. Sparingly soluble in cold, more soluble in hot, alcohol or ether. Sparingly soluble in cold concentrated sulphuric acid. Easily and abundantly soluble in solutions of the caustic or carbonated alkalies. (Kamp, *Ann. Ch. u. Pharm.*, **100.** 302.)

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M.

Madarin. *Vid.* Mudarin.

Magnesia. *Vid.* Oxide of Magnesium.

Magnesium. Permanent in dry air. Very slowly oxidized by pure cold water, but very quickly attacked by acidulated water, being dissolved by dilute acids. Difficultly soluble in strong sulphuric acid. It takes fire in concentrated chlorhydric acid. Most of the magnesium salts are soluble in water; those insoluble in water are generally soluble in chlorhydric acid.
Mg

Malamic Acid. *Vid.* Aspartic Acid.

Malamid.
(*Isomeric with dry Asparagin.*)
$C_8 H_8 N_2 O_6 = N_2 \left\{ \begin{matrix} C_8 H_4 O_6'' \\ H_4 \end{matrix} \right.$

Malamid(*active*) with (*right*)**Tartramid.** 100 pts. of water at 20° dissolve 18.01 pts. of it. (Pasteur, *Ann. Ch. et Phys.*, (3.) **38.** 466.)

Malamid(*active*) with (*left*)**Tartramid.** Much more soluble than the preceding compound [of (right)tartramid]; requiring less than 3 pts. of water to dissolve it at 19°. (Pasteur, *Ibid.*, p. 467.)

Malamate of Ethyl. Soluble in alcohol, sparingly soluble, or insoluble in ether. (Demondesir.)

Malamylic Acid. *Vid.* Amylmalic Acid.

Malanil. *Vid.* PhenylMalimid.

MalAnilic Acid. *Vid.* PhenylMalamic Acid.

MalAnilid. *Vid.* PhenylMalamid.

Malic Acid. Soluble in water, spirit, and ether. Slightly soluble in caoutchin; but is decomposed when boiled with it for some time. (Himly.)
(*Solanic Acid. Fungic Acid. Menispermic Acid. Cocculinic Acid.*)
$C_8 H_6 O_{10} = C_8 H_4 O_8, 2 HO$

There are two modifications of malic acid: *α* "*active*," and *β* "*inactive*." The active modification is deliquescent and very soluble in water, and alcohol. The inactive modification is not deliquescent. It is, however, very soluble in water, though less soluble than the active modification. (Pasteur, *Ann. Ch. et Phys.*, (3.) **34.** 47.) Most malates are soluble in water; some being deliquescent; but few are soluble in alcohol; those insoluble in alcohol dissolve in nitric acid. (Wittstein's *Handw.*)

Malate of Alumina.

I.) *normal.* Permanent. Readily soluble in water.

II.) *basic.* Sparingly soluble in water. (Braconnot.)

Malate of Ammonia.

I.) *normal.* Deliquescent. Very soluble in water. (Braconnot.)
$C_8 H_4 (N H_4)_2 O_{10}$

II.) *acid.*

$a = C_8 H_5 (N H_4) O_{10} = (\alpha)$ The *α* salt is permanent. 100 pts. of water at 15.7 dissolve 32.15 pts. of it; or 1 pt. of the salt is soluble in 3.11 pts. of water at 15.7°. (Pasteur, *Ann. Ch. et Phys.*, (3.) **34.** 50.) Soluble in 8 pts. of cold, and in much less hot water. (Liebig.) Insoluble in absolute alcohol or in ether. (Braconnot.) Very slowly soluble in dilute spirit. (Liebig.) Crystallizes from its solution in nitric acid.

$b = C_8 H_5 (N H_4) O_{10} = (\beta)$ More soluble in water than the preceding.

$b' = C_8 H_5 (N H_4) O_{10} + 2 Aq$ Crystallizes from the mother liquor of *b*.

Malate of Ammonia & of Antimony. Soluble in water.

Malate of Ammonia & of Lead. Soluble in water. (Braconnot.)

Malate of Ammonia & of Lime. Soluble in water. (Braconnot.)

Malate of Ammonia & of Zinc. Soluble in water.

Malate of Ammonia with Sulphate of Copper. Permanent.

*Bi***Malate**(*α*)**of Ammonia** with (*right*)*bi***Tartrate of Ammonia.** 100 pts. of water at 15° dissolve 8.436 @ 8.515 pts. of this double salt; it is partially decomposed by recrystallization. (Pasteur, *Ann. Ch. et Phys.*, (3.) **38.** 463.)
$C_8 H_5 (N H_4) O_{10} ; C_8 H_5 (N H_4) O_{12}$

Malate of AmmoniumChloroPlatin(*ous*)-**ammonium.** Somewhat soluble in water. (Gros, *Ann. der Pharm.*, 1838, **27.** 256.)
(*Gros's Malate.*)

Malate of Antimony & of Potash.

Malate of Baryta.

I.) *normal.*

$a = C_8 H_4 Ba_2 O_{10}$ The anhydrous salt is absolutely insoluble in water, even when this is boiling; but is easily soluble in acids. Water containing a trace of nitric acid readily dissolves it. (Liebig.)

$b = C_8 H_4 Ba_2 O_{10} + 2 Aq$ Easily soluble in water.

$c = C_8 H_4 Ba_2 O_{10} + 4 Aq$ Permanent. Easily soluble in water. (Braconnot.)

II.) *acid.* More soluble than the normal salt (*c*) in water. (Braconnot.)

Malate of Copper.

I.) *normal.* Permanent. Readily soluble in water. (Luck.)
$C_8 H_4 Cu_2 O_{10} + 2 Aq$

II.) *acid.* Soluble in water.
$C_8 H_5 Cu O_{10} + 2 Aq$

III.) *tris.*

$a = C_8 H_4 Cu_2 O_{10}, Cu O + 4 Aq$ Insoluble in water or malic acid. (Liebig.)

$b = C_8 H_4 Cu_2 O_{10}, Cu O + 5 Aq$ Soluble in water, the solution undergoing decomposition in the course of a few days. Insoluble in alcohol.

$c = C_8 H_4 Cu_2 O_{10}, Cu O + 6 Aq$

Malate of Copper with Sulphate of Ammonia. Permanent. More soluble than sulphate of copper in water. (Schulze.)

Malate of Ethyl.

I.) *normal.* Very easily decomposed by water.
$C_8 H_4 (C_4 H_5)_2 O_{10}$

II.) *acid* *Vid.* EthylMalic Acid.
$C_8 H_5 (C_4 H_5) O_{10}$

Malates of Iron. Permanent. Very soluble in water, and alcohol. (Scheele, Braconnot.) Oxide of iron is not
normal & acid.

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precipitated when caustic alkalies are added to the aqueous solution. (H. Rose.)

Malate of Lead.

I.) $C_8 H_4 Pb_2 O_{10} + 6 Aq$ Very sparingly soluble in cold, somewhat more soluble in hot water. After passing into the resinous state, it is less readily soluble in water. (Braconnot; Vauquelin.) Both the active and the inactive modifications are soluble in an aqueous solution of acetate of lead. (Pasteur, *Ann. Ch. et Phys.*, (3.) **34.** 59.) Donovan supposes that it does not dissolve in water, as such, but as an acid salt, while a basic salt remains; but Lassaigne says that it dissolves completely, if sufficient water be employed. It is no more soluble in acetic or malic acids than in pure water. Easily soluble in nitric acid. Insoluble in ammonia-water. (Rogers.) With ammonia-water it forms a clear solution; also in hot aqueous solutions of nitrate and succinate of ammonia and of chloride of ammonium. With a hot aqueous solution of sulphate of ammonia it forms a solution which is at first clear, but subsequently becomes turbid; with carbonate of ammonia its solution is permanently turbid. (Wittstein.) Soluble in dilute nitric acid. (Lerch.)

II.) *tetra.* $C_8 H_4 Pb_2 O_{10}, 2 PbO$ Both the active and inactive modifications are almost entirely insoluble either in hot or in cold water. They are both soluble in an aqueous solution of acetate of lead; also in water acidulated with acetic acid. (Pasteur, *Ann. Ch. et Phys.*, (3.) **34.** 59.)

Malate of Lead & of Zinc. Ppt.

Malate of Lime.

I.) *normal.*

$a = C_8 H_4 Ca_2 O_{10}$ The anhydrous salt is nearly insoluble, even in boiling water. (Hagen.) Very sparingly soluble either in hot or cold water. Insoluble in alcohol. (Pasteur, *Ann. Ch. et Phys.*, (3.) **34.** 57.) Soluble in chlorhydric acid, and in an aqueous solution of chloride of ammonium. (Pasteur, *Ann. Ch. et Phys.*, (3.) **31.** 85.) Soluble in 1995 pts. of water at 8°, and in 600 pts. at 100°.

$b = C_8 H_4 Ca_2 O_{10} + 2 Aq$ Is deposited on boiling the aqueous solution of the 4 Aq salt (*c*), and is almost insoluble in water. (Richardson & Menzdorf.)

$c = C_8 H_4 Ca_2 O_{10} + 4 Aq$ Soluble in water; a portion of the 2 Aq salt (*b*) being precipitated on boiling the solution; a precipitate is also formed on the addition of alcohol.

$d = C_8 H_4 Ca_2 O_{10} + 5 Aq$ Somewhat soluble in water. (Pasteur, *Ann. Ch. et Phys.*, (3.) **34.** 57.) The salt obtained by mixing solutions of chloride of calcium and of normal malate of soda is soluble in 147 pts. of cold water, and in (at most) 65 pts. of boiling water, from which it does not again separate as the solution cools. (Braconnot.)

II.) *acid.* $C_8 H_5 Ca O_{10} + 8 Aq$ Very sparingly soluble in cold water. (Pasteur.) Abundantly soluble in water. (Rogers.) Sparingly soluble in water. (Braconnot.) The active modification is soluble in 50 pts. of cold water, and is [much (Pasteur)] more soluble in boiling water. (Trommsdorff.)

Pasteur (*Ann. Ch. et Phys.*, 1852, (3.) **34.** 59) regrets that he has not yet been able to compare the solubilities of the two modifications. Insoluble in boiling alcohol of 96%. (Wackenroder.) Soluble in boiling alcohol of 70%, leaving a portion of the anhydrous normal salt as a white powder; as the solution cools, No. II. (the acid salt) is deposited, while a superacid salt remains in solution. (Wackenroder.) Soluble in ammonia-water.

Malate of Lime & of Potash.

I.) Soluble in water.

II.) Insoluble in water.

Malate of Lime & of Soda. Ppt.

Malate of Lithia.

I.) *normal.* } Syrups.
II.) *acid.* }

Malate of Magnesia.

I.) *normal.*

$a = C_8 H_4 Mg_2 O_{10}$ Insoluble in absolute alcohol.

$b = C_8 H_4 Mg_2 O_{10} + 2 Aq$

$c = C_8 H_4 Mg_2 O_{10} + 10 Aq$ Efflorescent. (Liebig.) Permanent. (Donovan.) Soluble in water, from which alcohol precipitates it. Soluble in 28 pts. of water. (Donovan.) 100 pts. of water dissolve 3.6 pts. of it.

II.) *acid.* $C_8 H_5 Mg O_{10} + 4 Aq$ Permanent. Soluble in water. (Braconnot.)

Malate of Manganese.

I.) *normal.* Deliquescent. Very soluble in water.

II.) *acid.* Soluble in 41 pts. of cold alcohol. (Braconnot.)

Malate *of dinoxide* **of Mercury.** Insoluble in water, alcohol, or ether. Soluble in hot nitric acid. (Harff.) Easily soluble in malic and in stronger acids. (Braconnot.)

Malate *of protoxide* **of Mercury.**

I.) *normal.* Decomposed by water, to a soluble acid and an insoluble basic salt. (Braconnot.)

II.) *basic.* Soluble in 2000 pts. of water. Soluble in chlorhydric, and nitric acids. (Harff.)

Malate of Methyl.

I.) *normal.* $C_8 H_4 (C_2 H_3)_2 O_{10}$ Tolerably soluble in water. Soluble in ether. (Demondesir.)

II.) *acid.* *Vid.* MethylMalic Acid.

Malate of Potash.

I.) *normal.* $C_8 H_4 K_2 O_{10}$ Deliquescent. Very soluble in water. Insoluble in strong alcohol. (Braconnot.)

II.) *acid.* $C_8 H_5 K O_{10}$ Permanent. Soluble in water. Insoluble in alcohol. (Donovan.)

Malate of Silver. $C_8 H_4 Ag_2 O_{10}$ Soluble in boiling, less soluble in cold water. Easily soluble in acids.

Malate of Soda.

I.) *normal.* Deliquescent. Readily soluble in water. Insoluble in alcohol.

II.) *acid.* Permanent. Soluble in water; insoluble in alcohol. (Donovan.)

Malate of Solanin. Soluble in water.

Malate of Strontia.

I.) *normal.* $C_8 H_4 Sr_2 O_{10} + 2 Aq$ Permanent. Very soluble in water. (Braconnot.)

II.) *acid.* Sparingly soluble in cold, more soluble in boiling water. (Braconnot.)

Malate *of protoxide* **of Tin.** Hygroscopic. Easily soluble in water.

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Malate *of binoxide* of Tin. Easily soluble in water.

Malate *of sesquioxide* of Uranium. Sparingly soluble in water. (Richter.)

Malate of Yttria. Soluble in 74 pts. of water. Abundantly soluble in an aqueous solution of malate of soda, apparently with combination. (Berlin.) Soluble in an aqueous solution of malic acid, from which it crystallizes out unchanged. (Berlin.)
$C_8 H_4 Yr_2 O_{10} + 2 Aq$

Malate of Zinc.

I.) *normal.* Soluble in 55 pts. of cold water, and in 10 pts. of boiling water; from which it does not again separate as the solution cools. (Braconnot.) Soluble in 67 pts. of water at 20°. (Lassaigne.) Very sparingly soluble in water. (Pasteur, *Ann. Ch. et Phys.*, (3.) 31. 86.)
$C_8 H_4 Zn_2 O_{10} + 6 Aq$

II.) *acid.* Soluble in 23 pts. of cold water. (Braconnot.)
$C_8 H_5 Zn O_{10} + 2 Aq$

III.) *tri.* Insoluble in water. (Braconnot.)
$C_8 H_4 Zn_2 O_{10}, Zn O$

Malate of Zirconia. Soluble in water.

Maleic Acid (Anhydrous).
(Identical with Anhydrous Fumaric Acid.)
$C_8 H_2 O_6$

Maleic Acid. Permanent. Soluble in 2 pts. of water (Lassaigne); in about its own weight of cold water. (Pelouze.) Very soluble in alcohol (Pelouze, Lassaigne); also soluble in ether. (Regnault.) Soluble in ammonia-water. The metallic maleates, excepting those of lead, silver, and copper, are generally soluble in water; its compounds with the alkaloids are also readily soluble in water. (Pelouze.) Solutions of the maleates are not precipitated on the addition of another acid; in this they differ from those of the fumarates, the sparingly soluble fumaric acid being deposited when an acid is added to these.
(PyroMalic Acid. ParaFumaric Acid. Equisetic Acid. ParaSorbic Acid.)
(Isomeric with Fumaric Acid.)
$C_8 H_2 O_6, 2 H O$

Maleate of Ammonia.

I.) *normal.* Very deliquescent. More soluble than the acid salt in water. (Buechner.) Insoluble in alcohol.

II.) *acid.* Very soluble in water; though less soluble than the normal salt. Insoluble in alcohol.
$C_8 H_3 (N H_4) O_8$

Maleate of Baryta.

I.) *normal.* Soluble in 9 pts. of water at 20°. (Regnault.) Easily soluble in boiling water. (Buechner.) Soluble in baryta-water. (Pelouze.)
$C_8 H_2 Ba_2 O_8 + 4 Aq$

II.) *acid.* Soluble in water. Insoluble in alcohol. (Buechner.) Readily soluble in water, and alcohol. (Gerhardt's *Tr.*)
$C_8 H_3 Ba O_8 + 5 Aq$

Maleate of Copper.

I.) *normal.* Sparingly soluble in water, even when this is boiling. Soluble in ammonia-water. (Buechner.)
$C_8 H_2 Cu_2 O_8 + 2 Aq$

Maleate of Cupr(*ic*)ammonium. Very soluble in water, insoluble in alcohol. (Buechner.)
$C_8 H_2 (N H_3 Cu)_2 O_8$

Maleate of Iron.

Maleate of Lead. Insoluble in water, or acetic acid. Soluble in nitric acid. (Braconnot.)
$C_8 H_2 Pb_2 O_8 + 6 Aq$

Maleate of Lime.

I.) *normal.* Very soluble in water. Insoluble in alcohol. (Buechner.)
$C_8 H_2 Ca_2 O_8 + 2 Aq$

II.) *acid.* Permanent. Very soluble in water. Insoluble in alcohol. (Buechner.)
$C_8 H_3 Ca O_8 + 5 Aq$

Maleate of Magnesia.

I.) *normal.* Easily soluble in water. It is also soluble in spirit, although absolute alcohol precipitates it from the concentrated aqueous solution. (Buechner.)
$C_8 H_2 Mg_2 O_8$

II.) *acid.* Very soluble in water. Insoluble in alcohol. (Buechner.)
$C_8 H_3 Mg O_8 + 6 Aq$

Maleate of Mercury.

Maleate of Nickel. Readily soluble in water. Insoluble in alcohol. (Buechner.)
$C_8 H_2 Ni_2 O_8 + 2 Aq$

Maleate of Potash.

I.) *normal.* Hygroscopic. Very soluble in water; more soluble than the acid salt. Insoluble in alcohol. (Pelouze, Buechner.)
$C_8 H_2 K_2 O_8$

II.) *acid.* Very soluble in water; though less soluble than the normal salt. Insoluble in alcohol. (Buechner.)
$C_8 H_3 K O_8 + Aq$

Maleate of Potash & of Soda. Very deliquescent. Soluble in water, from which it is precipitated on the addition of alcohol.
$C_8 H_2 Na K O_8 + 2 Aq$

Maleate of Silver.

I.) *normal.* Ppt.
$C_8 H_2 Ag_2 O_8$

II.) *acid.*
$C_8 H_3 Ag O_8$

Maleate of Soda.

I.) *normal.* Permanent. Soluble in water, more readily than the acid salt. Alcohol precipitates it from the aqueous solution. (Buechner, Pelouze.)
$C_8 H_2 Na_2 O_8$

II.) *acid.* Very sparingly soluble in cold, more soluble in boiling water. Less soluble in water than the normal salt. Insoluble in alcohol. (Buechner.)
$C_8 H_3 Na O_8 + 6 Aq$

Maleate of Strontia.

I.) *normal.* Soluble in water.
$C_8 H_2 Sr_2 O_8 + 10 Aq$

II.) *acid.* Soluble in water. Insoluble in alcohol. (Buechner.)
$C_8 H_3 Sr O_8 + 8 Aq$

Maleate of Zinc.

I.) *normal.* Readily soluble in water. Insoluble in alchol. (Buechner.)
$C_8 H_2 Zn_2 O_8 + 4 Aq$

Malonic Acid. Readily soluble in water, and alcohol. (Dessaignes.)
$C_6 H_4 O_8 = C_6 H_2 O_6, 2 H O$

Malonate of Ammonia.

I.) *normal.* Deliquescent. Soluble in water.

II.) *acid.*

Malonate of Baryta. Somewhat soluble in water.

Malonate of Lead. Ppt. Soluble in nitric acid.

Malonate of Lime. Somewhat soluble in water.

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Malonate *of dinoxide* **of Mercury.** Ppt.

Malonate of Potash.

I.) *normal*. Deliquescent. Soluble in water.

Malonate of Silver. Somewhat soluble $C_6 H_2 Ag_2 O_8$ in water. (Dessaignes.)

Mandelic Acid. *Vid.* FormoBenzoylic Acid.

Manganic Acid. Its alkaline salts alone are $Mn O_3$ soluble in water, those of the alkaline earths being insoluble. (H. Rose, *Tr.*)

Manganate of Baryta. Insoluble in water. $Ba O, Mn O_3$

Manganate of Manganese. Insoluble in *(Bin, black, or per-Oxide of Manganese.)* $Mn_2 O_3, Mn O_3 = 3 Mn O_2$ water. Soluble, with decomposition, in chlorhydric, sulphuric, nitrous, and sulphurous acids. It is more readily soluble in acids when reducing agents, like oxalic acid, sugar, or other organic matters, are present. Sparingly soluble in hot concentrated, but insoluble in dilute nitric acid. (Deville.) On boiling with an aqueous solution of chloride of ammonium, it undergoes no change excepting a slight reduction and formation of a very small quantity of protoxide, which dissolves. (H. Rose, *Tr.*) When pure it is insoluble in dilute sulphuric acid in the cold, or even when gently heated, but if a small quantity of protoxide of manganese is present, much of the peroxide will be dissolved. (Carius.) Several hydrates of this compound have been described; as a rule, they are much more readily soluble in acids than the native mineral.

Manganate of Potash. Soluble in water, $K O, Mn O_3$ with subsequent decomposition. Soluble, without decomposition, in cold alkaline solutions, but these are decomposed on boiling.

Manganate of Soda. Very soluble in water. (Mitscherlich.)

Manganate of Strontia. Insoluble in water. (Chevillot & Edwards.)

Manganese. Permanent in dry air, but ox- Mn idizes when exposed to moist air at the ordinary temperature. Slowly oxidized by cold, rapidly by hot water; less rapidly by alcohol. Readily soluble in acids, even when these are dilute.

*Per*Manganic Acid. *Vid.* PerManganic Acid.

ManganiCyanide of Lead. Ppt.

ManganiCyanide of Manganese. Ppt. $3 Mn Cy, Mn_2 Cy_3$

ManganiCyanide of Potassium. Decom- $3 K Cy, Mn_2 Cy_3$ posed by water, alcohol, and acids; but is soluble in an aqueous solution of cyanide of potassium. (Balard.)

ManganiCyanide of Silver. Ppt. $3 Ag Cy, Mn_2 Cy_3$

Mangostin. Insoluble in water. Readily sol- $C_{40} H_{22} O_{10}$ uble in alcohol, and ether. Soluble in warm, less soluble in cold dilute acids. Decomposed by warm concentrated nitric acid. Soluble in cold concentrated sulphuric acid, the solution undergoing decomposition when heated. Soluble in solutions of the caustic alkalies. (Schmid, *Ann. Ch. u. Pharm.*, **93.** 85.)

Mangostin with Oxide of Lead. Insoluble $5 Pb O, 2 (C_{40} H_{22} O_{10}) + Aq$ in water. Sparingly soluble in alcohol. Decomposed by acids.

Mannide. Very deliquescent. Very soluble $C_{12} H_{10} O_8$ in cold water, and in cold absolute alcohol. Insoluble in ether. (Berthelot, *Ann. Ch. et Phys.*, (3.) **47.** 313.)

Mannitan. Deliquescent. Extremely soluble *(Anhydrous Mannite.)* *(Isomeric with Pinit and Quercit.)* $C_{12} H_{12} O_{10}$ in water, and in absolute alcohol. Insoluble in ether. After having been dried, it dissolves slowly though abundantly in absolute alcohol. Soluble, with combination, in concentrated chlorhydric, and sulphuric acids. The baryta salt of the new compound with sulphuric acid is soluble in water. (Berthelot, *Ann. Ch. et Phys.*, (3.) **47.** 308.)

Mannitate of *X*. *Vid.* Mannite with *X*.

Manni(*te*)**Tartaric Acid.** Soluble in water. $C_{30} H_{18} O_{35}$ (Berthelot, *loc. cit.*, p. 330.)

ManniTartrate of Lime. When recently $C_{30} H_{15} Ca_3 O_{35} + 6 Aq$ precipitated, it is readily soluble in water; but after drying, it dissolves slowly and with difficulty. Almost entirely insoluble in alcohol which has been diluted with 1 or even 2 vols. of water.

ManniTartrate of Magnesia. Soluble in $C_{30} H_{15} Mg_3 O_{35}, 4 Mg O + 30 H O$ water. Sparingly soluble in spirit. (Berthelot, *Ann. Ch. et Phys.*, (3.) **47.** 330.)

Mannite. Readily soluble in water. Spar- *(Mushroom Sugar. Fraxinin. Grenadin. Perhaps identical with Melampyrin. Isomeric with Dulcit.)* ingly soluble in cold, easily soluble in boiling alcohol. Insoluble in ether. After mannite has been digested with water for a day or two, the latter may hold much more of the former in solution than will be found several days later, — the solution having been maintained at the same temperature. This decrease of solubility, however, soon ceases, and at last the composition of the solution remains constant. (Berthelot, *Ann. Ch. et Phys.*, (3.) **46.** 85.) 100 pts. of an aqueous solution, saturated at 18°, contains 13.7 pts., and at 20°, 14.15 pts. 10 c. c. of a solution of mannite in absolute alcohol, saturated at 14°, contain 0.0065 grm. of mannite. 10 c. c. of a solution of mannite in alcohol of 0.8985 sp. gr., saturated at 15°, contain 0.115 grm. (Berthelot, *Ann. Ch. et Phys.*, (3.) **46.** 85.) 100 pts. of water at 18° dissolve 15.6 pts., and at 23°, 18.5 pts. of it. Sometimes mannite dissolves in much larger proportion than the above in cold water; thus 100 pts. of water at 18° can dissolve even 30 pts. of mannite, but such solutions are neither stable nor in fixed proportions. (*Ann. Ch. et Phys.*, (3.) **46.** 85.) It would seem that crystallized mannite must be in a molecular state, distinct from that of dissolved mannite. 100 pts. of alcohol, of 0.8985 sp. gr., dissolve at 15°, 1.2 pts. of mannite. 100 pts. of absolute alcohol at 14° dissolve 0.07 pt. of it. (Berthelot, *Ann. Ch. et Phys.*, (3.) **47.** 301.) Soluble in aqueous solutions of caustic potash, soda, baryta, and lime, without alteration even on boiling, unless these solutions be very concentrated. Soluble, with combination, in concentrated sulphuric acid. (Favre, *Ann. Ch. et Phys.*, (3.) **11.** 76.)

Mannite with Oxide of Lead. *(Mannitate of Lead.)*

I.) *mono*. Very soluble in water. (Favre, $Pb O, C_6 H_5 O_4$ *Ann. Ch. et Phys.*, (3.) **11.** 75.)

II.) *di*. Very sparingly soluble in boiling $2 Pb O ; C_6 H_5 O_4$ water. Partially decomposed by water, especially if this be boil-

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ing. Insoluble in alcohol. Soluble in ammoniacal acetate of lead, especially if it be warm. (Favre, *loc. cit.*)

III.) *tri.* Insoluble in water. (Favre, *loc. cit.*)
$3 PbO, C_6 H_5 O_4$

Mannite with Lime. Soluble in water, the strong aqueous solution coagulating on being heated, but becoming clear again on cooling. (Berthelot, *Ann. Ch. et Phys.*, (3.) **46.** pp. 179, 177, 180.) (See also Oxide of Calcium.)

Margaramid. Permanent. Insoluble in water. Very soluble in alcohol, and ether, especially when these are warm.
$C_{34} H_{35} N O_2 = N \left\{ \begin{matrix} C_{34} H_{33} O_2 \\ H_2 \end{matrix} \right.$

Margaric Acid. Insoluble in water. Readily soluble in alcohol, and ether; in all proportions when these liquids are warm. Difficultly soluble in cold, very easily soluble in hot alcohol.
$C_{34} H_{33} O_3, HO$

Insoluble in water. Soluble in all proportions in boiling alcohol of 0.821 sp. gr. (Chevreul, *Ann. Ch. et Phys.*, 1816, (2.) **2.** pp. 356, 349.) Soluble in creosote. (Reichenbach.)

The normal alkaline margarates are soluble in pure water, especially if it be warm; they are much more soluble in hot than in cold alcohol; and are almost insoluble in ether. The alkaline-earthy, and earthy salts are insoluble in water or ether; and many of them are insoluble in alcohol. As a general rule, the margarates are insoluble in absolute alcohol, or in ether.

Margarate of Ammonia.

I.) *normal.*
$C_{34} H_{33} (N H_4) O_4$

II.) *acid.* Sparingly soluble in boiling water.

Margarate of Baryta. Insoluble in hot alcohol.
$C_{34} H_{33} Ba O_4$

Margarate of Copper. Ppt.

Margarate of Ethyl. Insoluble, or almost insoluble, in water. Soluble in alcohol.
$C_{34} H_{33} (C_4 H_5) O_4$

Margarate of Glyceryl. *Vid.* Margarin.

Margarate of Lead.

I.) *normal.* Insoluble in water. Soluble in 300 pts. of boiling alcohol. Soluble in 10 pts. of boiling ether. Soluble in all proportions in boiling naphtha, and oil of turpentine.
$C_{34} H_{33} Pb O_4$

II.) *acid.* Soluble in 20 @ 30 pts. of boiling alcohol of 0.823 sp. gr.; as this solution cools the normal salt (No. I.) is deposited. Soluble in 100 pts. of boiling ether. Boiling naphtha, and oil of turpentine dissolve it in all proportions.

III.) *di.* Insoluble in alcohol, or ether. Soluble in naphtha, and oil of turpentine.
$C_{34} H_{33} Pb O_4, Pb O$

Margarate of Lime. Insoluble in boiling alcohol. (Chevreul, *Ann. Ch. et Phys.*, (2.) **2.** 353, note.)
$C_{34} H_{33} Ca O_4$

Margarate *of dinoxide* **of Mercury.** Insoluble in water. Soluble in alcohol, and ether.

Margarate *of protoxide* **of Mercury.** Insoluble in water, or cold alcohol; soluble in boiling alcohol, and ether.

Margarate of Methyl.
$C_{34} H_{33} (C_2 H_3) O_4$

Margarate of Potash.

I.) *normal.* Soluble in 10 pts. of hot water. Soluble in boiling water, the solution undergoing decomposition on cooling, the insoluble acid salt separating out. (Chevreul, *Ann. Ch. et Phys.*, (2.) **2.** 356.) 1 pt. of this salt will convert 10 pts. of water at 11.6° into a translucent jelly. When this jelly is heated to 70° the solution becomes complete. A cloudiness reappears when the temperature of the solution has fallen to 60°. (Chevreul. [T.]). Soluble in 83 pts. of cold, and in 10 pts. of boiling alcohol. 100 pts. of alcohol at 10° can hold in solution 1.21 pts. of it. If 1 pt. of the salt be boiled with 10 pts. of alcohol of 0.821 sp. gr., it dissolves; if now this solution be cooled to 40° it solidifies entirely. Insoluble in ether, by which it is partially decomposed.
$C_{34} H_{33} K O_4$

II.) *acid.* Almost completely insoluble in water. Soluble in 3 pts. of hot spirit.
$C_{34} H_{33} K O_4, C_{34} H_{34} O_4$

100 pts. of alcohol, of 0.834 sp. gr. dissolve 0.31 pt. of it at 20°, and 31.37 pts. at 67°. (Gerhardt's *Tr.*) Almost insoluble in water. Soluble, to almost any extent in boiling alcohol of 0.832 sp. gr.; 20 grs. of this alcohol dissolved 50 grs. of the salt at 60° (= 100 : 250), and the liquid was concentrated to the extent that the relation of alcohol to salt was, as 1 : 6, without any precipitation. (Chevreul, *Ann. Ch. et Phys.*, 1816, (2.) **2.** pp. 355, 356.)

Margarate of Silver.
$C_{34} H_{33} Ag O_4$

Margarate of Soda.

I.) *normal.* Soluble in 10 pts. of water at 80°; on cooling this solution to 54° it becomes a jelly. If the boiling aqueous solution be mixed with cold water, the salt is decomposed. Soluble in 20 pts. of boiling alcohol. At 10°, 100 pts. of alcohol retain in solution only 0.38 pt. of it. Ether partially decomposes it; 100 pts. of ether extracting 0.17 pt. of margaric acid.
$C_{34} H_{33} Na O_4$

II.) *acid.* Insoluble in water. Soluble in alcohol.
$C_{34} H_{33} Na O_4, C_{34} H_{34} O_4$

Margarate of Strontia.
$C_{34} H_{33} Sr O_4$

*Mono***Margarin.** Soluble in alcohol. Soluble in hot, sparingly soluble in cold ether.
(*Margarate of Glyceryl.*)
$C_{40} H_{40} O_8$

*Tri***Margarin.** Soluble in hot ether. (Berthelot, *Ann. Ch. et Phys.*, (3.) **41.** 236.) Of natural margarin 100 pts. of boiling absolute alcohol dissolve 21.5 pts.; it is much less soluble in cold alcohol. It is readily soluble in ether, being more soluble therein than stearin; it separates from the hot ethereal solution when this is cooled.
(*TetraMargarin.*)
$C_{108} H_{104} O_{12}$

Margaritinic Acid. Easily soluble in alcohol, and ether. (Saalmueller, *Am. J. Sci.*, (2.) **8.** 263.)
$C_{60} H_{50} O_5$ [?]

Margaritinate of Baryta. Insoluble in water. Soluble in alcohol, and ether.

Margaritinate of Ethyl. Insoluble in water.

Margaritinate of Potash. Sparingly soluble in cold water. Easily soluble in hot, less soluble in cold alcohol.
$C_{60} H_{57} K_3 O_5$

Margaritinate of Silver. Partially soluble in water, and alcohol. Easily soluble in ammonia-water.
$C_{60} H_{57} Ag_3 O_5$

Margarone. Insoluble in water. Soluble in 50 pts. of spirit of 80%; and in 6.5 pts. of absolute alcohol. Easily soluble in ether, concentrated acetic acid, oil of turpentine, and the fatty oils.
$C_{33} H_{33} O$(?)

MARSH GAS. *Vid.* Hydride of Methyl.

MASTIC. See under Resins.

MATICIN(from *Arthante longata*).

MECHLOIC ACID. Sparingly soluble in cold, more freely soluble in boiling water. Soluble in boiling alcohol, and ether. (Courbe.)
$C_{14}H_7O_{10}$

MECHLOATE OF COPPER.
MECHLOATE OF IRON.
MECHLOATE OF LEAD.
MECHLOATE OF LIME.
MECHLOATE OF MERCURY.
} Ppts.

MECHLOATE OF POTASH. Soluble in water.

MECHLOATE OF SILVER. Ppt.

MECONAMIC ACID. Soluble in hot, less soluble in cold water. (How.)
(*Meconamidic Acid.*)
$C_{14}H_5NO_{10}$

MECONAMATE OF AMMONIA. Easily soluble in boiling water. Very sparingly soluble in boiling alcohol. (How.)
$C_{14}H_4(NH_4)NO_{10}$

MECONAMATE OF BARYTA. Insoluble in boiling water. (How.)

MECONAMATE OF SILVER.

MECONAMIDIC ACID. *Vid.* Meconamic Acid.

" **MECONIC ACID**(Anhydrous)." *Vid.* Comenic Acid.

MECONIC ACID. Sparingly soluble in cold water. Soluble in 4 pts. of boiling water. (Robiquet.) The aqueous solution is slowly decomposed by boiling, especially if chlorhydric or sulphuric acid be present. Less soluble in water acidulated with chlorhydric acid than in pure water. (Robiquet.) Readily soluble in alcohol. (Sertuerner); less readily soluble in ether, especially if it be absolute. (Stenhouse.)
$C_{14}HO_{11}, 3HO + 6Aq$

The metallic meconates are, as a rule, less soluble than the pyromeconates; many which are insoluble in water are soluble in acetic acid. (Robiquet.) They are insoluble in alcohol. (Sertuerner.)

MECONATE OF AMMONIA.

I.) *normal*, or *tri*. Permanent. Soluble in 1.5 pts. of water. 100 pts. of cold water dissolve 66 pts. of it. (Robiquet.)
$C_{14}H(NH_4)_3O_{14}$

II.) *di*. Soluble in water.
$C_{14}H_2(NH_4)_2O_{14}$

III.) *mono*. Sparingly soluble in cold, more soluble in boiling water. (Robiquet.)
$C_{14}H_3(NH_4)O_{14} + 2Aq$

MECONATE OF AMMONIA & *of sesquioxide* **OF IRON.** Sparingly soluble in cold, very readily soluble in boiling water. Sparingly soluble in alcohol. Very readily soluble in dilute acids. (Stenhouse.)

MECONATE OF AMMONIA & OF LIME. Insoluble in alcohol. Somewhat soluble in ammonia-water. (Robiquet.)

MECONATE OF BARYTA.

I.) *tri*? Insoluble in water. Soluble in acetic acid. (Wackenroder.)

II.) *di*. Sparingly soluble in water. Readily soluble in baryta-water. (Liebig.) Readily soluble in acetic acid. (Wackenroder.)
$C_{14}H_2Ba_2O_{14} + 2Aq$

MECONATE OF COPPER.

I.) *di*.
II.) *mono*.
} Insoluble in water; slowly soluble in acetic and quickly in nitric acid. (Wackenroder.)

MECONATE OF ETHYL. *Vid.* EthylMeconic Acid.

*Bi***MECONATE OF ETHYL.** Soluble in 2 @ 3 pts. of boiling water; much less soluble in cold water. (How.)
(*Meconate of EthylMeconic Acid.*)
$C_{32}H_{12}O_{28} = C_{14}H_3(C_4H_5)O_{14}, C_{14}H_4O_{14}$

MECONATE *of protoxide* **OF IRON.** Very soluble in water.
$C_{14}H_2Fe_2O_{14}$

MECONATE *of sesquioxide* **OF IRON.** Tolerably soluble in cold, more quickly soluble in hot water; or in water containing acid. It is more soluble before than after having been dried. Tolerably soluble in cold alcohol. Insoluble in ether. (Stenhouse.)
$C_{14}HFe_2'''O_{14}$

MECONATE OF LEAD.

I.) *tri*. Insoluble either in cold or in warm water. (Stenhouse.) Insoluble in acetic acid, or in acetate of lead. (Wackenroder.)
$C_{14}HPb_3O_{14} + 2Aq$

II.) *basic*. Insoluble in water or acetic acid. Sparingly soluble in nitric acid.

MECONATE OF LIME. Soluble in acetic acid.

I.) *tri*?

II.) *di*. Soluble in 20 pts. of water acidulated with chlorhydric acid.
$C_{14}H_2Ca_2O_{14} + 2Aq$

III.) *mono*. Sparingly soluble in cold water. Quickly soluble in acetic acid. (Wackenroder.) Soluble in warm water acidulated with chlorhydric acid. (Liebig.)
$C_{14}H_3CaO_{14} + 2Aq$

MECONATE OF MAGNESIA.

I.) *di*. Sparingly soluble in water.

II.) *mono*. Easily soluble in water. (Ure.)

MECONATE *of dinoxide* **OF MERCURY.** Insoluble in water. Sparingly soluble in nitric acid. (Wackenroder.)

MECONATE *of protoxide* **OF MERCURY.** Insoluble in water, or in an aqueous solution of nitrate of protoxide of mercury. Tolerably readily soluble in acetic, and nitric acids, as well as in an aqueous solution of chloride of sodium. (Wackenroder.)

MECONATE OF MORPHINE. Readily soluble in water, and alcohol.

MECONATE OF POTASH.

I.) *tri*. Readily soluble in water. More soluble than the di-salt. (Robiquet.)

II.) *di*. Sparingly soluble in cold, tolerably soluble in warm water. (Liebig.)
$C_{14}H_2K_2O_{14}$

III.) *mono*. Less soluble than No. II.
$C_{14}H_3KO_{14}$

MECONATE OF SILVER.

I.) *tri*. Insoluble in water, or acetic acid. (Wackenroder.)
$C_{14}HAg_3O_{14}$

II.) *di*. Insoluble in water. Soluble in acids. Soluble in cold concentrated nitric acid. When boiled with water it is converted into No. I. (the normal salt). (Liebig.)
$C_{14}H_2Ag_2O_{14}$

MECONATE OF SODA.

I.) *tri*. Efflorescent. Readily soluble in water.

II.) *di*. Soluble in 5 pts. of water. (Stenhouse.) Very sparingly soluble in alcohol.

III.) *mono*. Tolerably soluble in water. Sparingly soluble in absolute alcohol, and in an aqueous solution of caustic potash. (Robiquet.)

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Meconate *of protoxide* **of Tin.** Readily soluble in an aqueous solution of protochloride of tin. (Wackenroder.)

Meconate *of binoxide* **of Tin.** Sparingly soluble in acetic, readily soluble in nitric acid.

Meconate of Urea.
$3 C_2 H_4 N_2 O_2, C_{14} H_4 O_{14}$

Meconate of Yttria. Sparingly soluble in water.

Meconate of Zinc.
I.) *di.* Insoluble in water, or an aqueous solution of sulphate of zinc. Very sparingly soluble in acetic, readily soluble in nitric acid.

Meconin. Soluble in 700 pts. of water at 15.5°, and in 22 pts. of boiling water. No more soluble in alkaline liquids than in water. (Anderson, *J. Ch. Soc.*, **9.** 274.) Soluble in 265.7 pts. of cold, and in 18.56 pts. of boiling water. (Courbe.) Still more soluble in alcohol, and ether, especially if these are warm. Soluble in the volatile oils. Soluble in cold concentrated sulphuric acid, the solution undergoing decomposition when heated. Soluble in dilute sulphuric, or chlorhydric acid, without alteration. Soluble in acetic acid. Soluble in concentrated nitric acid, with decomposition. Scarcely at all soluble in ammonia-water, but soluble in aqueous solutions of caustic potash and soda. (Courbe.)
(*Opianyl. Hydride of Opianyl.*)
$C_{20} H_{10} O_8$

MeconinHypoNitric Acid(*of Courbe*). Soluble in water, alcohol, and ether. Soluble in warm concentrated acids, crystallizing out again unchanged on cooling, or when the solution is diluted with water. Readily soluble in alkaline solutions, with combination. (Courbe.)
$C_{20} H_9 N O_{12}$

MeconinResin. Insoluble in water. Soluble in ether. (Courbe.)
$C_{10} H_5 O_8$

Melain(coloring matter of *Sepia officinalis*). Insoluble in cold, soluble in boiling water. Insoluble in alcohol, ether, or acids. Soluble in warm aqueous solutions of the caustic alkalies. (Bizio.)

Melam. Insoluble in cold, very sparingly soluble in hot water. Insoluble in alcohol or ether. Soluble in a hot aqueous solution of caustic potash, with partial decomposition. Soluble in hot concentrated acids, the solutions being decomposed on the addition of water.
(*Polein.*)
$C_6 H_6 N_6$

Melamin. Permanent. Sparingly soluble in cold, but tolerably easily soluble in boiling water. Insoluble in alcohol, or ether. More soluble in potash-lye than in water.
$C_6 H_6 N_6 = N_3 \left\{ \begin{array}{l} Cy_3 \\ H_3 \\ H_3 \end{array} \right.$

Melampyrin(from *Melampyrum nemorosum*). Permanent. Soluble in 25.5 pts. of water at 15°; much more soluble in boiling water. Soluble in 1362 pts. of alcohol of 0.835 sp. gr. (Eichler.) Insoluble in ether. (Huenefeld.)
(*Probably identical with Mannite.* (Weltzien.).)
$C_{12} H_{15} O_{13}$

Melanic Acid(of Prout). Insoluble in water, or alcohol. Soluble in aqueous solutions of the caustic alkalies. (Prout.)

Melanic Acid(of Piria). Insoluble in water. Readily soluble in alcohol, and ether. Soluble in aqueous solutions of the caustic alkalies. (Piria.)
(*Kinonic Acid.*)
$C_{20} H_8 O_{10}$

Melanate of Ammonia.

Melanate of Silver.
I.) *normal.* Ppt.
$C_{20} H_6 Ag_2 O_{10}$

MelAnilin. Only slightly soluble in cold, somewhat more soluble in boiling water. Easily sōluble in alcohol, ether, wood-spirit, acetone, bisulphide of carbon, and the fatty and essential oils. Easily soluble in acids, with combination. (Hofmann, *J. Ch. Soc.*, **1.** 290.)
(*CyanPhenyl-Phenylbiamin.*)
$C_{26} H_{13} N_3 = N_2 \left\{ \begin{array}{l} C_{12} H_4 (C_2 N) . H \\ C_{12} H_5 \\ H_3 \end{array} \right.$

MelAnilin with Nitrate of Silver. Insoluble, or nearly insoluble in cold, decomposed by hot alcohol. (Hofmann, *J. Ch. Soc.*, **1.** 297.)
$2 C_{26} H_{13} N_3 ; Ag O, N O_5$

Melanin. Insoluble in water, alcohol, ether, dilute mineral acids, or concentrated acetic acid. Decomposed by hot nitric acid. Slowly soluble in an aqueous solution of caustic potash.
(*Black pigment of the Eye.*)

Melanochin. Insoluble in water, alcohol, or ether. Soluble in aqueous solutions of caustic potash and ammonia. (Brandes & Leber.)
$C_{26} H_{18} N_{1\frac{1}{2}} O_{12}$

MelanOximid. *Vid.* Oxamelanil.

MelanTannic Acid. Insoluble in cold water. Easily soluble in alcohol, and in aqueous alkaline solutions. (Stenhouse.)

Melanurin. Easily soluble in weak acids. (Braconnot.)

Melassic Acid(from the action of caustic alkalies upon sugar, gum, starch, &c.). Insoluble in water. Soluble in alcohol. (Peligot.)

Melene. Insoluble in water, or cold absolute alcohol. Soluble in boiling absolute alcohol. Easily soluble in ether, and the fatty and volatile oils. Unacted upon by boiling alkaline solutions, or by cold concentrated sulphuric acid, and but slightly attacked by boiling concentrated nitric acid.
(*Paraffin of Wax.*)
$C_{60} H_{60}$

Melezitose(from *Larix Europæa*). Easily soluble in water. Almost insoluble in cold, and but difficultly soluble in boiling or ordinary spirit.
$C_{12} H_{11} O_{11}$

Melissic Acid.
$C_{60} H_{59} O_3, H O$

Melissate of Silver.
$C_{60} H_{59} Ag O_4$

Melitose(in Australian manna, from various species of *Eucalyptus*). About as soluble as mannite in water. (Berthelot.) Sparingly soluble in cold, more soluble in boiling alcohol. Insoluble in ether. (Johnson.)
$C_{12} H_{12} O_{12} + 2 Aq$

Mellamic Acid. *Vid.* Euchroic Acid.

Mellamid. *Vid.* Mellithamid.

Mellic Acid. *Vid.* Mellitic Acid.

Mellimid. *Vid.* Mellithamid.

Mellitic Acid. Permanent. Readily soluble in water, and alcohol. Soluble, without decomposition, in boiling concentrated sulphuric acid. Unacted upon by boiling concentrated nitric acid. (Wœhler.)
(*Mellic Acid. Mellithsæure. Honigsteinsæure.*)
$C_8 H_2 O_8 = C_8 O_6, 2 H O$

The alkaline mellitates are soluble in water, but the other salts are insoluble, or difficultly soluble.

Mellitate of Alumina. Insoluble in cold water. Decomposed by boiling water, by an aqueous solution of carbonate of soda, and by ammonia-water. Insoluble in acetic acid. Soluble, with decomposition, in di-
(*Honeystone. Mellite.*)
$2 Al_2 O_3, 3 C_8 O_6 + 36 Aq$

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lute nitric, sulphuric, and chlorhydric acids. (Klaproth.)

Mellitate of Ammonia.

I.) *normal*, or *di*. Occurs in two varieties of crystals. One variety (α) is slightly efflorescent, the other (β) is very efflorescent. Both forms are easily soluble in water. On boiling the aqueous solution the acid salt is formed.
$C_8(NH_4)_2O_8 + 6\ Aq$

II.) *peracid*. Much more soluble in water than No. I. (Erdmann & Marchand)
$C_8H(NH_4)O_8, 2\,C_8H_2O_8 + 8\ Aq$

Mellitate of Ammonia & of Copper.

I.) $C_8(NH_4)CuO_8 + x\ Aq(?)$ Permanent.

II.) $C_8(NH_4)CuO_8;\ C_8Cu_2O_8 + 16\ Aq$

Mellitate of Ammonia & of Palladium.

I.) *basic*.
$C_8Pd_2O_8;\ 4\,NH_4O(?)$

Mellitate of Anilin. Easily soluble in water. Also soluble in warm alcohol. (Karmrodt.)
$C_{12}H_7N, C_8H_2O_8(?)$

Mellitate of Baryta. Insoluble in water. [Y.] Soluble in nitric, and chlorhydric acids. (Klaproth.)
$C_8Ba_2O_8 + 2\ Aq$

Mellitate of Cinchonin.

Mellitate of Cobalt. Soluble in 37300 pts. of cold water; much more soluble in hot water. (Karmrodt.)
$C_8Co_2O_8 + 12\ Aq$

Mellitate of Copper.

I.) *normal*. Ppt., partially decomposed by water. Soluble in ammonia-water.
$C_8Cu_2O_8 + 8\ Aq$

II.) *sesqui*.
$C_8Cu_2O_8;\ C_8HCuO_8 + 16\ Aq$

Mellitate of Ethyl. *Vid.* EthylMellitic Acid.

Mellitate *of protoxide* **of Iron.**

I.) *basic*. Sparingly soluble in water. Readily soluble in dilute chlorhydric acid. (Karmrodt.)
$C_8Fe_2O_8, 2\,FeO + 6\ Aq$

Mellitate *of sesquioxide* **of Iron.** Insoluble in water. [Y.] Soluble in chlorhydric acid. (Karmrodt.)

Mellitate of Furfurin. Soluble in water. (Karmrodt.)

Mellitate of Lead. Insoluble in water. Soluble in nitric acid. (Klaproth; Vauquelin; Wœhler.) Decomposed by water, with formation of a basic salt. (Berzelius, *Lehrb.*)
$C_8Pb_2O_8 + 2\ Aq$

Mellitate of Lime. Insoluble in water. [Y.] Soluble in chlorhydric acid. (Klaproth.)

Mellitate of Magnesia. Sparingly soluble in water. Alcohol precipitates it, as a salt containing 14 equivalents of water, from the aqueous solution. (Karmrodt.)
$C_8Mg_2O_8 + 12\ Aq$

Mellitate of Manganese. More soluble in *cold* than in hot water. Soluble in 800 pts. of water. (Karmrodt.)
$C_8Mn_2O_8 + 12\ Aq$

Mellitate *of dinoxide* **of Mercury.** Almost insoluble in water. Readily soluble in nitric acid. (Karmrodt.)
$C_8Hg_4O_8 + 4\ Aq$

Mellitate *of protoxide* **of Mercury.** Soluble in hot concentrated nitric acid. (Karmrodt.)
$C_8Hg_2O_8 + 4\ Aq$

Mellitate of Morphine.

I.) *acid*. More soluble in *cold* than in boiling water. Insoluble in alcohol or ether. Easily soluble in aqueous solutions of caustic potash, and ammonia.

Mellitate of Nickel.

$a = C_8Ni_2O_8 + 16\ Aq$ Slowly soluble in water. Readily soluble in chlorhydric, and nitric acids. (Karmrodt.)

$b = C_8Ni_2O_8 + 6\ Aq$ Much more readily soluble in water than the 16 Aq salt. (Karmrodt.)

Mellitate of Palladium. Soluble in water; also, with combination, in ammonia-water. (Karmrodt.)

Mellitate of Palladium & of Potash. Deliquescent. Soluble in water. (Karmrodt.)

Mellitate of Palladium & of Soda.

Mellitate of Potash.

I.) *normal*. Very efflorescent. Soluble in water, though less so than the acid salt.
$C_8K_2O_8 + 6\ Aq$

II.) *acid*. Soluble in hot, less soluble in cold water. More soluble in water than the normal salt.
$C_8HKO_8 + 4\ Aq$

III.) *sesqui*. Soluble in hot water.
$C_8K_2O_8, C_8HKO_8 + 12\ Aq$

Mellitate of Potash & of Silver.

*Mono*Mellitate of Potash with Nitrate of Potash. Very sparingly soluble in water. (Wœhler.) About as difficultly soluble in water as bitartrate of potash. (Berzelius's *Lehrb.*)
$4\,C_8HKO_8;\ KO, NO_5 + 6\ Aq$

Mellitate of Quinine. Sparingly soluble in cold, more soluble in boiling water. (Karmrodt.)

Mellitate of Silver. Ppt., somewhat soluble in cold water. [Y.]
$C_8Ag_2O_8$

Mellitate of Soda. Separates, with 8 equivalents of Aq, from the warm concentrated aqueous solution; while a salt containing 12 Aq crystallizes out from the cold solution as it evaporates. (Erdmann & Marchand.)

Mellitate of Solanin. Soluble in water, the solution undergoing decomposition when evaporated. (Karmrodt.)

Mellitate of Strontia. Soluble in chlorhydric acid. (Klaproth.)

Mellitate of Strychnine. Soluble in about 1500 pts. of cold water and in about 650 pts. of boiling water.

Mellitate of Zinc.

$a = C_8Zn_2O_8 + 10\ Aq$ Tolerably readily soluble in cold water. Easily soluble in weak acids, even in mellitic acid. (Karmrodt.)

$b = C_8Zn_2O_8 + 6\ Aq$ Is precipitated when alcohol is added to the aqueous solution of the 10 Aq salt; but it is much more soluble in water than the latter. (Karmrodt.)

Mellithamid. Insoluble in water, but is decomposed by long boiling therewith. Insoluble in alcohol, nitric acid, or aqua-regia. Soluble in hot concentrated sulphuric acid, from which it is

(*Mellimid. Mellamid. Paramid. Mellithylamid.*)
$C_8HNO_4 = N\left\{\begin{matrix}C_8O_4''\\H\end{matrix}\right.$

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precipitated on the addition of water. Soluble, with subsequent decomposition, in dilute aqueous solutions of caustic potash and ammonia.

MellithArgentamid.
$N \left\{ \begin{matrix} C_8\,O_4'' \\ Ag \end{matrix} \right.$

MellithArgent*bi*amid. Ppt.
$C_8\,H_3\,Ag\,N_2\,O_4 = N_2 \left\{ \begin{matrix} C_8\,O_4'' \\ Ag \\ H_3 \end{matrix} \right.$

Mellith*ter*amic Acid. Somewhat soluble in boiling water. Soluble in ammonia-water, with subsequent decomposition. (H. Schwarz.)
(*Paramidic Acid.*)
$C_{24}\,H_5\,N_3\,O_{14} = N_3 \left\{ \begin{matrix} (C_8\,O_4'')_3 \\ H_3 \end{matrix} \right. .HO,HO$

"**Mellone**"(of Gerhardt). *Vid. di*Cyanamid.
$C_4\,H\,N_3$

"**Mellone**"(of Liebig). *Vid. tri*Cyanamid.
$C_6\,N_4$

Mellonhydric Acid. Very sparingly soluble in cold, more readily soluble in boiling water. The aqueous solution is miscible with alcohol without being precipitated. It is partially decomposed when evaporated to dryness. (Liebig, *Ann. Ch. u. Pharm.*, **95.** 270.) Insoluble in alcohol, and ether, and in oils whether fixed or volatile. (Liebig.) Quickly and abundantly soluble in strong nitric acid. Somewhat more slowly, but in equal quantity, in oil of vitriol. Both solutions become milky on the addition of water. (*Gm.*)
(*HydroMellone.*)
$C_{18}\,H_3\,N_{13} = N \left\{ \begin{matrix} N \left\{ \begin{matrix} Cy_3 \\ H \end{matrix} \right. \\ N \left\{ \begin{matrix} Cy_3 \\ H \end{matrix} \right. \\ N \left\{ \begin{matrix} Cy_3 \\ H \end{matrix} \right. \end{matrix} \right. , \text{ or } N_4 \left\{ \begin{matrix} Cy_4 \\ Cy_4 \\ Cy.\,H_3 \end{matrix} \right.$

Mellonide of Ammonium. Soluble in water. Insoluble in alcohol. (Liebig.)

Mellonide of Barium. Sparingly soluble in boiling, less soluble in cold water. Much more readily soluble in pure water than in water which contains a baryta salt in solution. (Liebig.)

Mellonide of Cadmium. Sparingly soluble in boiling water.

Mellonide of Calcium. Easily soluble in water. Somewhat more soluble than the strontium salt in boiling water. (Liebig.) Much more readily soluble in pure water than in water containing a calcium salt in solution. (Liebig.)

Mellonide of Chromium. Ppt.

Mellonide of Cobalt. Ppt.

Mellonide *of dinoxide* of Copper. Insoluble in water.

Mellonide *of protoxide* of Copper. Sparingly soluble in boiling water.

Mellonide of Gold. Ppt.

Mellonide *of protoxide* of Iron. Ppt.

Mellonide *of sesquioxide* of Iron. Ppt.

Mellonide of Lead. Insoluble in boiling water.

Mellonide of Magnesium. Easily soluble in water. Much more readily soluble in pure water than in water containing magnesium salts in solution. (Liebig.)

Mellonide of Manganese. Ppt.

Mellonide of Mercury(Hg_2). Ppt.

Mellonide of Mercury(Hg). Insoluble in water. Soluble in cold dilute cyanhydric acid. (Liebig.)

Mellonide of Nickel. Ppt.

Mellonide of Platinum. Ppt.

Mellonide of Potassium.

I.) *tri.* Efflorescent. Soluble in 37.453 pts. of water at the ordinary temperature, and in much less hot water. Its solubility in cold water is greatly diminished by the presence of other salts; for example, sulphocyanide of potassium. (Liebig, 1855.) Nearly insoluble in alcohol, even boiling. Soluble in ammonia-water. Nitric, sulphuric, and chlorhydric acids precipitate it from the aqueous solution, but acetic acid does not.
$C_{18}\,N_{13}\,K_3 + 10\,Aq = N \left\{ \left(N \left\{ \begin{matrix} Cy_3 \\ K \end{matrix} \right. \right)_3 \right. + 10\,Aq\,;$
$\text{or, } N_4 \left\{ \begin{matrix} Cy_4 \\ Cy_4 \\ Cy\,K_3 \end{matrix} \right. + 10\,Aq$

II.) *di.* Soluble in cold, decomposed by boiling water.
$C_{18}\,N_{13}\,H\,K_2 + 6\,Aq$

III.) *mono.* Insoluble in cold, sparingly soluble in boiling water. Easily soluble in an aqueous solution of acetate of potash. (Liebig, *Ann. Ch. u. Pharm.*, 1855, **95.** 276.)
$C_{18}\,N_{13}\,H_2\,K$

Mellonide of Silver. Insoluble in boiling water.
$C_{18}\,N_{13}\,Ag_3$

Mellonide of Sodium. Tolerably easily soluble in water. Insoluble in alcohol. (Liebig.)
$C_{18}\,N_{13}\,Na_3$

Mellonide of Strontium. Much more soluble than the barium salt in water. Much more readily soluble in pure water than in water containing a strontium salt in solution. (Liebig.) The boiling saturated aqueous solution solidifies on cooling.

Mellonide of Zinc. Ppt. Sparingly soluble in boiling water.

Melyl. *Vid.* Myricyl.

MeNaphthylamin. Almost insoluble in cold, very sparingly soluble in boiling water. Somewhat soluble in alcohol, and ether. Most of its salts are sparingly soluble in water. (Perkin, *J. Ch. Soc.*, **9.** 10.)
$C_{42}\,H_{17}\,N_3$

MeNaphtoximid. Insoluble in water. Very slightly soluble in alcohol, and ether. (Perkin, *J. Ch. Soc.*, **9.** 14.)
$C_{46}\,H_{15}\,N_3\,O_4$

Menic Acid. Insoluble in water.

Menate of Silver. Soluble in ammonia-water. (Berzelius.)
$C_{48}\,H_{19}\,Ag\,O_5$ (?)

Menispermin. Insoluble in water. Easily soluble in alcohol, and ether. Easily soluble in dilute acids.
$C_{18}\,H_{11}\,N\,O_2$

Sparingly soluble or insoluble in cold, somewhat soluble in hot water. Sparingly soluble in cold alcohol. Easily soluble in ether, and, with combination, in acids. (Parrish's *Pharm.*, p. 394.)

Menthene. Insoluble in water. Forms a turbid mixture, with small quantities of alcohol or ether, but a clear mixture with large quantities. Tolerably readily soluble in wood-spirit, and very easily in oil of turpentine. (Walter.)
(*Isomeric with Sebacin and Camphin.*)
$C_{20}\,H_{18}$

Menthene*chloré*. *Vid.* ChloroMenthene.

"**Menyanthin**"(of Trommsdorff). *Vid.* Inulin.

Menyanthin(from *Menyanthes trifoliata*). Soluble in water, alcohol, and ordinary ether. Insoluble in absolute ether. (R. Brandes.)

Mercaptan. *Vid.* Sulphydrate of Ethyl.

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Mercaptide of *X*. *Vid.* Sulphide of Ethyl & of *X*.

Mercur(*ic*)Acetamid. Easily soluble in water. Sparingly soluble in alcohol. (Strecker, *Ann. Ch. u. Pharm.*, **103**. 324.)
$C_4 H_4 Hg N O_2 = N \left\{ \begin{matrix} C_4 H_3 O_2 \\ Hg \\ H \end{matrix} \right.$

MercurAllyl.
(*HydrargAllyl. HydrargAcryl.*)
$C_6 H_5 Hg_2$

***Tri*Mercur(*ic*)amin.** Soluble in chlorhydric and in concentrated nitric acids. Partially soluble in boiling dilute sulphuric acid. Decomposed, with explosion, by concentrated sulphuric acid. (Plantamour.)
(*Nitride of Mercury.*)
$N \left\{ Hg_3 \right.$

MercurAmyl.

Mercur(*ic*)Butyramid. Soluble in cold water. (Dessaignes, *Ann. Ch. et Phys.*, (3.) **34**. 145.)
$C_8 H_8 Hg N O_2 = N \left\{ \begin{matrix} C_8 H_7 O_2 \\ Hg \\ H \end{matrix} \right.$

Mercur(*ous*)Ethyl. Not known in the free state.
(*HydrargEthyl.*)
$C_4 H_5 Hg_2$

Mercur(*ic*)Ethyl. Insoluble in water. Sparingly soluble in alcohol. Readily soluble in ether. (Buckton.)
$C_4 H_5 Hg$

Mercur(*ic*)Methyl. Nearly insoluble in water. Very soluble in alcohol, and ether. Water precipitates it from the alcoholic solution. (Buckton.)
$C_2 H_3 Hg$

***Tri*Mercur(*ic*)Phosphin with Nitrate *of dinoxide* of Mercury.**

***Tri*Mercur(*ic*)Phosphin with Nitrate *of protoxide* of Mercury.** Soluble in chlorine-water. (H. Rose.)
$P \left\{ Hg_3 ; 8 (2 Hg O, N O_5) \right.$

Mercury. Permanent. Unacted upon by water. Scarcely at all attacked by chlorhydric acid, even when this is hot and concentrated. Unacted upon by concentrated iodhydric acid, even when this is hot. Very readily attacked by oxidizing acids, especially when these are hot. Unacted upon by dilute sulphuric acid; but concentrated sulphuric acid dissolves it.
Hg

Mercury is not attacked by *pure* dilute nitric acid, unless this is heated, but it is readily attacked by the cold dilute acid, when this contains nitrous acid. When mercury is treated with pure concentrated nitric acid at the temperature of a freezing mixture, it becomes covered with an insoluble coating, but owing to the fluidity of the mercury this coating does not put a stop to the action of the acid. (Millon, *Ann. Ch. et Phys.*, (3.) **6**. 99.) In contact with aqueous solutions of the alkaline chlorides, and exposed to the air, mercury is attacked to a certain extent, with formation of protochloride of mercury ($Hg\ Cl$); the action being so much the more rapid in proportion as the saline solution is more concentrated, and as the metal is more finely divided. The formation of the protochloride occurs about as readily in the cold as when the solution is heated, but the presence of air is essential, no action occurring out of contact with the atmosphere. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5**. 183.)

Mercury & Platinum(amalgam of). Hardly acted upon by boiling nitric acid. Insoluble in cold, soluble in warm aqua-regia.

Mesaconic Acid. Sparingly soluble in cold, abundantly soluble in hot water. (Gottlieb.) Soluble in 38 pts. of water at 14°, and in 29 pts. at 22°; (Baup, *Ann. Ch. et Phys.*, (3.) **33**. 193); in 14.29 pts. of water at 18.2°, and in 0.85 pt. at 100°. (Pebal.) Soluble in alcohol, and ether (Pebal); in 2.6 pts. of alcohol of 83%, at 22°. (Baup, *loc. cit.*) Also soluble in ether.
(*Citracartic Acid.*)
$C_{10} H_6 O_8 = C_{10} H_4 O_6, 2 H O$

Mesaconate of Ammonia.

I.) *normal.* Soluble in water; the solution gives off ammonia when it is evaporated.
$C_{10} H_4 (N H_4)_2 O_8$

II.) *acid.* Very readily soluble in water. (Pebal.) Soluble in 8 pts. of water at 15°. (Baup, *Ann. Ch. et Phys.*, (3.) **33**. 194.)
$C_{10} H_5 (N H_4) O_8$

Mesaconate of Baryta.

I.) *normal.* Permanent. Tolerably readily soluble in water.
$C_{10} H_4 Ba_2 O_8 + 8 Aq$

II.) *acid.* Permanent. Decomposed by alcohol.
$C_{10} H_5 Ba O_8 + 2 Aq$

Mesaconate of Copper.

I.) *normal.*
$C_{10} H_4 Cu_2 O_8 + 4 Aq$

II.) *basic.* Very efflorescent.

Mesaconate of Ethyl. Sparingly soluble in cold, more soluble in boiling water. Miscible in all proportions with alcohol, and ether. (Pebal.)
$C_{10} H_4 (C_4 H_5)_2 O_8$

Mesaconate of Lead.

I.) *normal.* Sparingly soluble in water. Very soluble in an aqueous solution of nitrate of lead.
$C_{10} H_4 Pb_2 O_8 + 8 Aq$

II.) *acid.*
$C_{10} H_5 Pb O_8$

Mesaconate of Lime.

I.) *normal.* Soluble in 16.5 pts. of water at 20°. Insoluble in alcohol. (Baup, *Ann. Ch. et Phys.*, (3.) **33**. 195.)
$C_{10} H_4 Ca_2 O_8 + 8 Aq$

Mesaconate of Potash.

I.) *normal.* Very deliquescent. Very soluble in water; somewhat less soluble in alcohol. (Pebal.)

II.) *acid.* Very readily soluble in water. Sparingly soluble in alcohol. (Baup, *Ann. Ch. et Phys.*, (3.) **33**. 194.)

Mesaconate of Silver.

I.) *normal.* Sparingly soluble in water; more soluble in an aqueous solution of ammonia. Alcohol precipitates it from the aqueous solution.
$C_{10} H_4 Ag_2 O_8 + 2 Aq$

II.) *acid.* Tolerably easily soluble in warm water. (Pebal.)
$C_{10} H_5 Ag O_8$

Mesaconate of Soda.

I.) *normal.* Very soluble in water. (Pebal.)

II.) *acid.* Permanent. (Baup.)

Mesite(of Reichenbach). Sometimes soluble in 2 pts. of water. Soluble in all proportions in bisulphide of carbon.
(*Acetate of Methyl*, according to Berzelius.)

Mesite(of Weidemann & Schweizer). Soluble in 3 pts. of water. (W. & S.)
$C_{12} H_{12} O_4$

Mesitene. Soluble in 3 pts. of water. (Weidemann & Schweizer.)
$C_{12} H_{12} O_6$

Mesitic Alcohol. *Vid.* Acetone.

Mesitic Aldehyde. Very sparingly soluble in water. Readily soluble in alkaline liquors. (Kane.)
(*Isomeric with Acrolein.*)
$C_6 H_4 O_2$

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Mesitic Chloral.
$C_6 H_4 Cl_2 O_2$

Mesitic Ether. *Vid.* Oxide of Mesityl.

Mesitylene. Insoluble in water. Unacted upon by alkaline solutions.
(*Mesitylol. Hydride of Mesityl. Isomeric with Cumene.*)
$C_{18} H_{12}$

Mesitylol. *Vid.* Mesitylene.

MesitylHypoPhosphorous Acid. Readily soluble in baryta-water.

MesitylHypoPhosphite of Baryta. Very slowly soluble in water. Insoluble in alcohol. (Kane.)
$Ba O, C_6 H_6 O_2, P O$

MesitylHypoSulphuric Acid. *Vid.* MesitylSulphuric Acid.

MesitylPhosphoric Acid. Its salts are soluble in water.

MesitylPhosphate of Soda. Efflorescent. Soluble in water. (Kane.)
$C_6 H_5 Na O_2 P O_6 + 6 Aq$

" **MesitylSulphuric Acid** "(of Kane). *Vid.* SulphoMesitylic Acid.

MesitylSulphuric Acid.
(*SulphoMesitylic Acid.*)
$C_{18} H_{12} S_2 O_6$

MesitylSulphate of Lead. Extremely soluble in water, and alcohol.
$C_{18} H_{11} Pb S_2 O_6$

MesitylSulphate of Silver. Extremely soluble in water. (Hofmann, *J. Ch. Soc.*, **2.** 113.)

Mesoxalic Acid. Readily soluble in water. Soluble in all proportions in water. (Redtenbacher.)
$C_6 H_2 O_{10} = C_6 O_8, 2 H O$

Mesoxalate of Baryta. Difficultly soluble in cold, but easily soluble in boiling water. Insoluble in alcohol. Soluble in acids. (Berzelius, *Lehrb.*)
$C_6 Ba_2 O_{10} + 2 Aq$

Mesoxalate of Lead.

I.) *normal.* Ppt.
$C_6 Pb_2 O_{10} + 2 Aq$

II.) *basic.* Ppt.
$C_6 Pb_2 O_{10}, 2 (Pb O, H O)$

Mesoxalate of Lime. Much more soluble in water than the baryta-salt. (Svanberg & Kolmodin.)
$C_6 Ca_2 O_{10} + 4 Aq$

Mesoxalate of Silver.

I.) *normal.* Appears to be soluble in water.
$C_6 Ag_2 O_{10}$

II.) *basic.* Ppt.
$C_6 Ag_2 O_{10} ; 2 Ag O$

MetaCaprol. Soluble, without coloration, in cold concentrated sulphuric acid, — on heating the mixture a conjugate acid is formed, the baryta-salt of which is soluble in water. (Gerhardt.)
(*Isomeric with Hydride of Rutyl.*)
$C_{20} H_{20} O_2$

MetaCaprylene. Insoluble in water. Scarcely soluble in cold alcohol. Unacted upon by a boiling aqueous solution of caustic potash. (Bouis.)
(*Meta Octylene.*)
$C_{16} H_{16}$

MetAceChlorPlatin. Difficultly soluble in water, even when this is hot. Very difficultly soluble in alcohol. Insoluble in ether. Soluble in acetone. Easily soluble in an aqueous solution of potash. (Zeise.)
$Pt Cl ; C_6 H_5 O$

MetAcetamid. *Vid.* Propionamid.

MetAcetamin. *Vid.* Propylamin.

MetAcetene. *Vid.* Propylene.

MetAcetic Acid. *Vid.* Propionic Acid.

MetAcetic Alcohol. *Vid.* Hydrate of Propyl.

MetAcetone. Insoluble in water. Very easily soluble in alcohol, and ether.
(*Perhaps isomeric with Propion.*)
$C_6 H_5 O$

MetAcetonic Acid. *Vid.* Propionic Acid.

MetAcetonic Alcohol. *Vid.* Hydrate of Propyl.

MetAcetoNitric Acid. *Vid.* NitroPropionic Acid.

MetAcetonitril. Identical with Cyanide of Ethyl, *q. v.*

MetaChloral. Insoluble in cold, and only slightly soluble in hot water. Insoluble in boiling alcohol or ether.
(*Insoluble Chloral.*)
$C_4 H Cl_3 O_2$

MetaCinnamein(of Scharling). *Vid.* Cinnamate of Toluenyl(Cinnamein).

MetaCinnamein(of Fremy). *Vid.* Cinnamate of Styracyl(Styracin).

MetAcrolein. Insoluble in cold, and only very sparingly soluble in warm water. Easily soluble in alcohol, and ether. Soluble in concentrated sulphuric acid, and in acetic acid. (Geuther & Cartmell.)

MetaGallic Acid. *Vid.* GallUllmic Acid.

MetAldehyde. *Vid.* under Hydride of Acetyl.

MetaMargaric Acid. Insoluble in water. Easily soluble in spirit of 36°. Soluble in ether. (Fremy.)

MetaNaphthalin. Entirely insoluble in water. Sparingly soluble in cold spirit; very soluble in warm absolute alcohol; still more soluble in ether, naphtha, oil of turpentine, and other liquid hydrocarbons. (Pelletier & Walter.)
$C_{20} H_8$

MetArsenMethylic Acid. *Vid.* ArsenEthylic Acid.

MetaOctylene. *Vid.* MetaCaprylene.

MetaOleic Acid. *Vid.* MetOleic Acid.

MetaPectic Acid. Deliquescent. Soluble in water, and alcohol. All of its salts are soluble, excepting a precipitate which forms when it is treated with subacetate of lead. (Fremy, *Ann. Ch. et Phys.*, (3.) **24.** 37.)
$C_8 H_5 O_7$

MetaPectin. Soluble in water. Insoluble in alcohol. Decomposed by alkaline solutions. It combines with acids, — for example, sulphuric, chlorhydric, and oxalic acids, forming compounds soluble in water, but insoluble in alcohol. (Fremy, *Ann. Ch. et Phys.*, (3.) **24.** 18.)
$C_{64} H_{46} O_{62}$

MetaPectin with Baryta.

MetaPectin with Oxide of Lead.

MetaStannate of *X*. *Vid.* under Stannate of *X*.

MetaStyrol. Insoluble in water, or alcohol, even when these are hot. Sparingly soluble in boiling ether. Easily soluble in bisulphide of carbon. Soluble in hot volatile and fatty oils, but separates out again from these solutions as they cool. Oil of turpentine dissolves traces of it. Insoluble in potash-lye, or in cold concentrated sulphuric acid. When heated with the latter it is decomposed. (Blyth & Hofmann.)
(*Draconyl. Oxide of Styrol.*)
$C_{16} H_8$

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MetaTartaric Acid. Very deliquescent. Readily soluble in water. (Braconnot; Erdmann; Laurent & Gerhardt.) Its salts, of the metallic oxides, are more soluble in water than those of ordinary tartaric acid.

(Meta Tartric Acid. Amorphous Tartaric Acid.)
$C_8 H_6 O_{12} = C_8 H_4 O_{10}, 2 H O$

MetaTartrate of Ammonia.

I.) *acid.* The aqueous solution is changed by boiling. Much more soluble than the acid tartrate of ammonia in water. Less soluble in alcohol than in water. (Laurent & Gerhardt.)

$C_8 H_5 (N H_4) O_{12}$

MetaTartrate of Baryta.

I.) *normal.* Much more readily soluble in water than tartrate of baryta. (Laurent & Gerhardt.) Easily soluble in an excess of acid. (Erdmann.)

$C_8 H_4 Ba_2 O_{12} + 2 Aq$

MetaTartrate of Lead. Insoluble in cold, very sparingly soluble in boiling water. Easily soluble in metatartaric acid, and in other acids; also in ammonia-water. (Erdmann.)

MetaTartrate of Lime. More soluble in water than the corresponding tartrate. When once deposited in crystals, it dissolves in a large quantity of cold water, and is very difficultly soluble in boiling water, being transformed into tartrate of lime; but it dissolves easily in the cold, if the water is acidulated with a little nitric or chlorhydric acid. (Laurent & Gerhardt.)

$C_8 H_4 Ca_2 O_{12} + 8 Aq$

MetaTartrate of Magnesia.

MetaTartrate of Potash.

I.) *acid.* As sparingly soluble as cream of tartar. (Braconnot.)

$C_8 H_5 K O_{12}$

MetaTartrate of Potash & of Soda.

MetaTartrate of Soda.

I.) *normal.* Deliquescent. (Braconnot.)

MetaTerebenthene.

$C_{20} H_{16}$

MetaToluidin. *Vid.* MeToluidin.

MetEthamAmylamin. *Vid.* MethylEthylAmylamin.

MetEthAnilin. *Vid.* MethylEthylAnilin.

MethAmAnilin. *Vid.* MethylAmylAnilin.

Methamin. *Vid.* Methylamin.

MethAmylic Ether. *Vid.* Oxide of Amyl & of Methyl.

MethEthamAnilin. *Vid.* Hydrate of MethylEthylAmylPhenylAmmonium.

MethAnilin. *Vid.* MethylAnilin.

Methionic Acid. Very deliquescent. Exceedingly soluble in water; less soluble in alcohol. Its salts are soluble in water, but insoluble in absolute alcohol. (Buckton & Hofmann.)

(Di Sulpho Metholic Acid.)
$C_2 H_4 S_4 O_{12} = C_2 H_2 S_4 O_{10}, 2 H O$

Methionate of Ammonia. Easily soluble in hot, tolerably soluble in cold water. (Buckton & Hofmann.)

$C_2 H_2 (N H_4)_2 S_4 O_{12}$

Methionate of Baryta.

I.) *normal.* Soluble in hot, less soluble in cold water. Insoluble in alcohol. (Buckton & Hofmann.) The salt obtained by Liebig, 1835, *Ann. Pharm.*, **13**. 35, to which he attributes the formula $C H_3, Ba O, 2 S O_3$, and which contains no water of crystallization, is soluble in 40 pts. of cold water, and in a smaller quantity of hot water. It is insoluble in alcohol. (Liebig, *loc. cit.*)

$C_2 H_2 Ba_2 S_4 O_{12} + 4 Aq$

Methionate of Copper. Efflorescent. Soluble in water. Easily soluble in spirit; but insoluble in absolute alcohol. (Strecker). Insoluble in absolute, but soluble in dilute alcohol. (Buckton & Hofmann.)

$C_2 H_2 Cu_2 S_4 O_{12} + 10 Aq$

Methionate of Lead.

I.) *normal.* Very easily soluble in water. Alcohol precipitates it from the aqueous solution. (Buckton & Hofmann; Strecker.)

$C_2 H_2 Pb_2 S_4 O_{12} + 4 Aq$

II.) *basic.* Much less soluble than the normal salt in cold water, though somewhat soluble in hot water. (Strecker.)

$C_2 H_2 Pb_2 S_4 O_{12}, Pb O$

Methionate of Lime. Easily soluble in water. (Strecker, *Ann. Ch. u. Pharm.*, **100**. 199.)

Methionate of Potash. Very soluble in water. Soluble in 14 pts. of water at 22°. (Buckton & Hofmann.)

Methionate of Silver. Soluble in water. Alcohol precipitates it from the concentrated aqueous solution. (Strecker.) Insoluble in absolute alcohol; somewhat soluble in dilute alcohol. (Buckton & Hofmann.)

$C_2 H_2 Ag_2 S_4 O_{12}$

Methionate of Zinc. Soluble in water, and alcohol. (Buckton & Hofmann.)

Methol. Insoluble in water. Readily soluble in alcohol, and ether. (Voelckel.)

$C_{18} H_{12}(?)$

Methyl. Insoluble in water. [Almost insoluble in water. (Kolbe, *Lehrb.*, 1. 234.).] 1 volume of alcohol absorbs 1.13 vols. of methyl gas. Unacted upon by concentrated sulphuric acid. (Kolbe & Frankland, *J. Ch. Soc.*, 1. 65.) Nearly insoluble in water. 1 vol. of alcohol at 8.8°, and 665.5^{mm} pressure, absorbs 1.22 vols. of it. (Frankland, *J. Ch. Soc.*, **2**. 290.)

(Isomeric with Hydride of Ethyl.)
$C_2 H_3$ or $\left.\begin{matrix} C_2 H_3 \\ C_2 H_3 \end{matrix}\right\}$

1 vol. of water, under a pressure of 0m.76 of mercury, at °C.	Dissolves of methyl — vols., reduced to 0°C. and 0m.76 pressure of mercury.
0°	0.0871
1°	0.0838
2°	0.0807
3°	0.0777
4°	0.0748
5°	0.0720
6°	0.0693
7°	0.0668
8°	0.0644
9°	0.0621
10°	0.0599
11°	0.0578
12°	0.0559
13°	0.0541
14°	0.0524
15°	0.0508
16°	0.0493
17°	0.0480
18°	0.0468
19°	0.0457
20°	0.0447

(Bunsen's *Gasometry*, pp. 288, 128, 150.)

Insoluble in sulphate of pentachloride of antimony. (Kolbe.)

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MethylAcetal. Soluble in about 15 volumes of water; less soluble in an aqueous solution of chloride of calcium. Soluble in all proportions in alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **48.** 375.)
$C_{10} H_{12} O_4$

MethylAcetamid.
(*MethylAcetylamid.*)
$C_8 H_7 N O_2 = N \left\{ \begin{matrix} C_4 H_3 O_2 \\ C_2 H_3 \\ H \end{matrix} \right.$

MethylAcetone. Miscible in all proportions with water, and alcohol.
$C_8 H_8 O_2$

MethylAcetyl. *Vid.* Acetone.

Methylal. Soluble in 3 vols. of water. Soluble in alcohol. Miscible in all proportions with ether. Insoluble in a saturated aqueous solution of caustic potash. (Malaguti.)
(*Formomethylal.*)
$C_6 H_8 O_2$

Methyl(*ic*)Alcohol. *Vid.* Hydrate of Methyl.

***Di*MethylAlloxantin.** Almost insoluble in cold, sparingly soluble in boiling water. Sparingly soluble in boiling absolute alcohol. (Rochleder.)
(*Amalic Acid.*)
$C_{24} H_{14} N_4 O_{16}$

Methylamid. *Vid.* Methylamin.

Methylamin. Is the most soluble gas known. 1 volume of water dissolves 1153.9 vols. of it at 12.5°; and 959 vols. at 25°; it is less soluble at higher temperatures. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 449.)
(*Methylammonia Methylamid. Methamin. Methyliaque.*)
$C_2 H_5 N = N \left\{ \begin{matrix} (C_2 H_3) \\ H_2 \end{matrix} \right.$

***Di*Methylamin.**
(*Isomeric with Ethylamin.*)
$C_4 H_7 N = N \left\{ \begin{matrix} (C_2 H_3)_2 \\ H \end{matrix} \right.$

***Tri*Methylamin.** As soluble as ammonia gas in water, and spirit. (Winkles, *Ann. Ch. u. Pharm.*, **93.** 325.)
(*Isomeric with Propylamin, and with MethylEthylamin.*)
$C_6 H_9 N = N (C_2 H_3)_3$

MethylAmin*iodé*, &c. *Vid.* Iod(&c.)Ethylamin.

Methylammonia. *Vid.* Methylamin.

***Tetra*Methylammonium.** Not isolated.

MethylAmylAnilin. Almost insoluble in water. (Hofmann.)
(*MethylAmylPhenylamin. Methamanilin. Formemylanilin.*)
$C_{24} H_{19} N = N \left\{ \begin{matrix} C_{12} H_5 \\ C_2 H_3 \\ C_{10} H_{11} \end{matrix} \right.$

MethylAmylPhenylamin. *Vid.* MethylAmylAnilin.

MethylAnilin. The salts of methylanilin are sparingly soluble in water, and are still less soluble in acids than in pure water. They are less soluble in water than the salts of ethylanilin.
(*Methanilin. MethylPhenylamin. FormAnilin. Isomeric with Toluidin and Lutidin.*)
$C_{14} H_9 N = N \left\{ \begin{matrix} C_{12} H_5 \\ C_2 H_3 \\ H \end{matrix} \right.$

***Tri*MethylArsamin.**
$C_6 H_9 As = As \left\{ (C_2 H_3)_3 \right.$

MethylArsenic Acid. *Vid.* ArsenMethylic Acid.

Methylate of Amyl(&c.). *Vid.* Oxide of Amyl(&c.) & of Methyl.

Methylate of Ethylene. Sparingly soluble in water. (Wurtz.)
$C_8 H_{10} O_4 = \left. \begin{matrix} C_4 H_4'' \\ (C_2 H_3)_2 \end{matrix} \right\} O_4$

MethylBromoSalicylic Acid. Almost completely insoluble in water. Very soluble in alcohol. Easily soluble in ether. More soluble than methylbibromosalicylic acid in alcohol of 36%. Soluble, with combination, in a cold aqueous solution of caustic potash, but is decomposed by a hot solution of potash. (Cahours, *Ann. Ch. et Phys.*, (3.) **10.** pp. 339, 340.)
(*BromoSalicylate of Methyl. Salicylate of Methylmonobromé.*)
$C_{16} H_7 Br O_6$

MethylBromoSalicylate of Potash. Soluble in water. (Cahours, *Ibid.*, p. 340.) Very soluble in acetic acid, from which water precipitates it.

Methyl*bi*BromoSalicylic Acid. Insoluble in water. Soluble in alcohol, and ether, especially when these are hot. Less soluble than methylmonobromosalicylic acid in alcohol of 36%. Soluble, with combination, in cold concentrated aqueous solutions of potash and soda, but is decomposed when boiled therewith. Sparingly soluble, without alteration, in bromine. (Cahours, *Ann. Ch. et Phys.*, (3.) **10.** pp. 339, 342, 343.)
(*BiBromoSalicylate of Methyl.*)
$C_{16} H_6 Br_2 O_6$

Methyl*bi*BromoSalicylate of Potash. Soluble in water.

Methyl*bi*BromoSalicylate of Soda. Soluble in water.

MethylCamphoric Acid. Very sparingly soluble in water. Very soluble in alcohol, ether, and chloroform. (Loir, *Ann. Ch. et Phys.*, (3.) **38.** 485.)
(*CamphoMethylic Acid. Camphorate of Methyl.*)
$C_{22} H_{18} O_8 = C_{20} H_{14} (C_2 H_3) O_7, H O$

MethylCamphorate of Baryta. Somewhat soluble in water.

MethylCamphorate of Copper. Ppt.

MethylCamphorate of Lead. Insoluble, or but sparingly soluble in water, or alcohol. Soluble in an aqueous solution of acetate of lead.

MethylCamphorate of Lime. Appears to be soluble in water.

MethylCamphorate of Silver. Ppt. (Loir, *loc. cit.*)

MethylCaproyl.
(*MethylHexyl. Methylide of Hexyl.*)
$C_{14} H_{16} = \left\{ \begin{matrix} C_2 H_3 \\ C_{12} H_{13} \end{matrix} \right.$

MethylCarbamic Acid.
(*MethylUretan. Carbaminate of Methyl. Uretylan.*)
$C_4 H_5 N O_4 = N H (C_2 H_3) (C O)_2, O, H O$

MethylCarbamate of Methylamin.

MethylCarbonic Acid. Not isolated.
(*Carbomethylic Acid.*)
$C_4 H_4 O_6$

MethylCarbonate of Baryta. Soluble in cold water, but the solution soon decomposes; instantly on boiling. Insoluble in alcohol, or in wood-spirit. (Dumas & Peligot.)
$C_4 H_3 Ba O_6 = C_2 O_4 \left\{ \begin{matrix} Ba O \\ C_2 H_3 O \end{matrix} \right.$

MethylChlorAcetal.
$C_6 H_6 Cl_2$

MethylCitric Acid.
(*Citrate of Methyl.*)
$C_{14} H_{10} O_{14}$

MethylCitrate of Lime. Very easily soluble in water. Insoluble in alcohol. (Demondesir.)

***Di*MethylCitric Acid.**
(*CitrobiMethylic Acid.*)
$C_{16} H_{12} O_{14}$

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***Di*MethylCitrate of Lime.** Very easily soluble in water, and alcohol. (Demondesir.)

MethylChloroSalicylic Acid. More soluble in alcohol than methylbichlorosalicylic acid.
(*ChloroSalicylate of Methyl. Salicylate of Methylene monochloré.*)
$C_{16}H_7ClO_6$
(Cahours, *Ann. Ch. et Phys.*, (3.) **10.** 344.)

Methyl*bi*ChloroSalicylic Acid. Insoluble in water. Soluble in alcohol, more readily in hot than in cold, and in ether. Slowly soluble, with decomposition, in ammonia-water. Also soluble, with decomposition, in cold, concentrated potash-lye. (Cahours, *Ann. Ch. et Phys.*, (3.) **10.** 344.)
(*BiChloroSalicylate of Methyl. Salicylate of Methylenebichloré.*)
$C_{16}H_6Cl_2O_6$

MethylConiin. Very sparingly soluble in water. More soluble in *cold* than in hot water. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **89.** 144.)
$N\left\{\begin{matrix}C_{16}H_{14}''\\C_2H_3\end{matrix}\right.$

MethylCyanamid.
$C_4H_4N_2 = N\left\{\begin{matrix}C_2H_3\\Cy\\H\end{matrix}\right.$

MethylCyanAnilin.
(*MethylCyanPhenylamin.*)
$C_{16}H_8N_2 = N\left\{\begin{matrix}C_{12}H_4(C_2N)\\C_2H_3\\H\end{matrix}\right.$

Methylene. Not isolated.
C_2H_2''

MethyleneMercaptan. *Vid.* Sulphydrate of Methyl.

MethyleneStannEthyl. *Vid.* $\frac{2}{3}$ StannEthyl.

Methyl(*ic*)Ether. *Vid.* Oxide of Methyl.

MethylEthyl.
$C_6H_8 = \left.\begin{matrix}C_2H_3\\C_4H_5\end{matrix}\right\}$

MethylEthylamin. A little more soluble in water than *di*EthylAmylamin.

Methyl*tri*Ethylammonium.

***Di*Methyl*di*Ethylammonium.**
$C_{12}H_{16}N = N\left\{\begin{matrix}(C_2H_3)_2\\(C_4H_5)_2\end{matrix}\right.$

MethylEthylAmylamin. Sparingly soluble in water; though somewhat more soluble than diethylamylamin. Slowly soluble in acids, with combination. (Hofmann.)
$C_{16}H_{19}N = N\left\{\begin{matrix}C_2H_3\\C_4H_5\\C_{10}H_{11}\end{matrix}\right.$

Methyl*di*EthylAmylammonium. Not isolated.

MethylEthylAnilin. Resembles ethylanilin. Its salts are exceedingly readily soluble in water. (Hofmann.)
(*Metethanilin. MethylEthylPhenylamin.*)
$C_{18}H_{13}N = N\left\{\begin{matrix}C_{12}H_5\\C_2H_3\\C_4H_5\end{matrix}\right.$

MethylEthylate of Ethylene. Soluble in about 15 vols. of water. Miscible in all proportions with alcohol. Less soluble in an aqueous solution of chloride of calcium than in water. (Wurtz.)
$C_{10}H_{12}O_4 = \left.\begin{matrix}C_4H_4''\\C_2H_3,\ C_4H_5\end{matrix}\right\}O_4$

MethylEthylConiin. *Vid.* Hydrate of MethylEthylConiin.

MethylEthylCyanamin.
(*Isomeric with EthylbiCyanamin.*)
$C_8H_8N_2 = N\left\{\begin{matrix}C_2H_3\\C_4H_5\\C_2N\end{matrix}\right.$

Methyl*tri*Ethylium. *Vid.* Methyl*tri*Ethylammonium.

MethylEthylPhenylamin. *Vid.* MethylEthylanilin.

MethylEthylUrea. Very deliquescent. (Wurtz.)
$C_8H_{10}N_2O_2 = N_2\left\{\begin{matrix}C_2O_2''\\C_2H_3\\C_4H_5\\H_2\end{matrix}\right.$

MethylHexyl. *Vid.* MethylCaproyl.

Methyliaque. *Vid.* Methylamin.

Methylic Chloral(of Weidmann & Schweizer). Probably a mixture of *ter* and *quadri*ChlorAcetone.

MethylIrisin. Easily soluble in water, from which it is precipitated on the addition of concentrated potash-lye. Readily soluble in alcohol. Insoluble in ether. Soluble in acids. (v. Babo.)

***Tetra*Methylium.** *Vid.* *tetra*Methylammonium.

MethylLutidin.
$C_{16}H_{11}N$

MethylMalic Acid.
(*Malate of Methyl.*)
$C_8H_5(C_2H_3)O_{10}$

MethylMalate of Lime. Insoluble, or but sparingly soluble in water. Soluble in alcohol.
$C_8H_4(C_2H_3)CaO_{10}$

MethylNicotin. Known only in combination. See Hydrate of MethylNicotin.

MethylNitroPhenidin. Insoluble in cold, tolerably readily soluble in boiling water. Easily soluble in boiling, less soluble in cold alcohol. Easily soluble in ether, especially when this is hot; and in acids, with combination. (Cahours, *Ann. Ch. et Phys.*, (3.) **27.** 445.)
(*Nitranisidin. Anisidine nitrique.*)
$C_{14}H_8N_2O_6 = N\left\{\begin{matrix}C_{14}H_6(NO_4)O_2\\H_2\end{matrix}\right.$

Methyl*bi*NitroPhenidin. Extremely sparingly soluble in cold, very sparingly soluble in hot water. Sparingly soluble in cold, tolerably soluble in boiling alcohol. Sparingly soluble in warm ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **27.** 453.)
(*Binitranisidin. Anisidine binitrique.*)
$C_{14}H_7N_3O_{10} = N\left\{\begin{matrix}C_{14}H_5(NO_4)_2O_2\\H_2\end{matrix}\right.$

MethylNitroSalicylic Acid. Very sparingly soluble in cold, more soluble in boiling water; in the latter the portion which remains undissolved melts to a thick oil. Tolerably soluble in boiling alcohol; the saturated solution solidifying on cooling. Insoluble in ammonia-water, but readily soluble, with combination, in solutions of caustic potash and soda. (Cahours, *Ann. Ch. et Phys.*, (3.) **10.** 345.)
(*NitroSalicylate of Methyl. Indigotate of Methylene. Anilate of Methylene.*)
$C_{16}H_7NO_{10} = C_{14}H_4(C_2H_3)(NO_4)O_6$

Methyl*bi*NitroSalicylic Acid. Insoluble in boiling water. Nearly insoluble in cold, tolerably readily soluble in boiling alcohol. Much less soluble in alcohol than ternitrosalicylic acid. Soluble, with combination, in cold aqueous solutions of potash and soda. No more soluble in boiling concentrated chlorhydric acid than in water. Soluble in aqua-regia, when this is gently heated, and separates out unchanged as the solution cools. Soluble in concentrated sulphuric acid when this is gently heated; on the addition of water it is precipitated unchanged from this solution. Insoluble in ordinary nitric acid, either concentrated or dilute. Soluble in fuming nitric acid at a temperature of 30° @ 40°, and is reprecipitated in its original state, on the addition of water; this solution is decomposed on boiling. (Cahours, *Ann. Ch. et Phys.*, (3.) **25.** 6.)
(*BiNitroSalicylate of Methyl. Gaultheric Acid binitré.*)
$C_{16}H_6N_2O_{14} = C_{14}H_3(C_2H_3)(NO_4)_2O_6$

Methyl*bi*NitroSalicylate of Ammonia. $C_{16} H_5 (N H_4) (N O_4)_2 O_6$ Sparingly soluble in cold, readily soluble in hot water. (Cahours, *Ann. Ch. et Phys.*, (3.) **25.** 9.)

Methyl*bi*NitroSalicylate of Copper. Very sparingly soluble in water. (Cahours, *loc. cit.*)

Methyl*bi*NitroSalicylate of Lead. Very sparingly soluble in water. (Cahours, *loc. cit.*)

Methyl*bi*NitroSalicylate of Potash. Soluble in water. (Cahours, *loc. cit.*)

Methyl*bi*NitroSalicylate of Silver. $C_{16} H_4 Ag (N O_4)_2 O_6$ Very sparingly soluble in water. (Cahours, *loc. cit.*)

Methyl*bi*NitroSalicylate of Soda. Soluble in water. (Cahours, *loc. cit.*)

Methyl*ter*NitroSalicylic Acid. (*TerNitro Salicylate of Methyl.*) $C_{16} H_5 N_3 O_{18} = C_{14} H_2 (C_2 H_3) (N O_4)_3 O_6$ More soluble in alcohol than methylbinitrosalicylic acid. Soluble in water acidulated with nitric or sulphuric acids. (Cahours, *loc. cit.*)

MethylŒnanthol. *Vid.* Hydrate of Capricyl.

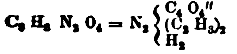
MethylOxalic Acid. (*Bin Oxalate of Methyl.*) $C_6 H_4 O_8$

MethylOxalate of Baryta. $C_6 H_3 Ba O_8$

MethylOxalate of Methyl. *Vid.* Oxalate of Methyl.

MethylOxamic Acid. *Vid.* Oxamate of Methyl.

***Di*MethylOxamid.** (*Methyl Oxamid.*)



$C_8 H_8 N_2 O_4 = N_2 \left\{ \begin{matrix} C_4 O_4'' \\ (C_2 H_3)_2 \\ H_2 \end{matrix} \right.$

Easily soluble in warm water; less soluble in alcohol. Decomposed by alkaline solutions. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 464.)

***Di*MethylParabanic Acid.** *Vid.* Parabanate of Methyl.

MethylParaTartaric Acid. (*Racemate of Methyl. Racemomethylic Acid. Para Tartromethylic Acid.*) $C_{10} H_8 O_{12} = C_8 H_5 (C_2 H_3) O_{12}$ Very easily soluble in cold, soluble in all proportions in boiling water. Readily soluble in alcohol, and wood-spirit. Sparingly soluble in ether. (Guérin-Varry.)

MethylParaTartrate of Baryta. $C_{10} H_7 Ba O_{12} + 4 Aq$ Efflorescent. More soluble in warm than in cold water. Insoluble in alcohol of 95%, or in wood-spirit.

MethylParaTartrate of Lead. Insoluble in methylparatartaric acid.

MethylParaTartrate of Lime. Insoluble in methylparatartaric acid.

MethylParaTartrate of Potash. $C_{10} H_7 K O_{12} + Aq$ More soluble in hot than in cold water. Insoluble in alcohol of 95%, or in wood-spirit.

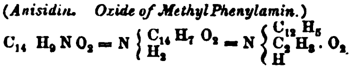
MethylParaTartrate of Silver. Insoluble in methylparatartaric acid.

MethylParaTartrate of Soda. Appears to be soluble in water.

MethylParaTartrate of Strontia. Sparingly soluble in water. Insoluble in methylparatartaric acid.

MethylParaTartrate of Soda. Sparingly soluble in cold water. (Guérin-Varry.)

MethylPhenidin. (*Anisidin. Oxide of Methyl Phenylamin.*)



$C_{14} H_9 N O_2 = N \left\{ \begin{matrix} C_{14} H_7 O_2 \\ H_2 \end{matrix} \right. = N \left\{ \begin{matrix} C_{12} H_5 \\ C_2 H_3 . O_2 \\ H \end{matrix} \right.$

Soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **27.** 443.)

MethylPhenylamin. *Vid.* MethylAnilin.

MethylPhosphoric Acid. (*Phosphate of Methyl.*) $C_2 H_5 P O_8 = C_2 H_3 O, 2 H O, P O_5$ Soluble in water. Its salts are much less soluble in water than those of dimethylphosphoric acid.

MethylPhosphate of Baryta. $C_2 H_3 Ba_2 P O_8 + 4 Aq$ Less soluble in water at 100° than in lukewarm water. (Limpricht.)

MethylPhosphate of Lime. $C_2 H_3 Ca_2 P O_8 + 4 Aq$

***Di*MethylPhosphoric Acid.** (*DiPhosphate of Methyl.*) $C_4 H_7 P O_8 = 2 C_2 H_3 O, H O, P O_5$ Soluble in water, alcohol, and ether. The aqueous solution is readily decomposed by boiling. The salts of dimethylphosphoric acid are much more soluble in water than those of monomethylphosphoric acid. They are tolerably readily soluble in water; less soluble in alcohol, and insoluble in ether. Their aqueous solutions are decomposed when heated.

***Di*MethylPhosphate of Baryta.** $C_4 H_6 Ba P O_8$ Nearly insoluble in alcohol.

MethylPhosphate of Cobalt. Ppt.

MethylPhosphate of Copper. Appears to be easily soluble in water.

MethylPhosphate *of protoxide* **of Iron.** Appears to be easily soluble in water.

MethylPhosphate of Lead. $C_4 H_6 Pb P O_8$ Soluble in water. Insoluble in ether.

MethylPhosphate of Lime. $C_4 H_6 Ca P O_8$ Very soluble in water.

MethylPhosphate of Magnesia. Soluble in water.

MethylPhosphate *of protoxide* **of Mercury.** Ppt.

MethylPhosphate of Silver. Ppt.

MethylPhosphate of Strontia. $C_4 H_6 Sr P O_8 + 2 Aq$ Somewhat more soluble than the baryta salt. Almost insoluble in alcohol.

MethylPhosphate of Zinc. Tolerably readily soluble in water. (Schiff.)

***Tri*MethylPhosphin.** Insoluble in water. $P (C_2 H_3)_3$ (Hofmann & Cahours.)

MethylPhosphorous Acid. (*Phosphite of Methyl.*) $C_2 H_5 P O_6 = C_2 H_3 O, 2 H O, P O_3$ Easily soluble in water, and dilute alcohol. Difficultly soluble in ether. Its salts are hygroscopic and dissolve readily in water; they are sparingly soluble in alcohol, and insoluble in ether. (H. Schiff, *Ann. Ch. u. Pharm.*, **103.** 164.)

MethylPhosphite of Baryta. $C_2 H_4 Ba P O_6$ Less soluble in water, and alcohol, than the lime salt.

MethylPhosphite of Lead. $C_2 H_4 Pb P O_6$

MethylPhosphite of Lime. $C_2 H_4 Ca P O_6 + 2 Aq$ More soluble in water, and alcohol, than the baryta salt.

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MethylPhosphite *of protoxide* **of Mercury.** Ppt.

MethylPhosphite of Silver. Ppt.

*Tetra***MethylPhosphonium.** Not isolated.

$P \} (C_2H_3)_4$

MethylPiperidin. Soluble in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 92.)

(*MethylPiperylamin.*)

$C_{12}H_{13}N = N \left\{ \begin{matrix} C_{10}H_{10}'' \\ C_2H_3 \end{matrix} \right.$

MethylPiperylUrea. *Vid.* Cyanate of MethylPiperidin.

MethylPlumbEthyl. *Vid.* *bi*Plumb(*ic*)*tri*Ethyl.

MethylQuinolein. Not isolated.

$C_{20}H_9N$

MethylSalicylic Acid. Very sparingly soluble in water. Soluble in all proportions in alcohol, ether, oil of turpentine, and oil of lemon. Soluble, with combination, in cold aqueous solutions of caustic potash and soda, but is decomposed when boiled therewith. (Cahours, *Ann. Ch. et Phys.*, (3.) **10.** 328.)

(*Salicylate of Methyl. Salicylate of Methylene. Gaultheric Acid. Oil of Wintergreen. MethylSpiroylic Acid. Hydrate of MethylSalicyl. Isomeric with Anisic Acid.*)

$C_{16}H_8O_6 = C_{14}H_4(C_2H_3)O_5, HO$

MethylSalicylate of Baryta. Insoluble in cold, very sparingly soluble in hot water. Insoluble in alcohol. (Cahours, *loc. cit.*, pp. 334, 336.)

$C_{16}H_7BaO_6$

MethylSalicylate of Copper. Insoluble in water.

MethylSalicylate of Lead. Insoluble in water.

MethylSalicylate *of protoxide* **of Mercury.** Insoluble in water.

MethylSalicylate of Methyl. *Vid.* Salicylate of Methyl.

MethylSalicylate of Potash. Very readily and largely soluble in water. Soluble in absolute alcohol. (Cahours, *loc. cit.*, p. 334.) Abundantly soluble in water. Very easily soluble in alcohol, and ether. (Procter.)

$C_{16}H_7KO_6$

MethylSalicylate of Silver. Ppt.

MethylSalicylate of Soda. Largely soluble in water, but somewhat less soluble therein than the potash salt. Soluble in absolute alcohol. (Cahours, *loc. cit.*) Less soluble than the potash salt in water, alcohol, and ether. (Procter.)

MethylSalicylate of Strontia. Somewhat soluble in water. (Cahours, *loc. cit.*, p. 334.)

MethylSalicylate of Zinc. Insoluble in water. (Cahours, *loc. cit.*)

MethylSelenious Acid. Deliquescent. Easily soluble in water, and alcohol.

(*Selenite of Methyl.*)

$C_2H_4Se_2O_6 = C_2H_3O, HO, 2SeO_2$

MethylSelenite of Ammonia. Soluble in water.

MethylSelenite of Baryta. Ppt.

MethylSelenite of Silver. Sparingly soluble in cold, more soluble in boiling water. The solution is decomposed by long-continued boiling. (Wœhler & Dean, *Ann. Ch. u. Pharm.*, **97.** 7.)

$C_2H_3AgSe_2O_6$

MethylStannEthyl. *Vid.* *bi*Stann(*ic*)*tri*Ethyl.

MethylSulphuric Acid. Very soluble in water; less easily in alcohol. The metallic methyl sulphates are all very soluble in water, much less soluble in alcohol.

(*Sulphomethylic Acid. Bisulphate of Methyl. Bisulphate of Methylene.*)

$C_2H_4S_2O_8 = \left. \begin{matrix} C_2H_3O \\ HO \end{matrix} \right\} S_2O_6$

MethylSulphate of Baryta. Effloresces in warm air. Very soluble in water.

$C_2H_3BaS_2O_8 + 2Aq$

MethylSulphate of Lead. Very deliquescent and soluble in water. (Kane.)

$C_2H_3PbS_2O_8 + Aq$ & $2Aq$

MethylSulphate of Lime. Very deliquescent.

$C_2H_3CaS_2O_8$

MethylSulphate of Potash. Very deliquescent. Soluble in water.

$C_2H_3KS_2O_8 + Aq$

MethylSulphate *of sesquioxide* **of Uranium.** Very deliquescent. Soluble in water. (Peligot, *Ann. Ch. et Phys.*, (3.) **12.** 560.)

Ur_2O_3, C_2H_3O, S_2O_6

Methyl*tetra***Sulphuric Acid**(of Hofmann & Buckton). *Vid.* Methionic Acid.

MethylSulphurous Acid. Soluble in water. The metallic methylsulphites are soluble in water.

(*Sulphosomethylic Acid. Hyposulphomethylic Acid. Sulphoformic Acid. Sulphite of Methyl. Methyldithionic Acid. Sulphomethylsulphuric Acid. Bisulphimethylic Acid.*)

$C_2H_4S_2O_6 = \left. \begin{matrix} C_2H_3O \\ HO \end{matrix} \right\} S_2O_4$

MethylSulphite of Baryta. Permanent. Very soluble in water. Alcohol, and spirit, precipitate it from the aqueous solution. (Muspratt, *J. Ch. Soc.*, **1.** 52.)

$C_2H_3BaS_2O_6$

MethylSulphite of Copper. Remarkably soluble in water. (Muspratt, *loc. cit.*, p. 53.)

$C_2H_3CuS_2O_6 + 5Aq$

MethylSulphite of Lead.

I.) *normal.* Permanent. Soluble in water. (Kolbe, Muspratt.)

$C_2H_3PbS_2O_6 + Aq$

II.) *basic.* Soluble in water. (Kolbe.)

$C_2H_3PbS_2O_6, 2PbO$

MethylSulphite of Potash.

I.) *normal.* Very soluble in cold water. Insoluble in cold absolute alcohol. Sparingly soluble in boiling alcohol. (Kolbe.)

$C_2H_3KS_2O_6$

II.) *acid.* Deliquescent. Soluble in water.

$C_2H_3KS_2O_6, C_2H_4S_2O_6$

MethylSulphite of Silver. Soluble in water. (Kolbe.)

$C_2H_3AgS_2O_6$

MethylSulphite of Zinc. Soluble in water.

Methyl*di***SulphoCarbonate of** *X*. *Vid.* OxySulphoCarbonate of Methyl & of *X*.

MethylSulphoPhenic Acid. Soluble in water.

(*SulphAnisolic Acid. Sulphate of Toluenyl.*)

$C_{14}H_8S_2O_8 = C_{12}H_4(C_2H_3)O, HO, S_2O_6$

MethylSulphoPhenate of Baryta. Soluble in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **10.** 357.)

$C_{14}H_7BaS_2O_8 + Aq$

MethylTartaric Acid. Permanent. Very soluble in cold, soluble in all proportions in boiling water. Easily soluble in alcohol, and wood-spirit. Sparingly soluble in ether. The aqueous solution is decomposed by long-continued ebullition. (Guérin-Varry.)

(*TartroMethylic Acid. Tartrate of Methyl.*)

$C_{10}H_8O_{12} = C_8H_5(C_2H_3)O_{12}$

MethylTartrate of Baryta. Ppt. More soluble in warm than in cold

$C_{10}H_7BaO_{12} + Aq$

water, easily decomposed by washing with water. Insoluble in absolute alcohol, or alcohol of 96%. (Guérin-Varry.) Insoluble in absolute wood-spirit. (Dumas & Peligot.)

MethylTartrate of Lead.

MethylTartate of Lime. Sparingly soluble in water. Soluble in a slight excess of the acid. (Guérin-Varry.)

MethylTartrate of Potash. $C_{10}H_7KO_{12}$ Much more soluble in warm than in cold water. The aqueous solution is decomposed by long-continued boiling. Insoluble in absolute alcohol, or alcohol of 95%. (Guérin-Varry.)

MethylTartrate of Silver. Sparingly soluble in water. Insoluble in an excess of methyltartaric acid.

MethylTartrate of Soda. Sparingly soluble in water. (Guérin-Varry.)

MethylTartrate of Strontia. Soluble in a slight excess of acid.

"**Methyl*di*Thionic Acid.**" *Vid.* MethylSulphurous Acid.

Methyl*di*Thionic Acid. $C_2H_4S_2O_4$ The aqueous solution readily undergoes decomposition. (Hobson, *J. Ch. Soc.*, **10.** 245.)

Methyl*di*Thionate of Baryta. $C_2H_3BaS_2O_4$ Very soluble in water. Insoluble in alcohol, or ether. (Hobson, *loc. cit.*)

Methyl*di*Thionate of Copper. Soluble in water; the solution undergoes decomposition when evaporated. (Hobson, *loc. cit.*)

Methyl*di*Thionate of Ethyl. Insoluble in water. (Hobson, *loc. cit.*)

Methyl*di*Thionate of Lime. $C_2H_3CaS_2O_4$ Soluble in water. Insoluble in alcohol, or ether. (Hobson, *loc. cit.*)

Methyl*di*Thionate of Magnesia. $C_2H_3MgS_2O_4 + Aq$ Very soluble in water. Insoluble in alcohol or ether. (Hobson, *loc. cit.*)

Methyl*di*Thionate of Nickel. Soluble in water; the aqueous solution undergoes decomposition when evaporated. (Hobson, *loc. cit.*)

Methyl*di*Thionate of Silver. Soluble in water; the aqueous solution undergoes decomposition when evaporated. (Hobson, *loc. cit.*)

Methyl*di*Thionate of Zinc. $C_2H_3ZnS_2O_4$ Very soluble in water. Insoluble in alcohol or ether. (Hobson, *J. Ch. Soc.*, **10.** 245.)

MethylThiosinamin.

MethylUramin. $C_4H_7N_3 = N_2\left\{\begin{matrix}C_2H_3\\ Cy\\ H_4\end{matrix}\right.$ Very deliquescent. Soluble in water.

MethylUrea. $C_4H_6N_2O_2 = N_2\left\{\begin{matrix}C_2O_2''\\ C_2H_3\\ H_3\end{matrix}\right.$ Deliquescent. Soluble in water, and alcohol. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 460.)

***Di*MethylUrea.** $C_6H_8N_2O_2 = N_2\left\{\begin{matrix}C_2O_2''\\ (C_2H_3)_2\\ H_2\end{matrix}\right.$ Permanent. Easily soluble in water, and alcohol.

MethylXanthic Acid. *Vid.* OxySulphoCarbonate of Methyl.

MethylXanthic Ether. *Vid.* OxySulphoCarbonate of Methyl.

MetŒnanthol. $C_{14}H_{14}O_2$ Insoluble in water. Readily soluble in boiling, sparingly soluble in cold alcohol. (Bussy.)

MetOleic Acid. Insoluble in water. Very sparingly soluble in alcohol. Very soluble in ether.

The alkaline metoleates are soluble in water, but all the other salts are insoluble. (Fremy.)

MeToluidin. $C_{30}H_{17}N_3$ Slightly soluble in cold, somewhat more readily soluble in boiling water. Soluble in alcohol. Readily soluble, with combination, in chlorhydric acid. (Wilson, *J. Ch. Soc.*, **3.** 156.)

Microcosmic Salt. *Vid.* Phosphate of Ammonia & of Soda.

Middletonite. See under **Resins.**

MimoTannic Acid. (*CatechuTannic Acid. Cachoutannic Acid. Ratanhiagerbsäure* (of Wittstein).) $C_{18}H_8O_8 = C_{18}H_7O_7, HO$ Easily soluble in water. Sparingly soluble in water acidulated with sulphuric acid, though more soluble than gallotannic acid. Easily soluble in alcohol, and ether. Insoluble in fatty or essential oils. Soluble in aqueous alkaline solutions.

Its salts, with the alkaline earths and metals, are sparingly soluble precipitates.

MimoTannate of Potash. Readily soluble in water.

Molybdic Acid. MoO_3 Soluble in 960 pts. of hot water (Hatchett); in 500 pts. of cold water; and in a much smaller quantity of hot water (Bucholz); in 570 pts. of cold, and in much less hot water. (Dumas, *Tr.*) Soluble in ammonia-water. Before ignition, it is soluble in some acids; its best solvent is a boiling aqueous solution of bitartrate of potash, but after ignition it is only slightly soluble therein. (Berzelius.) Soluble in strong acids; when these solutions are diluted and boiled, decomposition ensues. (H. Rose, *Pogg. Ann.*, **83.** 151.)

Excepting the ammonia-salt, all the molybdates are insoluble, or difficultly soluble in water.

Molybdic Acid with Phosphate of Ammonia. (*i. e.* the yellow precipitate produced when molybdate of ammonia is added to the solution of a phosphate. Sometimes called *Phosphate of Molybdenum.*) $2(3NH_4O, PO_5); 15(HO, 4MbO_3)$ Soluble in hot water; slightly soluble in cold water. Soluble in solutions of the alkaline phosphates. (Fresenius, *Quant.*, p. 161.) Soluble in a dilute aqueous solution of acetate of soda. (Seligsohn.)

Easily soluble in boiling aqueous solutions of chloride of ammonium and oxalate of ammonia. Sparingly soluble in boiling solutions of sulphate of ammonia, nitrate of potash, chloride of potassium, and sulphate of magnesia. Very little soluble in a boiling solution of nitrate of ammonia. Soluble in boiling solutions of sulphate of potash, sulphate of soda, chloride of sodium, and chloride of magnesium. Also in hot water and in hot sulphuric, chlorhydric, and nitric acids, both concentrated and dilute. Solutions of caustic alkalies, and of the alkaline carbonates dissolve it, even in the cold, as do also solutions of chloride of ammonium and oxalate of ammonia. Cold mineral acids act upon it to some extent. Cold water dissolves it with great difficulty. Its behavior towards solvents is changed by the presence of molybdate of ammonia, so that it becomes nearly insoluble in acids, even on boiling. (Craw, *Am. J. Sci.*, (2.) **13.** 394.)

Molybdate of Alumina. Insoluble in water. (Berzelius, *Lehrb.*)

Molybdate of Alumina & of Ammonia. $3(NH_4O, 2MoO_3); Al_2O_3, 6MoO_3 + 20Aq$ Some-

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what more readily soluble in water than the corresponding potash salt. (Struve.)

Molybdate of Alumina & of Potash. $3(KO, 2MoO_3); Al_2O_3, 6MoO_3 + 20Aq$ Soluble in 40 pts. of water at 17°. (Struve.)

Molybdate of Ammonia.

I.) *normal.* NH_4O, MoO_3 Insoluble in water, or alcohol. Soluble in ammonia-water. (Flueckiger.)

II.) *bi.* Easily soluble in water. (Delffs.) $NH_4O, 2MoO_3 + Aq$ Soluble in 2 @ 3 pts. of water. (Brandes.)

III.) *ter.* $NH_4O, 3MoO_3 + Aq$ Difficultly soluble in cold, more readily soluble in boiling water. (Berlin.)

IV.) *quadri.* $NH_4O, 4MoO_3 + 2Aq$

V.) $NH_4O, 2MoO_3; NH_4O, 3MO_3 + 8Aq$ Permanent. Soluble in water. (Struve & Svanberg.)

Molybdate of Ammonia & of Chromium. $3(NH_4O, 2MoO_3); Cr_2O_3, 6MoO_3 + 20Aq$ Soluble in water. (Struve.)

Molybdate of Ammonia & of Copper. $NH_4O, 3MoO_3; CuO, 2MoO_3 + 9Aq$ Difficultly soluble in cold, more soluble (without decomposition) in hot water. (Struve.)

Molybdate of Ammonia & of Iron. $3(NH_4O, 2MoO_3); Fe_2O_3, 6MoO_3 + 20Aq$ Soluble in water. (Struve.)

Molybdate of Ammonia & of Magnesia. Easily soluble in water. (Craw, *Am. J. Sci.*, (2.) **13**. 394.)

Molybdate of Ammonia & of Manganese. $5(NH_4O, 2MoO_3); Mn_2O_3, 6MoO_3 + 12Aq$ Permanent. Soluble in 102 pts. of water at 17°. (Struve.)

Molybdate of Ammonia & of Zinc. Soluble in water. (Berzelius.)

Molybdate of Antimony. Soluble in boiling water. (Berzelius.) Insoluble in cold water. [Y.]

Molybdate of Baryta.

I.) *mono.* BaO, MoO_3 Almost insoluble in water. Soluble in dilute chlorhydric, and nitric acids.

II.) *di.* $2BaO, MoO_3 + Aq$ Soluble in dilute chlorhydric, and nitric acids.

III.) $2BaO, 5MoO_3 + 6Aq$ Tolerably soluble in water. (Svanberg & Struve.)

IV.) *ter.* $BaO, 3MoO_3 + Aq$ Sparingly soluble in water. (S. & S.)

V.) *nono.* $BaO, 9MoO_3 + 4Aq$ Insoluble in water, either pure or acidulated. (S. & S.)

Molybdate of Bismuth. $BiO_3, 3MoO_3$ Soluble in 500 pts. of water, and in the stronger acids. (Richter.)

Molybdate of Cadmium.

Molybdate *of protoxide* of Cerium. CeO, MoO_3 Insoluble in water. Soluble in several acids. (Berzelius & Hisinger.)

Molybdate of *ter*Chloride of Molybdenum. $MoCl_3, 2MoO_3$ Easily soluble in water. Also soluble in alcohol. (Berzelius.)

Molybdate *of sesquioxide* of Chromium. Insoluble in water. Soluble in an aqueous solution of molybdate of ammonia. (Berzelius.)

Molybdate of Chromium & of Potash. $3(KO, 2MoO_3); Cr_2O_3, 6MoO_3 + 20Aq$ Permanent. Soluble in 38.51 pts. of water at 17°. On being heated, it melts, and on cooling again is very difficultly soluble in water or acids. (Struve.)

Molybdate of Chromium & of Potash. $3(NaO, 2MoO_3); Cr_2O_3, 6MoO_3 + 21Aq$ Easily efflorescent. Easily soluble in water.

Molybdate of Cobalt. CoO, MoO_3 Ppt. Decomposed by aqueous solutions of the caustic alkalies, and by strong acids. (Berzelius, *Lehrb.*)

Molybdate of Copper.

I.) CuO, MoO_3 Sparingly soluble in water. Decomposed by acids, and by alkaline solutions. (Berzelius.)

II.) $4CuO, 3MoO_3 + 5Aq$ Ppt.

Molybdate of Ethylamin. $N\left\{\begin{matrix}C_4H_5\\H_2\end{matrix}\right. . HO, 2MoO_3$ Soluble in water. (E. Meyer.)

Molybdate of Ethylamin with Phosphate of Ethylamin. More soluble in acids and in saline solutions than the corresponding ammonia compound. (E. Meyer.)

Molybdate *of teroxide* of Gold. Sparingly soluble in water. Soluble in chlorhydric and nitric acids. (Richter.)

Molybdate *of protoxide* of Iron. FeO, MoO_3 Insoluble in water. (Scheele.)

Molybdate *of sesquioxide* of Iron.

I.) $Fe_2O_3, 3MoO_3$ Ppt. Decomposed by an aqueous solution of caustic potash.

II.) $Fe_2O_3, 5MoO_3 + 16Aq$ Ppt.

Molybdate of Iron & of Potash. $3(KO, 2MoO_3); Fe_2O_3, 6MoO_3 + 20Aq$ Soluble in water. (Struve.)

Molybdate of Lead. PbO, MoO_3 Insoluble in water. Soluble in an aqueous solution of caustic potash; also, with decomposition, in sulphuric, chlorhydric, and nitric acids.

Molybdate of Lime. CaO, MoO_3 Insoluble in water. Soluble in chlorhydric acid.

Molybdate of Magnesia. $MgO, MoO_3 + 4Aq$ Permanent. Soluble in 12 @ 15 pts. of cold water. (Brandes.)

Molybdate *of protoxide* of Manganese. $MnO, MoO_3 + Aq$ Difficultly soluble in boiling water. (Struve.) Soluble in 40 @ 50 pts. of water [containing Mn Cl, or K O, MoO_3 ?] (Richter.)

Molybdate *of sesquioxide* of Manganese. $2Mn_2O_3, MoO_3 + 4Aq$ Easily soluble in water, from which it is precipitated by saline solutions, as of chloride of ammonium. (Struve.)

Molybdate *of sesquioxide* of Manganese & of Potash. $5(KO, 2MoO_3); Mn_2O_3, 6MoO_3 + 12Aq$ Soluble in 384 pts. of water at 17°; and more readily in boiling water, by which, however, it is partially decomposed. (Struve.)

Molybdate *of dinoxide* of Mercury.

I.) Hg_2O, MoO_3 Insoluble in water. (Struve.) Easily soluble in nitric acid. (Berzelius, *Lehrb.*)

II.) $Hg_2O, 2MoO_3$ Ppt. Decomposed by long-continued washing, or when

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boiled with water. (Struve.) Soluble in 500 @ 600 pts. of water. Decomposed by nitric acid. (Hatchett.)

Molybdate of Molybdenum.

I.) $Mo O_2, 2 Mo O_3$ (*Olive-green oxide of Molybdenum.*) Soluble in water. Sparingly soluble in alcohol. (Gmelin.) Insoluble in an aqueous solution of chloride of ammonium.

II.) $Mo O_2, 4 Mo O_3$ (*Blue oxide of Molybdenum.*) Soluble in cold, more soluble in hot water; also somewhat soluble in alcohol. Insoluble in an aqueous solution of chloride of ammonium. Very difficultly soluble in saline solutions. Soluble in acids.

Molybdate of Nickel. $Ni O, Mo O_3$ Slightly soluble in boiling water. (Berzelius, *Lehrb.*)

Molybdate of Potash.

I.) *mono.* $K O, Mo O_3$ Permanent. Readily soluble in water (Bucholz); especially when this is hot. Insoluble in alcohol. (Svanberg & Struve.)

II.) *bi.* Sparingly soluble in cold water. Soluble in 3 @ 4 pts. of boiling water. (Bucholz.) According to Berzelius, if this salt is dissolved in hot water the solution deposits a portion of a more acid salt, which does not redissolve in boiling water. Svanberg & Struve could not obtain a bimolybdate of potash; they describe, however, a compound salt consisting either of $3 (K O, 2 Mo O_3) + K O, 3 Mo O_3 + 6 Aq$, or $3 (K O, Mo O_3) + 5 (K O, 3 Mo O_3) + 12 Aq$, which is decomposed by water to termolybdate, and monomolybdate of potash which dissolves.

III.) *ter.* $K O, 3 Mo O_3 + 3 Aq$ Difficultly soluble in cold, easily soluble in boiling water.

IV.) *quadri.* $K O, 4 Mo O_3$ Soluble in hot, less soluble in cold water.

V.) *quinqui.* $K O, 5 Mo O_3 + 2 Aq$ Insoluble in water. (Svanberg & Struve.)

Molybdate of Potash & of Zinc. Soluble in water. (Berzelius.)

Molybdate of Potash with Phosphate of Potash. $3 (K O, 3 Mo O_3 + 3 H O); K O, 2 H O, P O_5 + 6 Aq$ Soluble in water. (Zenker.)

Molybdate of Silver.

I.) *mono.* $Ag O, Mo O_3$ Slightly soluble in water (Richter); and in nitric acid. (H. Rose.) Very sparingly soluble in pure water; easily soluble in water acidulated with nitric acid. (Struve & Svanberg.)

II.) *acid.* $2 Ag O, 5 Mo O_3$ Ppt. Somewhat soluble in water.

Molybdate of Soda.

I.) *mono.* $Na O, Mo O_3 + 2 Aq$ Efflorescent. Very easily soluble in water.

II.) *bi.* $Na O, 2 Mo O_3 + Aq$ When prepared in the moist way it is easily soluble in water; but after ignition it is difficultly soluble in cold, and only slowly soluble in hot water.

III.) *ter.* $Na O, 3 Mo O_3 + 7 Aq$ More soluble in water than the corresponding potash salt.

Molybdate of Strontia. Insoluble in water.

Molybdate of Thoria. $Th O, Mo O_3$ Insoluble in water. (Berzelius.)

Molybdate *of binoxide* **of Tin.** $Sn O_2, 2 Mo O_3$ Insoluble in water. Soluble in an aqueous solution of caustic potash and in dilute chlorhydric acid. (Berzelius.)

Molybdate *of protoxide* **of Uranium.** Ppt. Decomposed by washing with water. Soluble in chlorhydric acid.

Molybdate *of sesquioxide* **of Uranium.** Insoluble in water. Soluble in an aqueous solution of carbonate of ammonia and in strong acids. (Berzelius.)

Molybdate of Vanadium. Soluble in water.

Molybdate of Yttria. Insoluble in water. Readily soluble in nitric acid. (Berlin.)

Molybdate of Zinc. $Zn O, Mo O_3$ Sparingly soluble in water; more soluble in acids.

Molybdate & Phosphate of

Aconitin
Ammonia
Amylammonium
*di*Amylammonium
*tri*Amylammonium
*tetra*Amylammonium
Anilin
Atropin
Berberin
Brucin
Chinolin
Cinchonin
Colchicin
Coniin
Daturin
Delphinin
Ethylammonium
*di*Ethylammonium
*tri*Ethylammonium
*tetra*Ethylammonium
Jervin
Mercuramin
Mercur*tetr*Amylammonium
Mercur*tetr*Ethylammonium
Morphine
Narcotin
Nicotin
Piperin
Quinine
Sinamin
Solanin
Strychnine
Thein
Theobromin
Veratrin

Insoluble, or very sparingly soluble, at ordinary temperatures in water, alcohol, ether, or dilute mineral acids, excepting phosphoric acid. Least soluble in dilute nitric acid. Partially soluble in boiling concentrated nitric acid. Scarcely acted upon at ordinary temperatures by acetic acid; but soluble in boiling acetic acid, separating out again as the solution cools. Unacted upon by cold, soluble in boiling oxalic, tartaric, and citric acids; from these solutions noth-separates out on cooling. Easily soluble in aqueous solutions of the caustic alkalies and of the alkaline carbonates, borates, and phosphates; somewhat less soluble in solutions of the alkaline acetates and tartrates. (Sonnenschein, *Ann. Ch. u. Pharm.*, **104.** 45.)

Molybdenum. Mo Permanent. Insoluble in dilute sulphuric, chlorhydric, or fluorhydric acid. Soluble in concentrated sulphuric acid, and in nitric acid so long as an excess of the metal is present, but if the acid is in excess, insoluble molybdic acid separates out. Easily soluble in aqua-regia. Insoluble in potash-lye. (Berzelius, *Lehrb.*)

Monesin (from *Chrysophyllum glycyphlæum*). Soluble in water, and alcohol. Insoluble in ether.

Moric Acid. (*Morin.*) $C_{36} H_{14} O_{18} + 2 Aq$ Very sparingly soluble in water. Soluble in 4000 pts. of water at 20°; and in 1060 pts. of boiling water. Readily soluble in alcohol, and ether. Soluble in weak acids, and in solutions of the caustic alkalies and the alkaline carbonates. Soluble in concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water. The solution in concentrated sulphuric acid is decomposed when heated.

Morate of Baryta. $3 C_{36} H_{13} Ba O_{18}; C_{36} H_{14} O_{18} + 2 Aq$ Soluble in water.

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Morate of Lime. Soluble in alcohol, from which it is precipitated on the addition of water.
$C_{36} H_{13} Ca O_{18} + 2 Aq$

Morindin. Easily soluble in boiling, sparingly soluble in cold water. Sparingly soluble in cold, more soluble in boiling alcohol, especially if the alcohol be dilute. Insoluble in ether. Soluble in alkaline solutions; also with decomposition in concentrated sulphuric and nitric acids.
(Rochleder maintains that it is identical with *Ruberythric Acid.*)
$C_{28} H_{15} O_{15}$ (?)

Morindone. Entirely insoluble in water. Easily soluble in alcohol, and ether. Soluble in alkaline solutions, and in concentrated sulphuric acid, from which water precipitates it.
(*Identical with Alizarin*, according to Rochleder.)
$C_{24} H_{10} O_{10}$ (?)

Morin. *Vid.* Moric Acid.

Moringic Acid. Very soluble in spirit, even in the cold. Decomposed by warm concentrated sulphuric acid. (Walter.)
(*Moringasœure.*)
$C_{30} H_{28} O_4$

MorinTannic Acid. Soluble in 64 pts. of cold, and in 2.14 pts. of boiling water. Easily soluble in alcohol, wood-spirit, and ether. Insoluble in oil of turpentine, and the fatty oils. Soluble in water acidulated with chlorhydric, sulphuric, phosphoric, or arsenic acids. Soluble in cold concentrated sulphuric acid, from which it is precipitated on the addition of water. Soluble in aqueous solutions of the alkalies and alkaline carbonates.
$C_{36} H_{16} O_{20} = C_{36} H_{12} O_{16}, 2 HO + 2 Aq$?

MorinTannate of Alumina.

MorinTannate of Copper.

MorinTannate *of sesquioxide* **of Iron.**

MorinTannate of Lead.

I.) $C_{36} H_{12} Pb_2 O_{18}; 2 Pb O$

II.) $3 (C_{36} H_{12} Pb_2 O_{18}), 2 Pb O + 5 Aq$

MorinTannate of Lime. Soluble in water, and alcohol.
$C_{36} H_{13} Ca O_{18}$

MorinTannate of Quinine. Sparingly soluble in water. Readily soluble in alcohol. (Wagner.)
$C_{40} H_{24} N_2 O_4, C_{36} H_{14} O_{18}$

Moroxylic Acid ?(from *Morus alba*). Permanent. Easily soluble in water, and alcohol. (Klaproth.)

Moroxylate of Ammonia. Soluble in water.

Moroxylate of Lime. 100 pts. of cold water dissolve 1.5 pts. of it; 100 pts. of boiling water dissolve 3.5 pts. (Klaproth.)

Morphetin. Soluble in water. Slightly soluble in strong alcohol. Only slightly soluble in strong chlorhydric acid, but easily soluble in nitric acid. (E. Marchand.)

Morphine. Permanent. Very sparingly soluble in cold water. Soluble in about 500 pts. of boiling, and in 1000 pts. of cold water. Soluble in 40 pts. of cold, and in 24 @ 30 pts. of boiling absolute alcohol; in 20 pts. of cold, and in 13 pts. of boiling alcohol of 0.82 sp. gr. (Duflos.) Nearly insoluble in cold water; soluble in 100 pts. of boiling water. (M. R. & P.) Soluble in 960 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, from Canstatt's *Jahresbericht, für* 1854, p. 76.) Almost insoluble in ether, or the essential oils.
$C_{34} H_{19} N O_6 + 2 Aq$

It is much more soluble in ether when agitated therewith at the moment when it is set free from its combination with an acid, than after it has once crystallized. Much more soluble in a mixture of alcohol and ether than in pure ether. (Polstorf, *Ann. Ch. u. Pharm.*, **100.** 48.) Sparingly soluble in benzin. (Mansfield, *J. Ch. Soc.*, **1.** 262.) 100 pts. of chloroform dissolve 1.66 pts. of pure morphine at the ordinary temperature. (Schlimpert, *Kopp & Will's J. B., für* 1859, p. 405.) 100 pts. of chloroform dissolve 0.57 pt. of morphine at the ordinary temperature. (Michael Pettenkofer, *Kopp & Will's J. B., für* 1858, p. 363.) Insoluble in olive-oil. (Pettenkofer, *loc. cit.*) Morphine is soluble at the ordinary temperature in water saturated with carbonic acid, but at 0° the morphine separates out as such, — not as carbonate of morphine, as has been stated by Choulant. (Langlois, *Ann. Ch. et Phys.*, (3.) **48.** 503.) Sparingly soluble in ammonia-water; very readily soluble, with alteration, in an aqueous solution of caustic soda. (Bouchardat, *Ann. Ch. et Phys.*, (3.) **9.** 221.) Soluble in aqueous solutions of caustic potash, lime, soda, (less readily in carbonate of soda,) baryta, and strontia. Insoluble in a solution of chloride of ammonium [or chloride of calcium]. Readily soluble in dilute acids, with combination.

The salts of morphine are generally readily soluble in water, and alcohol; but are insoluble in ether.

They are generally freely soluble in glycerin. (Parrish's *Pharm.*, p. 236.)

*pseudo***Morphine.** *Vid.* Pseudomorphine.

Mucamid. Very slightly soluble in boiling water, separating out as the solution cools. Insoluble in alcohol or ether. (Malaguti.)
(*Mucylbiamid.*)
$C_{12} H_{12} N_2 O_{12} = N_2 \left\{ \begin{matrix} C_{12} H_8 O_{12}'' \\ H_4 \end{matrix} \right.$

Mucic Acid. Permanent. Very sparingly soluble in cold, somewhat more soluble in boiling water. Decomposed by long-continued boiling with water. Soluble in 60 pts. of boiling water; the solution depositing ¼ pt. on cooling. (Scheele.) Soluble in 80 pts. of boiling water. (Hermstadt, *Phys. Chem.*, [T.]; Morveau, *Encyc. Method.*, **1.** 290 [T.]; Trommsdorff.) 100 pts. of water at 15.5° dissolve 0.84 pt. of it; and at 100°, 1.25 pts. (Ure's *Dict.*) Soluble in 66.66 pts. of boiling water, *i. e.* 100 pts. of boiling water dissolve 1.5 pts. of it. (Malaguti.) Difficultly soluble in dilute acids. Soluble in concentrated sulphuric acid. Insoluble in alcohol.
(*Schleimsœure.*)
$C_{12} H_{10} O_{16} = C_{12} H_8 O_{14}, 2 HO$

Insoluble in caoutchin. (Himly.)

The alkaline mucates are readily soluble in water, the others are very slightly soluble. When they are treated with another acid, mucic acid is precipitated.

Mucate of Alumina.

I.) *normal.* Almost insoluble in boiling water. (Trommsdorff.)

II.) *acid.* Very readily soluble in boiling water. (Trommsdorff.)

Mucate of Ammonia.

I.) *normal.* Sparingly soluble in cold, readily soluble in hot water. (Trommsdorff.) Much less soluble in water than the acid salt. (Johnson.) More soluble in water than the corresponding pyromucate. (Malaguti.)
$C_{12} H_8 (N H_4)_2 O_{16}$

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II.) *acid.* Much more soluble in water than the normal salt. (S. W. Johnson, *Ann. Ch. u. Pharm.*, **94**. 227.)
$C_{12}H_9(NH_4)O_{16} + 2\,Aq$

The normal and acid salts crystallize together in indefinite proportions; these mixtures appear to be somewhat less soluble in water than the acid salt.

Mucate of Amyl.
I.) *mono.* *Vid.* AmylMucic Acid.

Mucate of Baryta. Insoluble in cold, very sparingly soluble in boiling water. (Trommsdorff.)
$C_{12}H_8Ba_2O_{16} + Aq$

Mucate of Chromium & of Potash.
$KO, Cr_2O_3, C_{12}H_8O_{14} + 7\,Aq$

Mucate of Copper.
I.) *normal.* Insoluble in water. (Hagen.)
$C_{12}H_8Cu_2O_{16} + Aq$
II.) *tetra.* Insoluble in water. (Trommsdorff.)

Mucate of Ethyl.
I.) *normal.* 100 pts. of water at 15° dissolve 2.27 pts. of it; *i. e.* 1 pt. is soluble in 44.05 pts. of water at 15°. Much more readily soluble in boiling water, but the aqueous solution is decomposed by long-continued boiling. 1000 pts. of alcohol, of 0.814 sp. gr., at 15° dissolve only 6.4 pts. of it; *i. e.* 1 pt. is soluble in 156.25 pts. of this alcohol at 15°. It is easily soluble in boiling alcohol. Insoluble in ether. (Malaguti.)
(*Mucic Ether.*)
$C_{20}H_{18}O_{16} = C_{12}H_8(C_4H_5)_2O_{16}$
II.) *mono.* *Vid.* EthylMucic Acid.

Mucate *of protoxide* **of Iron.** Permanent. Soluble in water. [Y.]
$C_{12}H_8Fe_2O_{16} + 4\,Aq$

Mucate of Lead.
I.) $C_{12}H_8Pb_2O_{16} + 2\,Aq$ Insoluble in water. (Scheele; Berzelius.)
II.) One or two basic mucates of lead are insoluble, or very sparingly soluble in water.

Mucate of Lead & of Plumbammonium.
$C_{12}H_8Pb(NH_3Pb)O_{16} + 6\,Aq$

Mucate of Lime. Nearly insoluble in water. Soluble in acetic acid. Very sparingly soluble in mucic acid. (Trommsdorff.)
$C_{12}H_8Ca_2O_{16} + 8\,Aq$

Mucate of Lithia. Easily soluble in water. (C. G. Gmelin.)

Mucate of Magnesia. Very sparingly soluble in cold water. (Trommsdorff.)
$C_{12}H_8Mg_2O_{16} + 4\,Aq$

Mucate of Manganese.

Mucate *of dinoxide* **of Mercury.** Insoluble in water. (Burckhardt.) Nearly insoluble in water. (Harff.)

Mucate *of protoxide* **of Mercury.** Insoluble in water, alcohol, or ether. (Burckhardt.)

Mucate of Methyl. Very readily soluble in boiling water. Soluble in 210 pts. of boiling alcohol. (Malaguti.)
(*Mucate of Methylene.*)
$C_{16}H_{14}O_{16} = C_{12}H_8(C_2H_3)_2O_{16}$

Mucate of Potash.
I.) *normal.* Very sparingly soluble in cold water; soluble in 8 pts. of hot water. (Scheele.) Insoluble in alcohol. (Trommsdorff.)
$C_{12}H_8K_2O_{16} + Aq$
II.) *acid.* More soluble in water than the normal salt. (S. W. Johnson, *Ann. Ch. u. Pharm.*, **94**. 227.)
$C_{12}H_9KO_{16} + 2\,Aq$

Mucate of Silver. Insoluble in water. Easily soluble in ammonia-water.
$C_{12}H_8Ag_2O_{16}$

Mucate of Soda.
I.) *normal.* Soluble in 122 pts. of water at 19° (Malaguti); in 5 pts. of boiling water. (Scheele.) More soluble than mucate of potash.
$C_{12}H_8Na_2O_{16} + 9\,Aq$
II.) *acid.* Soluble in water. (S. W. Johnson, *loc. cit.*)
$C_{12}H_9NaO_{16} + 7\,Aq$

Mucate of Solanin. Readily soluble in water.

Mucate of Strontia. Insoluble in cold, sparingly soluble in boiling water. (Trommsdorff.)

Mucate of Zinc.

Mucilages. Are distinguished from Gums, inasmuch as they merely swell up in hot water, and do not dissolve therein.
$C_{12}H_{10}O_{10}$

Mucin (of De Saussure). Permanent. Soluble in water, alcohol, acids, and a solution of caustic potash. Insoluble in ether.

MucoVinic Acid. *Vid.* EthylMucic Acid.

Mucus. Swells up in water, but does not dissolve.
b.) (*nasal.*) Easily soluble in acids.
c.) (*of the bile vesicle.*) Soluble in water, when heated to 210° in a sealed tube. Insoluble in alcohol, ether, or acids. Soluble in alkaline solutions.

Mudarin (from *Calotropis Mudarii*). Soluble in water, and alcohol. Insoluble in ether, or oils. (Duncan.)
(*Madarin.*)

Murexan. *Vid.* Dialuramid.

Murexid. *Vid.* Purpurate of Ammonia.

Murexoin. Soluble in warm, less soluble in cold water, and alcohol. (Rochleder.)
$C_{36}H_{23}N_{10}O_{15}$

Muriatic Acid. *Vid.* Chlorhydric Acid.

Myaldid. *Vid.* Hydride of Valeryl.

Mycomelic Acid. Sparingly soluble in cold, more soluble in warm water. (Liebig & Wœhler.) More soluble in a solution of uric acid than in water. Insoluble in strong, somewhat soluble in dilute alcohol. Insoluble in ether. Easily soluble in aqueous solutions of caustic potash and ammonia. Soluble in cold concentrated sulphuric and chlorhydric acids, and in aqueous solutions of carbonate and phosphate of soda. (Hlasiwetz.)
$C_8H_4N_4O_4 + 2\,Aq$

Mycomelate of Ammonia.

Mycomelate of Silver. Insoluble in water. (Liebig & Wœhler.)

Mycose. Very easily soluble in water. Scarcely at all soluble in alcohol. Boiling alcohol dissolves only 1% of it.
$C_{12}H_{18}O_{18}$

MylAnilin. *Vid.* AmylAnilin.

Myricin. *Vid.* Palmitate of Myricyl.

Myricyl. Not isolated.
(*Meryl.*)
$C_{60}H_{61}$

Myricyl(*ic*)Alcohol. *Vid.* Hydrate of Myricyl.

Myristic Acid (Anhydrous). Saponified with difficulty by boiling caustic potash.
(*Myristic Anhydride.*)
$C_{56}H_{54}O_6 = \left.\begin{matrix}C_{28}H_{27}O_2\\ C_{28}H_{27}O_2\end{matrix}\right\}O_2$

Myristic Acid. Entirely insoluble in water. Readily soluble in boiling alcohol, and ether; sparingly soluble in cold ether. Somewhat more soluble than palmitic acid in alcohol. (Heintz.)
(*Myristearic Acid. Sericinic Acid.*)
$C_{28} H_{27} O_3, H O$

Myristate of Baryta. Very sparingly soluble in water or alcohol.
$C_{28} H_{27} Ba O_4$

Myristate of Copper.
$C_{28} H_{27} Cu O_4$

Myristate of Ethyl. Insoluble in water. Soluble in boiling, but only very slightly soluble in cold alcohol. Easily soluble in hot ether. (Heintz.)
$C_{32} H_{32} O_4 = C_{28} H_{27} (C_4 H_5) O_4$

Myristate of Glyceryl. *Vid.* Myristin.

Myristate of Lead. Insoluble in water.
$C_{28} H_{27} Pb O_4$

Myristate of Lime.

Myristate of Magnesia. Insoluble in water.
$C_{28} H_{27} Mg O_4 + 8 Aq$

Myristate of Potash. Very soluble in water, and alcohol. Insoluble in ether.
$C_{28} H_{27} K O_4$

Myristate of Silver. Insoluble in water. Readily soluble in ammonia-water.
$C_{28} H_{27} Ag O_4$

Myristicin. *Vid.* Nutmeg-Camphor.

Myristin. Soluble in all proportions in boiling ether; less soluble in boiling absolute alcohol; entirely insoluble in water.
(*Myristearin. Sericin. Myristate of Glyceryl.*)
$C_{90} H_{86} O_{12} = C_6 H_5 O_3, 3 C_{28} H_{27} O_3$

MyristoBenzoic Acid. *Vid.* BenzoMyristic Acid.

Myristone. Soluble in boiling absolute alcohol, and in ether. (Overbeck.)
$C_{54} H_{54} O_2$

Myrolic Acid. *Vid.* Myronic Acid.

Myronic Acid. Soluble in water, and alcohol. Insoluble in ether. The myronates are all soluble in water. (Bussy.)

Myronate of Ammonia. Soluble in water.

Myronate of Baryta. Soluble in water.

Myronate of Lead. Soluble in water.

Myronate of Lime. Soluble in water.

Myronate of Potash. Permanent. Very easily soluble in water. Sparingly soluble in spirit; insoluble in absolute alcohol.

Myronate of Silver. Soluble in water.

Myronate of Soda. Soluble in water.

Myrosin. Soluble in water. Insoluble in alcohol. (Bussy.)

Myroxocarpin. Insoluble in water. Very soluble in warm alcohol, and ether; partially soluble in cold alcohol, and ether. Insoluble in acids or in alkaline solutions. (Stenhouse.)
$C_{48} H_{34} O_6$

Myrrh (*Gummy-resinous exudation of Balsamodendrón myrra.*) Partially soluble in water, alcohol, and ether. Sparingly soluble in a solution of caustic potash.

N.

Napellin. More soluble than aconitin in water and dilute alcohol. Difficultly soluble in ether. (Huebschmann.)

Naphtalic Acid. *Vid.* Phtalic Acid.

Naphtamein. Insoluble in water. Sparingly soluble in alcohol. Abundantly soluble in ether. Soluble in cold concentrated sulphuric acid, from which solution it is reprecipitated on the addition of water. Soluble in concentrated acetic acid; — this solution is miscible with water, but is precipitated on the addition of sulphuric, chlorhydric, nitric, and oxalic acids; by solutions of ammonia, potash, soda, chloride of sodium, chloride of ammonium, bichloride of platinum, sesquichloride of iron, protochloride of mercury, chloride of barium, sulphate of soda, sulphate of magnesia, sulphate of protoxide of iron, nitrate of baryta, nitrate of silver, ferro- and ferri-cyanide of potassium, phosphate of soda, acetate of lead, and oxalate of ammonia; indeed, of all the substances tried, tartaric acid was the only one which did not precipitate the acetic acid solution of naphtamein. Insoluble in aqueous solutions of caustic potash or ammonia. (Piria, *Ann. Ch. et Phys.*, (3.) 31. 252.)
(*Oxynaphtylamine.*)
$C_{20} H_9 N O_2$

Naphtalidam. *Vid.* Naphtylamin.

Naphtalidamic Carbamid. *Vid. di*Naphtyl-Carbamid.

Naphtalidin. *Vid.* Naphtylamin.

Naphtase. *Vid.* Naphthalase.

Naphtene. Unacted upon by chlorhydric, sulphuric, or nitric acids. (Laurent.)
$C_{18} H_{18}$

"Naphtha"(wood). *Vid.* Hydrate of Methyl.

Naphtha. Insoluble in water. Miscible in all proportions with absolute alcohol, ether, and the fatty and volatile oils. Soluble in 5 pts. of alcohol of 41° B. at 12°, and in 8 pts. of alcohol of 36° B. at 12°. (Saussure.) Miscible in all proportions with liquid carbonic acid. (Thilorier.) Decomposed by warm concentrated nitric and sulphuric acids.
(*Rock-Oil.*)
(*The more volatile portions of Petroleum.*)

But slightly attacked at first by hot concentrated nitric acid, but when heated for some time therewith it is decomposed. Neither concentrated sulphuric nor chlorhydric acid exerts any action upon it, nor is it attacked by a concentrated solution of potash. (Laurent.)

Naphthalamid. *Vid.* Phtalamic Acid.

Naphthalase. Soluble in water. Insoluble in alcohol. Scarcely at all soluble in ether. Soluble in concentrated sulphuric acid. (Laurent.)
(*Naphtase.*)
$C_{20} H_7 O$?

Naphthalamid. *Vid.* Phtalimid.

Naphthalin. Insoluble in cold water (Garden); slightly soluble in boiling water, from which it separates for the most part on cooling. (Kidd.) Insoluble in aqueous alcohol. (Garden.) Soluble in alcohol, especially if this be hot, from which it is precipitated on the addition of water. (Garden; Reichenbach.) The solution in 4 pts. of hot alcohol solidifies on cooling. (Kidd.) Very rapidly soluble in ether, and in bisulphide of carbon. (Reichenbach.) More readily soluble in ether than in alcohol. (Kidd; Ure.) Soluble in oil of turpentine, the temperature falling 4.2°, being the more soluble as the oil is hotter. (Chamberlain.) Soluble in fatty and essential oils. (Garden.) Gradually soluble in creosote; slowly in eupion, picamar, and cold olive-oil. (Reichenbach.) Insoluble in aqueous alkalies. (Garden; Reichenbach.) It is not attacked by concentrated acetic or oxalic acid.
(*Naphtalene. Hydride of Naphtyl* of Kolbe.)
$C_{20} H_8$

(Reichenbach.) Soluble in aqueous solutions of acetic, and oxalic acids, the warm saturated solution solidifying on cooling. (Garden; Kidd.) Very slowly soluble in cold concentrated sulphuric acid (Reichenbach); when the acid is gently warmed it dissolves naphthalin with combination (Faraday, Berzelius), but on the addition of water some unaltered naphthalin is precipitated. (Berzelius.) Unacted upon at first in the cold by strong nitric acid (Laurent); but in the course of 5 or 6 days nitronaphthalin is formed. (Piria, *Ann. Ch. et Phys.*, **31.** 217, [*Gm.*]); it dissolves when the liquid is warmed. (Garden.)

NaphthaloCyanic Acid. *Vid.* Naphtoyl-Carmamid.

Naphthesic Acid. $C_{20}H_8O_8$ Very slightly soluble in water. Soluble in alcohol. (Laurent.)

Naphthionic Acid. (*Sulpho Naphtalidamic Acid. Sulpho Naphthylamic Acid.*) $C_{20}H_9NS_2\Theta_6 + Aq$ Scarcely at all soluble in cold water, or in alcohol. Soluble in more than 2000 pts. of water at the ordinary temperature; more soluble in boiling water. Soluble, without decomposition, in warm concentrated sulphuric acid, from which it is precipitated on the addition of water. Insoluble in boiling chlorhydric acid. The salts of naphthionic acid are all soluble in water; many of them are also soluble in alcohol. (Piria, *Ann. Ch. et Phys.*, (3.) **31.** 222.)

Naphthionate of Ammonia. Very soluble in water, and alcohol. (Piria.)

Naphthionate of Argent*bi*ammonium. $C_{20}H_8\left(N_2\left\{\begin{matrix}H_5\\Ag\end{matrix}\right.\cdot H\right)NS_2O_6 + 2\,Aq$ Soluble in ammonia-water. (Piria.)

Naphthionate of Baryta. Very soluble in water, especially if this is boiling. Very sparingly soluble in alcohol. (Piria.)

Naphthionate of Copper. Soluble in water, and alcohol.

Naphthionate of Lead. $C_{20}H_8PbNS_2O_6 + 2\,Aq$ Sparingly soluble in water. Insoluble in alcohol. (Piria.)

Naphthionate of Lime. $C_{20}H_8CaNS_2O_6 + 8\,Aq$ Very soluble in water. Almost insoluble in cold, more soluble in boiling alcohol. (Piria.)

Naphthionate of Magnesia. $C_{20}H_8MgNS_2O_6 + 8\,Aq$ & $10\,Aq$ Soluble in water, and in weak alcohol. (Piria.)

Naphthionate of Potash. $C_{20}H_8KNS_2O_6$ Very soluble in water, and alcohol; but very sparingly soluble in these liquids when they contain caustic potash in solution. (Piria.)

Naphthionate of Silver. $C_{20}H_8AgNS_2O_6 + 2\,Aq$ Somewhat soluble in water, especially if it be warm. Soluble, with combination, in ammonia-water. (Piria.)

Naphthionate of Soda. $C_{20}H_8NaNS_2O_6 + 8\,Aq$ Very soluble in water, and alcohol. Insoluble in ether. Very sparingly soluble either in aqueous or alcoholic solutions of the alkalies. (Piria.)

Naphthionate of Zinc. Very soluble in water. Soluble in absolute alcohol, especially if it is warm. (Piria.)

Naphthulmin. $C_{20}H_8O_4$ Insoluble in almost all solvents, especially acids and alkalies. It dissolves, however, in concentrated sulphuric acid, and is precipitated again unchanged on the addition of water. (Schuetzenberger & Willm.)

NaphtoylCarbamid. (*Cyanate of Naphtyl. Cyanate of Naphtoyl. Carbonyl Naphtoylamid. Naphthalocyanic Acid.*) $C_{22}H_7NO_2 = N\left\{\begin{matrix}C_2O_2''\\C_{20}H_7\end{matrix}\right.$ Insoluble in water. Very soluble in alcohol, and ether.

NaphtoylPhenylSulphoCarbamid. (*Sulpho Carbonyl Phenyl Naphtoylbiamid.*) $C_{34}H_{14}N_2S_2 = N_2\left\{\begin{matrix}C_2S_2''\\C_{20}H_7\\C_{12}H_5\\H_2\end{matrix}\right.$ Difficultly soluble in alcohol, and ether.

NaphtoylSulphoCarbamid. (*Naphthalo Sulpho Cyanic Acid. Sulpho-Cyanide of Naphtoyl or of Naphthyl. Sulpho Carbonyl Naphtoylamid.*) $C_{22}H_7NS_2 = N\left\{\begin{matrix}C_2S_2''\\C_{20}H_7\end{matrix}\right.$ Insoluble in water. Very easily soluble in alcohol, and ether.

Naphtylamin. (*Naphtalidam. Naphtalidin.*) $C_{20}H_9N = N\left\{\begin{matrix}C_{20}H_8''\\H\end{matrix}\right.$ Almost insoluble in water. (Zinin.) Very soluble in alcohol, and ether.

***Di*NaphtylCarbamid.** (*Carbo Naphtalid. Naphthalidamic Carbamid.*) $C_{42}H_{16}N_2O_2 = N_2\left\{\begin{matrix}C_2O_2''\\(C_{20}H_8'')_2\end{matrix}\right.$ Insoluble in water. Very slightly soluble in boiling, less soluble in cold alcohol. Unacted upon by dilute acids. Soluble, without decomposition, in an alcoholic solution of caustic potash, from which it is precipitated on the addition of water. (Delbos, *Ann. Ch. et Phys.*, (3.) **21.** 69.)

***Tri*NaphtylPhosphamid.** (*Phosphoryltri Naphthylteramid.*) $C_{60}H_{24}N_3PO_2 = N_3\left\{\begin{matrix}PO_2'''\\(C_{20}H_8'')_3\end{matrix}\right.$ Readily decomposed by hot water, or by boiling acids or alkalies. (Schiff.)

***Di*NaphtylSulphoCarbamid.** (*Naphtalidamic Carbamide Sulfurée.*) $C_{42}H_{16}N_2S_2 = N_2\left\{\begin{matrix}C_2S_2''\\(C_{20}H_7)_2\\H_2\end{matrix}\right.$ Insoluble in water, alcohol, or bisulphide of carbon. Unacted upon by dilute acids. (Delbos, *Ann. Ch. et Phys.*, (3.) **21.** 71.)

***Tri*NaphtylPhosphamid.** $C_{30}H_{24}N_3PO_2 = N_3\left\{\begin{matrix}PO_2'''\\3\,C_{10}H_7\\H_3\end{matrix}\right.$ Insoluble in water. Soluble in acids, with decomposition. (Schiff.)

NaphtylThiosinamin. (*Allyl Naphthyl Sulphocarbamid. Sulpho Carbonyl Allyl Naphthylbiamid.*) $C_{28}H_{14}N_2S_2 = N_2\left\{\begin{matrix}C_2S_2''\\C_{20}H_8''\\C_6H_5\\H\end{matrix}\right.$ Insoluble in water. Sparingly soluble in cold, more soluble in boiling concentrated alcohol. Sparingly soluble in ether. Soluble, without combination or change in an alcoholic solution of chlorhydric or sulphuric acid.

NaphtylUrea. $C_{22}H_{10}N_2O_2 = N_2\left\{\begin{matrix}C_2O_2''\\C_{20}H_7\\H_3\end{matrix}\right.$ Scarcely at all soluble in water; more readily soluble in ether. Very easily soluble in alcohol. (Schiff, *Ann. Ch. u. Pharm.*, **101.** 90.)

Narcein. $C_{46}H_{29}NO_{18}$ Sparingly soluble in cold, easily soluble in boiling water. (Anderson.) Soluble in 375 pts. of water at 14°, and in 230 pts. of boiling water; more readily soluble in alcohol than narcotin. Insoluble in ether. (Pelletier.) More readily soluble in ammonia-water and weak alkaline solutions than in pure water; but is insoluble in concentrated potash-lye. (Anderson.) Soluble in chlorhydric acid, and in dilute acids, with combination. Soluble in cold concentrated sulphuric acid. Decomposed by nitric acid.

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Narcitin (from *Narcissus poeticus*). Deliquescent. Easily soluble in water, alcohol, and acids. (Jourdain.)

Narcotein. Easily soluble in water, and alcohol, and in nitric and sulphuric acids. Difficultly soluble in ether. (E. Marchand.)

Narcotin. (*Opianin.*) $C_{46}H_{25}NO_{14}$ Insoluble in cold, soluble in 7000 pts. of boiling water.

Soluble in 300 pts. of cold alcohol of 77%
" 128 " boiling "
" 60 " cold absolute alcohol.
" 12 " boiling absolute alcohol. (R. Brandes.)

Soluble in 142 pts., or less, of alcohol at the ordinary temperature. (Bouchardat, *Ann. Ch. et Phys.*, (3.) **9.** 225, 227.) Soluble in 33 pts. of cold, and in 19 pts. of boiling, absolute ether (R. Brandes); in about 100 pts. of ether at the ordinary temperature. (Bouchardat, *loc. cit.*)

Insoluble in cold, soluble in 500 pts. of boiling water.

Soluble in 100 pts. of cold alcohol.
" 24 " boiling "
" 100 " cold ether.
" 50 " boiling ether. (Wittstein's *Handw.*)

100 pts. of chloroform dissolve 37.17 pts. of it. (Michael Pettenkofer, *Kopp & Will's J. B., für* 1858, p. 363.) 100 pts. of olive-oil dissolve 0.25 pt. of it. (Pettenkofer, *loc. cit.*) 1 ounce of olive-oil dissolves 1.2 grains of it. (Parrish's *Pharm.*, p. 397.) Soluble in the fatty and essential oils; also in cold acetic acid, from which it separates out when the solution is evaporated. Soluble in concentrated sulphuric acid; also in cold dilute nitric acid without decomposition, unless the solution is heated to 50°. Easily soluble in acids with combination.

Soluble, with combination, in alcohol acidulated with chlorhydric acid; also in water acidulated with sulphuric or chlorhydric acid. (Bouchardat, *loc. cit.*, p. 224.) Soluble in warm iodic acid without neutralizing it, and crystallizes out unchanged when the solution is evaporated. (Sérullas, *Ann. Ch. et Phys.*, 1830, (2.) **45.** 276.) Insoluble in aqueous solutions of caustic potash, ammonia, or lime, or of chloride of sodium. (Wittstock.) Several of the salts of narcotin are soluble in alcohol, and ether. (Brandes.)

Nelkensæure. *Vid.* Eugenic Acid.

Niccolate of Ammonia.

Niccolate of Ammonia with Sulphate of Ammonia. $NH_4O, NiO; NH_4O, SO_3$ Readily soluble in water. Insoluble in alcohol, even when this is dilute. (Erdmann.)

Niccolate of Baryta. Ppt.

Niccolate *of protoxide* **of Iron.**

Niccolate of Lime. Ppt.

Niccolate of Magnesia. Ppt.

Niccolate of Potash. Insoluble in water. (Dumas, *Tr.*)

Niccolate of Soda. Gives up soda to hot water. (Berzelius.)

Niccolate of Strontia. Ppt.

Nickel. Ni Permanent. Slowly soluble in not too dilute chlorhydric acid, — more readily in hot than in cold. Hot dilute sulphuric acid dissolves it with some difficulty. Much more easily soluble in dilute nitric acid, but with concentrated nitric acid it behaves like iron.

Nicotianin. (*Essence of Tobacco. Tobacco-Camphor.*) $C_{46}H_{32}N_2O_6 = N_2\left\{C_{46}H_{32}O_6{}^{\text{vi}}\right.$ Soluble in water. (Hermbstædt.) Soluble in alcohol, and ether. According to Hermbstædt, no precipitate occurs when water is added to the alcoholic solution, but, according to Posselt & Reimann, a milkiness is produced. Not sensibly soluble in chlorhydric acid. Insoluble in cold, but soluble, with decomposition, in hot nitric acid. (Posselt & Reimann.) Soluble in potash-lye. (P. & R.; and Barral.)

Nicotic Acid. (*Thought to be identical with Malic Acid.*) $C_6H_3O_6, 2HO$ Readily soluble in water. The potash and ammonia salts are soluble in water. The lead salt ($2PbO, C_6H_3O_6$) is insoluble. (Barral.)

Nicotin. $C_{20}H_{14}N_2 = N_2\left\{(C_{10}H_7{}'')_2\right.$ Very hygroscopic. Soluble in all proportions in water. (Barral, *Ann. Ch. et Phys.*, (3.) **20.** 353; Posselt & Reimann, and others.) With half its volume or less of water, it forms (when it contains resinous matter, according to Posselt & Reimann) a clear mixture, which is rendered turbid on the addition of more water. (Ortigosa.) Nicotin itself dissolves a certain amount of water. Miscible in all proportions with alcohol, and ether. (Posselt & Reimann.) Ether abstracts it completely from the aqueous solution. Soluble in about 40 pts. of oil of turpentine. Easily soluble in oil of almonds, the solution giving up all its nicotin when shaken with acetic acid. (Reimann.) Miscible with olive-oil. (Parrish's *Pharm.*, p. 417.) Soluble in acids, with combination, forming salts which are generally very soluble in water, and alcohol, but insoluble in ether. Many of them are deliquescent.

Nicotin with Nitrate of Silver.

I.) $C_{20}H_{14}N_2; AgO, NO_5$ Somewhat soluble in alcohol. (Wertheim.)

II.) $2C_{20}H_{14}N_2; AgO, NO_5$ Somewhat soluble in alcohol. (Wertheim.)

Nigellin (from *Nigella damascena*). Easily soluble in water, and alcohol. Insoluble in ether. (Reinsch.)

Nigric Acid. $C_{14}H_7O_7 + HO$ Insoluble in water, or ether. Easily soluble in alcohol. (Lœwig & Weidmann.)

NiNaphthylamin. (*NiNaphthylidin. Isomeric with NitrosoNaphtylin.*) $C_{20}H_8N_2O_2$ Soluble in a mixture of alcohol and ether. (C. S. Wood.)

Nithialin. $C_{12}H_8NS_4O$ Almost completely insoluble in water. Very sparingly soluble in alcohol. Almost entirely insoluble in ether or chloroform. Very difficultly soluble in acids, with the exception of concentrated sulphuric acid, in which it dissolves readily; from this solution it is precipitated on the addition of water, also completely by alkalies. Partially soluble, with decomposition, in boiling concentrated potash-lye. (Arppe, *Ann. Ch. u. Pharm.*, **96.** 117.)

NitrAcetoNitril. Not isolated.
(*Knallsæure* (of Kekule).)
$C_4H_2N_2O_4 = N\left\{C_4H_2(NO_4)'''\right.$

NitrAcetoNitril with Mercury.
$C_4Hg_2N_2O_4 = N\left\{C_4Hg_2(NO_4)'''\right.$

NitrAcetoNitril with Silver.
$C_4Ag_2N_2O_4 = N\left\{C_4Ag_2(NO_4)'''\right.$

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*Ter*NitrAcetoNitril. $C_4\,N_4\,O_{12} = N\left\{C_4\,(N\,O_4)_3'''\right.$ Insoluble in water, by which it is slowly decomposed, however. Soluble, with decomposition, in alcohol. Soluble, without decomposition, in absolute ether. Insoluble in cold concentrated sulphuric acid. (Chichkoff, *Ann. Ch. et Phys.*, (3.) **49.** 319.)

*Ter*NitrAcetoNitril with Silver. $C_4\,H_{14}\,N_{10}\,Ag_2\,O_{26}$ Readily soluble in hot, less soluble in cold water.

NitrAcrol. Sparingly soluble in water. Readily soluble in alcohol.

*Ter*NitrAmarin. $C_{42}\,H_{15}\,(N\,O_4)_3\,N_2$ Sparingly soluble in boiling water. Soluble in boiling, less soluble in cold strong alcohol. Its best solvent is a mixture of alcohol and ether, in which it is very easily soluble. Its salts are but sparingly soluble in water. (Bertagnini, *Ann. Ch. et Phys.*, (3.) **33.** 480.)

NitrAmidin. *Vid.* Xyloidin.

*Bi*NitrAmmonyl. $C_4\,H_4\,N_4\,O_8$ Very soluble in water; less soluble in alcohol. Nearly insoluble in ether.

*Bi*NitrAmmonyl with Silver. $C_4\,H_3\,Ag\,N_4\,O_8$ Sparingly soluble in cold, abundantly soluble in hot water. (Schischkoff & Rosing.)

NitrAnilic Acid. *Vid.* NitroSalicylic Acid.

NitrAnilin. (*NitroPhenylamin.*) $C_{12}\,H_6\,N_2\,O_4 = N\left\{\begin{matrix}C_{12}\,H_4\,(N\,O_4)\\ H_2\end{matrix}\right.$ There are two isomeric modifications of NitrAnilin: —

α. Nitranilin { which is the "nitranilin" of Hofmann & Muspratt.
viz., and
β. Nitranilin { which is the nitranilin of Arppe.

I.) *AlphaNitrAnilin.* *ParaNitrAnilin.* Almost insoluble in cold, more soluble in boiling water. (Hofmann & Muspratt.) Soluble in 600 pts. of water at 18.5°; much more soluble in boiling water. (Arppe, *Ann. Ch. u. Pharm.*, **93.** 359.) Easily soluble in alcohol, and ether. (Arppe, *loc. cit.*; also Hofmann & Muspratt.) Decomposed by nitric acid.

II.) *BetaNitrAnilin.* Soluble in 1250 pts. of water at 12.5°, and in 45 pts. of boiling water. Readily soluble in alcohol, and ether. Soluble in nitric acid, even concentrated, without alteration. It is also soluble in chlorhydric and other acids, forming salts which are decomposed by water. (Arppe, *Ann. Ch. u. Pharm.*, **93.** 361.)

*Bi*NitrAnilin. (*BiNitroPhenylamin.*) $C_{12}\,H_5\,N_3\,O_8 = N\left\{\begin{matrix}C_{12}\,H_3\,(N\,O_4)_2\\ H_2\end{matrix}\right.$ Very sparingly soluble in cold, readily soluble in boiling water. Readily soluble in hot alcohol; also in a mixture of alcohol and ether. (Gottlieb.)

*Ter*NitrAnilin. (*TerNitroPhenylamin.* *Picramid.*) $C_{12}\,H_4\,N_4\,O_{12} = N\left\{\begin{matrix}C_{12}\,H_2\,(N\,O_4)_3\\ H_2\end{matrix}\right.$ Insoluble in water. Difficultly soluble in cold, tolerably easily soluble in boiling alcohol. Very sparingly soluble in ether. (Pisain.)

NitrAnilinUrea. *Vid.* NitroPhenylCarbamid.

NitrAnisic Acid. (*NitroDraconic Acid.* *NitrAnisatic Acid.* *NitroDraconesinic Acid.*) $C_{16}\,H_7\,N\,O_{10}$ Very sparingly soluble in cold, somewhat more soluble in boiling water. (Cahours.) Insoluble in water. (Cahours, also in *Gmelin's Handbook.*) Very sparingly soluble even in warm water. Easily soluble in alcohol, and ether, especially when these are warm. Moderately soluble in hot alcohol, the solution solidifying on cooling. Tolerably easily soluble in hot, less soluble in cold nitric acid. Water precipitates it from the nitric-acid solution. The alkaline salts of nitranisic acid are soluble in water; but those of the other metallic oxides are only difficultly soluble.

NitrAnisate of Alumina. Ppt.

NitrAnisate of Ammonia. Soluble in water, and alcohol.

NitrAnisate of Baryta. $C_{16}\,H_6\,Ba\,(N\,O_4)\,O_6 + 4\,Aq$ Sparingly soluble in water. (Cahours.) Nearly insoluble in cold, much more soluble in boiling water. (Engelhardt.)

NitrAnisate of Cobalt. Appears to be somewhat soluble in water.

NitrAnisate of Copper ($Cu\,O$). Ppt.

NitrAnisate of Ethyl. $C_{16}\,H_6\,(C_4\,H_5)\,(N\,O_4)\,O_6$ Insoluble in water. Abundantly soluble in warm, very much less soluble in cold alcohol. Soluble in cold, and more soluble in hot concentrated sulphuric acid; from the hot solution it separates out partially on cooling, and entirely on the addition of water. (Cahours, *Ann. Ch. et Phys.*, (3.) **14.** 502.)

NitrAnisate *of sesquioxide* of Iron. Ppt.

NitrAnisate of Lead. Somewhat soluble in hot, less soluble in cold water.

NitrAnisate of Lime. $C_{16}\,H_6\,Ca\,(N\,O_4)\,O_6 + 4\,Aq$ Sparingly soluble in water. (Cahours.)

NitrAnisate of Magnesia. Sparingly soluble in water. (Cahours.)

NitrAnisate of Manganese. Ppt.

NitrAnisate *of protoxide* of Mercury. Appears to be somewhat soluble in water.

NitrAnisate of Methyl. (*NitrAnisate of Methylene.*) $C_{16}\,H_6\,(C_2\,H_3)\,(N\,O_4)\,O_6$ Insoluble in water. Easily soluble in warm, almost entirely insoluble in cold, alcohol, or wood-spirit. (Cahours, *Ann. Ch. et Phys.*, (3.) **14.** 504.) Soluble in boiling ether.

NitrAnisate of Nickel. Appears to be somewhat soluble in water.

NitrAnisate of Potash. $C_{16}\,H_6\,K\,(N\,O_4)\,O_6 + 2\,Aq$ Readily soluble in water. Soluble in boiling, less soluble in cold alcohol.

NitrAnisate of Silver. $C_{16}\,H_6\,Ag\,(N\,O_4)\,O_6$ Insoluble in water.

NitrAnisate of Soda. $C_{16}\,H_6\,Na\,(N\,O_4)\,O_6 + 2\,Aq$ Readily soluble in water. Soluble in hot, less soluble in cold alcohol. (Engelhardt.)

NitrAnisate of Strontia. $C_{16}\,H_6\,Sr\,(N\,O_4)\,O_6 + 4\,Aq$ Sparingly soluble in water. (Cahours.)

NitrAnisate of Zinc. Ppt.

*Ter*NitrAnisic Acid. $C_{16}\,H_5\,N_3\,O_{18}$

*Ter*NitrAnisate of Ammonia.

*Ter*NitrAnisate of Potash.

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*Ter*NITRANISATE OF SODA.

NITRANISATIC ACID. *Vid.* NitrAnisic Acid.

NITRANISID. *Vid.* *bi*NitrAnisoin.

NITRANISIDIN. *Vid.* MethylNitroPhenidin.

*Bi*NITRANISOIN. Insoluble in water. (Kraut.)
(*Nitranisid.*)
$C_{20}H_{10}(NO_4)_2O_2$

NITRANISOL. *Vid.* NitroPhenate of Methyl.

NITRIC ACID(Anhydrous). Soluble in water, with evolution of heat. (H. Deville, *Ann. Ch. et Phys.*, (3.) **28.** 249.)
NO_5

NITRIC ACID. Absorbs water from the air. Soluble in water, with evolution of heat. Miscible with concentrated acetic acid.
NO_5, HO

All of its salts, excepting a few basic compounds, are soluble in water; many are soluble in alcohol; some are soluble in glycerin.

Amount of Anhydrous NO_5, &c., in the aqueous acid of various strengths.

Sp. gr.	Per cent of NO_5.	Per cent of acid of 1.5 sp. gr.
1.5000 . . .	79.700 . . .	100
1.4980	78.903	99
1.4960	78.106	98
1.4940	77.309	97
1.4910	76.512	96
1.4880	75.715	95
1.4850	74.918	94
1.4820	74.121	93
1.4790	73.324	92
1.4760	72.527	91
1.4730	71.730	90
1.4700	70.933	89
1.4670	70.136	88
1.4640	69.339	87
1.4600	68.542	86
1.4570	67.745	85
1.4530	66.948	84
1.4500	66.155	83
1.4460	65.354	82
1.4424	64.557	81
1.4385	63.760	80
1.4346	62.963	79
1.4306	62.166	78
1.4269	61.369	77
1.4228	60.572	76
1.4189	59.775	75
1.4147	58.978	74
1.4107	58.181	73
1.4065	57.384	72
1.4023	56.587	71
1.3978	55.790	70
1.3945	54.993	69
1.3882	54.196	68
1.3833	53.399	67
1.3783	52.602	66
1.3732	51.805	65
1.3681	51.068	64
1.3630	50 211	63
1.3579	49.414	62
1.3529	48.617	61
1.3477	47.820	60
1.3427	47.023	59
1.3376	46.226	58
1.3323	45.429	57
1.3270	44.632	56
1.3216	43.835	55
1.3163	43.038	54
1.3110 . . .	42.241 . . .	53
1.3056	41.444	52
1.3001	40.647	51
1.2947	39.850	50
1.2887	39.053	49
1.2826	38.256	48
1.2765	37.459	47
1.2705	36.662	46
1.2644	35.865	45
1.2583	35.068	44
1.2523	34.271	43
1.2462	33.474	42
1.2402	32.677	41
1.2341	31.880	40
1.2277	31.083	39
1.2212	30.286	38
1.2148	29.489	37
1.2084	28.692	36
1.2019	27.895	35
1.1958	27.098	34
1.1895	26.301	33
1.1833	25.504	32
1.1770	24.707	31
1.1709	23.900	30
1.1648	23.113	29
1.1587	22.316	28
1.1526	21.519	27
1.1465	20.722	26
1.1403	19.925	25
1.1345	19.128	24
1.1286	18.331	23
1.1227	17.534	22
1.1168	16.737	21
1.1109	15.940	20
1.1051	15.143	19
1 0993	14.346	18
1.0935	13.549	17
1.0878	12.752	16
1.0821	11.955	15
1.0764	11.158	14
1.0708	10.361	13
1.0651	9.564	12
1.0595	8.767	11
1.0540	7.970	10
1.0485	7.173	9
1.0430	6.376	8
1.0375	5.579	7
1.0320	4.782	6
1.0267	3.985	5
1.0212	3.188	4
1.0159	2.391	3
1.0106	1.594	2
1.0053 . . .	0.797	1

(Ure, *Schweigger's J. für Ch. u. Phys.*, **35.** 446; *Gmelin's Handbook*, **2.** 395; Ure's *Dict. Chem.*, London, 1823, p. 71.)

An aqueous solution of sp. gr. (at 16.56°)	Contains per cent, by weight, of anhydrous NO_5.	Boiling-point.
1.75 ?	100 . .	—1.11° !
1.62	82.7	37.78° !
1.54	72.5	79.44°
1.50	68.0	98.89°
1.45	58.4	115.56°
1.42	54.4	120°
1.40	51.2	119.44°
1.35	44.3	116.66°
1.30	37.4	113.33°
1.26	32.3	111.11°
1.22	28.5 . . .	109.44°

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An aqueous solution of sp. gr. (at 16.56°)	Contains per cent, by weight, of anhydrous NO_5	Boiling-point.
1.20	25.4	107.78°
1.18	23.0	106.11°
1.17	21.0	105°
1.16	19.3	104.44°
1.15	17.8	103.89°
1.14	16.6	103.89°

Results very different from these have been obtained by other observers; thus, in an acid of 1.298 sp. gr., Kirwan says the real acid is 36.75%; Davy says 48%, and Berthollet 32 or 33%. Dalton's own experiments gave, for acid of 1.51 sp. gr., 67% of NO_5; for acid of 1.42 sp. gr., 54%; for acid of 1.35 sp. gr., 44.4%, and for acid of 1.315 sp. gr., 38.6%. (Kirwan & Dalton, in the latter's *New System*, Pt. 2. pp. 355, 346, 349.) According to Mitscherlich, the acid of 1.54 sp. gr. contains 88.82% of NO_5, that of 1.522 sp. gr., 86.17%, and that of 1.4 sp. gr., 44%.

Nitrate of Acetamid. Soluble in water. (Strecker, *Ann. Ch. u. Pharm.*, 103. 323.)
$N\left\{\begin{matrix}C_4H_3O_2\\H_2\end{matrix}\right.\cdot HO, NO_5$

Nitrate of Acetosamin. Soluble in water, from which it is precipitated on the addition of alcohol.

Nitrate of Alanin. $C_6H_7NO_4, HO, NO_5$ Deliquesces in moist air. Very easily soluble in water; less soluble in alcohol.

Nitrate of Alanin & Silver. Soluble in spirit.

Nitrate of Allyl & Silver. C_6H_5O, AgO, NO_5 Easily soluble in water and in hot alcohol. Only slightly soluble in cold alcohol, or in ether. Soluble, with decomposition, in ammonia-water. (Wertheim.)

Nitrate of Alumina.

I.) *normal.* $Al_2O_3, 3NO_5 + 18Aq$ Deliquescent. Very soluble in water, and alcohol. Soluble in nitric acid. From solutions of alumina in an excess of nitric acid a precipitate is gradually deposited, especially if the solution is heated. After drying, this powder is only partially soluble in boiling sulphuric, chlorhydric, or nitric acids. (Hollunder, *Kastner's Archiv.*, 12. 424.) Deliquescent. Very soluble in water, and nitric acid. Melts in its water of crystallization at 72.7°, and the liquid may be cooled to 64.2°; it boils at 133.9°. (Ordway, *Am. J. Sci.*, (2.) 9. 33, & 27. 17.) Soluble in 1 pt. of strong alcohol at 12.5°. (Wenzel, in his *Verwandtschaft*, p. 300. [T.].)

II.) *basic.* Basic nitrates of alumina containing 6 equivalents, or less, of base to one of acid may be obtained soluble in water, and the aqueous solution is not precipitated on the addition of metallic chlorides or nitrates; but the compounds containing more than 6 equivalents of base are insoluble in water. (Ordway, *Am. J. Sci.*, (2.) 26. 203.)

Nitrate of Amarin. Sparingly soluble in boiling, less soluble in cold water. (Laurent.) Very sparingly soluble in water. (Fownes.)
$N_2\left\{\begin{matrix}(C_{14}H_6)_3\\H_6\end{matrix}\right.\cdot HO, NO_5$

Nitrate of AmidoBenzoic Acid. *Vid.* Nitrate of Benzamic Acid.

Nitrate of *bi*AmidoBenzoic Acid. Soluble in water.

Nitrate of Ammelid & of Silver. *Vid.* Nitrate of Argent-Ammelid.

Nitrate of Ammelin. $C_6H_5N_5O_2, HO, NO_5$ Partially decomposed by water. Soluble in water acidulated with nitric acid.

Nitrate of Ammelin & Silver. *Vid.* Nitrate of ArgentAmmelin.

Nitrate of Ammolin (of Unverdorben). Very readily soluble in water, and alcohol. Insoluble in ether.

Nitrate of Ammonia. NH_4O, NO_5 Deliquescent. Soluble in 0.5012 pt. of water at 18.12°; or 100 pts. of water, at 18.12°, dissolve 199.54 pts. of it, the aqueous solution saturated at 18.12° containing 66.57% of the salt. (Karsten, *Berlin Abhandl.*, 1840, p. 101.) 100 pts. of water, at 10° dissolve 185 pts. of it. (Townsend Harris, *C. R.*, 1847, 24. 818.) A very considerable reduction of temperature occurs as it dissolves in water. Much more soluble in hot than in cold water. Soluble in 2 pts. of water, at 15.5°, and in 0.5 pt. of boiling water. (Fourcroy, *English Trans.*, 3. 195. [T.].) Soluble in 1 pt. of cold, and in 0.5 pt. of boiling water; the saturated cold solution contains 50% of it. (Fourcroy, cited by Hassenfratz, *Ann. de Chim.*, 28. pp. 390, 291.) Soluble in 2 pts. of cold, and in 1 pt. of boiling water; the saturated cold solution containing 33.33% of it and the boiling saturated solution 50%. (M. R. & P.) Soluble in 0.5 pt. of water at 18°. (Berzelius's *Lehrb.*, 3. 304.) Soluble in 2 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, 8. 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) When treated with boiling water some ammonia is evolved, and the solution exhibits an acid reaction. (Emmet, *Am. J. Sci.*, (1.) 18. pp. 255, 256.) The salt is liable to form supersaturated solutions. (Ogden.) The saturated aqueous solution boils at about 182°. (T. Griffiths, *Quar. J. Sci.*, 1825, 18. 91.)

In a solution containing for 100 pts. of water pts. of crystallized nitrate of ammonia.	The boiling-point is elevated.	Difference.
0.0	0°	
10.0	1 . . .	10.
20.5	2	10.5
31.3	3	10.8
42.4	4	11.1
53.8	5	11.4
65.4	6	11.6
77.3	7	11.9
89.4	8	12.1
101.9	9	12.5
114.9	10	13.0
128.4	11	13.5
142.4	12	14.0
156.9	13	14.5
172.0	14	15.1
188.0	15	16.0
204.4	16	16.4
221.4	17	17.0
238.8	18	17.4
256.8	19	18.0
275.3	20	18.5
314.0	22	38.7
354.0	24	40.0
396.0	26	42.0
440.2	28	44.2
487.4	30	47.2
537.3	32	49.9
590.0	34	52.7
645.0	36	55.0
705.5	38 . . .	60.5

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In a solution containing for 100 pts. of water pts. of crystallized nitrate of ammonia.	The boiling-point is elevated.	Difference.
770.5	40	65.0
840.6	42	70.1
915.5	44	74.9
995.5	46	80.0
1081.5	48	86.0
1173.5	50	92.0
1273.0	52	99.5
1383.0	54	110.
1504.0	56	121.
1637.0	58	133.
1775.0	60	136.
1923.0	62	148.
2084.0	64	161.
∞	80	

The point of ebullition of pure water, observed in a glass tube containing bits of metallic zinc, having been 100°. (Legrand, *Ann. Ch. et Phys.*, 1835, (2.) **59.** 435.) Easily soluble in alcohol. (Wittstein.) Soluble in 1.121 pts. of strong boiling alcohol. (Wenzel, in his *Verwandtschaft*, p. 300. [T.]). Soluble in 2.293 pts. of alcohol of 66.8% at 25°, *i. e.* 100 pts. of this alcohol dissolve 43.61 pts. of the salt at 25°. (Pohl, *Wien. Akad. Bericht*, **6.** 599.)

Soluble in a saturated aqueous solution of nitrate of potash without causing any precipitation of the latter. A solution of the same sp. gr. as the above is obtained when a mixture of the two salts is digested with water at the same temperaature. (Karsten, *Berlin Abhandl.*, 1840, p. 113.) Soluble in a saturated solution of nitrate of soda, the latter salt being precipitated meanwhile, until a certain definite limit is attained. (Karsten, *Berlin Abhandl.*, 1840, p. 114.) Soluble in a saturated solution of nitrate of lead. (Karsten, *loc. cit.*)

When chloride of ammonium is added to a saturated solution of nitrate of ammonia it dissolves, while nitrate of ammonia is precipitated. This reaction continues until a certain definite equilibrium is attained. The mixed solution thus obtained is identical with that prepared by treating a mixture of the two salts with water. (Karsten, *loc. cit.*, 1840, p. 110.) Soluble in a saturated solution of chloride of potassium, while $N H_4 Cl$ separates out. (Karsten, *loc. cit.*, p. 131.) Nitrate of ammonia is also soluble in a saturated solution of chloride of sodium, at first without occasioning any precipitation, but subsequently chloride of ammonium is precipitated. (Karsten, *loc. cit.*, p. 123.)

NITRATE OF AMMONIA & OF COBALT. Permanent. Soluble in water. (P. Thénard.)

NITRATE OF AMMONIA & OF COPPER.

I.) $N H_4 O, N O_5$; $Cu O, N O_5$ Very easily soluble in water.

II.) *basic.* Soluble in warm, less soluble in cold water.

NITRATE OF AMMONIA & OF MAGNESIA. $N H_4 O, N O_5$; $Mg O, N O_5$ Slowly deliquescent. Soluble in 10 [11 in T., & in Berzelius's *Lehrb.*] pts. of water at 12.5°; and in much less hot water. (Fourcroy.)

NITRATE OF AMMONIA & OF *di*MERCUR(*ic*)AMMONIUM & *proto*XIDE OF MERCURY.

I.) $N H_4 O, N O_5 ; N \left\{\begin{matrix} H_2 \\ Hg_2 \end{matrix}\right\} O, 2 Hg O, N O_5$ Sparingly soluble in nitric acid. Insoluble in sulphuric acid, or in aqueous solutions of caustic ammonia or potash. (Mitscherlich.)

II.) $2 N H_4 O, N O_5 ; N \left\{\begin{matrix} H_2 \\ Hg_2 \end{matrix}\right\} O, 2 Hg O, N O_5 + 2 Aq$ Decomposed by water. (Kane.)

NITRATE OF AMMONIA & *din*OXIDE OF MERCURY.

I.) *mono.* Slightly soluble in water; soluble in nitric acid.

II.) *basic.* *Vid.* Nitrate of Mercur(*ous*)Ammonium with *din*oxide of Mercury.

NITRATE OF AMMONIA & OF NICKEL. Soluble in 3 pts. of water. (Thénard.)

NITRATE OF AMMONIA & NICKELAMMONIUM.

I.) *basic.* Efflorescent, with decomposition. $N \left\{\begin{matrix} H_3 \\ Ni \end{matrix}\right. , N H_4 O, N O_5$ Readily soluble in cold water; the solution undergoing decomposition when boiled. Somewhat soluble in dilute alcohol. (Erdmann.)

NITRATE OF AMMONIA & *of sesquioxide* OF OSMIUM. Sparingly soluble in cold, more soluble in hot water. (Berzelius.)

NITRATE OF AMMONIA & OF PALLADIUM.

I.) Insoluble in water, or in boiling ammonia-water. Easily soluble in chlorhydric acid. Soluble in hot, insoluble in cold, nitric acid. (Fisher.)

II.) Easily soluble in water, ammonia-water, and nitric acid. Insoluble in alcohol. (Fischer.)

NITRATE OF AMMONIA & SILVER. $8 N H_4 O, Ag O, N O_5$ Very soluble in water. (Dumas, *Tr.*)

NITRATE OF AMMONIA & OF *binoxide* OF TIN ? The presence of nitrate of ammonia increases the solubility of oxide of tin in nitric acid.

NITRATE OF AMMONIOIRIDIUM. $5 N H_3 . Ir_2 O_3, 3 N O_5$ Tolerably easily soluble in water. (Claus, *Beiträge*, p. 91.)

NITRATE OF AMMONIORHODIUM. $5 N H_3 . Rh_2 O_3, 3 N O_5$ Tolerably easily soluble in water. Insoluble in alcohol. (Claus, *Beiträge*, p. 89.)

NITRATE OF AMMONIUMCHLORPLATIN(*ous*)AMMONIUM. (*Nitrate of Gros's (and of Raewsky's 2d) Base.*) $N_3 H_6 Pt Cl O_6 =$ "$N_2 H_6 Pt Cl O, N O_5$" $= N \left\{\begin{matrix} H_2 \\ Pt Cl \\ N H_4 \end{matrix}\right. . O, N O_5$ Easily soluble in water, especially when this is heated. Insoluble in nitric acid. (Gros, *Ann. der Pharm.*, 1838, **27.** 246.)

NITRATE OF AMMONIUMCHLORPLATIN(*ous*)AMMONIUM & OF AMMONIUMOXYPLATIN(*ous*)AMMONIUM. (*Nitrate of Raewsky's 1st Base. Sesquichlorhydronitrate de diplatinamine* (of Gerhardt).) $N_6 H_{12} Pt_2 Cl O_{15} =$ "$N_4 H_{12} Pt_2 Cl O_5, 2 N O_5 =$ $N \left\{\begin{matrix} H_2 \\ Pt Cl \\ N H_4 \end{matrix}\right. . O, N O_5 ; N \left\{\begin{matrix} H_2 \\ Pt O \\ N H_4 \end{matrix}\right. . O, N O_5 + H O$ Soluble in boiling, less soluble in cold water. Unacted upon by dilute sulphuric acid. (Raewsky.)

NITRATE & OXALATE OF AMMONIUMOXYPLATIN(*ous*)AMMONIUM.

I.) $N_4 H_{12} Pt_2 O_4, 2 N O_5, C_4 O_6 = 2 \left(N \left\{\begin{matrix} H_2 \\ Pt O \\ N H_4 \end{matrix}\right. , O \right), 2 N O_5, C_4 O_6$ Separates from the nitric-acid solution of No. II.

II.) $N_4 H_{12} Pt_2 O_4, N O_5, C_4 O_6 = 2 \left(N \left\{\begin{matrix} H_2 \\ Pt O \\ N H_4 \end{matrix}\right. , O \right) N O_5, C_4 O_6$ Insoluble in water. (Gerhardt.) (*Sesquinitro-oxalate de diplatinamine* (of Gerhardt).)

Nitrate of Amyl. (*AmylNitric Ether. Nitrate of Amylene.*) $C_{10}\,H_{11}\,N\,O_6 = C_{10}\,H_{11}\,O, N\,O_5$ Sparingly soluble in boiling water. Soluble in alcohol, and ether. Water precipitates it from the alcoholic solution. (Hofmann, *Ann. Ch. et Phys.*, (3.) **23.** 376.)

Nitrate of *tetr***Amylammonium.**

Nitrate of AmylStrychnine. $C_{42}\,H_{21}\,(C_{10}\,H_{11})\,N_2\,O_4, H\,O, N\,O_5 + 11\,Aq$ Soluble in boiling, but very sparingly soluble in cold water. More soluble than the nitrate of ethylstrychnine in boiling water.

Nitrate of Anilin. Permanent. Soluble in water.

Nitrate of Anisamate of Ethyl. Decomposes readily. Soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 346.)

Nitrate of Anisamic Acid. $N \left\{ \begin{matrix} C_{16}\,H_7\,O_4 \\ H_2 \end{matrix} \right. . O_2, H\,O, N\,O_5$ Abundantly soluble in boiling water, and alcohol. Much less soluble in these liquids when they contain free nitric acid. Soluble in hot, less soluble in cold nitric acid. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 345.)

Nitrate of Anthranilic Acid. $C_{14}\,H_7\,N\,O_4, H\,O, N\,O_5$ Easily soluble in boiling spirit. (Kubel.)

Nitrate of Antimony. $2\,Sb\,O_3, N\,O_5$ Decomposed by cold water. (Bucholz.) The aqueous solution saturated at 10° contains 30.4% of it. (Eller, cited by Hassenfratz, *Ann. de Chim.*, **38.** 291.) Soluble in strong, less soluble in dilute nitric acid. (Peligot, *Ann. Ch. et Phys.*, (3.) **20.** 288.)

Nitrate of Argent*bi***amin.** (*AmmonioNitrate of Silver.*) $N \left\{ H_6 \right. . Ag\,O, N\,O_5$ Easily soluble in water. (Mitscherlich.)

Nitrate of Argent*ter***amin.** $N_2 \left\} H_9 \right. . Ag\,O, N\,O_5$ Completely soluble in water. (H. Rose.)

Nitrate of ArgentAmmelid. $C_6\,H_2\,Ag\,N_4\,O_4, H\,O, N\,O_5$ Soluble for the most part in water, though with partial decomposition, and separation of some ammelid. (Knapp, *Ann. der Pharm.*, 1837, **21.** 254.)

Nitrate of ArgentAmmelin. $C_6\,H_4\,Ag\,N_5\,O_2, H\,O, N\,O_5$ Ppt. Soluble in boiling water.

Nitrate of Arsen*di***Ethyl.** Soluble in alcohol.

Nitrate of Arsen*tri***Ethyl.** Deliquescent. Soluble in water. (Landolt, *Ann. Ch. u. Pharm.*, **89.** 330.)

Nitrate of ArsenMethylAmylium. $(C_2\,H_3)_2\,(C_{10}\,H_{11})_2\,As\,O, N\,O_5$

Nitrate of ArsenMethylEthylium. $(C_2\,H_3)_2\,(C_4\,H_5)_2\,As\,O, N\,O_5$ Very deliquescent. Soluble in water. (Cahours & Riche.)

Nitrate of ArsenMethylium. $(C_2\,H_3)_4\,As\,O, N\,O_5$ Deliquescent. Very soluble in water. (Cahours & Riche.)

Nitrate of Asparagin. $C_8\,H_8\,N_2\,O_6, H\,O, N\,O_5$ Permanent. Soluble in water. (Dessaignes, *Ann. Ch. et Phys.*, (3.) **34.** 152.)

Nitrate of Asparagin & Silver with Nitrate of Silver. $C_8\,H_8\,N_2\,O_6, Ag\,O, N\,O_5 ; Ag\,O, N\,O_5$ Soluble in water.

Nitrate of Aspartic Acid. Soluble in water.

Nitrate of Atropin. Deliquescent. Soluble in water.

Nitrate of Baryta. $Ba\,O, N\,O_5$ Permanent. Somewhat difficultly soluble in water, with slight reduction of temperature; being the least soluble of any of the normal metallic nitrates.

Soluble in 20 pts. of water at 0°
" 12.5 " 15°
" 5.9 " 49°
" 3.4 " 86°
" 2.8 " 101.6°
(Gay-Lussac, cited in Gmelin's *Handbook*.)

100 pts. of water at 0° dissolve 5.00 pts. of it.
" 14.95° " 8.18 "
" 17.62° " 8.54 "
" 37.87° " 13.67 "
" 49.22° " 17.07 "
" 52.11° " 17.97 "
" 73.75° " 25.01 "
" 86.21° " 29.57 "
" 101.65° " 35.18 "
(Gay-Lussac, *Ann. Ch. et Phys.*, (2.) **11.** 313.)

From Gay-Lussac's experiments Nos. 1, 3, 6, and 9 in the table, Kopp deduces the following formula: —

100 pts. of water dissolve of the salt, parts =
$$5.00 + 0.17179\,T + 0.0017406\,T^2 - 0.0000050035\,T^3$$

By direct experiment Gay-Lussac found that 100 pts. of water dissolved of the salt at		By calculation from the above formula, 100 pts. of water should dissolve of the salt
0°	5.00 pts.	5.00 pts.
14.95°	8.18	7.94
17.62°	8.54	8.54
37.87°	13.67	13.73
49.22°	17.07	17.08
52.11°	17.97	17.97
73.75°	25.01	25.13
86.21°	29.57	29.54
101.65°	35.18	35.18

By direct experiment Kopp found that 100 pts. of water dissolved 9.10 pts. of the salt at 19.3°, while by the formula 8.9 pts. should have been dissolved. (H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 262.) The aqueous solution saturated at 20° is of 1.0678 sp. gr. It contains 7.896% of the salt, *i. e.* 100 pts. of water at 20° dissolve 8.57 pts. of the salt, or 1 pt. of it is soluble in 11.67 pts. of water at 20°. (Karsten, *Berlin Abhandl.*, 1840, p. 101.) 100 pts. of the aqueous solution saturated at its boiling-point (101.1°) contain 26.5 pts. of the dry salt, or 100 pts. of water at 101.1° dissolve 36.054 pts. of it; or 1 pt. of the salt is soluble in 2.773 pts. of water at 101.1°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) Soluble in 12 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) The aqueous solution saturated at 12.5° contains 6.5% of it. (Hassenfratz, *Ann. de Chim.*, **28.** 291.) The aqueous solution saturated at 15° is of 1.063977 sp. gr., and contains in every 100 pts. of water at least 7.94 pts. of it. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.) The saturated aqueous solution boils at 102.5°. (Kremers, *Pogg. Ann.*, **99.** 43.)

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An aqueous solution of sp. gr., at 19.5° (sp. gr. of water at 19.5° = 1)	Contains Per cent of $Ba\,O, N\,O_5$	Contains Pts. of $Ba\,O, N\,O_5$ dissolved in 100 pts. of water.
1.0145	1.768	1.80
1.0292	3.503	3.63
1.0436	5.186	5.47
1.0593	6.959	7.48
1.0707	8.265	9.01

(Kremers, *Pogg. Ann.*, **95.** 121. The second column is from Gerlach's *Sp. Gew. der Salzlæsungen*, p. 35.)

A solution of sp. gr., at 12.5°	Contains of $Ba\,O, N\,O_5$ per cent.
1.0062	1
1.0123	2
1.0185	3
1.0250	4
1.0320	5
1.0409	6

(Hassenfratz, *Ann. de Chim.*, **28.** 300.) Insoluble in alcohol. (Berzelius, *Lehrb.*) Soluble in alcohol. (Schubarth's *Tech. Chem.*) Somewhat soluble in spirit. (Wittstein's *Handw.*)

Much less soluble in water acidulated with nitric or chlorhydric acid than in pure water. Entirely insoluble in concentrated nitric acid. (Mitscherlich; Braconnot; compare Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 318.) Very sparingly soluble in strong nitric or chlorhydric acid. (H. Wurtz, *Am. J. Sci.*, (2.) **25.** 376.) Almost entirely insoluble in strong nitric acid. (H. Wurtz, *Ibid.*, (2.) **26.** 188.)

Soluble in a saturated aqueous solution of nitrate of potash, without occasioning any precipitation at first, but crystals of a double salt ($K\,O, N\,O_5$; $Ba\,O, N\,O_5$) soon separate out. After this precipitation has ceased, and all the nitrate of baryta which can enter into solution has been dissolved, the solution is of 1.239 sp. gr., and contains 16.82% of the mixed salts. 100 pts. of water have consequently dissolved 20.22 pts. of mixed salt; namely, 6.91 pts. of nitrate of baryta and 13.31 pts. of nitrate of potash. Saturated solutions of nitrate of potash and of nitrate of baryta may be mixed in any proportion without causing the formation of any precipitate. (Karsten, *Berlin Abhandl.*, 1840, p. 126.)

Sparingly soluble in a saturated aqueous solution of nitrate of soda, without causing any precipitation of the latter. The solution thus obtained at 18.75° contains 47.95% of mixed salt. Or 100 pts. of water dissolve 92.15 pts. of mixed salt; viz. 88.26 pts. of $Na\,O, N\,O_5$, and 3 89 pts. of $Ba\,O, N\,O_5$. A solution identical with the above is obtained when a mixture of the two salts is digested with water. (Karsten, *Berlin Abhandl.*, 1840, p. 111.) For the solubility of mixed nitrates of baryta and potash, and of baryta and soda, see also the nitrates of potash and of soda. Very sparingly and slowly soluble in a saturated solution of nitrate of lead without causing the precipitation of any of the latter. A solution of similar sp. gr. with the above may be obtained by digesting a mixture of the two salts with water. (Karsten, *Berlin Abhandl.*, 1840, p. 113.)

Soluble in a saturated aqueous solution of chloride of ammonium; the solution thus prepared at 18.75° contains 35.4 pts. of mixed salt. 100 pts. of water dissolve, therefore, 54.74 pts. of mixed salt; viz. 16.73 pts. of $Ba\,O, N\,O_5$ and 38.04 pts. $N\,H_4\,Cl$. This solution is of different composition from that prepared at 18.75°, by treating a mixture of the two salts with water. This last contains 35.98% of mixed salts. 100 pts. water dissolve, therefore, 56.2 pts. mixed salt, viz. 17.02 pts. $Ba\,O, N\,O_5$ and 39.18 pts. $N\,H_4\,Cl$. (Karsten, *Berlin Abhandl.*, 1840, p. 119.) When chloride of ammonium is added to a saturated aqueous solution of nitrate of baryta it dissolves, while nitrate of baryta is precipitated. This reaction goes on until the amounts of the two salts dissolved have attained a certain definite equilibrium, the mixed solution thus obtained being identical with that formed when a mixture of the two salts is treated with water. (Karsten, *Berlin Abhandl.*, 1840, p. 110.) Soluble in saturated aqueous solutions of chloride of barium and of chloride of sodium. (Karsten, *loc. cit.*)

When one equivalent of $Ba\,O, N\,O_5$, in aqueous solution, is mixed with a solution of an equivalent of acetate of lead ($C_4\,H_3\,Pb\,O_4$) $\frac{22}{100}$ of it are decomposed to nitrate of lead, which may be precipitated by adding alcohol, while $\frac{78}{100}$ of it remain unchanged; when mixed with a solution of an equivalent of acetate of potash ($C_4\,H_3\,K\,O_4$) $\frac{27}{100}$ of it are decomposed as before, while $\frac{73}{100}$ of it remain unchanged; (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.) When mixed with a solution of an equivalent of oxide of potassium ($K\,O$), $\frac{692}{1000}$ of it are decomposed. (*Ibid.*, p. 204.)

NITRATE OF BARYTA & *of dinoxide* OF MERCURY. $2\,(Ba\,O, N\,O_5)$; $2\,Hg_2\,O, N\,O_5$ Decomposed by water. Soluble in hot dilute nitric acid, and in a hot aqueous solution of nitrate of dinoxide of mercury, separating out unchanged in both cases as the solution cools. (Stædeler, *Ann. Ch. u. Pharm.*, **87.** 130.)

NITRATE OF BARYTA & OF POTASH.

NITRATE OF BARYTA with cPHOSPHATE OF BARYTA. Insoluble in cold, decomposed by boiling water. (Berzelius, *Gilbert's Ann. Phys.*, 1816, **53.** 409.)

NITRATE OF BENZAMATE OF ETHYL. Soluble in all proportions in water, and alcohol. Also easily soluble in ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 330.)

$$C_{18}\,H_{12}\,N_2\,O_{10} = N\left\{\begin{matrix} C_{14}\,H_5\,O_2 \\ C_4\,H_5 \\ H \end{matrix}\right. .\,O_2, H\,O, N\,O_5$$

NITRATE OF BENZAMIC ACID. Permanent. Easily soluble in hot water, and alcohol.

$C_{14}\,H_8\,N_2\,O_{10} = C_{14}\,H_7\,N\,O_4, H\,O, N\,O_5$

NITRATE OF BENZIDIN. Soluble in water.

NITRATE OF BERBERIN. Sparingly soluble in cold water.

$C_{42}\,H_{19}\,N\,O_{10}, H\,O, N\,O_5$

NITRATE OF BISMETHYL. *Vid.* Nitrate of Bismuth Ethyl.

NITRATE OF BISMUTH.

I.) *mono.*

a = $Bi\,O_3, N\,O_5 + Aq$ Very slightly, if at all soluble in water.

Subnitrate of bismuth when recently precipitated and still moist, but not when air-dried, nor that sold in the shops, is readily soluble in an aqueous solution of chloride of ammonium (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 98, 335), a very free evolution of ammonia occurring when the mixture is boiled. (L. Thompson, *Ibid.*, p. 179.) It is not soluble in a solution of nitrate of ammonia. (Brett, *Ibid.*, p. 98.)

b = $Bi\,O, N\,O_5 + 2\,Aq$ When freshly precipitated it is somewhat freely soluble in water, especially if this be acidulated with nitric acid.

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II.) *sesqui.* $2\,Bi\,O_3, 3\,N\,O_5$ Water abstracts nitric acid, rendering it more basic. (Graham.)

III.) *ter* or *normal.* $Bi\,O_3, 3\,N\,O_5 + 10\,Aq$ Permanent. Water dissolves it only partially with decomposition.

Only slightly soluble in water. (Braconnot.) Soluble in dilute nitric acid.

When treated even with the least possible amount of water it is decomposed, with separation of a basic salt. Only when a slight excess of nitric acid is present can this decomposition be prevented. In this case the salt dissolves completely in a great excess of water, but if the mother liquor be poured off from the basic salt which first separates on the addition of a certain portion of water, it can no longer be completely dissolved, although by repeated washing with water traces of nitric acid and oxide of bismuth are removed. When the neutral salt is decomposed by water, no acid salt, but only free nitric acid containing traces of oxide of bismuth remains in solution. (H. Rose, *Pogg. Ann.*, **83.** pp. 145, 140.) Insoluble as a whole in water, and is decomposed when one attempts to melt it in its water of crystallization, being resolved into a clear liquid, and an opaque solid, when heated to 74°; this mixture has been cooled to 68.3°, but on stirring it solidified, while the temperature rose to 74°. (Ordway, *Am. J. Sci.*, (2.) **27.** 19.) Melts partially at about 26° in its water of crystallization, while a portion remains unmelted. (Berzelius, *Lehrb.*, **3.** 782.) If acetic acid is added to an acid solution of nitrate of bismuth, the solution will no longer be precipitated on the addition of water.

IV.) $5\,Bi\,O_3, 4\,N\,O_5 + 9\,Aq$ Not sensibly soluble in water; by which, however, some of the nitric acid is abstracted from it. In water which contains a small portion of nitric acid it may be entirely dissolved. (H. Rose, *Pogg. Ann.*, **83.** 145.)

V.) $Bi\,O_3, 12\,N\,O_5$ Soluble, without turbidity, in water. (Duflos.)

Nitrate of BismuthEthyl. (*Nitrate of BismEthyl.*) $C_4\,H_5\,Bi\,O_2, 2\,N\,O_5$ When recently prepared it is completely soluble in water; but after having been kept for some time it is only partially soluble in water, a basic salt remaining undissolved. Soluble in nitric acid, the solution undergoing decomposition when evaporated.

Nitrate of *sesqui*BromoCinchonin. Sparingly soluble in water, and alcohol. (Laurent, *Ann. Ch. et Phys.*, (3.) **24.** 312.)

Nitrate of Brucin.

I.) "*normal.*" Exceedingly soluble in water. More soluble in water than nitrate of strychnine. (Parrish's *Pharm.*, p. 410.)

II.) "*acid.*" $C_{46}\,H_{26}\,N_2\,O_8, H\,O, N\,O_5 + 4\,Aq$ Less soluble in water than the corresponding salt of strychnine.

Nitrate of Butyl. (*Nitrate of Tetryl.*) $C_8\,H_9\,O, N\,O_5$ Insoluble, or nearly insoluble in water.

Nitrate of Cacodyl.

Nitrate of Cacothelin. "Decomposed by water?" Soluble in nitric acid. (Strecker.)

Nitrate of Cadmium. $Cd\,O, N\,O_5 + 4\,Aq$ Deliquescent. Readily soluble in water, and alcohol. (Children.) Melts in its water of crystallization at 59.4°, and the liquid has been cooled to 32.7° before beginning to crystallize; it boils at about 132.2°. On continued boiling the liquid remains thin and clear, until nearly 3 equivs. of water have been expelled. When all the water has been driven off, a small portion of the dry mass is insoluble in water. (Ordway, *Am. J. Sci.*, (2.) **27.** 19.) Almost entirely insoluble in strong nitric acid. (H. Wurtz.)

Nitrate of Caffein. Very sparingly soluble in ether. Soluble in nitric acid. (Herzog.)

Nitrate of Capryl. *Vid.* Nitrate of Octyl.

Nitrate *of protoxide* of Cerium. $Ce\,O, N\,O_5$ Readily soluble in water. (Berzelius.) Soluble in 2 pts. of alcohol. (Vauquelin.)

Nitrate *of sesquioxide* of Cerium.

I.) *normal.* $Ce_2\,O_3, 3\,N\,O_5$ Deliquescent. Soluble in alcohol. (Dumas, *Tr.*) The presence of a basic salt or of an alkali favors the solution of sesquioxide of cerium in nitric acid; the presence of Lanthanum also seems to increase this solubility. (Mosander.)

II.) *basic.* The basic compounds containing 6 equivalents, or less, of base may be obtained soluble in water; those containing more than six equivalents of base are insoluble. (Ordway, *Am. J. Sci.*, (2.) **26.** 205.)

Nitrate of CetylAnilin. Soluble in alcohol.

Nitrate of Chelidonin. Sparingly soluble in water. (Probst, *Ann. der Pharm.*, **29.** 127.)

Nitrate of ChlorAnilin. Very soluble in water, and alcohol.

Nitrate of *bi*ChlorCinchonin. Sparingly soluble in water. (Laurent, *Ann. Ch. et Phys.*, (3.) **24.** 305.)

Nitrate of ChloroNitroHarmin.

Nitrate *of sesquioxide* of Chromium.

I.) *normal* or *ter.* $Cr_2\,O_3, 3\,N\,O_5 + 18\,Aq$ Easily soluble in water. (Berzelius, *Lehrb.*) Melts in its water of crystallization at about 36.6°, and this solution has been cooled to 20°; it boils at 125.6°. (Ordway, *Am. J. Sci.*, 1859, (2.) **27.** 17.)

II.) *bi.* $Cr_2\,O_3, 2\,N\,O_5 + 12\,Aq$ Readily soluble in water. (Ordway, *Am. J. Sci.*, 1858, (2.) **26.** 203.)

III.) *polybasic.* An aqueous solution of normal nitrate of sesquioxide of chromium can dissolve enough sesquioxide of chromium to become octobasic; beyond this the solution does not remain perfectly transparent, and it is not easy to determine the exact limit which can be attained. By gradually neutralizing the solution of nitrate of chrome with an alkali, more than two thirds of the acid may be withdrawn without any loss of transparency. (Ordway, *Am. J. Sci.*, 1858, (2.) **26.** 202.)

Nitrate of Cinchonidin(of Wittstein).

a.) *normal.* $N_2\left\{C_{36}\,H_{20}\,O_2^{\text{vi}}, H\,O, N\,O_5 + 8\,Aq\right.$ Soluble in 73 pts. of cold, and in 1 pt. of boiling water.

b.) *acid.* Easily soluble in water.

II.) **Nitrate of Cinchonidin**(of Pasteur). Easily soluble in water. (Leers, *Ann. Ch. u. Pharm.*, **82.** 158.)

Nitrate of *α*Cinchonin. $C_{40}\,H_{24}\,N_2\,O_2, H\,O, N\,O_5 + 2\,Aq$ Readily soluble in water.

Nitrate of *β*Cinchonin. Permanent. Tolerably easily soluble in water, and alcohol. (W. Schwabe, *Kopp & Will's J. B., für* 1860, p. 364.)

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Nitrate of Cinnamoyl. *Vid.* Nitrate of Hydride of Cinnamyl.

Nitrate of Cobalt.

I.) *normal.* $CoO, NO_5 + 2 Aq$ Deliquesces in moist air. Easily soluble in water, and alcohol. Soluble in 1 pt. of strong alcohol at 12.5°. (Wenzel, in his *Verwandtschaft*, p. 300 [T.].) $CoO, NO_5 + 6 Aq$ melts in its water of crystallization at about the same temperature as the corresponding nickel salt, *q. v.*, and the solution boils at about the same temperature as that of the latter. (Ordway, *Am. J. Sci.*, (2.) **27.** 17.)

II.) *hexa.* $6 CoO, NO_5 + 5 Aq$ Insoluble in water. (Winkelblech.) Soluble in cold chlorhydric, and nitric acids. Decomposed by a boiling solution of caustic potash.

Nitrate *of sesquioxide* **of Cobalt.**

I.) *basic.* Insoluble in water. (Beetz.)

Nitrate of Cobalt*ter***amin.** (*AmmonioNitrate of Cobalt.*) $N_3 \left\{ H_9 \right. . CoO, NO_5 + 2 Aq$ or $3 NH_3 . CoO, NO_5 + 2 Aq$ Immediately decomposed by water, with separation of an insoluble subnitrate of cobalt, which subsequently dissolves in the ammoniacal liquor, which also results from the decomposition. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 266.)

Nitrate of Codein. $C_{36} H_{21} N O_6, HO, NO_5$ Easily soluble in boiling, less soluble in cold water.

Nitrate of Coniin. Deliquescent. Soluble in water.

Nitrate of Copper.

I.) *normal.*

a = CuO, NO_5 Readily soluble in water. The aqueous solution saturated at 12.5° contains 56.6% of it. (Hassenfratz, *Ann. de Chim.*, **28.** 291.) The saturated aqueous solution boils at about 173°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 91.)

An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of the salt.	An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of the salt.
1.0059	1	1.1915	26
1.0119	2	1.2117	28
1.0192	3	1.2320	30
1.0252	4	1.2513	32
1.0320	5	1.2712	34
1.0390	6	1.2912	36
1.0457	7	1.3113	38
1.0526	8	1.3320	40
1.0592	9	1.3533	42
1.0655	10	1.3749	44
1.0778	12	1.3978	46
1.0918	14	1.4206	48
1.1060	16	1.4440	50
1.1201	18	1.4686	52
1.1350	20	1.4944	54
1.1521	22	1.5205	56
1.1716	24		

(Hassenfratz, *Ann. de Chim.*, **28.** 301.)

Soluble in moderately concentrated nitric acid; but it is precipitated from the aqueous solution on the addition of nitric acid of 1.512 sp. gr. (Mitscherlich.) Soluble in 1 pt. of strong alcohol at 12.5°. (Wenzel, in his *Verwandtschaft*, p. 300. [T.].) Very soluble in alcohol. (Wittstein's *Handw.*; Dumas, *Tr.*) Soluble, to a considerable extent, in alcohol. (Gmelin.)

b = *terhydrated.* $CuO, NO_5 + 3 Aq$ Crystallizes at temperatures above 26.4°. Permanent. Melts in its water of crystallization at 114.5°, and the liquid has been cooled to 106.7°; it boils at 170°. (Ordway, *Am. J. Sci.*, (2.) **27.** pp. 17, 18.)

c = *sexhydrated.* $CuO, NO_5 + 6 Aq$ Crystallizes at low temperatures. Deliquesces in warm air. At 26.4° the crystals break up into a liquid, and crystals of the terhydrate. In order to liquefy the whole, the temperature must be above 38°. An aqueous solution of nitrate of copper saturated at 10° is of density 55° B. (Ordway, *Am. J. Sci.*, (2.) **27.** 17.) The 6-hydrated salt melts in its water of crystallization at a temperature not exceeding 38°. [T.]

III.) *tri.* $3 CuO, NO_5 + 4 Aq$ Insoluble in water. Easily soluble in acids.

IV.) *tetra.* $4 CuO, NO_5 + 5 Aq$ Insoluble in water. Easily soluble in acids.

V.) *penta.* $5 CuO, NO_5 + 5 Aq$ Completely insoluble in water. (—; compare Becquerel, *C. R.*, 1845, **20.** 1532.)

Nitrate of Copper & Glycocoll.
$C_4 H_4 N O_3, HO, CuO, NO_5, CuO, HO$

Nitrate of Creatin. $C_8 H_9 N_3 O_4, HO, NO_5$ Less soluble in water than either sulphate or chlorhydrate of creatin. (Dessaignes.)

Nitrate of Creatinin & Silver. Very soluble in boiling water.

Nitrate of Cumidin. $C_{18} H_{13} N, HO, NO_5$ Soluble in water, and alcohol. (Nicholson, *J. Ch. Soc.*, **1.** 7.)

Nitrate of Cumidin & of Silver. Soluble, with decomposition, in water, and alcohol. (Nicholson, *J. Ch. Soc.*, **1.** 9.)

Nitrate of Cuminamate of Ethyl. Easily soluble in water, and alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 340.)

Nitrate of Cuminamic Acid. Soluble in water? (Cahours, *loc. cit.*, p. 338.)

Nitrate of Cupr(*ic*)*bi***amin.** $N_2 \left\{ H_6 \right. Cu O, NO_5$ Easily soluble in water; [but the aqueous solution is decomposed when diluted with a large quantity of water,] or when treated with a small quantity of acid. Soluble in alcohol. (Newmann.)

Nitrate of CyanAnilin. $N \left\{ \begin{matrix} C_{12} H_5 \\ H_2 \end{matrix} \right. . C_2 N, HO, NO_5$ Soluble in boiling water; only slightly soluble in cold water, and still less soluble in alcohol, and ether. Easily soluble in boiling, less soluble in cold dilute nitric acid. (Hofmann, *J. Ch. Soc.*, **1.** 167.)

Nitrate of CyanAnilin & of Silver.

Nitrate of Cyanethin. $C_{18} H_{15} N_3, HO, NO_5$ Soluble in water, and alcohol. (Kolbe & Frankland, *J. Ch. Soc.*, **1.** 71.)

Nitrate of Cyanetholin.

Nitrate of Cyanetholin & of Silver.

Nitrate of Cystin. Soluble in water.
$C_6 H_6 N S_2 O_4, HO, NO_5 + Aq$

Nitrate of Delphin. Deliquescent. Soluble in water.

Nitrate of Didymium.

I.) DiO, NO_5 Deliquescent. Very soluble in water. (Mosander.) Deliquescent. Exceedingly soluble in water. Soluble in

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alcohol of 96%. Insoluble in ether; but ether does not precipitate it from the alcoholic solution. (Marignac, *Ann. Ch. et Phys.*, (3.) **38.** 162.)

II.) *basic.* Insoluble in water. (Marignac, $4\,DiO, NO_5 + 5\,Aq$ *loc. cit.*)

Nitrate of Ethyl. Absolutely insoluble in C_4H_5O, NO_5 water. Soluble in all proportions in alcohol, from which it is precipitated on the addition of a small quantity of water. Soluble in 4 pts. of concentrated sulphuric acid, with subsequent decomposition. Unacted upon by a concentrated aqueous solution of caustic potash, but is decomposed by an alcoholic solution of potash. (Millon, *Ann. Ch. et Phys.*, (3.) **8.** pp. 236, 237.)

Nitrate of Ethyl & of Mercury(Hg O). $C_4H_5O, NO_5; 3\,HgO, NO_5$ Insoluble in water or alcohol. (Gerhardt.)

Nitrate of Ethylamin. Very deliquescent, and soluble in water. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 485.)

Nitrate of *tetra*Ethylammonium. Very deliquescent.

Nitrate of *di*EthylAmylamin. Deliquescent.

Nitrate of *tri*EthylAmylammonium.

Nitrate of EthylAnilin.

Nitrate of EthylBrucin. Soluble in water.

Nitrate of EthylMethylConiin. Deliquescent. Readily soluble in water. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **89.** 139.)

Nitrate of EthylNicotin. Soluble in water. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **87.** 6.)

Nitrate of *tri*EthylPhenylammonium.

Nitrate of *tetra*EthylPhosphonium. Deliquescent. Soluble in water, and alcohol. Insoluble in ether.

Nitrate of EthylStrychnine. Sparingly $C_{42}H_{21}(C_4H_5)N_2O_4, HO, NO_5$ soluble in cold, easily soluble in boiling water.

Nitrate of EthylUrea. Soluble in water.

Nitrate of *di*EthylUrea. Deliquescent. $C_2H_2(C_4H_5)_2N_2O_2, HO, NO_5$ Soluble in water. (A. Wurtz.)

Nitrate of Fucucin. Soluble in hot water, and alcohol.

Nitrate of Furfurin. Effloresces in dry $N_2\{(C_{10}H_4O_2'')_3 . HO, NO_5$ air. Readily soluble in water. Sparingly soluble in chlorhydric acid; also slowly soluble in nitric acid. (Fownes.)

Nitrate of FuscoCobalt.

I.) $5\,NH_3 . 2\,(Co_2O_3, NO_5) + 4\,Aq$ Soluble in water. Alcohol precipitates it from the aqueous solution. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 287.)

II.) *granular.* (*Ibid.*, p. 288.)
$4\,NH_3 . Co_2O_3, 2\,NO_5 + 3\,Aq$

Nitrate of Glucina.

I.) *normal.* Very deliquescent. Easily soluble $Gl_2O_3, 3\,NO_5 + 9\,Aq$(Ordway). in water, and alcohol. (Vauquelin.) Melts in its water of crystallization at 60°, and may be cooled to 29.4° before it begins to solidify; it boils at 140.5°. (Ordway, *Am. J. Sci.*, (2.) **27.** 18.)

II.) *basic.* Completely soluble in water. Com- $(Gl_2O_3)_{2-3}, 3\,NO_5 + 9\,Aq$ pounds more basic than this are insoluble in water. (Ordway, *Am. J. Sci.*, (2.) **26.** 206.)

Nitrate of Glyceryl. *Vid.* NitroGlycerin.

Nitrate of Glycocoll.

I.) *mono.* *Vid.* NitroSaccharic Acid.

II.) $(C_4H_5NO_4)_2, HO, NO_5$

Nitrate *of teroxide* of Gold. Water precipitates hydrated teroxide of gold from the nitric acid solution. (Vauquelin; Fremy; Pelletier.)

Nitrate of Guanin.

I.) *mono.* Efflorescent. Much more soluble $C_{10}H_5N_5O_2, NO_5 + 4\,Aq$ in hot than in cold water. The aqueous solution is not decomposed by boiling. (Unger.)

II.) *acid.* Efflorescent. [There are two inter- $C_{10}H_5N_5O_2, 2\,NO_5 + 6\,Aq$ mediate compounds between those which are here given.]

Nitrate of Guanin with *din*Oxide of Mercury. Sparingly soluble in water.

Nitrate of Guanin with *prot*Oxide of Mercury. Insoluble in water. Easily soluble in chlorhydric and cyanhydric acids, and in an aqueous solution of cyanide of potassium. (Neubauer & Kerner, *Ann. Ch. u. Pharm.*, **101.** 329.)

Nitrate of Harmalin. Sparingly soluble in cold water.

Nitrate of Harmin. Sparingly soluble in cold water; more readily soluble in water acidulated with nitric acid.

Nitrate of HydrargEthyl, &c. *Vid.* Nitrate of MercurEthyl, &c.

Nitrate of Hydride of Cinnamyl. De- (*Nitrate of Cinnamoyl.*)
$C_{18}H_9NO_8 = \left.\begin{matrix}C_{18}H_7O_2\\H\end{matrix}\right\}HO, NO_5$ composed by water. (Dumas & Peligot.) Soluble in spirit. (Strecker.) More soluble in boiling than in cold alcohol. Soluble in ether. (Mulder.)

Nitrate of HydroCyanHarmalin. Soluble in water acidulated with nitric acid.

Nitrate of Igasurin. More soluble in water than the chlorhydrate or the sulphate.

Nitrate of IodAnilin. Readily soluble in water, especially if this is boiling, being more soluble in hot water than any other salt of iodanilin which has yet been examined. Readily soluble in alcohol, and ether. (Hofmann, *J. Ch. Soc.*, **1.** 278.)

Nitrate of Iridium. Soluble in water. IrO, NO_5 (Berzelius.)

Nitrate *of protoxide* of Iron. Very easily $FeO, NO_5 + 6\,Aq$ soluble in water. The aqueous solution is easily decomposed when heated, if it contains an excess of acid, but neutral solutions can be heated nearly to boiling before the decomposition commences. (Berzelius's *Lehrb.*, compare Chancel, *C. R.*, **51.** 883.) The dry crystals undergo spontaneous decomposition at the ordinary temperature of the air, with evolution of NO_2 and formation of a soluble basic nitrate of sesquioxide of iron.

Soluble in 0.51 pt. of water at 0°, the aqueous solution saturated by digestion at that temperature containing 6.63% of the 6 Aq salt, and being of 1.4386 sp. gr.; and in 0.41 pt. of water at 15°, the solution saturated (by digestion) at this temperature containing 71% of the 6 Aq salt, and being

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of 1.4868 sp. gr. The aqueous solution is decomposed when heated; less rapidly when dilute than when concentrated, and more readily in presence of an excess of acid than when neutral. But unless the excess of acid is very large, a solution may be heated to 65.5°. If a solution is nearly neutral, and contains less than 20% of the hydrated salt, it requires a boiling heat to effect decomposition. (Ordway, 1863, private communication.)

NITRATE *of sesquioxide* OF IRON.

I.) *normal.* $Fe_2O_3, 3NO_5 + 18 Aq$ Deliquescent. Very soluble in water. Almost entirely insoluble in cold nitric acid, at temperatures below 15.5°; a weighed quantity was not wholly taken up by more than 20 pts. of nitric acid of 1.27 sp. gr. (Ordway, *Am. J. Sci.*, (2.) **9.** 30.) Melts in its water of crystallization at 47.2°, and may remain liquid at 21° after having been strongly heated; boils at 125°. (Ordway, *Am. J. Sci.*, (2.) **27.** 17.) Easily soluble in alcohol. (Gmelin.)

II.) *basic.* Basic compounds containing eight equivalents, and less, of sesquioxide of iron may be obtained perfectly soluble in water. These compounds are less soluble in saline solutions than in water; all of the iron appears to be thrown down from their aqueous solution on the addition of chloride of ammonium, chloride of sodium, iodide of potassium, chlorate of potash, the sulphates of soda, lime, zinc, and copper, the nitrates of potash and of soda, and the acetates of baryta and of zinc. Precipitates form more slowly on the addition of the nitrates of ammonia, magnesia, baryta, and lead; while no precipitate is produced by alcohol, acetate of copper, cyanide of mercury, nitrate of silver, or arsenic acid. Upon solutions of the terbasic nitrates, no effect is produced by chloride of ammonium, chloride of sodium, or nitrate of soda, but the sulphates cited above throw down all the iron. (Ordway, *Am. J. Sci.*, (2.) **9.** 33; & (2.) **26.** 201.) Besides the generalization of Ordway, other special basic compounds have been described by various observers, thus: —

a = $8 Fe_2O_3, NO_5 + 2 Aq$ Sparingly soluble in water. Very difficultly soluble in cold or hot nitric acid; more readily soluble in hot chlorhydric acid. (Hausmann, *Ann. Ch. u. Pharm.*, **89.** 112.)

b = $8 Fe_2O_3, 2 NO_5 + 3 Aq$ Very easily soluble in water; less soluble in spirit. Difficultly soluble in cold dilute nitric acid. (Hausmann, *loc. cit.*, p. 110.)

c = $36 Fe_2O_3, NO_5 + 48 Aq$

d, &c. (See Gmelin's *Handbook of Chemistry*, **5.** 259.)

III.) *acid.* (See Gmelin's *Handbook*, **5.** 258.)

NITRATE OF JERVIN. Very sparingly soluble in water and in mineral acids. Soluble in alcohol.

NITRATE OF LANTHANUM. $LaO, NO_5 + 3 Aq$ Very deliquescent. Very soluble in water. Readily soluble in alcohol. (Mosander.) Melts in its water of crystallization at about 40°, and may be cooled to about 21°, without crystallizing immediately; boils at 124.5°. (Ordway, *Am. J. Sci.*, (2.) **27.** 18.)

✓ **NITRATE OF LEAD.**

I.) *normal.* PbO, NO_5 Sparingly soluble in water, with reduction of temperature. It is one of the least soluble of the normal metallic nitrates.

1 pt. of the anhydrous salt

is soluble in	pts. of water at
2.58	0°
2.07	10°
1.65	25°
1.25	45°
0.99	65°
0.83	85°
0.72	100°

The saturated aqueous solution boils at 103.5°. (Kremers, *Pogg. Ann.*, **92.** 499.)

100 pts. of water dissolve of the salt,

at	
22°	59.1
22.6°	58.1
24.7°	63.1

(H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 262.) Soluble in 1.707 pts. of water at 22.3°, and in 1.585 pts. at 24.7°. (H. Kopp, cited by Gmelin.) The aqueous solution saturated at 17.5°, is of 1.3978 sp. gr.; it contains 33.45% of the salt; or, 100 pts. of water dissolve 50.26 pts. of the salt at this temperature, *i. e.* 1 pt. of the salt is soluble in 1.99 pts. of water at 17.5°. (Karsten, *Berlin Abhandl.*, 1840, p. 101.) Soluble in 1.87 pts. of water at 17.5°; or 100 pts. of water at 17.5° dissolve 53.4 pts. of it; or the aqueous solution saturated at 17.5° contains 34.8% of it, and is of 1.3816 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.) 100 pts. of the aqueous solution saturated at its boiling-point (102.2°) contain 52.5 pts. of the dry salt; or 100 pts. of water at 102.2° dissolve 110.526 pts. of the salt, or 1 pt. of it is soluble in 0.9047 pt. of water at 102.2°. (T. Griffiths, *Quar. J. Sci.*, 1829, **18.** 90.) Soluble in 7.5 pts. of cold water, the saturated solution containing 11.77% of it, and in much less hot water. Less soluble in water acidulated with nitric acid than in pure water. (Wittstein's *Handw.*) 100 pts. of boiling water dissolve 13 pts. of it. (Ure's *Dict.*) The aqueous solution saturated at 15° is of 1.390071 sp. gr., and contains dissolved in every 100 pts. at least 49.698 pts. of the salt. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.) The sp. gr. of an aqueous solution saturated at 8° = 1.372. (Anthon, *Ann. der Pharm.*, 1837, **24.** 211.)

An aqueous solution of sp. gr., at 19.5° (sp. gr. of water at 19.5° = 1),	Contains Per Cent of PbO, NO_5	Pts. of PbO, NO_5 dissolved in 100 pts. of water.
1.0934	9.991	11.10
1.1857	18.460	22.64
1.2776	25.772	34.72
1.3717	32.332	47.78
1.4496	37.115	59.02

(Kremers, *Pogg. Ann.*, **95.** 121. The second column is from Gerlach's *Sp. Gew. der Salzlœsungen*, p. 35.)

An aqueous solution of sp. gr. (at 17.5°)	Contains (by experiment) per cent of PbO, NO_5
1.0661	7.73
1.1022	11.60
1.1415	15.46
1.2274	23.20
1.3816	34.79

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **108.** 339.) From these results Schiff calculates the following table, by means of the formula: —

$D = 1 + 0.007989\,p + 0.00006336\,p^2 + 0.0000006406\,p^3$: in which D = the sp. gr. of the solution and p the percentage of substance in the solution.

Sp. gr. (at 17.5°).	Per cent of Pb O, N O_5.	Sp. gr. (at 17.5°).	Per cent of Pb O, N O_5.
1.0080	1	1.1788	19
1.0163	2	1.1902	20
1.0247	3	1.2016	21
1.0331	4	1.2132	22
1.0416	5	1.2251	23
1.0502	6	1.2372	24
1.0591	7	1.2495	25
1.0682	8	1.2620	26
1.0775	9	1.2747	27
1.0869	10	1.2876	28
1.0963	11	1.3007	29
1.1059	12	1.3140	30
1.1157	13	1.3276	31
1.1257	14	1.3416	32
1.1359	15	1.3558	33
1.1463	16	1.3702	34
1.1569	17	1.3848	35
1.1677	18	1.3996	36

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 75.) Somewhat soluble in alcohol. (Withering, *Phil. Trans.*, 1782, **72.** 336.) Insoluble in alcohol, or spirit. (Dumas, *Tr.*) Insoluble in strong nitric acid, by which, indeed, it is precipitated from the aqueous solution. (Braconnot.)

Soluble in a saturated aqueous solution of nitrate of potash, without causing any precipitation. The solution thus obtained, at 18.75° contains 53.28% of mixed salt; or 100 pts. of water dissolve 114 pts. of mixed salt, viz. 84.1 pts. Pb O, N O_5 and 29.9 pts. K O, N O_5. This solution is different from that obtained by treating a mixture of the two salts in excess with water. The latter prepared at 18.75° contains 62.87% of mixed salt; or 100 pts. of water dissolve 169.2 pts. of mixed salt, viz. 109.8 pts. Pb O, N O_5, and 59.2 pts. K O, N O_5. (Karsten, *Berlin Abhandl.*, 1840, p. 117.)

When a mixture (in excess) of nitrate of lead and nitrate of potash is treated with water, 100 pts. of the latter dissolve, at 20°, 153.8 pts. of the mixed salts, of which 94.3 pts. are nitrate of lead. In a second experiment, 158.6 pts. of the mixed salts, of which 96.2 pts. were nitrate of lead. This is a marked exception to the general law, that when a mixture of two salts of a single acid are treated with water, the salt with the strongest base is dissolved, as if no other salt than itself were present; for at 20° the solubility of nitrate of potash = 31.7, consequently in the above experiments calculation would indicate

$$\left\{\begin{array}{l} 153.8 = 31.7\ \mathrm{K\,O, N\,O_5} + 122.1\ \mathrm{Pb\,O, N\,O_5} \\ 158.6 = 31.7\ \mathrm{K\,O, N\,O_5} + 126.9\ \mathrm{Pb\,O, N\,O_5} \end{array}\right.$$

while there was found

$$\left\{\begin{array}{l} 153.8 = 59.5\ \mathrm{K\,O, N\,O_5} + 94.3\ \mathrm{Pb\,O, N\,O_5} \\ 158.6 = 62.4\ \mathrm{K\,O, N\,O_5} + 96.2\ \mathrm{Pb\,O, N\,O_5} \end{array}\right.$$

This exception is explained by the fact that a double salt (Pb O, N O_5; K O, N O_5) is formed, which has its own peculiar coefficient of solubility. (H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 268.) Soluble in considerable quantity in a saturated solution of nitrate of soda, without occasioning any precipitation of the latter. The solution obtained contains, at 18.75°, 54.94% of mixed salt. Or 100 pts. of water dissolve 121.9 pts. of mixed salt, viz. 87.8 pts. of Na O, N O_5 and 34.1 pts. of Pb O, N O_5. A solution identical with the above is obtained when a mixture of the two salts is treated with water. [Compare under Nitrate of Soda.] (Karsten, *Berlin Abhandl.*, 1840, p. 111.) When a mixture (in excess) of nitrate of lead and nitrate of soda is treated with water, 100 pts. of the water dissolve, at 15.6°, 117.9 pts. of the mixed salts, of which 33.6 pts. are Pb O, N O_5; at 20°, 123.0 pts. of the mixed salts, of which 38.4 pts. are Pb O, N O_5. According to the general law, that when a mixture of two salts of a single acid is treated with water, the salt of the stronger base dissolves as if no other salt than itself were present, the solubility of nitrate of soda, calculated from the above experiments would be

at 15.6°= 84.3 (amount dissolved by 100 pts. of water);

at 17.8° = 85.5 (as the mean of both experiments),

which agrees with the result obtained by direct experiment. (H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 269.) Also soluble in a saturated solution of mixed nitrate of potash and nitrate of soda. The solution obtained contains 64.05% of the mixed salts, or 100 pts. of water dissolve 178.13 pts. of mixed salt, viz. 43.75 pts. of Pb O, N O_5 and 134.38 pts. of (K O, Na O) N O_5. This solution is, however, not saturated, for a solution prepared by treating a mixture of the three salts with water at the same temperature contains 65.77% of salt; 100 pts. of water dissolving 192.47 pts. of mixed salt, viz. 53.24 pts. of Pb O, N O_5 and 139.23 pts. of (K O, Na O) N O_5. (Karsten, *Berlin Abhandl.*, 1840, p. 132.) Soluble in a saturated solution of nitrate of ammonia. (Karsten, *loc. cit.*)

Soluble in a saturated solution of nitrate of baryta, the latter being meanwhile precipitated until a certain definite limit is attained, when the reaction ceases. A solution of similar sp. gr. is obtained when a mixture of the two salts is treated with water. (Karsten, *Berlin Abhandl.*, 1840, p. 113.)

When one equivalent of Pb O, N O_5, in aqueous solution is mixed with a solution of an equivalent of acetate of potash (C_4 H_3 K O_4) $\frac{92}{100}$ of it are decomposed to nitrate of potash, which may be precipitated by adding alcohol, while $\frac{8}{100}$ of it remain unchanged; when mixed with a solution of an equivalent of acetate of strontia (C_4 H_3 Sr O_4) $\frac{655}{1000}$ of it are decomposed as before, while $\frac{345}{1000}$ of it remain unchanged; when mixed with a solution of an equivalent of acetate of baryta (C_4 H_3 Ba O_4) $\frac{77}{100}$ of it are decomposed, while $\frac{23}{100}$ of it remain unchanged. (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.)

II.) *di.* 2 Pb O, N O_5 + Aq. Very slightly soluble in cold, much more soluble in hot water. (Berzelius; Peligot; Gerhardt, *Ann. Ch. et Phys.*, (3.) **18.** 183.) 100 pts. of water at 19.2° dissolve 19.438 pts. of the anhydrous salt; *i. e.* 1 pt. of it is soluble in 5.145 pts. of water at 19.2°. (Pohl, *Wien. Akad. Bericht*, **6.** 597.)

III.) *tris.* 3 Pb O, N O_5 + 3 Aq. Slightly soluble in pure water; but insoluble in water containing such salts as have no chemical action upon it. (Berzelius.) Very sparingly soluble in hot, less soluble in cold water. 1 pt. of the anhydrous salt is soluble in 11.3 pts. of boiling, and in 127.3 pts. of cold water. 1 pt. of the hydrated salt is soluble in 119.2 pts. of cold and in 10.5 pts. of boiling water. Soluble in an aqueous solution of acetate of lead, but very difficultly soluble in a solution of nitrate of potash. (Vogel, *Ann. Ch. u. Pharm.*, **94.** 99.)

IV.) *tetra.* 4 Pb O, N O_5 + 3 Aq. Insoluble in boiling water. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **18.** 185.) [Gerhardt maintains that there are but two subnitrates of lead, viz. the *di* and the *tetra* salts.

V.) *hexa.* 6 Pb O, N O_5 + Aq. Almost completely insoluble in water. (Berzelius.)

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Nitrate of Lead & *of dinoxide* of Mercury. $2(PbO, NO_5); 2Hg_2O, NO_5$ Decomposed by water. Soluble in warm dilute nitric acid, and in a warm aqueous solution of nitrate of dinoxide of mercury, separating out in both cases as the solutions cool. (Stædeler, *Ann. Ch. u. Pharm.*, **87.** 130.)

Nitrate of Lead & of Potash. $PbO, NO_5; KO, NO_5$ See under **Nitrate of Lead.**

Nitrate of Lead & Leucin. $C_{12}H_{13}NO_4, PbO, NO_5$ Insoluble in water.

Nitrate of Lead with Nitrite of Lead.

I.) $PbO, NO_5; PbO, NO_3 + 2Aq$ Much more soluble in water than No. III. The solution is decomposed (oxidized) by evaporation. (Berzelius, *Lehrb.*)

II.) $PbO, NO_5; 3(PbO, NO_3) + 2Aq$ Decomposed by boiling water, with formation of dinitrate of lead. Soluble in water acidulated with nitric acid. (Gomez, *C. R.*, 1852, **34.** 188.)

III.) *basic.* $2PbO, NO_5; 2PbO, NO_3 + 4Aq$ Only difficultly soluble in cold water. (Proust, in *Berzelius's Lehrb.*, **3.** 725.)

IV.) $PbO, NO_5; 3PbO, NO_3 + Aq$ Same as Peligot's hyponitrate of lead, *q. v.*, according to Gomez (*loc. cit.*, p. 189).

Nitrite of lead is susceptible of crystallizing in all proportions with nitrate of lead. (J. Nicklès, *C. R.*, 1848, **27.** 244; compare Gomez, *loc. cit.*)

Nitrate of Lead with Oxalate of Lead. (*Nitro Oxalate of Lead.*)

I.) *normal.* $C_4Pb_2O_8; 2(PbO, NO_5) + 4Aq$ Slowly decomposed by cold, quickly by hot water. (Pelouze; Johnston.) Soluble in warm nitric acid. (Dujardin.)

II.) *basic.* Ppt. $4PbO, C_4Pb_2O_8; 6(PbO, NO_5) + 6Aq$

Nitrate of Lead with Phosphate of Lead. (*Nitro Phosphate of Lead.*) $8PbO, PO_5; PbO, NO_5 + Aq$ Insoluble in cold, decomposed by boiling water. Soluble in nitric acid, from which solution it may be recrystallized. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **22.** 505.) Only slightly acted upon by cold water; but when finely powdered the compound is slowly decomposed by boiling water. (Berzelius, *Gilbert's Ann. Phys.*, 1816, **53.** 408.)

Nitrate of Lead with Saccharate of Lead. $2(PbO, NO_5); C_{12}H_8Pb_2O_{16}$ Insoluble in cold, very sparingly soluble in hot water. Insoluble in alcohol, or saccharic acid. (Varry.)

Nitrate of Lepidin. $N\left\{C_{20}H_9''', HO, NO_5\right.$ Permanent. Soluble in alcohol. Soluble in dilute nitric acid. (Gr. Williams.)

Nitrate of Leucin. (*Nitro Leucic Acid. Leuco Nitric Acid.*) $C_{12}H_{13}NO_4, HO, NO_5$ Readily soluble in water.

Nitrate of Leucin & of Lime. (*Nitro Leucate of Lime.*) Permanent. Soluble in water.

Nitrate of Leucin & of Magnesia. (*Nitro Leucate of Magnesia.*) Permanent. Soluble in water.

Nitrate of Lime.

I.) *mono.*

a = *anhydrous.* CaO, NO_5 Soluble in water, with evolution of much heat. (Ordway, *Am. J. Sci.*, (2.) **27.** 18.)

$b = CaO, NO_5 + 4Aq$ Quickly deliquescent. Crystallized nitrate of lime is soluble in 0.25 pt. of cold water, with reduction of the temperature, the saturated solution containing 80% of it, and in all proportions in boiling water. (Berzelius's *Lehrb.*) Soluble in 2 pts. of cold, and in 0.6667 pt. of boiling water. (Fourcroy.) The aqueous solution saturated "in the cold" contains 33.3% of it. (Fourcroy); at 12.5°, 33.8%. (Hassenfratz, *Ann. de Chim.*, **28.** 291.) The hot aqueous solution is liable to become supersaturated on cooling. (Fischer, *Schw.*, **12.** 187. (*Gm.*) Melts in its water of crystallization at 43.8°; a portion, which had been heated to 51°, began to recrystallize at 35.5°, but another portion, heated to 67.2°, remained liquid over night, the temperature having fallen as low as 14.2°; it boils at 132.2°, and when the boiling is continued, the liquid remains clear until about one third of the water has been expelled. (Ordway, *Am. J. Sci.*, (2.) **27.** 18.) The saturated aqueous solution boils at 152°, with partial decomposition (Kremers, *Pogg. Ann.*, **99.** 43); at 151°, and contains in 100 pts. of water 362.8 pts. of the anhydrous salt. (Berzelius, *Lehrb.*)

An aqueous solution of sp. gr. at (12.5°)	Contains per cent of the [crystallised ?] salt.
1.0052	1
1.0104	2
1.0156	3
1.0208	4
1.0260	5
1.0310	6
1.0361	7
1.0411	8
1.0481	9
1.0510	10
1.0601	12
1.0690	14
1.0777	16
1.0864	18
1.0950	20
1.1044	22
1.1112	24
1.1185	26
1.1257	28
1.1320	30
1.1383	32

(Hassenfratz, *Ann. de Chim.*, **28.** 301.)

In a solution containing for 100 pts. of water, pts. of anhydrous CaO, NO_5	The boiling-point is elevated.	Difference.
0.0	0°	
15.0	1	15.0
25.3	2	10.3
34.4	3	9.1
42.6	4	8.2
50.4	5	7.8
57.8	6	7.4
64.9	7	7.1
71.8	8	6.9
78.6	9	6.8
85.3	10	6.7
91.9	11	6.6
98.4	12	6.5
104.8	13	6.4
111.2	14	6.4
117.5	15	6.3
123.8	16	6.3
130.0	17	6.2
136.1	18	6.1
142.1	19	6.0
148.1	20	6.0

In a solution containing for 100 pts. of water, pts. of anhydrous $Ca\,O, N\,O_5$	The boiling-point is elevated.	Difference.
160.1	22°	12.0
172.2	24	12.1
184.5	26	12.3
197.0	28	12.5
209.5	30	12.5
222.2	32	12.7
235.1	34	12.9
248.1	36	13.0
261.3	38	13.2
274.7	40	13.4
288.4	42	13.7
302.6	44	14.2
317.4	46	14.8
333.2	48	15.8
351.2	50	18.0
362.2 [saturated]	51	11.0

The point of ebullition of pure water, observed in a glass tube containing bits of metallic zinc, having been 100.1°. (Legrand, *Ann. Ch. et Phys.*, (2.) **59.** 439.) Soluble in 0.8 pt. of alcohol (Macquer), in 1 pt. of boiling alcohol. (Berzelius's *Lehrb.*) Dry nitrate of lime is soluble in 7 pts. of alcohol at 15°, and in 1 pt. of boiling alcohol. (Bergman, *Essays*, **1.** pp. 144, 181.) Ether precipitates it from the alcoholic solution. (Doebereiner.) Soluble in glacial acetic acid. (Persoz, *Chim. Moléc.*, p. 347.) Insoluble in strong nitric acid (Braconnot); by which, indeed, it is precipitated from the aqueous solution. (Mitscherlich.) Soluble in a saturated aqueous solution of nitrate of potash, with elevation of temperature and precipitation of a portion of the nitrate of potash. (Fourcroy & Vauquelin, *Ann. de Chim.*, **11.** 135.)

II.) *basic.* Decomposed by water. Insoluble (*Of variable composition.*) in, and unacted upon, by alcohol of 40°. (Millon, *Ann. Ch. et Phys.*, (3.) **6.** 91.)

Nitrate of Lime & of Magnesia. Difficultly soluble in water. (Bergman.)

Nitrate of Lime & Urea. Deliquescent. $3\,C_2\,H_4\,N_2\,O_2, Ca\,O, N\,O_5$ Soluble in water, and alcohol.

Nitrate of Lithia. Exceedingly deliquescent. $Li\,O, N\,O_5 + 5\,Aq$ Very easily soluble in water. It exhibits an extraordinary tendency to form supersaturated aqueous solutions. (Kremers, *Pogg. Ann.*, **92.** 520.)

1 pt. of the anhydrous salt
is soluble in 2.12 pts. of water at 0°
" 2.02 "
" 1.33 "
" 1.32 " 20°
" 1.31 "
" 0.59 " 40°
" 0.60 " 40.5°
" 0.51 " 70°
" 0.44 " 100°
" 0.39 " 110°

(Kremers, *Pogg. Ann.*, **99.** pp. 43, 52.) The saturated aqueous solution boils at about 200°. Very soluble in strong alcohol.

Nitrate of Lobelin.

Nitrate of Lophin. Insoluble in water. $C_{42}\,H_{16}\,N_2, H\,O, N\,O_5 + 2\,Aq$ Soluble in alcohol.

Nitrate of LuteoCobalt. Only sparingly (*Nitrate of diCobaltiagmin. Nitrate of LuteoCobaltiaque.*) $6\,N\,H_3 . Co_2\,O_3, 3\,N\,O_5$ soluble in water, more readily soluble in hot than in cold water. It is partially decomposed by long-continued boiling with water. Acids precipitate it from the aqueous solution. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 281.) Tolerably readily soluble in cold, very much more soluble in hot water. Almost insoluble in acids. (Rogojski, *Ann. Ch. et Phys.*, (3.) **41.** pp. 454, 455.) Readily soluble in hot, less soluble in cold water. Insoluble in ammonia-water, or in chlorhydric or nitric acids. Decomposed by sulphuric acid. (Gibbs & Genth, *Smithson. Contrib.*, vol. **9.** p. 45 of the Memoir.)

Nitrate of Magnesia.

I.) *mono.*

a = *anhydrous.* Soluble in 1 pt. of water at $Mg\,O, N\,O_5$ 15.6°. [Y.] A sample dried until decomposition had commenced was soluble in 4 pts. of absolute alcohol at 15.6°, and in 2 pts. at the boiling temperature. (Graham.) More soluble in alcohol of 0.817 sp. gr. than in that of 0.900 sp. gr. (Kirwan.) Soluble in 0.3458 pts. of strong alcohol at 82.5°. (Wenzel, in his *Verwandtschaft*, p. 300. [T.].) Dry nitrate of magnesia is soluble in 10 pts. of alcohol at 15°. (Bergman, *Essays*, **1.** p. 144); in 9 pts. of alcohol at a moderate heat. (*Ibid.*, p. 182.)

b = $Mg\,O, N\,O_5 + 6\,Aq$ Rapidly deliquesces. Soluble in 0.5 pt. of cold water; and in 9 pts. of cold alcohol of 0.84 sp. gr. Very difficultly soluble in absolute alcohol. (Graham, John.) Melts in its water of crystallization at 90°, and the liquid thus obtained has been cooled to 86.6°; it boils at 143.4° On continuing the application of heat, the liquid remains clear until about 5 equivs. of the water and a little acid have been expelled; the residue is now not entirely soluble. (Ordway, *Am. J. Sci.*, (2.) **27.** 16.) Less soluble in an aqueous solution of nitrate of lime than in pure water. (Dijonval.)

An aqueous solution of sp. gr. (at 21°)	Contains (by experiment) per cent. of $Mg\,O, N\,O_5 + 6\,Aq.$
1.2969	60.05
1.1840	40.04
1.1162	26.69
1.0847	20.02
1.0549	13.34
1.0267	6.67

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 334.)

From these results Schiff calculates the following table by means of the formula:—

$$D = 1 + 0.003881\,p + 0.00001708\,p^2 - 0.0000000229\,p^3;$$

in which D = the sp. gr. of the solution, and p the percentage of substance in the solution.

Sp. gr. (at 21°)	Per cent of $Mg\,O, N\,O_5 + 6\,Aq$	of $Mg\,O, N\,O_5$
1.0078	2	1.156
1.0158	4	2.312
1.0239	6	3.468
1.0321	8	4.624
1.0405	10	5.780
1.0490	12	6.936
1.0577	14	8.092
1.0663	16	9.248
1.0752	18	10.404
1.0843	20	11.560
1.0934	22	12.716
1.1026	24	13.872
1.1120	26	15.028
1.1216	28	16.184
1.1312	30	17.348

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Sp. gr.	Per cent	
(at 21°)	of $Mg O, N O_5 + 6 Aq$	$Mg O, N O_5$
1.1410	32	18.504
1.1508	34	19.660
1.1608	36	20.816
1.1709	38	21.972
1.1811	40	22.128
1.1914	42	23.284
1.2019	44	24.440
1.2124	46	25.596
1.2231	48	26.750
1.2340	50	27.900

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 70.)

NITRATE OF MAGNESIA & UREA. $2 C_2 H_4 N_2 O_2, Mg O, N O_5$ Deliquescent. Soluble in water, and alcohol.

NITRATE *of protoxide* OF MANGANESE. $Mn O, N O_5 + 6 Aq$ Deliquescent. Readily soluble in water, and alcohol. (John.) Melts in its water of crystallization at 25.8°, and the liquid has been cooled to 15.5° without solidifying; it boils at 129.4°; if the boiling be continued, decomposition soon commences, binoxide of manganese being deposited. (Ordway, *Am. J. Sci.*, (2.) **27.** 16.)

NITRATE *of sesquioxide* OF MANGANESE. $Mn_2 O_3, 3 N O_5 + 6 Aq$ (Millon.)

NITRATE OF MELAMIN. $C_6 H_6 N_6, H O, N O_5$ Permanent. Soluble in water.

NITRATE OF MELAMIN & SILVER. $C_6 H_6 N_6, Ag O, N O_5$ Somewhat soluble in water.

NITRATE OF MELANILIN. $C_{26} H_{13} N_3, H O, N O_5$ Tolerably soluble in boiling, scarcely at all soluble in cold water. Soluble in hot alcohol, scarcely at all soluble in ether. (Hofmann, *J. Ch. Soc.*, **1.** 292.)

NITRATE OF MELANILIN & SILVER. $2 C_{26} H_{13} N_3, Ag O, N O_5$ See under MELANILIN.

NITRATE OF MENAPHTHALAMIN. Nearly insoluble in cold water. Very soluble in alcohol, and ether.

✓ NITRATE OF *di*MERCUR(*ic*)AMMONIUM & *protoxide of* MERCURY.

I.) $N \left\{ \begin{matrix} H_2 \\ Hg_2 \end{matrix} \right. . O, Hg O, N O_5$ When boiled with water it is converted into No. II. Sparingly soluble in an aqueous solution of nitrate of ammonia, containing free ammonia. (Mitscherlich.)

II.) $N \left\{ \begin{matrix} H_2 \\ Hg_2 \end{matrix} \right. . O, 2 Hg O, N O_5$ Insoluble in water, or in an aqueous solution of caustic potash. Soluble in ammonia-water, from which solution it is partially precipitated on the addition of water. Largely soluble in a solution of nitrate of ammonia. Soluble in cold chlorhydric, but very sparingly soluble in nitric or sulphuric acids. (Soubeiran.)

III.) $N \left\{ \begin{matrix} H_2 \\ Hg_2 \end{matrix} \right. . O, 4 Hg O, N O_5$(?) Sparingly soluble in ammonia-water. Soluble in cold chlorhydric acid. Insoluble in warm concentrated sulphuric acid, or in a warm solution of potash.

NITRATE OF MERCUR(*ous*)AMMONIUM & *dinoxide of* MERCURY.
(*Hahnemann's Soluble Mercury.*)
$N \left\{ \begin{matrix} H_2 \\ Hg_2 \end{matrix} \right. . O, Hg_2 O, N O_5$ Insoluble in cold water. Easily soluble in nitric acid. Decomposed by dilute, completely soluble in concentrated chlorhydric acid. Cold nitric acid dissolves out some dinoxide of mercury, and boiling acetic acid dissolves the whole of it. (Bucholz.) Partially soluble, with separation of metallic mercury, in ammonia-water. (C. G. Mitscherlich), and in aqueous solutions of sulphate, and nitrate of ammonia, and of chloride of ammonium, especially when these are heated. [Some chemists regard this compound as a basic nitrate of ammonium & (of dinoxide) of mercury. $= 3 Hg_2 O, N H_4 O, N O_5$.]

NITRATE OF MERCUR(*ous*)ETHYL. (*Nitrate of HydrargEthyl.*) $C_4 H_5 Hg_2 O, N O_5$ Very easily soluble in water; less soluble in alcohol. (Strecker, *Ann. Ch. u. Pharm.*, **92.** 78.) Readily soluble in water, and alcohol. (Duenhaupt.)

NITRATE OF MERCUR(*ous*)METHYL. (*Nitrate of HydrargMethyl.*) $C_2 H_3 Hg_2 O, N O_5 + Aq$ Exceedingly soluble in water; sparingly soluble in alcohol. (Strecker, *Ann. Ch. u. Pharm.*, **92.** 79.)

NITRATE *of dinoxide* OF MERCURY.
(*Improperly Nitrate of protoxide of Mercury.*)

I.) *mono.* $Hg_2 O, N O_5$ (Lefort erroneously writes this $2 Hg_2 O, N O_5 + 1\frac{1}{2} Aq$) Easily soluble in a small amount of warm water; decomposed by a larger quantity of warm water to a soluble acid and an insoluble basic salt. Readily soluble in water acidulated with nitric acid. (Marignac, *Ann. Ch. et Phys.*, (3.) **27.** 332.) Almost entirely soluble in a large excess of cold water, only a very trifling quantity of an insoluble basic salt being formed. This solution may be preserved for a long time in closed vessels without any decomposition, i. e. without any protoxide being formed. But when treated with warmer water more of the basic salt is formed, — thus, with about 100 pts. of water at 60° a small quantity of yellow salt is formed; and if the whole be boiled, this becomes black; if more than 200 pts. of water are used, complete solution is effected, but a portion of the salt is converted into nitrate of the protoxide; some of the protoxide salt will be formed in any event, when a dilute solution of nitrate of dinoxide of mercury is boiled, although no precipitation occurs even after the boiling has been continued for a considerable length of time. (H. Rose, *Pogg. Ann.*, **83.** 153.)

II.) *di.* $2 Hg_2 O, N O_5 + Aq$(of Kane). Insoluble in cold, decomposed by boiling water.

Almost entirely insoluble in cold water; decomposed by boiling water, or by washing with hot water. (Marignac, *Ann. Ch. et Phys.*, (3.) **27.** 332; also H. Rose, *Pogg. Ann.*, **83.** 154.) Slowly soluble in cold, rapidly in hot chlorhydric acid.

Does not appear to dissolve in aqueous solutions of chloride of ammonium or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.) When treated with aqueous solutions of the alkaline chlorides, and especially if these are hot, a certain amount of protochloride of mercury (Hg Cl) is formed, and dissolves. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 179.)

III.) *crystalline basic.*
(*Nitrate intermediare*(of Lefort).)
($8 Hg_2 O, 2 N O_5 + 3 Aq$(of Mitscherlich, Jr.).)
($4 Hg_2 O, 3 N O_5 + Aq$(of Marignac).)
Soluble in a small quantity of water; decomposed by a large amount of water, to a soluble acid and an insoluble basic salt. (Mitscherlich.) Decomposed by cold water to $2 Hg_2 O, N O_5$ & $Hg_2 O, N O_5$; also by warm water, with formation of compounds of the protoxide. (H. Rose, *Pogg. Ann.*, **83.** 154.)

IV.) $5 Hg_2 O, 3 N O_5 + 2 Aq$(of Marignac).
($2 Hg_2 O, N O_5 + 2 Aq$(of Lefort).)
($2 Hg_2 O, N O_5 + Aq$(of Gerhardt).)
Soluble in boiling, less soluble in cold water. (Marignac, *Ann. Ch. et Phys.*, (3.) **27.** 328.)

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NITRATE *of protoxide* OF MERCURY.
(*Improperly BiNitrate of Mercury.*)

I.) *mono.*

a = "*Nitrate bimercurique sirupeux*" (of Millon).
$Hg\,O, N\,O_5 + 2\,Aq$ Known only in solution.

b = "*Nitrate bimercurique acid cryst. deliq.*" (of Millon).
$2\,(Hg\,O, N\,O_5) + Aq$

Deliquescent. Decomposed by water. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 355.) Insoluble in alcohol. (Braconnot.) Instantly decomposed by ether. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** pp. 181 – 182.)

II.) *di.* Not so deliquescent as the preceding.
(*Nitrate bimercurique monohydrat.* (of Millon).)
$2\,Hg\,O, N\,O_5 + Aq$

Decomposed by water. (Millon, *loc. cit.*) Deliquesces in moist air. Decomposed by cold water to $6\,Hg\,O, N\,O_5$, and $Hg\,O, N\,O_5$. Soluble in dilute nitric acid. (Kane ?)

The ordinary "nitrate of protoxide of mercury," obtained by dissolving the metal in nitric acid, consists of a mixture, in varying proportions, of $Hg\,O, N\,O_5$ and $2\,Hg\,O, N\,O_5$, the former readily soluble in water, the latter very sparingly soluble. It is exceedingly difficult to obtain either of these salts in a state of purity. (Pean de St. Gilles, *Ann. Ch. et Phys.*, (3.) **36.** pp. 84, 87.)

When "nitrate of mercury" is treated with hot water, it deposits a basic salt, which, if again treated with hot water, is still further decomposed, so that, after several repetitions of the hot-water treatment, nothing remains but pure protoxide of mercury ($Hg\,O$), entirely free from nitric acid. Meanwhile, no acid salt is formed, the water taking up nitric acid, in which only a small quantity of protoxide of mercury is dissolved. (H. Rose, *Pogg. Ann.*, **83.** pp. 142, 140.)

III.) *tri.* Insoluble in cold, decomposed by
(*Nitrate trimercurique monohydrat.* (of Millon).)
$3\,Hg\,O, N\,O_5 + Aq$

boiling water. (Kane.) Insoluble in cold water, by which, however, it is slowly decomposed; much more rapidly decomposed by boiling water. Soluble in dilute nitric acid. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 355.)

IV.) *hexa.* Insoluble in hot water. (Kane.)
$6\,Hg\,O, N\,O_5$

When water is added to a concentrated solution of protoxide of mercury in nitric acid a portion of [No. III.] $3\,Hg\,O, N\,O_5 + Aq$, is precipitated, while the dilute solution, thus made richer in acid, remains clear when more water is added. (Braconnot.)

NITRATE *of protoxide* OF MERCURY & OF SILVER.
$Hg\,O, N\,O_5;\ Ag\,O, N\,O_5$
Readily soluble in water, without decomposition. (Berzelius.)

NITRATE *of dinoxide* OF MERCURY & OF STRONTIA.
$2\,(Sr\,O, N\,O_5);\ 2\,Hg_2\,O, N\,O_5$
Decomposed by water. Readily soluble in a warm aqueous solution of nitrate of dinoxide of mercury, and in warm dilute nitric acid; separating out unchanged in either case as the solutions cool. (Stædeler, *Ann. Ch. u. Pharm.*, **87.** 131.)

NITRATE *of dinoxide* OF MERCURY with *protoxide* OF MERCURY.
$Hg_2\,O, 2\,Hg\,O, N\,O_5$
Decomposed by chlorhydric acid. (Gerhardt.)

NITRATE *of dinoxide* OF MERCURY with PHOSPHATE *of dinoxide* OF MERCURY.
$Hg_2\,O, N\,O_5;\ 3\,Hg_2\,O, P\,O_5 + 2\,Aq$
Insoluble in cold water. (Gerhardt.)

*Basic*NITRATE OF MERCURY with PHOSPHIDE OF MERCURY.
$3\,(2\,Hg\,O, N\,O_5);\ P\left\{Hg_3\right.$
Ppt.

NITRATE *of dinoxide* OF MERCURY with STRYCHNINE. Difficultly soluble in water. (Abel & Nicholson, *J. Ch. Soc.*, **2.** 262.)

NITRATE *of protoxide* OF MERCURY with SULPHIDE OF MERCURY.
$Hg\,O, N\,O_5;\ 2\,Hg\,S$
Soluble in hot aqua-regia with decomposition.

NITRATE *of protoxide* OF MERCURY with UREA & *protoxide of* MERCURY.

I.) $Hg\,O, N\,O_5;\ C_2\,H_4\,N_2\,O_2;\ Hg\,O$ Decomposed by boiling water.

II.) do.; do ; $2\,Hg\,O$ Ppt.

III.) do ; do.; $3\,Hg\,O$ Ppt. All three of these compounds are soluble in cyanhydric acid and in hot nitric acid. (Liebig, *J. Ch. Soc.*, **6.** 5.)

NITRATE OF METHYL. Sparingly soluble in
(*Methylic Nitrate. Nitrate of Methylene.*)
$C_2\,H_3\,O, N\,O_5$
water. Very soluble in alcohol, wood-spirit, and ether.

NITRATE OF METHYLAMIN. Deliquescent.
$N\left\{\begin{matrix}C_2\,H_3\\ H_2\end{matrix}\right., H\,O, N\,O_5$
Very soluble in water, and alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 460.)

NITRATE OF *tetra*METHYLAMMONIUM.

NITRATE OF METHYLENE. *Vid.* Nitrate of Methyl.

NITRATE OF METHYL*di*ETHYLAMYLAMMONIUM.

NITRATE OF METHYLNICOTIN. Very deliquescent. Soluble in water.

NITRATE OF METHYLNITROPHENIDIN. Much
$C_{14}\,H_8\,(N\,O_4)\,N\,O_2, H\,O, N\,O_5$
more soluble in warm than in cold water. (Cahours, *Ann. Ch. et Phys.*, (3.) **27.** 450.)

NITRATE OF METHYLPHENIDIN.
(*Nitrate of Anisidin.*)

NITRATE OF METHYLTUNGSTEN. Exceedingly deliquescent and soluble in water. (Riche.)

NITRATE OF METHYLURAMIN.

NITRATE OF METHYLUREA. Much less soluble in water than methylurea.

$$C_4\,H_7\,N_3\,O_8 = N_2\left\{\begin{matrix}C_2\,O_2''\\ C_2\,H_3\\ H_3\end{matrix}\right. .\ H\,O, N\,O_5$$

NITRATE OF *di*METHYLUREA.

$$C_6\,H_9\,N_3\,O_8 = N_2\left\{\begin{matrix}C_2\,O_2''\\ (C_2\,H_3)_2\\ H_2\end{matrix}\right. .\ H\,O, N\,O_5$$

NITRATE *of protoxide* OF MOLYBDENUM.

I.) *normal.* Appears to be soluble in water.
$Mo\,O, N\,O_5$ Soluble in dilute nitric acid.

II.) *basic.* Soluble in water, but the solution gradually decomposes, molybdic acid being formed.

NITRATE *of dinoxide* OF MOLYBDENUM.
$Mo\,O_2, 2\,N\,O_5$
Appears to be soluble in water. Soluble in dilute nitric acid.

NITRATE OF MOLYBDIC ACID. Soluble in dilute nitric acid.

NITRATE OF MORPHINE. Soluble in 1.5 pts. of water.

NITRATE OF NAPHTYLAMIN. Soluble in hot,
$C_{20}\,H_9\,N, H\,O, N\,O_5$
less soluble in cold dilute nitric acid. (Zinin.)

NITRATE OF NARCEIN. Sparingly soluble in cold water.

NITRATE OF NICKEL.

I.) *mono.* Efflorescent or deliquescent according to the state of the atmos-
$Ni\,O, N\,O_5 + 6\,Aq$

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phere. Soluble in 2 pts. of cold water; also soluble in spirit. (Tupputi.) Melts in its water of crystallization at 56.6°, and the liquid has been cooled to 46°; it boils at 136.7°. When the boiling is continued, the liquid remains clear until 3 equivs. of water have been expelled, it then begins to thicken and parts with acid. (Ordway, *Am. J. Sci.*, (2.) **27.** 17.) Soluble in spirit, but insoluble in absolute alcohol. Soluble in ammonia-water. (Gmelin.)

II.) *basic.* Insoluble in water. (Proust.)

Nitrate of Nickel*bi*Amin. Efflorescent. Easily soluble in water. (Erdmann.)

(*Ammonio-Nitrate of Nickel.*)

$N_2 \left\{ H_6 \right. . Ni O, N O_5 + Aq$

Nitrate of Nicotin. Easily soluble in water.

Nitrate of NitrAmarin. Insoluble in water. Sparingly soluble in alcohol; but more soluble in alcohol than the chlorhydrate. (Bertagnini, *Ann. Ch. et Phys.*, (3.) **33.** 481.)

Nitrate of (α) NitrAnilin. Readily soluble in water. Sparingly soluble in nitric acid. (Arppe, *Ann. Ch. u. Pharm.*, **93.** 360.)

Nitrate of (β) NitrAnilin. Decomposed by water. Very readily soluble in warm nitric acid. (Arppe.)

Nitrate of NitrAzoPhenylamin.

$N_2 \left\{ \begin{matrix} C_{12} H_3 (N O_4)' \\ H_4 \end{matrix} \right. , H O, N O_5$

Nitrate of NitroCumidin. Soluble in water.

Nitrate of NitroGuanin. Difficultly soluble in cold, more readily soluble in hot water. Difficultly soluble in alcohol. Insoluble in ether. Easily soluble in warm, less soluble in cold chlorhydric, and nitric acids. Soluble in aqueous solutions of potash, soda, and ammonia. (Neubauer & Kerner, *Ann. Ch. u. Pharm.*, **101.** 333.)

$C_{10} H_4 (N O_4) N_5 O_2, H O, N O_5$

Nitrate of NitroHarmalin. Somewhat sparingly soluble in water, especially if it be acidulated with nitric acid.

Nitrate of NitroHarmalin & Silver.

Nitrate of NitroHarmin. Sparingly soluble in water, still less soluble in dilute nitric acid.

Nitrate of *bi*NitroMelAnilin. Sparingly soluble in water. (Hofmann, *J. Ch. Soc.*, **1.** 308.)

$C_{26} H_{11} (N O_4)_2 N_3, H O, N O_5$

Nitrate of NitroMesidin. Decomposed by water. Soluble in water acidulated with sulphuric acid, and in alcohol. (Maule, *J. Ch. Soc.*, **2.** 120.)

Nitrate of NitroPapaverin. Almost insoluble in cold, somewhat more soluble in boiling water; much more soluble in water acidulated with nitric, or chlorhydric acids. Easily soluble in alcohol, and ether.

$C_{40} H_{20} (N O_4) N O_8, H O, N O_5$

Nitrate of NitroTyrosin. Soluble in about 5 pts. of cold water. (Stædeler ?) Sparingly soluble in cold, more soluble in boiling water. Also soluble in alcohol, especially if this is warm, though less soluble in alcohol than in water. Easily soluble in alkaline solutions.

$C_{18} H_{10} (N O_4) N O_6, H O, N O_5$

Nitrate of Octyl. Insoluble, or but sparingly soluble in water. Soluble in alcohol. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 137.)

(*Nitrate of Capryl. CaprylNitric Ether.*)

$C_{16} H_{17} O, N O_5$

Nitrate of Octylamin. Readily soluble in water. (Cahours.)

(*Nitrate of Caprylamin.*)

$N \left\{ \begin{matrix} C_{16} H_{17} \\ H_2 \end{matrix} \right. . H O, N O_5$

Nitrate *of protoxide* of Osmium. Soluble in water(?) (Berzelius.)

$Os O, N O_5$

Nitrate *of sesquioxide* of Osmium. Only sparingly soluble in water, but much more readily soluble in hot than in cold water. (Berzelius, *Lehrb.*, **3.** 1009.)

Nitrate of Oxycanthin.

Nitrate of "OxyCobaltiaque" (of Fremy). Decomposed by water, especially if this is hot, with formation of an insoluble subsalt. Soluble in warm, less soluble in cold ammonia-water. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 271.)

$5 N H_3 . Co_2 O_4, 2 N O_5 + 2 Aq$

Nitrate of Pallad*bi*Amin. Easily soluble in water.

$N_2 \left\{ H_6 \right. . Pd O, N O_5$

Nitrate of PalladAmmonium. Soluble in warm, less soluble in cold ammonia-water.

$N \left\{ \begin{matrix} H_3 \\ Pd \end{matrix} \right. . O, N O_5$

Nitrate of Palladium.

I.) *normal.* Very deliquescent. Decomposed by water, and alcohol. (Fischer.) Decomposed by water, even in the cold, to a basic salt, which separates out, and free nitric acid, containing trates of oxide of palladium, which remains in solution. No acid salt is formed. (H. Rose, *Pogg. Ann.*, **83.** pp. 143, 140.) Exceedingly deliquescent. When a solution of it is diluted with much water, a basic nitrate is precipitated. (Kane, *Phil. Trans.*, 1842, p. 293.)

$Pd O, N O_5$

II.) *basic.* Insoluble in water. (Kane, *Phil. Trans.*, 1842, pp. 293, 294.)

$4 Pd O, N O_5 + 4 Aq$

Nitrate of Papaverin. Soluble in hot, less soluble in cold water.

$C_{40} H_{21} N O_8, H O, N O_5$

Nitrate of PhenylAcetosamin. Soluble in water, and alcohol. (Natanson.)

(*Nitrate of AcetylAnilin.*)

Nitrate of PhenylCarbamic Acid. Soluble in water. Easily soluble in boiling alcohol. (Kubel.)

$C_{14} H_7 N O_4, H O, N O_5$

Nitrate of PhenylUrea. Sparingly soluble in water.

$C_{14} H_8 N_2 O_2, H O, N O_5$

Nitrate of PhenylUrea & Silver. Soluble in water.

$C_{14} H_8 N_2 O_2, Ag O, N O_5$

Nitrate of Phthalidin. Soluble in alcohol.

$C_{16} H_9 N, H O, N O_5$

Nitrate of Picolin. Soluble in water.

$N \left\{ C_{12} H_7''' \right. . H O, N O_5$

Nitrate of Piperidin. Soluble in water. Easily soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 83.)

$C_{10} H_{11} N, H O, N O_5$

Nitrate of Platin(*ic*)*bi*Amin.

I.) *mono.* Slightly soluble, or insoluble in cold, tolerably easily soluble in boiling water. Soluble in hot, less soluble in cold ammonia-water. (Gerhardt.)

(*Nitrate of diplatinamine.*)

$N_2 \left\{ H_6 \right. . Pt'' O_2, N O_5 + Aq$

II.) *acid.* Slightly soluble in cold, more freely soluble in boiling water. Less soluble in nitric acid than in water. A saturated aqueous solution of this salt gives no precipitate with potash or ammonia, even when heated, nor is it pre-

(*Sesquinitrate of diplatinamin.*)

$2 \left(N_2 \left\{ H_6 \right. . Pt'' O_2, N O_5 \right); H O, N O_5$

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cipitated by sulphuric acid or chloride of ammonium. (Gerhardt.)

NITRATE OF PLATIN(*ic*)AMMONIUM.

I.) *mono.* Sparingly soluble in cold, more soluble in boiling water.
(Nitrate of Platinamine.)
$N \left\{ \begin{matrix} H_3 \\ Pt'' \end{matrix} \right. O_2, N\,O_5 + 3\,\acute{A}q$

II.) *bi.* Insoluble in cold water. Soluble in hot nitric acid.
$N \left\{ \begin{matrix} H_3 \\ Pt'' \end{matrix} \right. O_2, 2\,N\,O_5$

NITRATE OF PLATIN(*ous*)*bi*AMIN. Readily soluble in water. (Reiset, *Ann. Ch. et Phys.*, (3.) **11.** 421.) Soluble in about 10 pts. of boiling water. Insoluble, or but sparingly soluble in alcohol. (Peyrone, *Ann. Ch. et Phys.*, (3.) **12.** pp. 203, 208.)
(Nitrate of diPlatosamin. Ammonio-Nitrate of protoxide of Platinum.)
$N_2 \} H_6 . Pt' O, N\,O_5$

NITRATE OF PLATIN(*ous*)AMMONIUM. Tolerably easily soluble in water. (Reiset, *Ann. Ch. et Phys.*, (3.) **11.** 426.) Soluble in ammonia-water, with combination. (Reiset, *Ibid.*, p. 431.)
(Nitrate of Platosamine.)
$N \left\{ \begin{matrix} H_3 \\ Pt' \end{matrix} \right. O, N\,O_5$

NITRATE *of protoxide* OF PLATINUM. Soluble in water.
$Pt\,O, N\,O_5$

NITRATE *of binoxide* OF PLATINUM.

I.) *normal.* Soluble in water.
$Pt\,O_2, 2\,N\,O_5$

II.) *basic.* Insoluble in water. (Berzelius, *Lehrb.*)

NITRATE *of binoxide* OF PLATINUM & OF POTASH.

I.) *basic.* Ppt.

NITRATE *of binoxide* OF PLATINUM & OF SODA. Known only in nitric acid solution. (Dœbereiner.)

NITRATE OF PLATOSAMMONIUM. *Vid.* Nitrate of Platin(*ous*)AMMONIUM.

NITRATE OF PLATOSOPYRIDIN.

NITRATE OF PLUMBETHYL. Readily soluble in alcohol, and ether.
$(C_4 H_5)_3\, Pb_2\, O, N\,O_5$

NITRATE OF POTASH. Permanent. Readily soluble in water, with considerable reduction of temperature.
(Nitre. Saltpetre.)
$K\,O, N\,O_5$

100 pts. of water at	0°	dissolve	13.32	pts. of it.
“	5.01	“	16.72	“
“	11.67	“	22.23	“
“	17.91	“	29.31	“
“	24.94	“	38.40	“
“	35.13	“	54.82	“
“	45.10	“	74.66	“
“	54.72	“	97.05	“
“	65.45	“	125.42	“
“	79.72	“	169.27	“
“	97.66	“	236.45	“

(Gay-Lussac, *Ann. Ch. et Phys.*, (2.) **11.** 314.)

1 pt. of the salt is soluble in pts. of water.	At °C.	100 pts. of the saturated solution containing pts. of the salt.
7.51	0°	11.72
5.98	5.01°	14.33
4.50	11.67°	18.18
3.41	17.91°	22.66
2.60	24.94°	27.74
1.33	45.10°	
less than 0.50	90°	
0.42	97.66°	70.28

(Schubarth's *Tech. Chem.*; and M. R. & P.)

From Gay-Lussac's experiments, H. Kopp deduced the following formula:—

100 pts. of water dissolve of the salt, parts =

$$13.32 + 0.5738\,T^{\circ} + 0.017168\,T^{\circ 2} + 0.0000035977\,T^{\circ 3}.$$

	By direct experiment Gay-Lussac found that 100 pts. of water dissolved of the salt, pts.	By calculation from the above formula, 100 pts. of water should dissolve of the salt, pts.
at 0°	13.32	13.32
5.01°	16.72	16.63
11.67°	22.23	22.36
17.91°	29.31	29.13
24.94°	38.40	38.37
35.13°	54.82	54.82
45.10°	74.66	74.45
54.72°	97.05	96.72
65.45°	125.42	125.42
79.72°	169.27	170.00
97.66	236.45	236.45

(H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 261.)

In addition to the above Kopp (*loc. cit.*, p. 262), determined by experiment that 100 pts. of water at 17.8° dissolve 87 pts. of the salt, and at 19.3°, 88.7 pts. The aqueous solution saturated at 18.1° is of 1.1601 sp. gr.; it contains 22.72% of the salt, or 100 pts. of water at 18.1° dissolve 29.45 pts. of it, i. e. 1 pt. is soluble in 3.396 pts. of water at 18.1°. (Karsten, *Berlin Abhandl.*, 1840, p. 101.) Soluble in 3.745 pts. of water at 15°. (Gerlach's determination. See his table of sp. grs., below.) Soluble in 3 pts. of water at 21°; or 100 pts. of water at 21° dissolve 33.3 pts. of it; or the aqueous solution saturated at 21° contains 25% of it, and is of 1.1683 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.) Soluble in 3 pts. of cold, and in 0.5 pts. of boiling water. (Fourcroy.) The aqueous solution saturated at 18° is of 1.151 sp. gr.; it contains 21.63% of the salt. Or 100 pts. of water at 18° dissolve 27 60 pts. of it, i. e. 1 pt. is soluble in 3.62 pts. of water at 18°. (Longchamp.) Soluble in 4 pts. of water at 16°, and in 0.25 pt. of boiling water. (Riffault.) 100 pts. of the aqueous solution saturated at its boiling-point (114.5°) contain 74 pts. of the dry salt; or 100 pts. of water at 114.5° dissolve 284.61 pts. of it; or 1 pt. of the dry salt is soluble in 0.3513 pts. of water at 114.5°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) Soluble in 7 pts. of cold water, and in scarcely more than 1 pt. of boiling water. (Bergman, *Essays*, **1.** 179.) Soluble in 6.15 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht, für* 1854, p. 76.) The aqueous solution saturated at 15° is of 1.134036 sp. gr., and contains dissolved in every 100 pts. of water at least 24.327 pts. of the salt. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.) 100 pts. of water at 15.5° dissolve 26.6 pts. of it; at 15.5°, 14.25 pts., and at 100°, 100 pts. (Ure's *Dict.*) The aqueous solution saturated at 10° contains 33.3% of it (Eller); at 38°(of B's therm.), 15.8% of it (Boerhave); "in the cold," 25.0% (Fourcroy); at 12.5°, 24.8% (Hassenfratz, *Ann de Chim.*, **28.** 291). Tables of the solubility of nitrate of potash at various temperatures, by Huss, are said to have been published in the *Jahrb. d. k. k. polytech. Inst. in Wien.*, vol. **1.** p. 415.

An aqueous solution of sp. gr., at 19.5° (sp. gr. of water at 19.5° = 1)	Contains Per cent of $K\,O, N\,O_5$.	Contains Pts. of $K\,O, N\,O_5$ dissolved in 100 pts. of water.
1.0307	4.871	5.12
1.0618	9.618	10.64
1.0920	14.044	16.34
1.1198	17.965	21.90
1.1457	21.488	27.37

(Kremers, *Pogg. Ann.*, **95.** 120. The second column is from Gerlach's *Sp. Gew. der Salzloesungen*, p. 34.) From the observations of Kremers and Beilstein, Schiff calculates the following

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table, by means of the formula: $D = 1 + 0.00629\ p + 0.0000099\ p^2 + 0.0000003\ p^3$; in which D = the sp. gr. of the solution and p the percentage of substance in the solution.

Sp. gr.	Per cent of KO, NO_5	Sp. gr.	Per cent of KO, NO_5
1.032	5	1.246	35
1.073	10	1.287	40
1.098	15	1.331	45
1.132	20	1.378	50
1.168	25	1.427	55
1.206	30	1.479	60

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **107.** 303.)

An aqueous solution of sp. gr. (at 21°)	Contains (by experiment) per cent of KO, NO_5.
1.0170	2.77
1.0337	5.54
1.0510	8.31
1.0695	11.08
1.1073	16.62
1.1683	24.93

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 339.)

From these results Schiff calculates the following table by means of the formula: $D = 1 + 0.005794\ p + 0.00004275\ p^2 - 0.0000001742\ p^3$; in which D = the sp. gr. of the solution, and p the percentage of substance in the solution.

Sp. gr. (at 21°)	Per cent of KO, NO_5	Sp. gr. (at 21°)	Per cent of KO, NO_5
1.0058	1	1.0819	13
1.0118	2	1.0887	14
1.0178	3	1.0956	15
1,0239	4	1.1026	16
1.0300	5	1.1097	17
1.0363	6	1.1169	18
1.0425	7	1.1242	19
1.0490	8	1.1316	20
1.0555	9	1.1390	21
1.0621	10	1.1464	22
1.0686	11	1.1538	23
1.0752	12	1.1613	24

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 75; compare **113.** 184.)

A solution of sp. gr. (at 16°).	Contains per cent of air-dried KO, NO_5
1.000	0.
1.0062	1.
1.0125	2.
1.0186	3.
1.0244	4.
1.0302	5.
1.0353	6.
1.0408	7.
1.0468	8.
1.0531	9.
1.0595	10.
1.0658	11.
1.0722	12.
1.0786	13.
1.0850	14.
1.0917	15.
1.0984	16.
1.1050	17.
1.1119	18.
1.1186	19.
1.1255	20.
1.1322	21.
1.1389	22.
1.1456	23.
1.1522	24.
1.1570	24.88 (sat'd sol.)

(Hassenfratz, *Ann. de Chim.*, **27.** 137, and **28.** 300.)

A solution of sp. gr. (at 16°)	Contains per cent of KO, NO_5 (carefully dried).
1.0433	6.00
1.0467	6.61
1.0484	6.93
1.0489	7.00
1.0504	7.27
1.0528	7.66
1.0541	8.00
1.0553	8.08
1.0583	8.55
1.0610	9.00
1.0676	10.00

(Hassenfratz, *Ann. de Chim.*, **31.** 133.)

The saturated aqueous solution boils at 116° (Graham Otto); at 114.5° (Griffiths, *loc. cit.*); at 118° (Kremers, *Pogg. Ann.*, **97.** 19); at 115.6° (Faraday); at 115.9°. (Legrand, *loc. inf. cit.*).

In a solution containing for 100 pts. of water, pts. of anhydrous KO, NO_5	The boiling-point is elevated.	Difference.
0.0	0°	
12.2	1°	12.2
26.4	2°	14.2
42.2	3°	15.8
59.6	4°	17.4
78.3	5°	18.7
98.2	6°	19.9
119.0	7°	20.8
140.6	8°	21.6
163.0	9°	22.4
185.9	10°	22.9
209.2	11°	23.3
233.0	12°	23.8
257.6	13°	24.6
283.3	14°	25.7
310.2	15°	26.9
335.1	15.9°	

The point of ebullition of pure water, observed in a glass tube containing bits of metallic zinc, having been 100.2°. (Legrand, *Ann. Ch. et Phys.*, 1835, (2.) **59.** 434.) Very sparingly soluble in alcohol of 0.833 sp. gr., and completely insoluble in absolute alcohol. (Berzelius, *Lehrb.*, **3.** 131.) By no means completely insoluble in absolute alcohol, as has been stated by Berzelius. (Kirchoff & Bunsen, *Pogg. Ann.*, 1861, **113.** 368, *note.*) Difficultly soluble in spirit, and as good as insoluble in absolute alcohol. (Fresenius, *Quant.*, p. 120.) Soluble in 48 pts. of boiling alcohol. (Wenzel, in his *Verwandtschaft*, p. 300. [T.]); in 100 pts. of alcohol. (Riffault.) 100 pts. of alcohol of 0.900 sp. gr. dissolve 2.76 pts. of it; of 0.872 sp. gr. 1 pt. of it; but it is insoluble in alcohol of from 0.817 to 0.848 sp. gr. (Kirwan, *On Mineral Waters*, p. 274. [T.].) Soluble in 100 pts. of alcohol of 0.878 sp. gr., but stronger alcohol does not take up any sensible portion of it. (Kirwan.)

A solution (saturated at 15°) in alcohol of		Contains per cent of KO, NO_5
Sp. gr.	Per cent by weight	
1.000	0	20.5
0.986	10	13.2
0.972	20	8.5
0.958	30	5.6
0.939	40	4.3
0.917	50	2.8
0.895	60	1.7
0.847	80	0.4

(H. Schiff, *Ann. Ch. u. Pharm.*, 1861, **118.** 365.) Almost insoluble in ether. (Braconnot.) Soluble in concentrated nitric acid, also more

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readily soluble in dilute nitric acid than in pure water. Alcohol precipitates it from these solutions. (Braconnot.)

Soluble in a saturated aqueous solution of nitrate of soda. A solution thus obtained, at 18.75°, contains 55.28% of mixed salt; or 100 pts. of water dissolve 123.79 pts. of salt, viz. 35.79 pts. of K O, N O_5, and 88 pts. of Na O, N O_5. This solution is not of the same composition as that obtained by treating a mixture of the two salts with water at 18.75°. Such a solution contains 57.37% of mixed salt, or 100 pts. of water dissolve 134.38 pts. of mixed salt. (Karsten, *Berlin Abhandl.*, 1840, p. 118.) Soluble in a saturated solution of nitrate of ammonia, at first without causing any precipitation, but subsequently with precipitation of the latter, until a certain definite amount has been dissolved, when the reaction ceases. The solution thus obtained has the same sp. gr. as that prepared at the same temperature, by treating a mixture of the two salts with water. (Karsten, *Berlin Abhandl.*, 1840, p. 113.)

Soluble in a saturated solution of nitrate of baryta at first to a clear solution, but soon a double salt (K O, N O_5; Ba O, N O_5) separates. After this precipitation has ceased, the solution, of 1.1675 sp. gr., contains 23.09% of mixed salt; 100 pts. of water dissolve 30.03 pts. of mixed salt, viz. 29.03 pts. K O, N O_5, and 1 pt. Ba O, N O_5. Saturated solutions of K O, N O_5, and of Ba O, N O_5, may be mixed in any proportion without the formation of any precipitate. (Karsten, *Berlin Abhandl.*, 1840, p. 126.) When a mixture of nitrate of baryta and nitrate of potash is treated with water, 100 pts. of the latter dissolve at 21.5°, 38.8 pts. of the mixed salts, of which 5.7 pts. are Ba O, N O_5; at 23°, 39.8 pts. of the mixed salts, of which 3.5 pts. are Ba O, N O_5. The solubility of pure nitrate of

$$\text{baryta is at} \begin{cases} 21.5^\circ = 9.4 \\ 23.0^\circ = 9.8 \end{cases} ;\ \text{that of}$$

$$\text{nitrate of potash at} \begin{cases} 21.5^\circ = 33.6 \\ 23.0^\circ = 35.6 \end{cases}$$

consequently the calculated composition of the mixed salts dissolved should be at 21.5°.

$$\text{total } 38.8 = \begin{cases} 33.6 \text{ K O, N O}_5 \\ 5.2 \text{ Ba O, N O}_5 \end{cases} ;$$

$$\text{at } 23^\circ \ \text{total } 39.8 = \begin{cases} 35.6 \text{ K O, N O}_5 \\ 4.2 \text{ Ba O, N O}_5 \end{cases}$$

By experiment there was found at 21.5°

$$\text{total } 38.8 = \begin{cases} 33.1 \text{ K O, N O}_5 \\ 5.7 \text{ Ba O, N O}_5 \end{cases} ;$$

$$\text{at } 23^\circ \ \text{total } 39.8 = \begin{cases} 36.3 \text{ K O, N O}_5 \\ 3.5 \text{ Ba O, N O}_5 \end{cases}$$

As a general rule, when two salts of a single acid are dissolved together, that of the stronger base retains its own solubility as if no other salt were present, and the salt of the weaker base dissolves in the solution of the other. (H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 265.)

A saturated solution of nitrate of potash which has dissolved some nitrate of lime has no tendency to dissolve any more nitrate of potash, but rather to deposit a little of that already dissolved. (Lavoisier, *Ann. de Chim.*, 1792, **15.** pp. 237, 244.) Soluble in a solution of nitrate of lime. After crystallizing out all the K O, N O_5 which would separate at 5°, the solution contained 16.33 pts. of Ca O, N O_5, 5.57 pts. of K O, N O_5, and 17.26 pts. of water, that is to say, more than twice as much K O, N O_5 as 17.26 pts. of pure water could dissolve at this temperature. (Longchamp, *Ann. Ch. et Phys.*, (2.) **9.** 8.)

Soluble in a saturated solution of nitrate of lead without causing any precipitation of the latter. The solution thus obtained at 18.75° contains 51.71% of mixed salt; or 100 pts. of water dissolve 107.6 pts. of mixed salt, viz. 51.56 pts. Pb O, N O_5 and 53.04 pts. K O, N O_5. This solution is of different composition from that obtained by treating a mixture of the two salts (in excess) with water at 18.75°, for the latter contains 62.87% of mixed salt; or 100 pts. of water dissolve 169.2 pts. of mixed salt, viz. 109.8 pts. Pb O, N O_5 and 59.2 pts. K O, N O_5. (Karsten, *Berlin Abhandl.*, 1840, p. 117.) [See also under NITRATE OF LEAD.] Soluble in a saturated solution of nitrate of lead and of soda (Na O, Pb O), N O_5 without causing any precipitation, but the solution thus obtained is not saturated, since it contains less of all the salts than the solution prepared by treating a mixture of them with water. (Karsten, *Berlin Abhandl.*, 1840, p. 132.)

Chloride of sodium dissolves in a saturated aqueous solution of nitrate of potash with slight elevation of temperature, and the mixed solution obtained is now capable of dissolving more K O, N O_5, the solubility of the latter appearing to increase in the same ratio as the quantity of Na Cl present; but after a while a large portion of the K O, N O_5 dissolved is deposited again; this deposition may, however, depend upon accidental circumstances. (Fourcroy & Vauquelin, *Ann. de Chim.*, **11.** 130, *et seq.*) A solution saturated at 18° is of 1.151 sp. gr., and contains 21.63% of K O, N O_5; when Na Cl is added to this solution a portion dissolves, and the solution thus obtained can now dissolve new portions of K O, N O_5; thus:—

If of the above solution of K O, N O_5 there be taken	and Na Cl be added to it,	K O, N O_5 will dissolve to the extent of	The amount of K O, N O_5 originally dissolved being	Total amount K O, N O_5 dissolved	Sp. gr. of the solution.
grms.	grms.	grms.	grms.	grms.	
100	5.	0.746	21.63	22.376	1.1871
100	10.	1.267	21.63	22.897	1.2212
100	15.	1.658	21.63	23.288	1.2523
100	20.	1.827	21.63	23.457	1.2832
100	25.	2.583	21.63	24.213	1.3096
100	26.85	3.220	21.63	24.850	1.3290

The last row of figures represents the maximum of K O, N O_5 and Na Cl which are dissolved at the temperature indicated. At 4° the sp. gr. of a saturated solution of K O, N O_5 + Na Cl = 1.3057. It contains 16.06% of K O, N O_5 and 22.2% of Na Cl. An amount of H O which, when pure, could only dissolve 100 pts. of K O, N O_5 at this temperature, now holds in solution 152.64 pts. of this salt. (Longchamp, *Ann. Ch. et Phys.*, (2.) **9.** pp. 8, 10, 11.) Soluble in a saturated solution of chloride of sodium. The solution thus obtained at 18.75° contains 41.05% of mixed salt; or 100 pts. of water dissolve 69.65 pts. of mixed salt, viz. 36.53 pts. Na Cl and 33.12 pts. K O, N O_5. This solution is not of the same composition as that prepared by treating a mixture of the two salts with water at 18.75°, for the latter contains 43.73% of mixed salt; or 100 pts. of water dissolve 77.72 pts. of mixed salt, viz. 38.53 pts. of K O, N O_5 and 39.19 pts. of Na Cl. (Karsten, *Berlin Abhandl.*, 1840, p. 117.) When a mixed solution of K O,

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$N O_5$ and of $Na Cl$ is evaporated at the boiling temperature, $Na Cl$ separates out first, but when evaporated at ordinary temperatures, $K O, N O_5$ separates out first. (Vauquelin, *Ann. de Chim.*, **13.** 97.)

Soluble in a saturated solution of chloride of potassium without precipitating any of the latter. A solution of same sp. gr. as the above is obtained when a mixture of the two salts is treated with water. (Karsten, *Berlin Abhandl.*, 1840, p. 113.) When a mixture of nitrate of potash and chloride of potassium is treated with water 100 pts. of the latter dissolve at 12.9°, 47.3 pts. of the mixed salts, of which 28.5 pts. are chloride of potassium; at 15.3°, 47.7 pts. of the mixed salts, of which 28.8 pts. are chloride of potassium.

At 12.9° the solubility of pure $K O, N O_5 = 23.6$
" 15.3° " " $= 26.1$
that of $K Cl$ at these temperatures $= 32.8$ and 33.4.

$$\text{Found at } 12.9^\circ \qquad 47.3 = 18.8 + 28.5$$

$$\text{Calculated at do.}\ \begin{matrix}23.6\\32.8\end{matrix}\begin{cases}56.4 : 23.6 : 32.8 =\\47.3 : 19.8 : 27.5\end{cases}$$

$$\text{Found at } 15.3^\circ \qquad 47.7 = 18.9 + 28.8$$

$$\text{Calculated at do.}\ \begin{matrix}26.1\\33.4\end{matrix}\begin{cases}59.5 : 26.1 : 33.4 =\\47.7 : 20.9 : 26.8.\end{cases}$$

(H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 264.)

Soluble in a saturated solution of chloride of ammonium. The solution thus obtained, at 18.75° contains 43.07 pts. of mixed salt, consequently 100 pts. of water dissolve 75.66 pts. of mixed salt, viz. 37.98 pts. $N H_4 Cl$, and 37.68 pts. $K O, N O_5$. This solution is of different composition from that prepared by treating a mixture of the two salts with water. This last containing 44.28% of mixed salt; 100 pts. of water dissolving 79.46 pts. of mixed salt, viz. 38.62 pts. $K O, N O_5$ and 39.84 pts. $N H_4 Cl$. (Karsten, *Berlin Abhandl.*, 1840, p. 119.) Soluble in a saturated solution of chloride of ammonium, from which solution it is not displaced by salts which would precipitate it from its solution in pure water. (Margueritte, *C. R.*, **38.** 307.)

A saturated solution of nitrate of potash which has dissolved some chloride of calcium has no tendency to dissolve any more nitrate of potash, but rather to deposit a small portion of that already dissolved. (Lavoisier, *Ann. de Chim.*, 1792, **15.** pp. 237, 244.) Soluble in a saturated solution of chloride of barium, while nitrate of baryta separates out. (Karsten, *loc. cit.*, p. 130.)

Slowly soluble in a saturated solution of sulphate of potash, at first without causing any precipitation, but afterwards with separation of $K O, S O_3$. The solution thus obtained contains, at 18.75°, 25.083% of mixed salt; or 100 pts. of water dissolve 33.42 pts. of mixed salt, viz. 29.46 pts. $K O, N O_5$ and 3.96 pts. $K O, S O_3$. A solution identical with the above is obtained when a mixture of the two salts is treated with water. (Karsten, *Berlin Abhandl.*, 1840, p. 112.) When an excess of a mixture of nitrate of potash and sulphate of potash is treated with water at 20°, 100 pts. of the water dissolve 33.6 pts. of the mixed salts, of which 6.9 pts. are sulphate of potash and 26.7 pts. nitrate of potash; a second experiment at the same temperature, gave 33.5 pts. of mixed salt, containing 6.4 pts. sulphate of potash and 27.1 pts. nitrate of potash.

At 20° the solubility of pure $K O, N O_5 = 31.7$; that of $K O, S O_3 = 11.8$.

$$\text{Found}\begin{cases}33.6 = 26.7 + 6,9\\33.5 = 27.1 + 6,4\end{cases}$$

$$\text{Calculated}\ \begin{matrix}31.7\\11.8\end{matrix}\begin{cases}43.5 : 31.7 : 11,8\\= 33,6 : 24.5 : 9,1.\end{cases}$$

At 40°, 100 pts. of water dissolved 64.8 pts. of mixed salt containing 5.8 pts. $K O, S O_3$. In a second experiment 65.4 pts. of mixed salt were dissolved, of which 5.7 pts. were $K O, S O_3$.

At 40°, the solubility of $K O, N O_5 = 64$; that of $K O, S O_3 = 15.3$

$$\text{Found}\begin{cases}64.8 = 59.0 + 5.8.\\65.4 = 59.7 + 5.7.\end{cases}$$

$$\text{Calculated}\ \begin{matrix}64.0\\15.3\end{matrix}\Big\{\ 79.3 : 64.0 : 15.3 =$$

$$\begin{cases}64.8 : 52.3 : 12.5\\65.4 : 52.8 : 12.6\end{cases}$$

(H. Kopp, 1840, *Ann. Ch. u. Pharm.*, **34.** 263.) Soluble in a saturated solution of sulphate of soda, but after several hours some $K O, S O_3$ separates. (Karsten, *loc. cit.*, pp. 129, 130.) Soluble also in a saturated solution of sulphate of copper, but only to form a double sulphate which soon begins to separate. Very slowly and difficultly soluble in a saturated solution of sulphate of magnesia with separation of some sulphate of potash. (Karsten, *loc. cit.*, p. 124.) Soluble in a saturated solution of sulphate of zinc, but only to form a double sulphate which immediately separates. Soluble in a saturated solution of chlorate of potash, and from this solution nitrate of potash is not precipitated by salts, which would precipitate it from its aqueous solution. (Margueritte, *C. R.*, **38.** 307.)

When one equivalent of $K O, N O_5$, in aqueous solution, is mixed with a solution of an equivalent of acetate of baryta ($C_4 H_3 Ba O_4$) $\frac{72}{100}$ of it are decomposed to nitrate of baryta, which may be precipitated by adding alcohol, while $\frac{28}{100}$ of it remain unchanged; when mixed with a solution of an equivalent of acetate of lead ($C_4 H_3 Pb O_4$) $\frac{9}{100}$ of it are decomposed as before, while $\frac{91}{100}$ of it remain unchanged; when mixed with the solution of an equivalent of acetate of strontia ($C_4 H_3 Sr O_4$), $\frac{86}{100}$ of it are decomposed, while $\frac{64}{100}$ of it remain unchanged (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203); when mixed with a solution of an equivalent of caustic baryta $\frac{9361}{10000}$ of it are decomposed, while $\frac{639}{10000}$ of it remain unchanged. (*Ibid.*, p. 205.)

Unusually large and perfect crystals of nitrate of potash are obtained when it is dissolved in boiling lime-water. It was not found that the latter exerted any similar influence upon other salts besides saltpetre. (Berzelius, *Lehrb.*, **1.** 431.)

NITRATE OF POTASH & OF SODA. Soluble in water. (Loose.)
$K O, N O_5 ; Na O, N O_5$

NITRATE OF POTASH & OF THORIA. Very soluble in water, and alcohol. (Berzelius.)
$K O, N O_5 ; Th O, N O_5$

NITRATE OF POTASH & OF UREA.

NITRATE OF POTASH & GLYCOCOL. Soluble in water, from which it is precipitated on the addition of strong alcohol. (Horsford, *Am J. Sci.*, (2.) **4.** 68.)
$C_4 H_4 N O_3, K O, N O_5$

NITRATE OF POTASH with *bi*SULPHATE OF POTASH. Decomposed by water, and alcohol. (Jacquelain); (compare Green, *Am. J. Sci.*, (1.) **3.** 93.)
$K O, N O_5 ; K O, H O, 2 S O_3$

NITRATE OF POTASH with SULPHOMOLYBDATE OF POTASH.

NITRATE OF POTASH with SULPHOTUNGSTATE OF POTASH. Very soluble in water, and almost as readily in cold as in hot. Insoluble in alcohol, by
$K S, W S_3 ; K O, N O_5$

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which it is precipitated from the aqueous solution. (Berzelius.)

Nitrate of Potash with Tungstate of Potash? (*Nitro Tungstate of Potash.*) 100 pts. of boiling water dissolve 5 pts. of it.

Nitrate of Quinidin. Less soluble in water than the quinine salt.

Nitrate of Quinine. $C_{40}H_{24}N_2O_4, HO, NO_5 + 2Aq$ Soluble in water; more readily in hot than in cold, and in alcohol. (Strecker.)

Nitrate of Quinine & Silver. *Vid.* Nitrate of Silver & Quinine.

Nitrate of Quinolein. (*Nitrate of Chinoline.*) $C_{18}H_7N, HO, NO_5$ Permanent. (Williams.) Extremely soluble in water, and alcohol. Insoluble in ether. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 172.)

Nitrate of Raewsky's 1st Base. *Vid.* Nitrate of AmmoniumChloroPlatin(*ous*)ammonium & of AmmoniumOxyPlatin(*ous*)ammonium.

Nitrate of Raewsky's 2d Base. Said to be identical with Nitrate of AmmoniumChloroPlatin(*ous*)Ammonium, *q. v.*

Nitrate of Retinin. Soluble in water.

Nitrate of Rhodium. Deliquescent.
$Rh_2O_3, 3NO_5$

Nitrate of Rhodium & of Soda. $Rh_2O_3, 3NO_5; NaO, NO_5$ Easily soluble in water. Insoluble in alcohol. (Berzelius.)

Nitrate of RoseoCobalt.

a = anhydrous. (*Nitrate of RoseoCobaltiaque.*) $5NH_3 . Co_2O_3, 3NO_5$ Scarcely soluble in cold, decomposed by boiling water. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 297.) Rather insoluble in cold water, though more soluble than the sulphate. Also rather more easily soluble in hot water than the sulphate, but the hot solution is readily decomposed unless it be acid. (Gibbs & Genth, *Smithsonian Contrib.*, vol. **9.** p. 15 of the Memoir.)

b = hydrated. $5NH_3 . Co_2O_3, 3NO_5 + 2Aq$ Readily soluble in water, even when this is cold. The neutral solution is easily decomposed by heating, but the presence of a few drops of nitric acid will prevent this decomposition. Insoluble in cold nitric acid. (Gibbs & Genth, *Smithson. Contrib.*, vol. **9.** p. 17 of the Memoir.)

Nitrate of Sarcin.

Nitrate of SelenEthyl. Soluble in nitric acid. (Joy.)

✓ **Nitrate of Silver.** AgO, NO_5 Permanent. Soluble in 1 pt. of cold, and in 0.5 pt. of hot water.

Soluble in	0.82	pt. of water at	0°.
"	0.44	"	19.5°.
"	0.20	"	54°.
"	0.14	"	85°.
"	0.09	"	110°.

The saturated aqueous solution boils at above 125°. (Kremers, *Pogg. Ann.*, **92.** 499.) Soluble in 1.333 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) The hot aqueous solution is liable to become supersaturated on cooling. (Fischer, *Schw.*, **12.** 187. [Gm.].)

Soluble in 2.4 pts. of strong boiling alcohol. (Wenzel, in his *Verwandtschaft*, p. 300. [T.].) Soluble in 10 pts. of alcohol. (Dumas, *Tr.*); in 4 pts. of boiling alcohol.

Soluble in glycerin. (Pelouze.) Soluble in ether. (Berzelius, *Lehrb.*, **3.** 928.) Abundantly soluble in cold creosote, the solution undergoing decomposition when boiled. (Reichenbach.) Insoluble in strong nitric acid, which precipitates it from the aqueous solution, and also from the solution in dilute nitric acid.

Nitrate of Silver & Glycocoll. $C_4H_5NO_3, AgO, NO_5$ Deliquescent. Soluble in water. (Horsford, *Am. J. Sci.*, (2.) **4.** 68.)

Nitrate of Silver with biNitroEthylate of Silver. $C_4H_5AgN_2O_4; AgO, NO_5$ Very sparingly soluble in water.

Nitrate of Silver & Oxide of Cacodyl $3C_8H_{12}As_2O_3, 2(AgO, NO_5)$ (Alkarsin). Insoluble in cold, decomposed by hot nitric acid.

Nitrate of Silver & Quinine. $C_{40}H_{24}N_2O_4, AgO, NO_5 + Aq$ Soluble in 285 pts. of water at 15°; more soluble in boiling water. Insoluble, or very sparingly soluble in alcohol. (Strecker, *Ann. Ch. u. Pharm.*, **91.** 161.)

Nitrate of Silver & Sinamin. Ppt.

Nitrate of Silver & Sarcin. $C_{10}H_4N_4O_2, AgO, NO_5$ Insoluble in water, or in cold dilute nitric acid. Soluble in moderately concentrated boiling nitric acid, separating out again unchanged as the solution cools. (Strecker.)

Nitrate of Silver & Strychnine.
$C_{42}H_{22}N_2O_4, AgO, NO_5$

Nitrate of Silver & Theobromine. $C_{14}H_8N_4O_4, AgO, NO_5$ Very sparingly soluble in water. (Glasson.)

Nitrate of Silver & Thiosinamin. $C_8H_8N_2S_2, AgO, NO_5$ Insoluble in cold, decomposed by boiling water. Soluble, without decomposition, in warm, dilute nitric acid. Soluble in aqueous solutions of nitrate of silver and of thiosinamine. (Aschoff.)

Nitrate of Silver & of Toluidin. Ppt.

Nitrate of Silver & Urea.

I.) $C_2H_4N_2O_2, AgO, NO_5$ Readily soluble in water, and alcohol. The aqueous solution is decomposed when boiled for some time.

II.) $C_2H_4N_2O_2, 2(AgO, NO_5)$ Soluble in water.

Nitrate of Sinapin. Readily soluble in water. (v. Babo & Hirschbrunn.)

Nitrate of Sinkalin. Deliquescent. Soluble in water. (v. Babo & Hirschbrunn.)

Nitrate of Soda. ✓ NaO, NO_5 Deliquesces in very moist air. Soluble in water, with great reduction of temperature. Soluble in about 3 pts. of water at 16°, and in 1 pt. at 52°; much more soluble in boiling water. (Dumas, *Tr.*, **6.** 238.)

Soluble in	1.58	pts. of water at	— 6°	
"	0.46	"	+ 119°	(Marx.)
"	2.89	"	2°	Osann.
"	1.12	"	28°	
"	0.79	"	47°	
"	1.14	"	18.5°	(H. Kopp.)
"	1.136	"	18.75°	(Karsten.)

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1 pt. of Na O, N O_5 dissolves in pts. water.	At °C.	100 pts. of the saturated solution contain pts. of Na O, N O_5
1.55	— 6°	38.68
1.25	0°	44.44
[?] 4.40	10°	18.50
1.82	15.5°	35.48
0.46	119°	68.60

(Mohr, Redwood & Procter's *Pharmacy*, p. 243.)

Soluble in 1.16 pts. of water at 20°; or 100 pts. of water at 20° dissolve 86.6 pts. of it; or the aqueous solution saturated at 20° contains 46.4% of it, and is of 1.3806 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.) Soluble in 2 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.)

100 pts. of water at — 6.1° dissolve 63.1 pts. of it.
" 0° " 80. "
" + 10° " 22.7 "
" 16° " 55. "
" 19° " 218.5 "

(Marx.) The statement of Marx, that the salt is more than three times as soluble in water at 0° than at 10° having been doubted by Poggiale, the latter instituted a new series of experiments. That his results do not agree with those of Marx may be seen by comparing the two tables.

100 pts. of water (at °C)	Dissolve of the anhydrous salt parts
— 6°	68.80
0°	79.75
+ 10°	84.30
16°	87.63
20°	89.55
30°	95.37
40°	102.31
50°	111.13
60°	119.94
70°	129.63
80°	140.72
90°	153.63
100°	168.20
120°	225.30

(Poggiale, *Ann. Ch. et Phys.*, (3.) **8.** 469.)

[Marx's table is incorrectly printed in Poggiale's Memoir, in *Ann. Ch. et Phys.*, (3.) **8.** 473.] In 100 pts. of the aqueous solution saturated at its boiling point, 119°, are contained 60 pts. of the dry salt. Or 100 pts. of water at 119° dissolve 150 pts. of it; or 1 pt. of the dry salt is soluble in 0.666 pt. of water at 119°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) The aqueous solution saturated at 18.75° is of 1.3769 sp. gr.; it contains 46.81% of the salt; or 100 pts. of water dissolve 88.001 pts. of it at 18.75°. (Karsten, *Berlin Abhandl.*, 1840, p. 101.) The aqueous solution saturated "in the cold," contains 33.3% of it (Fourcroy); at 12.5°, 34% (Hassenfratz, *Ann. de Chim.*, **28.** 291.) 100 pts. of water at 15.5° dissolve 33 pts. of it, and at 52.2°, 100 pts. (Ure's *Dict.*)

If a solution which is not yet saturated be concentrated by boiling, it will become somewhat supersaturated. In a solution thus prepared the boiling temperature was 123° just before crystals began to separate. With the separation of the first crystals the boiling point fell to its normal, 122°. (Kremers, *Pogg. Ann.*, **97.** pp. 21, 19.)

An aqueous solution of sp. gr. at 19.5° (sp. gr. of water at 19.5° = 1.)	Contains Per cent of Na O, N O_5	Contains Pts. of Na O, N O_5 dissolved in 100 pts. of water.
1.0844	12.057	13.71
1.1667	22.726	29.41
1.2450	31.987	47.03
1.3176	39.860	66.28
1.3805	46.251	86.05

(Kremers, *Pogg. Ann.*, **95.** 120. The second column is from Gerlach's *Sp. Gew. der Salzlæsungen*, p. 34.) An aqueous solution, saturated at 8°, is of 1.377 sp. gr. (*Ann. der Pharm.*, 1837, **24.** 211.)

An aqueous solution of sp. gr. (at 20.2°)	Contains (by experiment) per cent of Na O, N O_5
1.0342	5.165
1.0698	10.33
1.1075	15.50
1.1478	20.66
1.2326	30.99
1.3806	46.48

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 338.)

From these results Schiff calculates the following table by means of the formula: — $D = 1 + 0.006484\ p + 0.00002544\ p^2 + 0.0000002416\ p^3$; in which D = the sp. gr. of the solution, and p the percentage of substance in the solution.

Sp. gr. (at 20.2°)	Per cent of Na O, N O_5	Sp. gr. (at 20.2°)	Per cent of Na O, N O_5
1.0065	1	1.1904	26
1.0131	2	1.1987	27
1.0197	3	1.2070	28
1.0264	4	1.2154	29
1.0332	5	1.2239	30
1.0399	6	1.2325	31
1.0468	7	1.2412	32
1.0537	8	1.2500	33
1.0606	9	1.2589	34
1.0676	10	1.2679	35
1.0746	11	1.2770	36
1.0817	12	1.2863	37
1.0889	13	1.2958	38
1.0962	14	1.3055	39
1.1035	15	1.3155	40
1.1109	16	1.3255	41
1.1184	17	1.3355	42
1.1260	18	1.3456	43
1.1338	19	1.3557	44
1.1418	20	1.3659	45
1.1498	21	1.3761	46
1.1578	22	1.3864	47
1.1659	23	1.3968	48
1.1740	24	1.4074	49
1.1822	25	1.4180	50

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 75.)

Sp. gr. (at 12.5°)	Per cent of Na O, N O_5
1.0059	1
1.0119	2
1.0180	3
1.0240	4
1.0300	5
1.0359	6
1.0419	7
1.0480	8
1.0540	9
1.0600	10
1.0719	12
1.0840	14
1.0960	16
1.1081	18
1.1202	20

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Sp. gr. (at 12.5°)	Per cent of Na O, N O_5
1.1336	22
1.1482	24
1.1628	26
1.1779	28
1.1920	30
1.2099	32
1.2294	34

(Hassenfratz, *Ann. de Chim.*, **28.** 300.)

In a solution containing for 100 pts. of water pts. of anhydrous Na O, N O_5	The boiling-point is elevated.	Difference.
0.0	0°	
9.3	1°	9.3
18.7	2°	9.4
28.2	3°	9.5
37.9	4°	9.7
47.7	5°	9.8
57.6	6°	9.9
67.7	7°	10.1
77.9	8°	10.2
88.3	9°	10.4
98.8	10°	10.5
109.5	11°	10.7
120.3	12°	10.8
131.3	13°	11.0
142.4	14°	11.1
153.7	15°	11.3
165.2	16°	11.5
176.8	17°	11.6
188.6	18°	11.8
200.5	19°	11.9
212.6	20°	12.1
224.8	21°	12.2

The point of ebullition of pure water, observed in a glass tube containing bits of metallic zinc, having been 100.3°. (Legrand, *Ann. Ch. et Phys.*, 1835, (2.) **59.** 435.)

100 pts. of alcohol,		
of 0.900 sp. gr.,	dissolve	10.5 pts. of it.
" 0.872	"	6. "
" 0.834	"	0.38 "
" 0.817	"	0.00 "

(Kirwan, *On Mineral Waters*, p. 274. [T.].)

A solution (saturated at 15°) in alcohol of Sp. Gr.	Per cent by weight	Contains per cent of Na O, N O_5
1.000	0	45.9
0.986	10	39.5
0.972	20	32.8
0.958	30	26.2
0.939	40	20.5
0.895	60	10.2
0.847	80	2.7

(H. Schiff, *Ann. Ch. u. Pharm.*, 1861, **118.** 365.)

A solution in wood-spirit, of 40% (by weight) saturated at 15° contains 24.4% of it. (H. Schiff, *Ann. Ch. u. Pharm.*, 1861, **118.** 365.) As good as insoluble in absolute alcohol; scarcely at all soluble in spirit. (Fresenius, *Quant.*, p. 122.) Soluble in 10.4 pts. of boiling alcohol. (Wenzel, in his *Verwandtschaft*, p. 300. [T.].) Soluble in boiling alcohol. (Meissner, in his *Neues System der Chemie*, 2 Aufl., II. 50.) Insoluble in spirit. (Wittstein.) Soluble in 4.706 pts. of alcohol of 61.4% at 26°; or 100 pts. of this alcohol dissolve 21.248 pts. of the salt at 26°. (Pohl, *Wien. Akad. Bericht*, **6.** 600.) Soluble in glycerin. (Pelouze.)

Soluble in a saturated solution of nitrate of potash. This solution at 18.1° contains 54.33% of mixed salt; or 100 pts. of water dissolve 118.98 pts. of mixed salt, viz. 89.53 pts. Na O, N O_5 and 29.45 pts. of K O, N O_5. On the addition of the first portions of Na O, N O_5 to a saturated solution of K O, N O_5, especially if a considerable quantity be added at once, crystals of K O, N O_5, separate out for a moment, owing to the depression of temperature brought about by the solution of the Na O, N O_5, but these crystals of K O, N O_5 all redissolve, even before the solution has regained its original temperature; K O, N O_5 being much more soluble in a solution of Na O, N O_5 than in pure water. The solution thus obtained has not the same composition as that prepared by treating a mixture of the two salts with water. For such an one prepared at 15° contained 57.37% of salt, or 100 pts. of water dissolve 134.38 pts. of the mixed salt. (Karsten, *Berlin Abhandl.*, 1840, p. 118.)

Soluble in considerable quantity in a saturated solution of nitrate of ammonia, without any precipitation at first, but after a while a portion of the latter is precipitated. (Karsten, *Berlin Abhandl.*, 1840, p. 114.)

Soluble in a saturated solution of nitrate of baryta, a portion of the latter being precipitated. When the reaction ceases the solution contains 47.82% of mixed salt; or 100 pts. of water dissolve at 18.75° 91.64 pts. of mixed salt, viz. 87.93 pts. of Na O, N O_5, and 3.69 pts. of Ba O, N O_5. A solution identical with the above is obtained when a mixture of the two salts is treated with water. (Karsten, *Berlin Abhandl.*, 1840, p. 111.) When a mixture of nitrate of baryta and nitrate of soda is treated with water, 100 pts. of the latter dissolve at 20°, 92.0 pts. of the mixed salts, of which 3.7 pts. are Ba O, N O_5, and 88.3 pts. are Na O, N O_5; at 20.4° 92.6 pts. of the mixed salts, of which 3.6 pts. are Ba O, N O_5, and 89.0 pts. are Na O, N O_5. According to the general law, that when a mixture of two salts of a single acid is treated with water the salt with the stronger base dissolves in the water as if no other salt were present, the solubility of nitrate of soda calculated from the above experiments would be 88.6 at 20.2°, and by direct experiment [upon pure Na O, N O_5] it was found that 100 pts. of water dissolved at 17.8° 87.9 pts. of the salt, and at 19.3° 88.7 pts. (H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 266.)

Soluble in considerable quantity in a saturated solution of nitrate of lead, no precipitation occurring at first, but after a while nitrate of lead begins to fall, and this precipitation continues so long as nitrate of soda dissolves. The solution thus obtained at 18.75° contains 54.84% of the mixed salts; or 100 pts. of water dissolve 121.14 pts. of mixed salt, viz. 87.61 pts. of Na O, N O_5, and 34.53 pts. of Pb O, N O_5. A solution similar to this is obtained when a mixture of the two salts, in excess, is treated with water. (Karsten, *Berlin Abhandl.*, 1840, p. 111.) Soluble in a saturated solution of nitrate of lead and of potash (Pb O, K O), N O_5, with precipitation of some nitrate of lead, but the solution obtained is not saturated, since it contains less of the mixed salts than that prepared by treating a mixture of the three salts with water. (Karsten, *loc. cit.*, p. 132.)

Soluble in a saturated solution of chloride of potassium, with formation of a portion of K O, N O_5 which at first remains in solution, but as more Na O, N O_5 is dissolved K O, N O_5 is precipitated. (Karsten, *Berlin Abhandl.*, 1840, p. 123.) If crystals of chloride of sodium are thrown into a solution of nitrate of soda, they dissolve while Na O, N O_5 is precipitated. When the reaction is completed, the solution at 18.75° contains 43.7% of mixed salt; or 100 pts. of water dissolve 77.8 pts. of mixed salt, viz. 24.96 pts. of Na Cl and 52.84 pts. of Na O, N O_5. A solution identical with

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the above is obtained when the mixed salts are dissolved directly in water. (Karsten, *Berlin Abhandl.*, 1840, p. 108.)

Abundantly, and at first very rapidly soluble in a saturated solution of chloride of ammonium; after some time the solution proceeds more slowly, though without occasioning any precipitation, until at length some chloride of sodium separates. (Karsten, *loc. cit.*, p. 128.)

Very rapidly soluble in a saturated solution of chloride of barium with separation of nitrate of baryta. (Karsten, *loc. cit.*, p. 129.)

Readily soluble in a saturated solution of sulphate of potash, without causing any precipitation. This solution at 18.75° contains 51.07% of mixed salt; or 100 pts. of water dissolve 105.4 pts. of mixed salt, of which 7.64 pts. are $K O, S O_3$. (Karsten, *Berlin Abhandl.*, 1840, p. 123.) Soluble in a saturated solution of sulphate of soda, without causing any precipitation of the latter. (Karsten, *Berlin Abhandl.*, 1840, p. 115.)

Soluble in a saturated solution of sulphate of magnesia, at first to a clear solution, but subsequently with precipitation of a portion of the $Na O, N O_5$. The solution thus obtained has the same sp. gr. as that prepared at the same temperature, by treating a mixture of the two salts with water. (Karsten, *Berlin Abhandl.*, 1840, p. 115.) Very abundantly soluble in a saturated solution of sulphate of copper, at first to a clear solution, but subsequently with formation of a double sulphate. (Karsten, *loc. cit.*, p. 129.) Very rapidly soluble in a saturated solution of sulphate of zinc, with precipitation of $Zn O, S O_3$ at first, apparently on account of the reduction of temperature occasioned by the solution of the $Na O, N O_5$. Subsequently the $Zn O, S O_3$ redissolves, and finally a double salt of $Na O, S O_3$; $Zn O, S O_3$ separates out. (Karsten, *Berlin Abhandl.*, 1840, p. 116.) Insoluble in strong nitric acid. (Braconnot.)

NITRATE OF SODA & UREA. Permanent. $C_2 H_4 N_2 O_2, Na O, N O_5 + 2 Aq$ Soluble in water, the solution not being decomposed by boiling.

NITRATE OF SOLANIN. Soluble in water.

NITRATE OF SPARTEIN. Exceedingly soluble in water.

NITRATE OF STANN(*ous*)ETHYL. Soluble in water. $C_4 H_5 Sn O, N O_5$

NITRATE OF *di*STANN*tri*ETHYL. Readily soluble in ether. $(C_4 H_5)_3 Sn_2 O, N O_5$

NITRATE OF *tetra*STANN(*ous*)ETHYL. Soluble in alcohol, and ether. $(C_4 H_5 Sn)_4 O, N O_5$

NITRATE OF *tetra*STANN*tri*ETHYL. Soluble in alcohol. Sparingly soluble in ether. $(C_4 H_5)_3 Sn_4 O, N O_5$

NITRATE OF *tetra*STANN*quinq*ETHYL. Similar to the $\frac{3}{2}$ salt. $(C_4 H_4)_5 Sn_4 O, N O_5$

NITRATE OF STANNMETHYL.

NITRATE OF STIB*di*AMYL. Insoluble in water or dilute spirit. Easily soluble in absolute alcohol. Very difficultly soluble in ether.

NITRATE OF STIB*tri*AMYL. Insoluble in water or ether. Easily soluble in spirit. (Berlé.) $Sb (C_{10} H_{11})_3 O_2, 2 N O_5$

NITRATE OF STIB*tri*ETHYL.

I.) *normal.* Permanent. Very easily soluble in water. (Merck.) $Sb (C_4 H_5)_3 O_2, H O, N O_5$

II.) *acid.* Easily soluble in water; more difficultly soluble in alcohol, and scarcely at all soluble in ether. Difficultly soluble in water acidulated with nitric acid. (Lœwig & Schweizer.) $Sb (C_4 H_5)_3 O_2, 2 N O_5$

NITRATE OF STIBETHYLIUM. Deliquescent. Very soluble in water. $Sb (C_4 H_5)_4 O, N O_5$

NITRATE OF STIBMETHYLIUM. Readily soluble in water. Slowly soluble in alcohol, and ether. Unacted upon by strong boiling sulphuric acid. $Sb (C_2 H_3)_4 O, N O_5$

NITRATE OF STRONTIA. Very efflorescent. $Sr O, N O_5$ & $+ 4 Aq$ 1 pt. of the anhydrous salt is soluble in 1 pt. of water at 16°, and in 0.5 pt. of boiling water (Dumas, *Tr.*); in 5 pts. of cold, and 0.5 pt. of boiling water (Otto-Graham, & in Gmelin); in 5 pts. of cold, and in 0.5 pt. of boiling water; the saturated cold solution containing 16.66% of it, and the saturated boiling solution 66.66% (M. R. & P.); in 2 pts. of cold, and 0.5 pt. of boiling water (Wittstein's *Handw.*); 100 pts. of the aqueous solution saturated at its boiling-point (106.5°) contain 53 pts. of the dry salt; or 100 pts. of water at 106.5° dissolve 112.98 pts. of it; or 1 pt. of the dry salt is soluble in 0.88 pt. of water at 106.5°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.)

1 pt. of the anhydrous salt is soluble in	2.32	pts. of water at	0°
"	1.73	"	10°
"	1.10	"	25°
"	1.02	"	50°
"	0.99	"	75°
"	0.94	"	100°

(Kremers, *Pogg. Ann.*, **92.** 499.) Soluble in 2 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht, für* 1854, p. 76.)

An aqueous solution of sp. gr. at 19.5° (sp. gr. of water at 19.5° = 1.)	Contains Per cent of $Sr O, N O_5$	Pts. of $Sr O, N O_5$ dissolved in 100 pts. of water.
1.0428	5.195	5.48
1.0930	10.873	12.20
1.1097	12.694	14.54
1.2027	22.003	28.21
1.2927	29.967	42.79
1.3222	32.396	47.92
1.3705	36.265	56.90
1.3862	37.308	59.51
1.4067	38.830	63.48

(Kremers, *Pogg. Ann.*, **95.** 121. The second column is from Gerlach's *Sp. Gew. der Salzlœsungen*, p. 35.) The saturated aqueous solution boils at 107.5°. (Kremers, *Pogg. Ann.*, **92.** 499); at 108°. (Kremers, *Ibid.*, **99.** 43.)

When crystallized at temperatures above 24° the anhydrous salt is usually obtained, while that formed below 15.5° is usually hydrated, but between these temperatures there is no certainty as to which salt will separate out. Thus a solution saturated at 29°, while cooling down to 16.6° deposited nothing but anhydrous crystals; and a solution saturated at 21.6°, by standing some hours in a spot where the temperature did not fall below 21°, gave only (4)hydrated crystals. The statements that the crystallized salt contains 5 equivs. of water are erroneous. When heated, the hydrated salt is resolved into a liquid and the anhydrous nitrate; it may even become moist during hot summer weather if kept in a close vessel. (Ordway, *Am. J. Sci.*, (2.) **27.** 18.)

When one equivalent of $Sr O, N O_5$ in aqueous solution, is mixed with a solution of an equivalent of acetate of potash $(C_4 H_3 K O_4)$ $\frac{67}{100}$ of it are decomposed to nitrate of potash, which

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may be precipitated by adding alcohol, while $\frac{88}{100}$ of it remain unchanged; when mixed with a solution of an equivalent of acetate of lead, ($C_4 H_3 Pb O_4$) $\frac{88}{100}$ of it are decomposed as before, while $\frac{67}{100}$ of it remain unchanged. (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.) Insoluble in absolute, but sparingly soluble in ordinary alcohol. (Braconnot.) Soluble in 8500 pts. of absolute alcohol, and in 60000 pts. of a mixture of equal volumes of absolute alcohol and ether. (H. Rose.) Very sparingly soluble in strong nitric or chlorhydric acid. (H. Wurtz, *Am. J. Sci.*, (2.) **25.** 377.)

Nitrate of Strontia with Tartrate of Antimony & of Strontia. $Sr O, N O_5; C_8 H_4 Sr Sb''' O_{14} + Aq$ Somewhat efflorescent. Readily soluble in cold water, the solution undergoing partial decomposition when boiled.

Nitrate of Strychnine. $C_{42} H_{22} N_2 O_4, H O, N O_5$ Permanent. Soluble in about 50 pts. of water at 22°. (Bouchardat, *Ann. Ch. et Phys.*, (3.) **9.** 229.) Soluble in 50 pts. of cold, and in 2 pts. of boiling water; in 60 pts. of cold, and in 2 pts. of boiling alcohol. (Wittstein's *Handw.*) Soluble in 60 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) Much more soluble in warm than in cold water. Very sparingly soluble in alcohol. Insoluble in ether.

100 pts. of chloroform dissolve 6.6 pts. of it. (Schlimpert, *Kopp & Will's Jahresbericht, für* 1859, p. 405.)

Nitrate of Sulphate of Potash. $K O, S O_3; H O, N O_5$ Decomposed by water, and by alcohol. More soluble than nitrate of potash in nitric acid. (Jacquelin, *Berzelius's Lehrb.*)

Nitrate of TellurEthyl. $C_4 H_5 Te O, N O_5$ Readily soluble in water. (Mallet.)

Nitrate *of binoxide* of Tellurium. $Te O_2, 2 N O_5$ Precipitated on the addition of water. (Berzelius.) It is not precipitated by water. (Dumas, *Tr.*) Soluble in water. (*Ure's Dict.*)

Nitrate of TellurMethyl. $C_2 H_3 Te O, N O_5$ Readily soluble in water, and alcohol.

Nitrate of Tetryl. *Vid.* Nitrate of Butyl.

Nitrate of Theobromin. $C_{14} H_8 N_4 O_4, H O, N O_5$ Decomposed by water. Soluble in nitric acid. (Glasson.)

Nitrate of ThiAcetonin. Sparingly soluble in water, and alcohol. (Stædeler.)

Nitrate of Thialdin. $C_{12} H_{13} N S_4, H O, N O_5$ More soluble in water than the chlorhydrate. Soluble in alcohol, especially when this is hot. Insoluble in ether.

Nitrate of Thoria. $Th O, N O_5$ Deliquescent. Very soluble in water, the solution not undergoing decomposition when boiled. Very soluble in alcohol. (Berzelius.)

Nitrate *of protoxide* of Tin. $Sn O, N O_5$ Soluble in water acidulated with nitric acid.

Nitrate *of binoxide* of Tin. $Sn O_2, 2 N O_5$ Soluble in water acidulated with nitric acid. This solution soon decomposes at ordinary temperatures, unless it contains nitrate of ammonia. (Berzelius.)

On diluting the solution with water and then boiling, hydrated oxide of tin is precipitated, the precipitation being more complete in proportion as less acid and more water is present. (H. Rose, *Tr.*, **1.** 245.)

"*Per*Nitrate of Tin." See *per*Chloride of Tin (or Ordway's experiments in *Am. J. Sci.*, (2.) **23.** 220.)

Nitrate of Titanium. Soluble in water.

Nitrate of Toluidin.

Nitrate of Tungstic Acid. Difficultly soluble in water, from which it is precipitated on the addition of nitric acid.

Nitrate of Tyrosin. $C_{18} H_{10} N O_5, H O, N O_5 + Aq$ Soluble in water. Partially soluble in alcohol of 90%.

Nitrate *of sesquioxide* of Uranium.

I.) *mono.* $Ur_2 O_3, N O_5 + 6 Aq$ Effloresces in dry, and deliquesces in moist air.

Soluble in 0.5 pt. of water at 18°; in 0.35 pt. of absolute alcohol; and in 4.0 pts. of ether; the solution undergoing decomposition when exposed to the light. (Bucholz.) 100 pts. of water at 15.5° dissolve 215 pts. of it; 100 pts. of alcohol at 15.5 dissolve 333 pts. of it. (Ure's *Dict.*)

Effloresces in dry air. Very soluble in water. Melts in its water of crystallization when gently heated. Easily soluble in ether. (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** pp. 8, 42.) Melts in its water of crystallization at 59.4°, and may remain liquid at 46°; begins to boil at 118.3°; on continuing to boil, the liquid remains thin and clear till about 4 equivs. of water and a little of the acid have passed off. (Ordway, *Am. J. Sci.*, (2.) **27.** 17.)

When the solution of "nitrate of sesquioxide of uranium" in absolute alcohol is evaporated at a moderate heat, it is decomposed for the most part as soon as it has arrived at a certain degree of concentration. (Malaguti, *Ann. Ch. et Phys.*, (3.) **9.** [illegible]63.)

II.) *ter.* $Ur_2 O_3, 3 N O_5$ Efflorescent. (Berzelius.) Deliquescent. (Lecanu.) Less soluble than No. I.

Has no existence. (Ebelmen & Peligot.)

III.) *polybasic.* Slightly soluble in water. Insoluble in water containing 0.92% of sesquioxide of uranium. (Bucholz.) The terbasic salt, as well as the other compounds, which contain less base than this, may be obtained soluble in water. (Ordway, *Am. J. Sci.*, (2.) **26.** 209.)

Nitrate of Urea. $C_2 H_4 N_2 O_2, H O, N O_5$ Permanent. Sparingly soluble in cold, more soluble in boiling water. Soluble in 8 pts. of cold, more soluble in hot water. The dilute aqueous solution is decomposed by boiling, but the concentrated solution undergoes no change. Less soluble in water containing nitric acid than in pure water.

Soluble in 6 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht, für* 1854, p. 76.)

Sparingly soluble in alcohol. Less soluble in strong nitric acid than in water. But little soluble in nitric acid, or alcohol.

Nitrate *of binoxide* of Vanadium. $V O_2, 2 N O_5$ Appears to be soluble in water. Soluble in dilute nitric acid, and the solution undergoes no change on boiling. But if a saturated nitric acid solution of hydrate of binoxide of vanadium be evaporated, its blue color changes to green at a certain degree of concentration

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and complete decomposition occurs as soon as it has become completely dry. (Berzelius, *Lehrb.*)

Nitrate of Vanadic Acid($V O_3$). Soluble in water.

Nitrate of XanthoCobalt. $5 N H_3 . N O_2 . Co_2 O_3, 2 N O_5 + Aq$ Rather insoluble in cold, readily soluble in hot water. The solution is easily decomposed by boiling. Much less soluble than chloride of ammonium, or sulphate of ammonia, in cold water. Insoluble in nitric acid. (Gibbs & Genth, *Smithson. Contrib.*, vol. **9.**)

Nitrate of Yttria. $Y O, N O_5$ Deliquescent. Very soluble in water; much more readily than the sulphate.

✓ **Nitrate of Zinc.**

I.) *mono.* $Zn O, N O_5 + 6 Aq$ Very deliquescent. Extremely soluble in water, and alcohol. (Pierre, *Ann. Ch. et Phys.*, (3.) **16.** 247.)

Melts in its water of crystallization at 36.4°, and the liquid has been cooled to 30.5°; it boils at 131.1°. This solution cannot be heated long without rendering a portion of the nitrate of zinc basic and insoluble in water. (Ordway, *Am. J. Sci.*, (2.) **27.** 16.) The aqueous solution saturated at 12.5° contains 57.2% of it. (Hassenfratz, *Ann. de Chim.*, **28.** 291.)

An aqueous solution of sp. gr. (at 12.5°)	Contains per cent of the salt.
1.0061	1
1.0125	2
1.0189	3
1.0255	4
1.0320	5
1.0387	6
1.0442	7
1.0509	8
1.0574	9
1.0640	10
1.0786	12
1.0926	14
1.1063	16
1.1183	18
1.1340	20
1.1508	22
1.1676	24
1.1844	26
1.2012	28
1.2180	30
1.2348	32
1.2515	34
1.2683	36
1.2851	38
1.3020	40
1.3203	42
1.3395	44
1.3601	46
1.3810	48
1.4050	50
1.4271	52
1.4494	54
1.4727	56

(Hassenfratz, *Ann. de Chim.*, **28.** 301.) Only sparingly soluble in concentrated nitric acid. (Braconnot.)

II.) *tetra.* Insoluble in water.
$4 Zn O, N O_5 + 2 Aq$

III.) *octa.* Insoluble in water.
$8 Zn O, N O_5 + 2 Aq$

Nitrate of Zirconia. $Zr_2 O_3, 3 N O_5$ Soluble in water, and spirit. When evaporated at temperatures lower than 100° the residue is completely soluble in water. The aqueous solution is capable of dissolving much hydrate of zirconia, forming basic salts which are soluble in water. When these basic solutions are diluted with much water, and boiled, a still more basic insoluble salt ($2 Zr_2 O_3, 3 N O_5$) is precipitated. (Hermann.)

NitrAzoBenzid. (*Nitrazobenzene. Azobenzidenitré. NitroPhenoyl-Phenoylbiamin.*)
$C_{24} H_9 N_3 O_4 = N_2 \left\{ \begin{array}{l} C_{12} H_3 (N O_4)'' \\ C_{12} H_4 \\ H_2 \end{array} \right.$
Less soluble in alcohol than azobenzid, but more soluble than binitrazobenzid. (Laurent & Gerhardt.)

*Bi*NitrAzoBenzid. (*Binitrazobenzene. Azobenzidebinitré. DiNitroPhenoylbiamin.*)
$C_{24} H_8 N_4 O_8 = N_2 \left\{ \begin{array}{l} (C_{12} H_3 (N O_4)'')_2 \\ H_2 \end{array} \right.$
Very sparingly soluble in boiling, nearly insoluble in cold alcohol or ether. (Zinin.) Less soluble in alcohol than mononitrazobenzid. Soluble, without decomposition, in boiling nitric acid, from which solution it separates out on cooling. (Laurent & Gerhardt.)

NitrAzoPhenylamin. (*AzoPhenylamin*(of Gottlieb). *Amidonitranilin. NitroPhenoylbiamin.*)
$C_{12} H_7 N_3 O_4 = N_2 \left\{ \begin{array}{l} C_{12} H_3 (N O_4)'' \\ H_4 \end{array} \right.$
Tolerably readily soluble in water, alcohol, and ether; also in the acids generally, with combination. (Gottlieb.) Its salts are decomposed by water and by alcohol.

NitrAzoPhenylCitraconamic Acid.
$C_{22} H_{11} N_3 O_{10} = N \left\{ \begin{array}{l} C_{10} H_4 O_4'' \\ C_{12} H_5 N (N O_4) \\ H \end{array} \right. . O, H O$
Sparingly soluble in water.

NitrAzoPhenylCitraconamid. (*CitraconylNitroPhenoylbiamid. Citraconazophenylimid. Citraconnitrazophenylimid.*)
$C_{22} H_9 N_3 O_8 = N_2 \left\{ \begin{array}{l} C_{10} H_4 O_4'' \\ C_{12} H_3 (N O_4)'' \\ H_2 \end{array} \right.$
Sparingly soluble in water. Tolerably soluble in alcohol, and ether. Only slowly decomposed by alkaline solutions. Boiling ammonia-water even appears to dissolve it, without decomposition. (Gottlieb.)

NitrAzoPhenylOxamic Acid. (*AmidoNitranilic Acid. OxalazoPhenylamicAcid.*)
$C_{16} H_7 N_3 O_{10} = N \left\{ \begin{array}{l} C_4 O_4'' \\ C_{12} H_5 N (N O_4) \\ H \end{array} \right. . O, H O$
Soluble in boiling water.

NitrAzoPhenylOxamate of Ammonia. Sparingly soluble in cold, more soluble in boiling water.

NitrAzoPhenylOxamate of Baryta. $C_{16} H_6 Ba (N O_4) N_2 O_6 + 8 Aq$ Sparingly soluble in boiling water. (Gottlieb.)

NitrAzoPhenylOximid. (*OxalazoPhenylimide. Amidonitroxanil.*)
$C_{16} H_5 N_3 O_8 = N_2 \left\{ \begin{array}{l} C_4 O_4'' \\ C_{12} H_3 (N O_4)'' \\ H_2 \end{array} \right.$
Soluble in water. (Gottlieb.)

NitrAzOxyBenzid. (*Nitrazoxybenzene. Azoxibenzide nitré. Oxide of NitroPhenoylbiamin.*)
$C_{24} H_9 N_3 O_6 = N_2 \left\{ \begin{array}{l} C_{12} H_3 (N O_4)'' \\ C_{12} H_4'' \\ H_2 \end{array} \right. . O_2$
Sparingly soluble in boiling, less soluble in cold alcohol, and ether. Soluble in considerable quantity, without decomposition, in boiling fuming nitric acid, crystallizing out on cooling. (Zinin.)

Nitre. *Vid.* Nitrate of Potash.

Nitric Ether. *Vid.* Nitrate of Ethyl.

Nitric Oxide. *Vid. bin*Oxide of Nitrogen.

Nitrides. All the metallic nitrides are either insoluble in water, or immediately decomposed by it. (Persoz, *Chim. Moléc.*, p. 463.)

Nitride of "Acetyl." *Vid.* Cyanide of Methyl.

Nitride of Cadmium.

Nitride of Chromium.
$Cr_3 N_2$

Nitride of Copper. *Vid.* Cupramin.

Nitride of Iron.

Nitride of Mercury. *Vid.* Mercuramin.

Nitride of Potassium. Inflames in the air.
$N \{ K_3$ Decomposed by water.

Nitride of Silicon. Unacted upon by acids or by alkaline solutions. Slowly decomposed by fluorhydric acid.

Nitride of Sodium. Resembles nitride of
$N \{ Na_3$ potassium.

Nitride of Tantalum. Unacted upon by
$Ta_3 N_2 (?)$ nitric acid or by aqua-regia, but is attacked by a mixture of fluorhydric acid and nitric acid. (H. Rose.)

Nitride of Zinc. Immediately decomposed by water. (Frankland.) Decomposed by acids.

Nitrindin. Insoluble in water. Extremely
$C_{32} H_8 (N O_4)_2 N_2 O_4$ sparingly soluble in alcohol, and ether. Insoluble in ammonia-water. Soluble in an aqueous solution of caustic potash. (Laurent.)

Nitrous Acid. Abundantly soluble in water
(*Hyponitrous Acid.*) at 0°, without decomposition,
$N O_3$ but at temperatures above 0°, this solution decomposes. (Fritzsche.) Soluble in ether.

All of the normal nitrites are soluble in water, excepting nitrite of silver; but as a rule, they are less soluble than the nitrates.

Nitrite of Ammonia. Soluble in water, the
$N H_4 O, N O_3$ solution undergoing decomposition when heated to 50°. Decomposed by acids. (Berzelius.) When the aqueous solution contains free ammonia, it may be boiled for hours without suffering decomposition. (Millon, *Ann. Ch. et Phys.*, (3.) **19.** 255.)

Nitrite of Ammonia & *of sesquioxide* **of Cobalt.**

Nitrite of Amyl.
(*AmylNitrous Ether.*)
$C_{10} H_{11} O, N O_3$

Nitrite of Anthracenese. *Vid. bi*NitroParaNaphthalin.

Nitrite of Anthracenose(*hydrated*). Insol-
$C_{30} H_9 (N O_4) O_4$ uble in water; more soluble in alcohol, and ether. (Laurent.)

Nitrite of Baryta. Permanent. Easily
$Ba O, N O_3 + Aq$ soluble in water; soluble in dilute alcohol. (Fischer.) Much more easily soluble than nitrate of baryta. (Berzelius's *Lehrb.*) Insoluble in alcohol [?] (Dumas, *Tr.*, **6.** 262.)

Nitrite of Baryta & of Silver.

Nitrite of Butyl.
$C_8 H_9 O, N O_3$

Nitrite *of sesquioxide* **of Cobalt & of Potash.**
$Co_2 O_3, 3 K O, 5 N O_3, 2 H O$ Very sparingly, but still perceptibly soluble in cold, more readily, though still sparingly soluble in hot water; more soluble in solutions of chloride of sodium or of chloride of ammonium. Entirely insoluble even in boiling, tolerably concentrated solutions of sulphate, nitrate, or acetate of potash, or of chloride of potassium. Insoluble in alcohol of 80%. Soluble in acetic and oxalic acids. (A. Stromeyer, *Ann. Ch. u. Pharm.*, **96.** 218.) A *very small quantity* of acetic acid exerts no solvent action upon it. (Fresenius, *Quant.*, p. 139.) Insoluble in alcohol, and in a solution of acetate of potash. (Fischer ?) Insoluble in water, cold dilute acids or ammonia-water. (Fischer.) Almost insoluble in water, which, however, dissolves a very small quantity of it. Entirely insoluble in alcohol or ether. Traces of it are dissolved by sulphide of carbon. Decomposed by long-continued boiling with water. (Saint-Evre, *Ann. Ch. et Phys.*, (3.) **38.** 181.) Difficultly decomposed by solutions of caustic potash, easily by soda or baryta. (Stromeyer, *loc. cit.*)

Nitrite of Copper. Soluble in water. (Ber-
$Cu O, N O_3$ zelius.)

Nitrite of Ethyl. Soluble, with partial
(*Nitrous Ether. Hyponitrous Ether. Isomeric with Glycocoll.*) decomposition, in 48 pts. of water.
$C_4 H_5 O, N O_3$ (Thénard.) Soluble in 48 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 75.) Miscible in all proportions with alcohol, and ether. Also miscible with glacial acetic acid, and with several of the compound ethers. It is separated from the alcoholic solution by water, by an aqueous solution of normal tartrate of potash and by other saline solutions (Funcke); but not by a saturated solution of chloride of sodium. (Laudet.)

Nitrite of Idrialase. *Vid.* NitrIdrialin.

Nitrite of Lead.

I.) *mono.* Very soluble in water. (Péligot.)
$Pb O, N O_3 + Aq$

II.) *di.* Somewhat difficultly soluble in cold
$2 Pb O, N O_3 + 2 Aq$ water.

III.) *tri.* Soluble in water.
$3 Pb O, N O_3$

IV.) *tetra.* Permanent. Soluble in 1250 pts.
$4 Pb O, N O_3 + Aq$ of cold, and in 3.45 pts. of boiling water (Péligot); in 143 pts. of cold, and in 33 pts. of boiling water. (Chevreul.) Soluble in cold nitric and acetic acids.

Nitrite of Lead & of Potash. Easily sol-
"$K O, N O_4 ; Pb O, N O_4 + Aq$"(of Hayes). uble in water. (Fischer.) About as soluble as nitrate of potash in either hot or cold water. The solution may be boiled for some time without any decomposition. Readily decomposed by acids. (S. D. Hayes, *Am. J. Sci.*, (2.) **31.** 228.)

Nitrite of Lime. Very deliquescent. Insol-
$Ca O, N O_3$ uble in dilute alcohol. (Fischer.)

Nitrite of Magnesia. Deliquescent. Read-
$Mg O, N O_3$ ily soluble in dilute, insoluble in absolute alcohol. (Fischer.)

Nitrite of Manganese. Deliquescent. Sol-
$Mn O, N O_3$ uble in water. Easily soluble in alcohol. (Mitscherlich.)

Nitrite *of dinoxide* **of Mercury.**

I.) *basic.* Sparingly soluble in water.

Nitrite of Methyl.
$C_2 H_3 O, N O_3$

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Nitrite of Nickel & of Potash. Easily soluble in water. (Fischer.)

Nitrite of Palladium & of Potash. Soluble in water.

Nitrite of Palladium & of Soda. Soluble in water.

Nitrite of Potash. Deliquescent. More soluble in water than nitrate of potash, but less soluble in alcohol. (Fischer.)
KO, NO_3

Nitrite of Potash & of Silver. Permanent. Decomposed by water. (Fischer.)

Nitrite of Propyl.
C_6H_7O, NO_3

"**Nitrite of Pteleyl.**" Insoluble in water, by which, however, it is gradually decomposed. Soluble in absolute alcohol. (Chancel.) Soluble in alkaline solutions. (Kane.)
$C_6H_3NO_4$

Nitrite of Silver.

I.) *mono.* Very sparingly soluble in cold, more soluble in warm water, from which it is deposited as the solution cools. (Persoz, *Ann. Ch. et Phys.*, (3.) **23.** 50.) Soluble in 120 pts. of cold water; more soluble in hot water. (Mitscherlich.) Soluble in 300 pts. of cold water. (Fischer.) Insoluble in alcohol.
AgO, NO_3

II.) *basic.* Very sparingly, and but partially soluble in water. Easily soluble in ammonia-water. (Hess.)

Nitrite of Silver & of Soda.

Nitrite of Soda. Somewhat hygroscopic. More soluble in water than nitrate of soda, but less soluble in alcohol. Soluble in spirit; this distinguishes it from the potash salt. (Fischer.)
NaO, NO_3

Nitrite of Strontia. Permanent. Deliquescent. Soluble in water, and spirit. (Fischer.)
SrO, NO_3

NitroBenzaldid. *Vid.* Hydride of NitroBenzoyl.

NitroBenzamid. Very sparingly soluble in cold, easily soluble in warm water. Easily soluble in alcohol, ether, and wood-spirit. (Chancel.)
(*NitroBenzoylamid.*)
$C_{14}H_6N_2O_6 = N\left\{\begin{matrix}C_{14}H_4(NO_4)O_2\\H_2\end{matrix}\right.$

*Bi***NitroBenzamid.** Sparingly soluble in cold, somewhat more soluble in hot water. Soluble in ammonia-water. (Voit, *Ann. Ch. u. Pharm.*, **99.** 105.)
$C_{14}H_5N_3O_{10} = N\left\{\begin{matrix}C_{14}H_3(NO_4)_2O_2\\H_2\end{matrix}\right.$

NitroBenzanilid. Soluble in alcohol.
(*PhenylNitroBenzoylamid. Isomeric with "NitroPhenylBenzoylamid."*)
$C_{26}H_{10}N_2O_6 = N\left\{\begin{matrix}C_{14}H_4(NO_4)O_2\\C_{12}H_5\\H\end{matrix}\right.$

NitroBenzanisidid. *Vid.* BenzoNitranisid.

NitroBenzene. *Vid.* Hydride of NitroPhenyl.

NitroBenzic Acid. *Vid.* NitroBenzoic Acid.

NitroBenzid.
NitroBenzinase.
NitroBenzinese.
NitroBenzin.
Vid. Hydride of NitroPhenyl.

NitroBenzoic Acid (Anhydrous). Readily acidified by water. Almost insoluble in boiling alcohol, or ether. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 322.)
(*NitroBenzoate of NitroBenzoyl.*)
$C_{28}H_8(NO_4)_2O_6 = \left.\begin{matrix}C_{14}H_4(NO_4)O_2\\C_{14}H_4(NO_4)O_2\end{matrix}\right\}O_2$

NitroBenzoic Acid. At the ordinary temperature it is but sparingly soluble in water; easily soluble in boiling water.
(*NitroCinnolic Acid.*)
$C_{14}H_5(NO_4)O_4 = C_{14}H_4(NO_4)O_3, HO$

Soluble in 400 pts. of water at 10°, and in 10 pts. of water at 100°. Soluble in less than 1 pt. of alcohol at 20°. (Mitscherlich; E. Kopp.) Easily soluble in ether. Soluble in wood-spirit. (Chancel.) Soluble, without decomposition, in boiling nitric, and chlorhydric acids; also in cold concentrated sulphuric acid. Water precipitates it from its solution in acids.

Most of the nitrobenzoates are soluble in water and in alcohol.

NitroBenzoate of Ammonia.

I.) *normal.*

II.) *acid.* Soluble in water.
$C_{14}H_4(NH_4)(NO_4)O_4;\ C_{14}H_5(NO_4)O_4$

NitroBenzoate of Baryta. Soluble in water.
$C_{14}H_4Ba(NO_4)O_4 + 4Aq$

NitroBenzoate of Benzoyl. *Vid.* BenzoNitroBenzoic Acid.

NitroBenzoate of *bi***BromoPhenyl.** Insoluble in water. Sparingly soluble in boiling, less soluble in cold alcohol. (List & Limpricht.)
(*NitroBenzoate of biBromoCarbolic Acid.*)
$C_{26}H_7Br_2NO_8 = C_{14}H_4(C_{12}H_3Br_2)(NO_4)O_4$

NitroBenzoate of Cadmium. Soluble in water. Sparingly soluble in hot spirit. (Schiff.)
$C_{14}H_4Cd(NO_4)O_4 + 4Aq$

NitroBenzoate of Copper. Difficultly soluble in water.
$C_{14}H_4Cu(NO_4)O_4 + Aq$

NitroBenzoate of Ethyl. Insoluble in water. Very soluble in alcohol, and ether, especially when these are warm.
$C_{18}H_9NO_8 = C_{14}H_4(C_4H_5)(NO_4)O_4$

NitroBenzoate *of sesquioxide* **of Iron.** Insoluble in boiling water. (Mulder.)
$C_{42}H_{12}(Fe_2^{\prime\prime\prime})(NO_4)_3O_{12} = Fe_2O_3, 3C_{14}H_4(NO_4)O_3$

NitroBenzoate of Lead.

I.) *normal.* Sparingly soluble in water. (Mulder.)
$C_{14}H_4Pb(NO_4)O_4$

II.) *basic.* Insoluble in water. (Mulder.)
$PbO, 5C_{14}H_4Pb(NO_4)O_4$

NitroBenzoate of Lime. Easily soluble in water. (Mulder.)
$C_{14}H_4Ca(NO_4)O_4 + 2Aq$

NitroBenzoate of Manganese. Soluble in water. (Mulder.)
$C_{14}H_4Mn(NO_4)O_4 + 4Aq$

NitroBenzoate of Methyl. Insoluble in water. Tolerably soluble in alcohol, and ether; somewhat more readily soluble in wood-spirit. (Chancel.)
$C_{16}H_7NO_8 = C_{14}H_4(C_2H_3)(NO_4)O_4$

NitroBenzoate of *bi***NitroPhenyl.** Insoluble in cold water or spirit. Sparingly soluble in boiling alcohol and ether. Soluble in an aqueous solution of sulphide of ammonium. (List & Limpricht, *Ann. Ch. u. Pharm.*, **90.** 200.)
(*NitroBenzoate of biNitroCarbolic Acid.*)
$C_{26}H_7N_3O_{16} = C_{14}H_4[(C_{12}H_3)NO_4)_2](NO_4)O_4$

NitroBenzoate of Potash. Soluble in water.

NitroBenzoate of Silver. Tolerably soluble in hot water. (Abel.)
$C_{14}H_4Ag(NO_4)O_4$

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NitroBenzoate of Soda. Permanent. (Mitscherlich.) Deliquescent. (Mulder.) Soluble in water. (Mulder.)

NitroBenzoate of Strontia. Soluble in water. (Mulder.)
$C_{14} H_4 Sr (N O_4) O_4 + 2 Aq$

NitroBenzoate of Zinc.
I.) $C_{14} H_4 Zn (N O_4) O_4 + 2 Aq$ Soluble in water.
II.) *basic.* Ppt.
$2 C_{14} H_4 Zn (N O_4) O_4 ; 6 Zn O$

***Bi*NitroBenzoic Acid.** Much less soluble in hot or cold water than nitrobenzoic acid. (Voit, *Ann. Ch. u. Pharm.*, **99.** 104.) Scarcely at all soluble in cold, more soluble in boiling water. Tolerably soluble in cold, more readily soluble in warm alcohol, and ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **25.** 31.) Readily soluble, without decomposition, in hot nitric acid, separating out again as the solution cools. Also soluble in concentrated sulphuric acid when this is gently warmed; but the solution is decomposed by boiling. (Cahours, *loc. cit.*)
$C_{14} H_4 (N O_4)_2 O_4 = C_{14} H_3 (N O_4)_2 O_3, H O$

***Bi*NitroBenzoate of Ammonia.** Easily soluble in water, especially if this be warm. (Cahours, *loc. cit.*)
$C_{14} H_3 (N H_4) (N O_4)_2 O_4$

***Bi*NitroBenzoate of Baryta.** Somewhat soluble in hot, less soluble in cold water. (Voit, *loc. cit.*)
$C_{14} H_3 Ba (N O_4)_2 O_4$

***Bi*NitroBenzoate of Ethyl.** Soluble in warm, less soluble in cold alcohol. Water precipitates it from the aqueous solution. Decomposed by a solution of caustic potash. (Cahours, *loc. cit.*, p. 35.) Easily soluble in hot, very sparingly soluble in cold spirit. (Voit, *loc. cit.*)
$C_{18} H_8 N_2 O_{12} = C_{14} H_3 (C_4 H_5) (N O_4)_2 O_4$

***Bi*NitroBenzoate of Lead.** Sparingly soluble in water. (Cahours.)

***Bi*NitroBenzoate of Potash.** Readily soluble in water.

***Bi*NitroBenzoate of Silver.** Sparingly soluble in water. (Cahours.)
$C_{14} H_3 Ag (N O_4)_2 O_4$

***Bi*NitroBenzoate of Soda.** Readily soluble in water. (Cahours.)

NitroBenzoenase. *Vid.* Hydride of NitroToluenyl.

NitroBenzoene. *Vid.* Hydride of NitroToluenyl.

NitroBenzol. *Vid.* Hydride of NitroPhenyl.

***Bi*NitroBenzone.** *Vid.* *bi*NitroBenzoPhenone.

***Bi*NitroBenzoPhenone.** Easily soluble in ether. (Chancel.)
(*BiNitroBenzone. Benzophenone binitré.*)
$C_{26} H_8 (N O_4)_2 O_2$

NitroBenzoylBenzoin. Insoluble in water. Soluble in 12 pts. of boiling alcohol, but almost insoluble in cold alcohol. Insoluble in ether. (Zinin.) Readily and abundantly soluble, without decomposition, in strong nitric acid, especially if this be gently heated; but on boiling, a new compound is formed, which is tolerably soluble in ether, but less soluble in alcohol than nitrobenzoylbenzoin.
$C_{42} H_{15} N O_{10} = \begin{matrix} C_{28} H_{11} O_3 \\ C_{14} H_4 (N O_4) O_4 \end{matrix}$

NitroBromoBenzin. *Vid.* BromoNitroBenzin.

NitroBromoCarbolic Acid. *Vid.* BromoNitroPhenic Acid.

NitroBromoDraconesic Acid. *Vid.* BromAnisoNitrAnisic Acid.

NitroBromoPhenisic Acid. *Vid.* Bromo*bi*NitroPhenic Acid.

NitroButyronic Acid. Insoluble in water. Easily soluble in acids. (Chancel.)
$C_7 H_6 (N O_4) O, 2 H O$(?)

NitroCapric Acid.
$C_{20} H_{19} N O_8$

NitroCaprylic Acid. Very sparingly soluble in water. Soluble in alcohol. Soluble in concentrated nitric acid; also, with combination, in alkaline solutions. (Wirz.)
$C_{16} H_{15} (N O_4) O_4$

NitroCaprylate of Ammonia. Soluble in water.

NitroCaprylate of Baryta. Ppt.

NitroCaprylate of Copper. Ppt.

NitroCaprylate of Ethyl. Insoluble, or but sparingly soluble in water.
$C_{20} H_{19} N O_8$

NitroCaprylate of Lead. Ppt.

NitroCaprylate of Lime. Ppt.

NitroCaprylate of Silver. Ppt.
$C_{16} H_{14} Ag N O_8$

NitroCaprylene. Soluble in alcohol. (Bouis.)
(*Nitro Octylene.*)
$C_{16} H_{15} (N O_4)$

***Bi*NitroCaprylene.** Sparingly soluble in water. (Bouis.)
$C_{16} H_{14} (N O_4)_2$

NitroCarbAmidoAnilid. *Vid.* NitroPhenylCarbamid.

NitroCarbolic Acid. *Vid.* NitroPhenic Acid.

***Ter*NitroCarbolic Acid.** *Vid.* Picric Acid.

NitroCellulose. See under Gun-Cotton.

***Bi*NitroChloroBenzene.** *Vid.* Chloride of *bi*NitroPhenyl.

NitroChloroBenzoic Acid. Soluble in boiling water, without separating out again as the solution cools. Easily soluble in alcohol, and ether. (Limpricht & v. Uslar, *Ann. Ch. u. Pharm.*, **102.** 261.)
(*NitroNiceic Acid. NitroChloroNiceic Acid.*)
$C_{14} H_4 (N O_4) Cl O_4 = C_{14} H_3 Cl (N O_4) O_3, H O$

NitroChloroBenzoate of Baryta. Easily soluble in water. (L. & U., *Ibid.*)
$C_{14} H_3 Ba (N O_4) Cl O_4 + 2 Aq$

NitroChloroBenzoate of Ethyl. Soluble in alcohol. (L. & U., *Ibid.*)

NitroChloroBenzoate of Silver. Tolerably readily soluble in hot water. (L. & U., *Ibid.*)
$C_{14} H_3 Ag (N O_4) Cl O_4 + Aq$

Nitro*bi*ChloroCarbolic Acid. *Vid.* *bi*ChloroNitroPhenic Acid.

NitroChloroDraconesic Acid. *Vid.* ChlorAnisoNitrAnisic Acid.

NitroChloroMichmyl. Difficultly soluble in cold, decomposed by boiling water. Readily soluble in alcohol, with decomposition. (Scharling.)
$C_{14} H_4 Cl_2 O_2 . N O_5$(?)

NitroChloroNiceic Acid. *Vid.* NitroChloroBenzoic Acid.

NitroChloroNicene. Soluble in alcohol, and ether. (St. Evre.)
$C_{20} H_8 Cl_2 (N O_4)_2$

NitroChloroPhenic Acid. *Vid.* ChloroNitroPhenic Acid.

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NitroCholic Acid.
$C_2 H_2 N_4 O_{10}$

NitroCholate of Potash. Decomposes in the air. Soluble in water; the solution undergoing decomposition when boiled for a long time. (Redtenbacher.)
$C_2 H K N_4 O_{10}$

NitroChrysene. Insoluble in water. Only traces of it are dissolved by alcohol, and ether. Soluble in cold concentrated sulphuric acid.
$C_{12} H_3 (N O_4)$

NitroCinnamic Acid (Anhydrous). Easily acidified by water, and alcohol. Very sparingly soluble in ether. (Chiozza, *Ann. Ch. et Phys.*, (3.) **39.** 213.)
(*NitroCinnamic Anhydride.*)
$C_{36} H_{12} (N O_4)_2 O_6 = \left.\begin{matrix} C_{18} H_6 (N O_4) O_2 \\ C_{18} H_6 (N O_4) O_2 \end{matrix}\right\} O_2$

NitroCinnamic Acid. Almost insoluble in cold, sparingly soluble in boiling water. Very sparingly soluble in cold alcohol, being less soluble in this menstruum than cinnamic, benzoic, or nitrobenzoic acids. (E. Kopp, *Ann. Ch. et Phys.*, (3.) **20.** 380.) Almost insoluble in cold, and very sparingly soluble in boiling water. Soluble in 327 pts. of absolute alcohol at 20°. Sparingly soluble, without decomposition, in hot chlorhydric acid. (Mitscherlich.) Very sparingly soluble in ether. (Chiozza, *Ann. Ch. et Phys.*, (3.) **39.** 213.) Its alkaline salts are soluble in water, the others are sparingly soluble or insoluble.
$C_{18} H_7 (N O_4) O_4$

NitroCinnamate of Ammonia. Readily soluble in water, but the solution decomposes on being evaporated.

NitroCinnamate of Ethyl. Soluble in alcohol. Sparingly soluble in spirit. (Chiozza, *Ann. Ch. et Phys.*, (3.) **39.** 214.)
$C_{18} H_6 (C_4 H_5) (N O_4) O_4$

NitroCinnamate of Magnesia. Tolerably readily soluble in water.

NitroCinnamate of Potash. Permanent Readily soluble in water.

NitroCinnamate of Silver. Very sparingly soluble in water.
$C_{18} H_6 Ag (N O_4) O_4$

NitroCinnamate of Soda. Readily soluble in water.

NitroCinnamene. Sparingly soluble in water. Easily soluble in boiling alcohol, separating out again as the solution cools. (Mitscherlich.)
(*NitroStyrol. Isomeric, or identical with Hydride of NitroNaphthalin.*)
$C_{16} H_7 (N O_4)$

NitroCinnamid. Soluble in boiling, less soluble in cold water. Soluble in boiling, but sparingly soluble in cold alcohol. Tolerably soluble in ether. (Chiozza, *Ann. Ch. et Phys.*, (3.) **39.** 214.)
(*NitroCinnamylamid.*)
$C_{18} H_8 N_2 O_6 = N \left\{\begin{matrix} C_{18} H_6 (N O_4) O_2 \\ H_2 \end{matrix}\right.$

NitroCoccusic Acid. Readily soluble in water, but much more soluble in hot than in cold water. Readily soluble in alcohol, and very readily in ether. Its salts are very soluble in water, and most of them are soluble in alcohol also.
$C_{16} H_5 N_3 O_{18} + 2 Aq =$
$C_{16} H_3 (N O_4)_3 O_4, 2 H O + 2 Aq$

NitroCoccusate of Ammonia. Soluble in water. Sparingly soluble, or insoluble in ether.
$C_{16} H_3 (N H_4)_2 (N O_4)_3 O_6 + Aq$

NitroCoccusate of Baryta. Soluble in water. Insoluble in alcohol.
$C_{16} H_3 Ba_2 (N O_4)_3 O_6 + 2 Aq$

NitroCoccusate of Copper. Soluble in water.

NitroCoccusate of Potash. Readily soluble in water. Sparingly soluble in alcohol. Insoluble in ether.
$C_{16} H_3 K_2 (N O_4)_3 O_6$

NitroCoccusate of Silver. Soluble in water, and alcohol. (Warren de la Rue.)
$C_{16} H_3 Ag_2 (N O_4)_3 O_6$

NitroCodein. Sparingly soluble in boiling, and still less soluble in cold water. Easily soluble in boiling alcohol. Sparingly soluble in ether. Soluble in acids. Insoluble in solutions of caustic potash or ammonia. (Anderson.)
$C_{36} H_{20} (N O_4) N O_6$

*Ter*NitroCresic Acid.
(*TerNitroCresylic Acid. Isomeric with terNitrAnisol, and Chrysanisic Acid.*)
$C_{14} H_5 (N O_4)_3 O_2$

*Ter*NitroCresate of Potash. Sparingly soluble in cold, more readily soluble in hot water. More soluble in water than the picrate. (Fairlie.)
$C_{14} H_4 K (N O_4)_3 O_2$

NitroCumarin. Rather sparingly soluble in boiling water, alcohol, and ether, separating out again in each case as the solutions cool. (Bleibtreu.) Soluble in ammonia-water, and in cold alkaline solutions. Readily soluble in concentrated nitric acid, from which it is precipitated on the addition of a large quantity of water. Soluble in boiling, less soluble in cold alcohol. Soluble, without decomposition, in a cold aqueous solution of caustic potash, but is decomposed by boiling potash. (Delalande, *Ann. Ch. et Phys.*, (3.) **6.** 348.)
$C_{18} H_5 (N O_4) O_4$

NitroCumarin with Oxide of Lead. Sparingly soluble in water; still less soluble in alcohol, and almost insoluble in ether. (Bleibtreu.)
$C_{18} H_5 (N O_4) O_4, 3 Pb O$

NitroCumarin with Oxide of Silver. Sparingly soluble in water, still less soluble in alcohol, and almost insoluble in ether. (Bleibtreu.)
$C_{18} H_5 (N O_4) O_4, 2 Ag O$

NitroCumene. *Vid.* NitroCumol.

NitroCumidin. Insoluble in water. Readily soluble in alcohol, and ether. (Cahours.) Its salts are readily decomposed when in solution.
(*NitroCumenylamin. Isomeric with NitroMesidin.*)
$C_{18} H_{12} N_2 O_4 = N \left\{\begin{matrix} C_{18} H_{10} (N O_4) \\ H_2 \end{matrix}\right.$

*Bi*NitroCuminamid. Soluble in alcohol. (Boullet.)

NitroCuminic Acid. Insoluble in water. Easily soluble in alcohol, and ether. Also, with combination, in aqueous solutions of caustic potash, soda, and ammonia.
$C_{20} H_{11} (N O_4) O_4 = C_{20} H_{10} (N O_4) O_3, H O$

NitroCuminate of Ammonia. Soluble in water.

NitroCuminate of Lime.
$C_{20} H_{10} Ca (N O_4) O_4$

NitroCuminate of Potash. Soluble in water.

NitroCuminate of Silver. Insoluble in water.
$C_{20} H_{10} Ag (N O_4) O_4$

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NitroCuminate of Soda. Soluble in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **25.** 36.)

*Bi*NitroCuminic Acid. Insoluble, or very sparingly soluble in water. Soluble in boiling, less soluble in cold alcohol. Very readily soluble in ether. Unacted upon by boiling concentrated nitric acid. Insoluble either in hot or cold, concentrated or dilute, solutions of caustic potash, soda, or ammonia. (Cahours, *Ann. Ch. et Phys.*, (3.) **25.** 38.) The acid examined by Kraut (*Archiv. der Pharm.*, **96.** 273; *Chem. Centralblatt*, 1859, p. 86. [K.]) differs from that of Cahours, in being soluble in alkaline solutions, and behaving like a true acid. Kraut's acid is insoluble in water; soluble in alcohol, and with especial ease in ether.
$C_{20} H_{10} (N O_4)_2 O_4$

*Bi*NitroCuminate of Baryta. Soluble in water. (Kraut.)
$C_{20} H_9 Ba (N O_4)_2 O_4$

*Bi*NitroCuminate of Ethyl. Insoluble in water. Soluble in alcohol. (Kraut.)
$C_{20} H_9 (C_4 H_5)(N O_4)_2 O_4$

*Bi*NitroCuminate of Lime. Soluble in boiling water. (Kraut.)
$C_{20} H_9 Ca (N O_4)_2 O_4$

*Bi*NitroCuminate of Silver. Ppt. Soluble in hot water. (Kraut.)
$C_{20} H_9 Ag (N O_4)_2 O_4 + 2 Aq$

NitroCumol. Insoluble, or but sparingly soluble in water.
(*Nitro Cumene. Hydride of NitroCumenyl. Isomeric with NitroMesitylene.*)
$C_{18} H_{11} N O_4 = C_{18} H_{10} (N O_4), H$

*Bi*NitroCumol. Insoluble in water. Soluble in alcohol. (Ritthausen.) Insoluble in aqueous, but soluble, with decomposition, in alcoholic solutions of the caustic alkalies.
$C_{18} H_{10} N_2 O_8 = C_{18} H_9 (N O_4)_2, H$

NitroCyanide of *X*. *Vid.* Cyanide of *X* with Nitrate of *X*.

NitroCymene. Insoluble in water. (Barlow, *Ann. Ch. u. Pharm.*, **98.** 248.)
(*NitroCymol.*)
$C_{20} H_{13} N O_4$

*Bi*NitroCymene. Insoluble in water. Soluble in alcohol, and ether. (Kraut, *Ann. Ch. u. Pharm.*, **92.** 70.)
$C_{20} H_{12} (N O_4)_2$

NitroDraconasic Acid. *Vid.* AnisoNitrAnisic Acid.

NitroDraconesic Acid. *Vid.* NitrAnisic Acid.

NitroDracyl. *Vid.* Hydride of NitroToluenyl.

NitroDracylic Acid. Almost insoluble in cold, slightly soluble in hot water; as the hot aqueous solution cools it begins to deposit crystals at 70°, and at 60° the greater portion of the acid has separated out. Very soluble in alcohol. The alkaline salts are very soluble.
$C_{14} H_7 N O_8$

NitroDracylate of Copper. Soluble in water, and alcohol.

NitroDracylate of Lead. Tolerably soluble in water.

NitroDracylate of Silver. Tolerably easily soluble in water.

NitroErythroMannite. Insoluble in cold water. Soluble in boiling alcohol. (Stenhouse.)
$C_{24} H_{18} (N O_4)_{12} O_{24}$

*Bi*NitroEthylic Acid. Soluble in water; the solution readily undergoes decomposition. Its salts are all soluble in water, and alcohol. (Frankland.)
$C_4 H_6 N_2 O_4$

*Bi*NitroEthylate of Baryta. Very deliquescent. Very soluble in water. (Frankland.)
$C_4 H_5 Ba N_2 O_4$

*Bi*NitroEthylate of Copper. Soluble in water.
$2 C_4 H_5 Cu N_2 O_4 + Aq$

*Bi*NitroEthylate of Lime. Soluble in water.
$C_4 H_5 Ca N_2 O_4 + 3 Aq$

*Bi*NitroEthylate of Magnesia. Soluble in water.
$C_4 H_5 Mg N_2 O_4$

*Bi*NitroEthylate of Silver. Very soluble in water.

*Bi*NitroEthylate of Soda. Readily soluble in water, and strong alcohol.
$C_4 H_5 Na N_2 O_4$

*Bi*NitroEthylate of Zinc.

I.) *normal.* Very soluble in water, and alcohol. The hot concentrated aqueous solution solidifies on cooling.
$2 C_4 H_5 Zn N_2 O_4 + Aq$

II.) *basic.*
$C_4 H_5 Zn N_2 O_4 ; Zn O$

*Bi*NitroEthylate of Zinc with ZincEthyl. Instantly decomposed by water, and by absolute alcohol. Tolerably soluble in anhydrous ether. (Frankland.)
$C_4 H_5 Zn N_2 O_4 ; C_4 H_5 Zn$

NitroEuxanthic Acid. Very sparingly soluble in water; somewhat more soluble in alcohol, especially if this be boiling. Soluble in alkaline solutions.
$C_{42} H_{17} (N O_4) O_{22}$

NitroEuxanthate of Ammonia.

NitroEuxanthate of Potash. Soluble in water.

NitroEuxanthate of Lead.

I.) *basic.*
$C_{42} H_{16} Pb (N O_4) O_{22}, Pb O, H O$

NitroFerriCyanhydric Acid. *Vid.* NitroPrussic Acid.

NitroForm. *Vid.* Hydride of *ter*NitroMethyl.

NitroForm with Ammonia. *Vid. tri*NitroMethylide of Ammonium.

NitroFrangulinic Acid. Sparingly soluble in cold, more readily soluble in boiling water. Very readily soluble in alcohol, and ether. Less soluble in dilute acids than in water. Scarcely at all acted upon by cold concentrated acids, but soluble in [warm ?] concentrated nitric acid. Soluble, with combination, in alkaline solutions. (Casselman, *Ann. Ch. u. Pharm.*, **104.** 84.)
$C_{40} H_{10} N_5 O_{37} = C_{40} H_9 (N O_4)_5 O_{16} + Aq$

NitroFrangulinate of Copper. Exceedingly sparingly soluble in water; somewhat more soluble in alcohol, and ether. Easily soluble in acetic acid. (Casselmann, *loc. cit.*)
$C_{40} H_8 Cu (N O_4)_5 O_{16} + Aq$

NitroFrangulinate of Silver. Soluble in hot, very sparingly soluble in cold water. Easily soluble in alcohol, and ether. (Casselmann, *loc. cit.*)
$C_{40} H_8 Ag (N O_4)_5 O_{16} + Aq$

Nitrogen. Nearly insoluble in all known solvents. (Berthelot.) 1 vol. of recently boiled water absorbs 0.0147 vol. of it at 15.5°. (Henry, *Phil. Trans.*, 1803, p. 274. [T.].) 1 vol. of water absorbs 0.025 vol. of it. (Dalton, *Ann. Phil.*, **7.** 219. [T.].) 1 vol. of water absorbs 0.0156 vol. of nitrogen at ordinary temperatures, i. e. 1 vol. of nitrogen is soluble in 62.5 vols. of water. (Dalton, in *Gmelin's Handbook.*)
N

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1 vol. of water, under a pressure of 0m.76 of mercury, at °C.	Dissolves of nitrogen gas, — vols., reduced to 0°C. and 0m.76 pressure of mercury.
0°	0.02035
1°	0.01981
2°	0.01932
3°	0.01884
4°	0.01838
5°	0.01794
6°	0.01752
7°	0.01713
8°	0.01675
9°	0.01640
10°	0.01607
11°	0.01577
12°	0.01549
13°	0.01523
14°	0.01500
15°	0.01478
16°	0.01458
17°	0.01441
18°	0.01426
19°	0.01413
20°	0.01403

(Bunsen's *Gasometry*, pp. 286, 128, 144.)

At 18° C. and the ordinary pressure 100 vols.	Absorb vols. of N.
of water	4.2
of alcohol of 0.84 sp. gr.	4.2

(Th. de Saussure, *Gilbert's Ann. Phys.*, 1814, **47.** 167.)

1 vol. of alcohol, under a pressure of 0m.76 of mercury, at °C.	Dissolves of nitrogen gas, — vols., reduced to 0°C. and 0m.76 pressure of mercury.
0°	0.12634
1°	0.12593
2°	0.12553
3°	0.12514
4°	0.12476
5°	0.12440
6°	0.12405
7°	0.12371
8°	0.12338
9°	0.12306
10°	0.12276
11°	0.12247
12°	0.12219
13°	0.12192
14°	0.12166
15°	0.12142
16°	0.12119
17°	0.12097
18°	0.12076
19°	0.12056
20°	0.12038
21°	0.12021
22°	0.12005
23°	0.11990
24°	0.11976

(Bunsen's *Gasometry*, pp. 286, 128, 144.) 1 vol. of ether absorbs 0.15 vol. of nitrogen. (Dœbereiner.) 1 vol. of caoutchin absorbs 5 vols. of it in five weeks. (Himly.)

NitroGentianic Acid. Insoluble in water.
(*Nitro Gentianin.*)
$C_{28} H_8 (N O_4)_2 O_{10} + 2 Aq$

*Ter***NitroGlycerin.** Slightly soluble in water; more readily soluble in alcohol, and ether. (Railton, *J. Ch. Soc.*, 7. 223.)
(*Glonoin. Nitrate of Glyceryl.*)
$C_6 H_5 (N O_4)_3 O_6$

NitroGuanin with Oxide of Silver. Insoluble in water. Very sparingly soluble in ammonia-water, and in nitric acid. (Neubauer & Kerner, *Ann. Ch. u. Pharm.*, **101.** 336.)
$C_{10} H_4 N_6 Ag_3 O_9 = C_{10} H_4 (N O_4) N_5 O_2 ; 3 Ag O$

NitroHæmatic Acid. *Vid.* Picramic Acid.

NitroHarmalin. Sparingly soluble in cold, much more soluble in boiling water. More soluble in alcohol than either harmalin or harmin. Sparingly soluble in cold, more soluble in warm ether. Soluble in warm, less soluble in cold naphtha; also soluble in the fatty and essential oils, and in alkaline solutions. Very soluble in oxalic acid.
(*NitroHarmalidin. Chryso Harmin.*)
$C_{26} H_{13} (N O_4) N_2 O_2$

NitroHarmalin with Silver. Insoluble in water. Sparingly soluble in alcohol. Soluble, with combination, in naphtha.
$C_{26} H_{12} Ag (N O_4) N_2 O_2 + 2 Aq(?)$

NitroHarmin. Sparingly soluble in cold, more soluble in boiling water. Soluble in alcohol, especially when this is hot. Very sparingly soluble in ether. Soluble in warm naphtha, and coal-tar oil; also in acetic acid, and in water acidulated with chlorhydric acid.
(*NitroHarmidine.*)
$C_{26} H_{11} (N O_4) N_2 O_2$

NitroHellenin. Very sparingly soluble in water. Easily soluble in alcohol, and in nitric acid. Soluble in ammonia-water. (Gerhardt.)
$C_{15} H_9 (N O_4) O_2$

NitroHippuric Acid. Sparingly soluble in cold water, though somewhat more soluble than hippuric acid; readily soluble in boiling water. Soluble in 271 pts. of water at 23°. When contaminated with traces of impurities it is more readily soluble in cold water. More soluble in water containing ordinary phosphate of soda than in pure water. (Bertagnini.) Easily soluble in alcohol, even in the cold, and in ether. The metallic nitrohippurates are mostly soluble in water; part of them are soluble in alcohol also.
$C_{18} H_8 (N O_4) N O_6$

NitroHippurate of Ammonia.

I.) *normal.* Soluble in water.

II.) *acid.* Easily soluble in water, and alcohol.

NitroHippurate of Baryta. Soluble in water.

NitroHippurate of Copper. Soluble in boiling, but very sparingly soluble in cold water. Soluble in hot, less soluble in cold alcohol.
$C_{18} H_7 Cu (N O_4) N O_6 + 5 Aq$

NitroHippurate *of sesquioxide* **of Iron.** Soluble in boiling water.

NitroHippurate of Lead. Hygroscopic.
$C_{18} H_7 Pb (N O_4) N O_6$

NitroHippurate of Lime. Sparingly soluble in cold, readily soluble in boiling water. Sparingly soluble in alcohol.
$C_{18} H_7 Ca (N O_4) N O_6 + 3 Aq$

NitroHippurate of Magnesia. Very soluble in water. Readily soluble in alcohol.

NitroHippurate of Potash. Readily soluble in water, and spirit. Sparingly soluble in absolute alcohol. (Bertagnini.)

NitroHippurate of Silver. Tolerably soluble in cold, readily soluble in boiling water. Tolerably soluble in cold alcohol.
$C_{18} H_7 Ag (N O_4) N O_6$

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NitroHippurate of Soda. Very easily soluble in water. Also soluble in alcohol, though less readily than the potash salt.

NitroHippurate of Zinc. Sparingly soluble in water or alcohol at ordinary temperatures, but soluble in warm water, and alcohol. (Bertagnini.)

$C_{18}H_7Zn(NO_4)NO_6 + 6\,Aq$

***Ter*NitroHydroBenzamid.** Insoluble in water, ether, or oil of turpentine. Sparingly soluble in strong boiling, less so in cold alcohol. (Bertagnini, *Ann. Ch. et Phys.*, (3.) **33.** 478.)

(*Hydrobenzamide trinitré.*)
$C_{42}H_{15}N_5O_{12} = C_{42}H_{15}(NO_4)_3N_2$

NitroHydurilic Acid (of Schlieper). Insoluble in cold, sparingly soluble in hot water. Insoluble in alcohol or in ammonia-water. Soluble in concentrated sulphuric and nitric acids, from which it is precipitated on the addition of water. (Schlieper.) Also soluble in alkaline solutions.

(Said by Laurent to have been impure *NitroAlloxanic Acid.*)
$C_8H_2N_3O_{14}$

NitroIdrialin. Insoluble in water, alcohol, or ether. Soluble in concentrated sulphuric acid. Partially soluble in a solution of caustic potash.

(*Nitrite of Idrialase.*)
$C_{84}H_{28}(NO_4)_5O_2$

NitroInosite. Insoluble in water. Easily soluble in alcohol, from which it is precipitated on the addition of water. Unacted upon by dilute, decomposed by warm, concentrated acids. (Vohl, *Ann. Ch. u. Pharm.*, **101.** 56.)

NitroItaconanilid. *Vid.* NitroPhenylItaconamid.

NitroLeucic Acid. *Vid.* Nitrate of Leucin.

***Ter*NitroLophin.** Very sparingly soluble in boiling, and still less soluble in cold alcohol. Soluble in potash-lye, from which it is precipitated on the addition of water. (Laurent.)

(*NitroLophyl*)
$C_{42}H_{13}(NO_4)_3N$

NitroMalanil. *Vid.* NitroPhenylMalimid.

NitroMannite. Insoluble in water. Very sparingly soluble in cold, readily soluble in boiling alcohol. Easily soluble in warm ether. Easily soluble in concentrated sulphuric acid, without apparent decomposition. It is at once decomposed, however, when water is added to this solution. (Strecker.)

$C_{12}H_8(NO_4)_6O_{14}$

NitroMaric Acid. Insoluble in water. Very soluble in alcohol, and ether. Soluble in concentrated sulphuric acid, from which it is precipitated on the addition of water. (Laurent, *Ann. Ch. et Phys.*, (3.) **22.** 462.)

(*AzoMaric Acid.*)
$C_{40}H_{22}(NO_4)_2O_8$

NitroMarate of Ammonia. Very soluble in water. (Laurent, *loc. cit.*)

NitroMarate of Baryta. Insoluble in water.

NitroMarate of Lead.

I.) *basic.* Sparingly soluble in alcohol. (Laurent, *loc. cit.*)

$C_{40}H_{21}Pb(NO_4)_2O_8;\ PbO$

NitroMarate of Potash. Soluble in water.

NitroMarate of Silver.

NitroMarate of Soda. Soluble in water.

NitroMeconin. Difficultly soluble in cold, more easily soluble in boiling water. Soluble in alcohol, especially when this is warm, and in ether. No more soluble in cold aqueous solutions of caustic potash or ammonia than in water, but at the temperature of ebullition they dissolve it in considerable quantity, with decomposition. Insoluble in chlorhydric acid. Soluble in cold concentrated nitric acid, from which it separates on the addition of water. (Anderson, *J. Ch. Soc.*, **9.** 274.)

(*NitrOpianyl. Hydride of NitrOpianyl. HypoNitroMeconic Acid.*)
$C_{20}H_9(NO_4)O_8$

***Bi*NitroMelAnilin.** Insoluble in water, even when this is boiling. Difficultly soluble in alcohol, and still less soluble in ether. (Hofmann, *J. Ch. Soc.*, **1.** 306.)

$$C_{26}H_{11}N_5O_8 = N_3\left\{\begin{array}{l} C_{12}H_4(C_2N).H \\ C_{12}H_3(NO_4)_2 \\ H_3 \end{array}\right.$$

***Tetra*NitroMelAnilin?** Insoluble in water or alcohol. Soluble in hot strong nitric acid, from which solution it crystallizes on cooling. (Hofmann.)

$C_{26}H_9(NO_4)_4N_3$

NitroMesidin. *Vid.* NitroMesitylamin.

NitroMesitylamin. Slightly soluble in water. Very soluble in alcohol, and ether. Easily soluble in acids, with combination, forming salts which are soluble in alcohol, but decomposed by water. (Maule, *J. Ch. Soc.*, **2.** 118.)

(*NitroMesidin. Isomeric with Nitro Cumidin.*)

$$C_{18}H_{12}N_2O_4 = N\left\{\begin{array}{l} C_{18}H_{10}(NO_4) \\ H_2 \end{array}\right.$$

NitroMesitylene. Decomposed by an alcoholic solution of caustic potash to an isomeric compound which is very readily soluble in alcohol. (Cahours.)

(*Mesitic Aldehyde. Hydride of NitroMesityl. Isomeric with NitroCumol.*)
$C_{18}H_{11}NO_4 = C_{18}H_{10}(NO_4), H$

***Bi*NitroMesitylene.** Insoluble, or very sparingly soluble in water. Very readily soluble in alcohol. (Hofmann, *J. Ch. Soc.*, **2.** 110.)

(*Hydride of biNitroMesityl. Isomeric with biNitroCumol.*)
$C_{18}H_{10}N_2O_8 = C_{18}H_9(NO_4)_2, H$

***Ter*NitroMesitylene.** Insoluble, or very sparingly soluble in water. Not sensibly soluble in cold alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **25.** 40.) Extremely difficultly soluble in boiling alcohol or ether. (Hofmann, *loc. cit.*) Easily soluble in acetone. (Maule; Hofmann.)

(*Hydride of terNitroMesityl.*)
$C_{18}H_9N_3O_{12} = C_{18}H_8(NO_4)_3, H$

NitroMetacetic Acid. *Vid.* NitroPropionic Acid.

NitroMetacetonic Acid. *Vid.* NitroPropionic Acid.

NitroMetaStyrol. Insoluble in water, alcohol, ether, acids, or alkaline solutions.

(*NitroDraconyl. Isomeric with NitroCinnamene.*)
$C_{16}H_7(NO_4)''$

***Bi*NitroMethylic Acid.**

$C_2H_4N_2O_4$

***Bi*NitroMethylate of Soda.** Very readily soluble in water, and alcohol. (Frankland.)

$C_2H_3NaN_2O_4 + 2\,Aq$

***Bi*NitroMethylate of Zinc.**

I.) *normal.* Soluble in water.

$C_2H_3ZnN_2O_4 + Aq$

II.) *basic.* Dissolves in water to an opalescent solution. (Frankland.)

***Bi*NitroMethylate of Zinc with ZincMethyl.** Instantly decomposed by water. (Frankland.)

$C_2H_3ZnN_2O_4;\ C_2H_3Zn$

***Ter*NitroMethylide of Ammonium.** Soluble in water, and alcohol. (Schischkoff, *Ann. Ch. u. Pharm.*, **103.** 364.)

$C_2(NO_4)_3NH_4$

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NitroNaphthalesic Acid. *Vid.* NitroPhthalic Acid.

NitroNaphthalic Acid. *Vid.* NitroPhthalic Acid.

NitroNaphthalin. *(NitroNaphtalase. Ninaphtase. Nitrite of Naphtalase.)* $C_{20} H_7 (N O_4)$ Insoluble in water. Readily soluble in warm, less soluble in cold alcohol, ether, rock-oil, and chloride of sulphur. (Laurent.) Soluble in cold concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water. Decomposed by boiling concentrated sulphuric acid. (Laurent.) Unacted upon by chlorhydric acid.

***Bi*NitroNaphthalin.** *(Ninaphtese C. biNitrite of Naphtalese. Nitro Naphtalese.)* $C_{20} H_6 (N O_4)_2''$ Insoluble in water. Very sparingly soluble in ether; still less soluble in alcohol. (Laurent.) Soluble in nitric acid, from which it is precipitated on the addition of water. (Marignac.)

***Ter*NitroNaphthalin.** *(NitroNaphtalise. Ninaphtise.)* $C_{20} H_5 (N O_4)_3''$ There are three different modifications:

I.) *Modif.* α. *(Ninaphtise G.)* Very sparingly soluble in boiling alcohol. Very slightly soluble in ether. Soluble in nitric acid, and concentrated sulphuric acid, without decomposition if they be not too strongly heated. (Laurent.)

II.) *Modif.* β. *(NitroNaphtale. Ninaphtase G. L.)* Very sparingly soluble in boiling alcohol, or ether. Of all the nitrocompounds of naphthalin it is the least soluble in alcohol, and ether. Readily soluble in hot concentrated sulphuric acid, without decomposition, but if the solution be too strongly heated, some sulphurous acid is evolved. Decomposed by boiling nitric acid. (Laurent.)

III.) *Modif.* γ. Insoluble in cold water, and only so far soluble in boiling water that the liquid becomes turbid on cooling. Sparingly soluble in boiling alcohol. Almost insoluble in ether, even when this is boiling. Slightly soluble in concentrated nitric acid, from which it is precipitated on the addition of water. Is not acted upon by concentrated chlorhydric acid, or by dilute nitric or sulphuric acids, but is decomposed by concentrated sulphuric acid. (Marignac.)

NitroNaphtylamin. $C_{20} H_8 N_2 O_4 = N \left\{ \begin{matrix} C_{20} H_7 (N O_4)'' \\ H \end{matrix} \right.$ Insoluble in water or chlorhydric acid. Soluble in alcohol, sulphuric acid, nitric acid, and an aqueous solution of caustic potash. (Schiff.)

NitroNiceic Acid. *Vid.* NitroChloroBenzoic Acid.

NitroNitrosoPhenoylamin.
$C_{12} H_4 N_3 O_7 = N \left\{ \begin{matrix} C_{12} H_2 (N O_4) (N O_2)'' \\ H \end{matrix} \right. + Aq$

***Bi*NitroNitrosoPhenoylamin.** $C_{12} H_2 N_4 O_{10} = N \left\{ \begin{matrix} C_{12} H (N O_4)_2 (N O_2)'' \\ H \end{matrix} \right.$ Soluble in alcohol.

NitroOxalate of *X*. *Vid.* Nitrate of *X* with Oxalate of *X*.

NitroPapaverin. $C_{40} H_{20} N_2 O_{12} = N \left\{ \begin{matrix} C_{40} H_{19} (N O_4) O_8'' \\ H \end{matrix} \right.$ Insoluble in water. Soluble in boiling, insoluble in cold alcohol. Soluble in ether.

NitroParaBenzin. *(Nitro ParaBenzole.)*

I.) Insoluble, or very sparingly soluble in water.

II.) Slightly soluble in boiling, less soluble in cold water. Soluble in alcohol. (Church, *Phil. Mag.*, (4.) **14.** 417.)

***Bi*NitroParaNaphthalin.** *(Nitrite d'Anthracénèse.)* $C_{30} H_{10} N_2 O_8 = C_{30} H_{10} (N O_4)_2''$ Insoluble in water. Sparingly soluble in boiling alcohol. Readily soluble in hot ether.

NitroParaNicene. $C_{30} H_{11} (N O_4)$ Soluble in alcohol, and ether. (St. Evre.)

NitroParaTartaric Acid. Soluble in water, and alcohol.

NitroPeucedanin. $C_{24} H_{11} (N O_4) O_6$ Almost insoluble in water. Tolerably soluble in alcohol, and ether. (Bothe.)

NitroPeucedaninamid. *(NitroPeucedamid.)* $C_{24} H_{12} N_2 O_8 = N \left\{ \begin{matrix} C_{14} H_4 (N O_4) O_2 \\ C_{10} H_7 O_2 \\ H \end{matrix} \right.$ Nearly insoluble in water. Readily soluble in alcohol, and ether. (Bothe.) Decomposed by warm dilute acids, and alkaline solutions.

NitroPhenamic Acid. *(BiNitrodiPhenamic Acid. AmiNitroPhenic Acid.)* $C_{24} H_{12} (N O_4)_2 N_2 O_4 + 4 Aq$ Sparingly soluble in cold, more soluble in boiling water. Tolerably soluble in alcohol, and ether.

NitroPhenamate of Ammonia. Soluble in ammonia-water; the solution undergoing decomposition when evaporated.

NitroPhenamate of Baryta. Sparingly soluble in water.

NitroPhenamate of Copper. Ppt.

NitroPhenamate of Lead. Ppt.

NitroPhenamate of Lime. Sparingly soluble in water.

NitroPhenamate of Potash. $C_{24} H_{11} K (N O_4)_2 N_2 O_4$ Very readily soluble in water, and alcohol.

NitroPhenamate of Silver. $C_{24} H_{11} Ag (N O_4)_2 N_2 O_4$ Very difficultly soluble in boiling, and still less soluble in cold water.

NitroPhenAmylidin. *Vid.* Oxide of AmylNitroPhenylamin.

NitroPhenic Acid. *(NitroPhenol. NitroCarbolic Acid. Isomeric with IsoNitroPhenic Acid.)* $C_{12} H_5 (N O_4) O_2$ Only slightly soluble in water. Extremely soluble in alcohol, and ether. (Hofmann, *J. Ch. Soc.*, **10.** 205.) The alkaline salts of nitrophenic acid are difficultly soluble, or insoluble, in an excess of the solution of alkali, but they are readily soluble in pure water.

NitroPhenate of Ethyl. *(NitroPhenetol.)* $C_{16} H_9 N O_6 = C_{12} H_4 (C_4 H_5) (N O_4) O_2$ Insoluble in water. Easily soluble in alcohol, and ether.

NitroPhenate of Methyl. *(Nitranisol. Phenate of Methyl-nitré. Anisol mononitrique.)* $C_{12} H_4 (N O_4) (C_2 H_3) O_2$ Insoluble, or very sparingly soluble in water. Soluble in concentrated sulphuric acid, when this is gently heated; from this solution water precipitates it unchanged. (Cahours, *Ann. Ch. et Phys.*, (3.) **27.** 442.) It is not decomposed even by warm potash-lye.

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NitroPhenate of Potash.
$C_{12}H_4K(NO_4)O_2 + Aq$

NitroPhenate of Silver. Somewhat soluble in water.
$C_{12}H_4Ag(NO_4)O_2$

NitroPhenate of Soda. Soluble in water.
$C_{12}H_4Na(NO_4)O_2$

***Bi*NitroPhenic Acid.** Almost insoluble in cold, sparingly soluble in boiling water. Easily soluble in alcohol, and ether. (Laurent.) Warm alcohol dissolves somewhat more than ¼ its own weight of the acid, depositing it again on cooling. Sparingly soluble in boiling, less soluble in cold chlorhydric acid. Very soluble in warm concentrated sulphuric acid, from which solution it is precipitated on the addition of water. Its salts are almost all soluble in water.
(*NitroPhenesic Acid. BiNitroCarbolic Acid.*)
$C_{12}H_4N_2O_{10} = C_{12}H_3(NO_4)_2O, HO$

***Bi*NitroPhenate of Ammonia.** Very sparingly soluble in cold water, less soluble in alcohol. (Laurent.)

***Bi*NitroPhenate of Baryta.** Soluble in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **25.** 22.)
$C_{12}H_3Ba(NO_4)_2O_2 + 5\,Aq$

***Bi*NitroPhenate of Cobalt.** Soluble in water. (Laurent.)

***Bi*NitroPhenate of Copper.** Soluble in water. (Laurent.)

***Bi*NitroPhênate of Ethyl.** Insoluble in water. Soluble in boiling, less soluble in cold alcohol. (Baly, *J. Ch. Soc.*, **2.** 31; Cahours, *Ann. Ch. et Phys.*, (3.) **27.** 466.)
(*BiNitroPhenetol. BiNitroSalithol. Phenate d'Ethylebinitré.*)
$O_{18}H_8N_2O_{10} = C_{12}H_3(C_4H_5)(NO_4)_2O_2$

***Bi*NitroPhenate of Lead.**
I.) *di.* Ppt.
$C_{12}H_3Pb(NO_4)_2O_2, PbO + 4\,Aq$
II.) $2\,C_{12}H_3Pb(NO_4)_2O_2;\ PbO$ Ppt.

***Bi*NitroPhenate of Lime.**

***Bi*NitroPhenate of Methyl.** Scarcely at all soluble in boiling water. Easily soluble in boiling, less soluble in cold alcohol. Tolerably soluble in ether. Insoluble in alkaline liquors, or in caustic ammonia. (Cahours, *Ann. Ch. et Phys.*, (3.) **25.** 21; and (3) **27.** 441.)
(*BiNitranisol. Phenate of Methylbinitré. Anisol biNitrique.*)
$C_{12}H_3(NO_4)_2(C_2H_3)O_2$

***Bi*NitroPhenate of Potash.** Sparingly soluble in cold water. Very sparingly soluble in cold, more soluble in hot alcohol. (Laurent.)
$C_{12}H_3K(NO_4)_2O_2 + Aq$

***Bi*NitroPhenate of Silver.** Soluble in water, and alcohol. (Laurent.)

***Bi*NitroPhenate of Soda.** Tolerably soluble in water. (Laurent.)

***Bi*NitroPhenate of Strontia.**

***Ter*NitroPhenic Acid.** *Vid.* Picric Acid.

NitroPhenesic Acid. *Vid.* *bi*NitroPhenic Acid.

NitroPhenetidin. *Vid.* EthylNitroPhenidin.

NitroPhenetol. *Vid.* NitroPhenate of Ethyl.

NitroPhenisic Acid. *Vid.* Picric Acid.

NitroPhenol. *Vid.* NitroPhenic Acid.

***Di*NitroPhenylamin.** *Vid.* *bi*NitrAnilin.

NitroPhenylBenzoylamid. Soluble in boiling, less soluble in cold alcohol.
(*BenzoNitranilid. Isomeric with PhenylNitroBenzoylamid.*)
$C_{26}H_{10}N_2O_6 = N\left\{\begin{matrix}C_{14}H_5O_2\\C_{12}H_4(NO_4)\\H\end{matrix}\right.$

NitroPhenylCarbamid. Soluble in hot, less soluble in cold water. (Hofmann, *J. Ch. Soc.*, **2.** 42.) Easily soluble in boiling alcohol.
(*Carbamide NitroCarbanilid. NitroCarbamidoAnilid. NitroCarbanilamid. NitrAnilin Urea. Isomeric with NitroPhenyl Urea.*)
$C_{14}H_7N_3O_6 = N_2\left\{\begin{matrix}C_2O_2''\\C_{12}H_4(NO_4)\\H_3\end{matrix}\right.$

***Bi*NitroPhenylCitraconamic Acid.** Soluble in alcohol.
(*Citracobinitranilic Acid.*)
$C_{22}H_9N_3O_{14} = N\left\{\begin{matrix}C_{10}H_4O_4''\\C_{12}H_3(NO_4)_2\,.\,O, HO\\H\end{matrix}\right.$

***Bi*NitroPhenylCitraconamate of Silver.**
$C_{22}H_8AgN_3O_{14}$

***Bi*NitroPhenylCitraconimid.** Very sparingly soluble in cold, easily soluble in boiling water. Readily soluble in alcohol, especially when this is hot.
(*Citracobinitranil. CitraconylbiNitrophenylamide.*)
$C_{22}H_7N_3O_{12} = N\left\{\begin{matrix}C_{10}H_4O_4''\\C_{12}H_3(NO_4)_2\end{matrix}\right.$

***Quinqui*NitroPhenylItaconamid.** Insoluble in water and in alcohol. (Gottlieb.)
(*PentaNitroItaconanilide. Itaconanilide quintinitrée.*)
$C_{34}H_{11}N_7O_{24} = C_{34}H_{11}(NO_4)_5N_2O_4$

NitroPhenylMalimid. Easily soluble in warm water. Soluble in alcohol. (Arppe.)
(*NitroMalinil.*)

NitroPhenylPyroTartramic Acid. Very sparingly soluble in water, even when this is boiling. Easily soluble in spirit, and ether. (Arppe.)
(*PyroTartroNitralic Acid. PyroTartrylNitroPhenylaminic Acid.*)
$C_{22}H_{12}N_2O_{10} = N\left\{\begin{matrix}C_{10}H_6O_4''\\C_{12}H_4(NO_4)\,.\,O, HO\\H\end{matrix}\right.$

NitroPhenylPyroTartramate of Ammonia. Soluble in water.

NitroPhenylPyroTartramate of Potash. Soluble in water; the solution is easily decomposed.

NitroPhenylPyroTartramate of Silver.
$C_{22}H_{11}AgN_2O_{10}$ Ppt.

NitroPhenylPyroTartrimid. Almost entirely insoluble in water. Soluble in boiling alcohol, and in ether. (Arppe, *Ann. Ch. u. Pharm.*, **90.** 144.)
(*PyroTartrylNitroPhenylamid. PyroTartronitranil. NitroPyroTartranil. PyroTartonitranil.*)
$C_{22}H_{10}N_2O_8 = N\left\{\begin{matrix}C_{10}H_6O_4''\\C_{12}H_4(NO_4)\end{matrix}\right.$

NitroPhenylSulphurous Acid.
(*NitroSulphoBendizic Acid.*)
$C_{12}H_5(NO_4)S_2O_6 = C_{12}H_4(NO_4)S_2O_5, HO$

NitroPhenylSulphite of Ammonia.
$C_{12}H_4(NH_4)(NO_4)S_2O_6$

***Bi*NitroPhloretic Acid.** There are two isomeric modifications of this acid: —
$C_{18}H_8N_2O_{14} = C_{18}H_6(NO_4)_2O_4, 2\,HO$

I.) *Modif. α.* Very sparingly soluble in cold, more soluble in hot water. More soluble in alcohol than in water; less soluble in cold than in hot alcohol. Easily soluble in alkaline solutions. (Hlaziwetz, *Ann. Ch. u. Pharm.*, **102.** 155.)

II.) *Modif. β* has the same solubility as modif. *α*; its salts also exhibit the same degree of solubility as those of *α*. (Hlaziwetz, *loc. cit.*, pp. 158, 159.)

***Bi*NitroPhloretate of Ammonia.** Efflorescent. Soluble in water.
$C_{18}H_6(NO_4)_2(NH_4)_2O_6$

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***Bi*NitroPhloretate of Baryta.** Difficultly soluble in cold water.
$C_{18}H_6(NO_4)_2Ba_2O_6$

***Bi*NitroPhloretate of Copper.** Ppt.

***Bi*NitroPhloretate of Ethyl.** Very sparingly soluble in cold water. Easily soluble in alcohol, and ether.
$C_{18}H_7(NO_4)_2(C_4H_5)O_6$

***Bi*NitroPhloretate *of sesquioxide* of Iron.** Ppt.

***Bi*NitroPhloretate of Lead.** Ppt.

***Bi*NitroPhloretate of Lime.** Somewhat soluble in water.

***Bi*NitroPhloretate *of protoxide* of Mercury.** Ppt. Soluble in an aqueous solution of protochloride of mercury.

***Bi*NitroPhloretate of Potash.** Efflorescent. More sparingly soluble in dilute alcohol than in water. (Hlaziwetz.)
$C_{18}H_6K_2(NO_4)_2O_6$

***Bi*NitroPhloretate of Silver.**

***Bi*NitroPhloretate *of protoxide* of Tin.** Ppt.

***Bi*NitroPhloretate of Zinc.** Ppt.

NitroPhloretin. Insoluble in water or in dilute acids. Soluble in alcohol, wood-spirit, and alkaline solutions; also, without alteration, in concentrated sulphuric acid. (Stass.)
(*Improperly Phloretic Acid. Improperly NitroPhloretic Acid. NitroPhloretate of Phloro Glucin.*)
$C_{30}H_{13}(NO_4)O_{10}$

***Ter*NitroPhloretal.** Insoluble, or but sparingly soluble in cold water. Soluble in alcohol. (Hlaziwetz.)
$C_{16}H_7(NO_4)_3O_2$

"**NitroPhosphate of Phenyl.**" Insoluble in water. (Scrugham, *J. Ch. Soc.*, **7.** 242.)

NitroPhosphate of *X*. *Vid.* Nitrate of *X* with Phosphate of *X*.

NitroPhthalic Acid (Anhydrous). Very sparingly soluble in water.
$C_{16}H_3(NO_4)O_6$

NitroPhthalic Acid. Tolerably soluble in boiling, sparingly soluble in cold water. Easily soluble in alcohol, and ether.
(*NitroNaphthalic Acid. NitroNaphthalesic Acid.*)
$C_{16}H_5NO_{12} = C_{16}H_3(NO_4)O_6, 2HO$

Insoluble in water, alcohol, or ether. (Laurent, [*Gm.*, **14.** 87.].) Its alkaline salts are soluble. (*Ibid.*)

NitroPhthalate of Ammonia.

I.) *normal.* Soluble in water.
$C_{16}H_3(NH_4)_2(NO_4)O_8$

II.) *acid.* Soluble in water.
$C_{16}H_4(NH_4)(NO_4)O_8 + 4Aq$

NitroPhthalate of Baryta. Entirely insoluble, even in an excess of boiling nitrophthalic acid.
$C_{16}H_3Ba_2(NO_4)O_8$

NitroPhthalate of Lead.

I.) *basic.* Insoluble in water. (Marignac.)
$C_{16}H_3Pb_2(NO_4)O_8, 2PbO$

NitroPhthalate of Lime. Sparingly soluble in water. (Laurent.)

NitroPhthalate of Silver. Insoluble in water.
$C_{16}H_3Ag_2(NO_4)O_8$

NitroPhthalate of Strontia. Sparingly soluble in water. (Laurent.)

NitroPhtalene. Insoluble in cold water, but when distilled in a current of aqueous vapor the condensed water contains notable quantities of it. Sparingly soluble in cold, abundantly soluble in boiling alcohol. Very soluble in ether, and coal-oil. Soluble in concentrated sulphuric acid. Soluble, with decomposition, in alkaline solutions. (Dusart, *Ann. Ch. et Phys.*, (3.) **45.** 334.)
(*Phthaline nitré. Isomeric with NitroCinnamene and NitroStyrol.*)
$C_{16}H_7(NO_4)$

NitroPhtalimid.
(*NitroPhtalyamid.*)
$C_{16}H_4N_2O_8 = N\left\{\begin{matrix}C_{16}H_3(NO_4)O_4''\\H\end{matrix}\right.$

NitroPhtalinic Acid. Sparingly soluble in water, more soluble in alcohol. Soluble in weak alcohol. (Dusart, *Ann. Ch. et Phys.*, (3.) **45.** 338.)
$C_{32}H_{14}N_2O_{10}$

NitroPhtalinate of Ammonia. Soluble in water.

NitroPhtalinate of Baryta. Ppt.

NitroPhtalinate of Copper. Ppt.

NitroPhtalinate of Lead. Ppt.

NitroPhtalinate of Lime. Ppt.

NitroPhtalinate of Potash. Very soluble in water. Also soluble in alcohol. (Dusart.)

NitroPhtalinate of Silver. Ppt.

NitrOpianyl. *Vid.* NitroMeconin.

NitroPicric Acid. *Vid.* Picric Acid.

NitroPicril. Insoluble in water. Very sparingly soluble in alcohol. Very readily soluble in ether. (Laurent.)
(*NitroPikril.*)
$C_{42}H_{12}(NO_4)_3NO_4$

NitroPopulic Acid. *Vid.* *bi*NitroSalicylic Acid.

NitroPropionic Acid. Insoluble in water. Soluble in all proportions in alcohol. (Chancel, *Ann. Ch. et Phys.*, (3.) **12.** 150.) Sparingly soluble in water. (Gerhardt's *Tr.*)
(*ButyroNitric Acid. MetAcetoNitric Acid. NitroMetAcetic Acid.*)
$C_6H_5NO_8 = C_6H_4(NO_4)O_3, HO$

NitroPropionate of Ammonia. Soluble in water. (Laurent & Chancel.)
$C_6H_4(NH_4)(NO_4)O_4 + 2Aq$

NitroPropionate of Copper. Ppt.

NitroPropionate of Lead. Ppt.

NitroPropionate of Potash. Soluble in about 20 pts. of water. Scarcely at all soluble in alcohol. (Chancel, *Ann. Ch. et Phys.*, (3.) **12.** 151.)
$C_6H_4K(NO_4)O_4 + 2Aq$

NitroPropionate of Silver.

I.) *normal.* Soluble in water. (Chancel.)
$C_6H_4Ag(NO_4)O_4 + 2Aq$

II.) *di.* Sparingly soluble in water; on boiling it is converted into the preceding salt. (Chancel, *loc. cit.*)
$C_6H_4Ag(NO_4)O_4;\ AgO + Aq$

NitroPrussic Acid. Very deliquescent. Very soluble in water, alcohol, and ether. The aqueous solution undergoes decomposition after a time. (Playfair.)
(*NitroFerriCyanhydric Acid.*)
$C_{10}H_2N_6Fe_2O_2 = Fe_2Cy_5, NO_2, 2HCy + Aq$

NitroPrusside of Ammonium. Deliquescent. Very soluble in water, from which it is not precipitated by alcohol. (Playfair.)
$Fe_2Cy_5, NO_2, (NH_4)_2$

NitroPrusside of Barium. Very readily soluble in water, from which solution it is not precipitated by alcohol. (Playfair.)
$Fe_2Cy_5, NO_2, Ba_2 + 4Aq$

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NitroPrusside of Calcium. Very soluble in water. Alcohol does not precipitate it from the aqueous solution. (Playfair.)
$Fe_2\,Cy_5, N\,O_2, Ca_2 + x\,Aq$

NitroPrusside of Cobalt. Insoluble, or nearly insoluble in water.

NitroPrusside of Copper. Insoluble in water, or alcohol.

_Proto_NitroPrusside of Iron. Nearly insoluble in water; more soluble in water acidulated with nitric acid.

NitroPrusside of Lead.
I.) *normal.* Soluble in water, and is not precipitated therefrom by alcohol.

II.) *basic.* Insoluble, or nearly insoluble in water.

NitroPrusside of Nickel. Insoluble, or nearly insoluble in water.

NitroPrusside of Potash.
I.) *normal.* Somewhat deliquescent. Very soluble in water, being more readily soluble than nitrate of potash, or than nitroprusside of sodium. Soluble in 1 pt. of water at 16°. (Playfair.)
$Fe_2\,Cy_5, N\,O_2, K_2$

II.) *basic.* Readily soluble in water. Very sparingly soluble in alcohol. (Playfair.)
$Fe_2\,Cy_5, N\,O_2, K_2 ; K\,O, H\,O$

NitroPrusside of Silver. Insoluble in water, alcohol, or nitric acid. Decomposed by chlorhydric acid.
$Fe_2\,Cy_5, N\,O_2, Ag_2$

NitroPrusside of Sodium. Permanent. Very readily soluble in water, though less readily soluble than the potash salt. It is more soluble in cold, but less soluble in hot water than nitrate of soda. Soluble in 2.5 pts. of water at 15°, and in less hot water. Alcohol does not precipitate it from the aqueous solution. (Playfair.)
$Fe_2\,Cy_5, N\,O_2, Na_2 + 4\,Aq$

NitroPrusside of Zinc. Very slightly soluble in cold, more soluble in hot water. (Playfair.)

NitroPyrene. *Vid. bi*NitroParaNaphthalin.

NitroPyroTartranil. *Vid.* NitroPhenylPyroTartrimid.

NitroQuercite. Insoluble in water. Soluble in warm alcohol.

NitroSaccharic Acid. Permanent. Very soluble in water. Insoluble in alcohol or spirit.
(*Nitrate of Glycocoll.*)
$C_4\,H_5\,N\,O_4, H\,O, N\,O_5$

It is liable to form supersaturated solutions. (Ogden.)

NitroSaccharate of Baryta.

NitroSaccharate of Copper.
I.) *di.* Permanent.
$C_4\,H_3\,Cu_2\,N\,O_4, H\,O, N\,O_5 + 2\,Aq$

NitroSaccharate of Lead. Permanent.

NitroSaccharate of Lime. Permanent. Sparingly soluble in water. (Braconnot.) Slightly soluble in alcohol. (Gmelin's *Handbook.*)

NitroSaccharate of Magnesia. Deliquescent.

NitroSaccharate of Potash. Soluble in water; less soluble in alcohol. (Horsford.)

NitroSaccharate of Silver. Deliquesces in moist air.
$C_4\,H_4\,Ag\,N\,O_4, H\,O, N\,O_5$

NitroSaccharate of Zinc.

NitroSalicylamic Acid. Scarcely at all soluble in cold, much more soluble in boiling water. Much more soluble in alcohol, and ether, than in water. Easily soluble in cold ammonia-water, even when this is very dilute. Also readily soluble in cold aqueous solutions of caustic potash and soda. (Cahours, *Ann. Ch. et Phys.*, (3.) 10. 352.)
(*NitroSalicylamid. Anilamid.*)
$C_{14}\,H_6\,N_2\,O_8 = N\left\{\begin{matrix} C_{14}\,H_3\,(N\,O_4)\,O_2'' \\ H_2 \end{matrix}\right. . O, H\,O$

NitroSalicylamid. *Vid.* NitroSalicylamic Acid.

NitroSalicide. *Vid.* NitroSalicylous Acid.

NitroSalicylic Acid. Very sparingly soluble in cold, easily soluble in boiling water. (Gerhardt, *Ann. Ch. et Phys.*, (3.) 7. 225.) Soluble in 1000 pts. of cold water, and in all proportions in hot water. (Buff.) Soluble in 1515 pts. of water at 17°, and in 35 pts. of boiling water. (Strecker, in *Kolbe's Lehrb.*, 2. 270.) Soluble in 5 @ 6 pts. of benzin at 21°. (*Ibid.*) Soluble in all proportions in boiling alcohol. Easily soluble in ether. (Strecker.)
(*Anilic Acid. Indigotic Acid. NitrAnilic Acid. Anilotic Acid. NitroSpiroylic Acid.*)
$C_{14}\,H_5\,N\,O_{10} + 2\,Aq =$
$C_{14}\,H_3\,(N\,O_4)\,O_4, 2\,H\,O + 2\,Aq$

NitroSalicylate of Ammonia.
I.) *mono.* Soluble in water.
$C_{14}\,H_4\,(N\,H_4)\,(N\,O_4)\,O_6$

NitroSalicylate of Baryta.
I.) *normal.* Sparingly soluble in cold, somewhat more readily, though still difficultly soluble in hot water. Insoluble in alcohol. (Buff.)
$C_{14}\,H_3\,Ba_2\,(N\,O_4)\,O_6 + 6\,Aq$

II.) *acid.* Soluble in boiling water.
$C_{14}\,H_4\,Ba\,(N\,O_4)\,O_6 + 5\,Aq$

NitroSalicylate of Copper. Soluble only in hot water, separating out as the solution cools. (Buff.)

NitroSalicylate of Ethyl.
I.) *mono.* *Vid.* EthylNitroSalicylic Acid.

NitroSalicylate *of sesquioxide* of Iron. Sparingly soluble in cold water. (Buff.)

NitroSalicylate of Lead.
I.) *normal.* Entirely insoluble in water. (Dumas.)
$C_{14}\,H_3\,Pb_2\,(N\,O_4)\,O_6 + Aq$

II.) *acid.* Somewhat more soluble in water than nitrosalicylic acid is. (Buff.)
$C_{14}\,H_4\,Pb\,(N\,O_4)\,O_6 + Aq$

III.) $C_{14}\,H_3\,Pb_2\,(N\,O_4)\,O_6 ; C_{14}\,H_4\,Pb\,(N\,O_4)\,O_6$ Insoluble in water. Soluble in free nitrosalicylic acid.

NitroSalicylate of Lime.
I.) *normal.* Slightly soluble in water.
$C_{14}\,H_3\,Ca_2\,(N\,O_4)\,O_6 + 4\,Aq$

II.) *acid.* Tolerably soluble in water.
Nitrosalicylate of lime is readily soluble in water. (Buff.)

NitroSalicylate of Magnesia. Readily soluble in water. (Buff.)

NitroSalicylate *of dinoxide* of Mercury. Insoluble in cold, sparingly soluble in boiling water. (Buff.)
$C_{14}\,H_4\,Hg_2\,(N\,O_4)\,O_6 + 10\,Aq$

NitroSalicylate of Methyl. *Vid.* MethylNitroSalicylic Acid.

NitroSalicylate of Potash. Sparingly

soluble in cold, readily soluble in boiling water, and alcohol. (Marchand.)
$C_{14} H_4 K (N O_4) O_6$

NitroSalicylate of Silver. Difficultly soluble in cold (Buff), tolerably soluble in boiling water. (Dumas.)
$C_{14} H_4 Ag (N O_4) O_6$

NitroSalicylate of Soda. Readily soluble in water.

NitroSalicylate of Strontia. Readily soluble in water. (Buff.)

*Bi*NitroSalicylic Acid. Sparingly soluble in cold, readily soluble in boiling water. Easily soluble in alcohol, and ether. Soluble in cold concentrated sulphuric acid, from which solution it is precipitated unchanged on the addition of water. (Cahours, *Ann. Ch. et Phys.*, (3.) **25.** 12.) Very soluble in water, and still more so in weak and strong spirit. Decomposed by strong nitric acid. (Stenhouse, *Phil. Mag.*, 1851, (4.) **1.** 245.) Very sparingly soluble in cold water acidulated with chlorhydric or sulphuric acid.
(*NitroPopulic Acid.*)
$C_{14} H_4 N_2 O_{14} = C_{14} H_2 (N O_4)_2 O_4, 2 H O$

Its salts are difficultly soluble in water.

*Bi*NitroSalicylate of Ammonia. Sparingly soluble in water, though somewhat more soluble than the potash salt. (Stenhouse.)
$C_{14} H_3 (N H_4) (N O_4)_2 O_6$

*Bi*NitroSalicylate of Baryta.

I.) *normal.* Sparingly soluble, or insoluble in boiling water. (Stenhouse.)
$C_{14} H_2 Ba_2 (N O_4)_2 O_6 + Aq$

II.) *acid.* Somewhat soluble in hot, less soluble in cold water.
$C_{14} H_3 Ba (N O_4)_2 O_6$

NitroSalicylate of Ethyl. *Vid.* Ethyl*bi*NitroSalicylic Acid.

NitroSalicylate *of protoxide* of Iron. Ppt.

NitroSalicylate *of sesquioxide* of Iron. Ppt.

NitroSalicylate of Lead. Very sparingly soluble in water. (Cahours.)

NitroSalicylate of Methyl. *Vid.* Methyl*bi*NitroSalicylic Acid.

NitroSalicylate of Potash.

I.) *normal* (*red*). Sparingly soluble in water.
$C_{14} H_2 K_2 (N O_4)_2 O_6 + Aq$

II.) *acid* (*yellow*). Very sparingly soluble in cold water. Insoluble in alcohol or ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **25.** 16.) Somewhat soluble in hot, less soluble in cold water. Readily soluble in a cold dilute solution of carbonate of potash, from which it is reprecipitated on the addition of a slight excess of chlorhydric acid. Decomposed by boiling chlorhydric acid. (Stenhouse, *Phil. Mag.*, 1851, (4.) **1.** 245.)
$C_{14} H_3 K (N O_4)_2 O_6$

*Bi*NitroSalicylate of Silver. Very sparingly soluble in water. (Cahours.) Soluble in boiling alcohol.
$C_{14} H_3 Ag (N O_4)_2 O_6$

*Bi*NitroSalicylate of Soda. Sparingly soluble in water, though more soluble therein than the potash salt. (Stenhouse.) Much more soluble in water than the potash salt; though still sparingly soluble in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **25.** pp. 13, 18.)
$C_{14} H_3 Na (N O_4)_2 O_6$

*Ter*NitroSalicylate of Methyl. *Vid.* Methyl*ter*NitroSalicylic Acid.

NitroSalicylide of *X*. *Vid.* NitroSalicylite of *X*.

NitroSalicylous Acid. Hygroscopic. Sparingly soluble in water. Readily soluble in alcohol, and ether.
(*NitroSalicide. NitroSpiroylic Acid.*)
$C_{14} H_5 N O_8$

NitroSalicylite of Ammonia. Soluble in water.

NitroSalicylite of Baryta. Soluble in water.
$C_{14} H_4 Ba N O_8$

NitroSalicylite of Copper. Ppt.

NitroSalicylite *of sesquioxide* of Iron. Ppt.

NitroSalicylite of Lead.

I.) *basic.* Ppt.
$C_{14} H_4 Pb (N O_4) O_4; 8 Pb O$

NitroSalicylite of Potash. Soluble in water, and alcohol. Insoluble in ether. (Lœwig.)

NitroSalicylite of Soda. Soluble in water, and alcohol. Insoluble in ether.

NitroSalithol. *Vid.* NitroPhenate of Ethyl.

NitroSinapyl Resin. Insoluble in water or alcohol. Difficultly soluble in ether. Decomposed by alkaline solutions. (Lœwig & Weidmann.)
$C_{24} H_{12} N_6 S_4 O_{12}$

NitroSinapylic Acid. Easily soluble in water. Insoluble in alcohol, or ether. (Lœwig & Weidmann.)
$C_{18} H_9 N_7 S O_{17}$

NitroSinapylate of Baryta. Soluble in water. (L. & W.)

NitroSinapylate of Lead. Ppt.

NitroSinapylate of Potash. Soluble in water. (L. & W.)

NitroSinapylate of Silver. Ppt.

NitrosoNaphtylamin. Insoluble in water. Soluble in boiling alcohol. Insoluble in dilute acids; but soluble in concentrated sulphuric acid. (Church & Perkin, *J. Ch. Soc.*, **9.** 1.) Soluble in ether.
(*NitrosoNaphtylin.*)
$C_{20} H_8 N_2 O_2 = N \left\} \begin{matrix} C_{20} H_7 (N O)_2'' \\ H \end{matrix} \right.$

NitrosoPelargonic Acid. Insoluble, or but sparingly soluble in water. Its salts dissolve with great difficulty in cold water. (Chiozza.)
$C_{18} H_{18} N_2 O_8$

NitrosoPelargonate of Ammonia. Insoluble in cold water.

NitrosoPelargonate of Baryta. Ppt.
$C_{18} H_{17} Ba N_2 O_8$

NitrosoPelargonate of Potash. Very sparingly soluble in cold, readily soluble in boiling water, and alcohol. Insoluble, or but sparingly soluble in ether.

NitrosoPelargonate of Silver. Ppt.
$C_{18} H_{17} Ag N_2 O_8$

NitrosoPelargonate of Soda. Resembles the potash salt. It separates out almost entirely from its boiling aqueous solution when this is allowed to cool.

NitrosoPhenylamin. Almost insoluble in water. Readily soluble in alcohol, and in acids. Insoluble in benzin, &c. (Church & Perkin, *J. Ch. Soc.*, **9.** 1.)
(*Nitrosophenylin.*)
$C_{12} H_6 N_2 O_2 = N \left\} \begin{matrix} C_{12} H_4 (N O_2)' \\ H_2 \end{matrix} \right.$

NitroSpiroylic Acid. *Vid.* NitroSalicylic Acid; and NitroSalicylous Acid.

NitroStilbic Acid. Almost insoluble in water, more readily soluble in alcohol; and still more readily soluble in ether. (Laurent.)
(*Nitro Stilbenic Acid.*)
$C_{28} H_{11} N O_{14} = C_{28} H_{9} (N O_{4}) O_{8}, 2 H O$

NitroStilbate of Ammonia. Soluble in water.

NitroStilbate of Silver. Ppt.
$C_{28} H_{9} Ag_{2} (N O_{4}) O_{10}$

NitroStyrol. *Vid.* NitroCinnamene.

NitroSuccinic Acid. Soluble in alcohol.

NitroSuccinate of Anilin. Almost insoluble in cold, soluble in boiling alcohol. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 155.)

NitroSugar. Insoluble in water. Behaves towards solvents like a resin.

NitroSulphate of *X*. *Vid.* Sulphite of *X* and Nitric Oxide.

NitroSulphide of Iron. Insoluble in water, alcohol, or ether. Soluble in solutions of caustic alkalies and of alkaline sulphides, with combination. (Roussin.)
$Fe_{2} S_{3} N O_{2}$

NitroSulphide of Iron & of Cobalt. Soluble in alcohol, in almost all proportions. (Roussin.)

NitroSulphide of Iron & of Lead. Soluble in alcohol, and ether, in almost all proportions. (Roussin.)

NitroSulphide of Iron & of Sodium.

I.) $Fe_{2} S_{3}, N O_{2}, Na S, H O$ Permanent. Soluble in water. Soluble in alcohol, and ether, in almost all proportions. Insoluble in bisulphide of carbon, or chloroform. (Roussin, *Ann. Ch. et Phys.*, (3.) **52.** 297.)

II.) $Fe_{2} S_{3}, N O_{2}, 3 Na S$ Readily soluble in water. Very soluble in alcohol. Insoluble in ether. (Roussin, *loc. cit.*, p. 294.)

NitroSulphide of Iron & of Zinc. Soluble in alcohol, and ether, in almost all proportions. (Roussin.)

*Bi*NitroSulphide of Iron. Soluble in about 2 pts. of boiling water. Very sparingly soluble in cold water. Extremely soluble in alcohol, wood-spirit, amyl-alcohol, and glacial acetic acid. Sparingly soluble in naphtha, and oil of turpentine. Soluble in all proportions in ordinary ether. Completely insoluble in bisulphide of carbon or chloroform. Decomposed by concentrated chlorhydric, nitric, or sulphuric acids. Appears to be unacted upon by tartaric or oxalic acids. Insoluble in ammonia-water or a solution of caustic potash. (Roussin, *Ann. Ch. et Phys.*, (3.) **52.** 286.)
$Fe_{3} S_{5} H N_{2} O_{4} = Fe_{2} S_{3}, N O_{2}$; $Fe S, N O_{2}$; $H S$

NitroSulphoBenzid. Insoluble in cold, and but sparingly soluble in hot water. Readily soluble in hot, less soluble in cold spirit. Easily soluble in ether. Soluble in nitric acid; but insoluble in chlorhydric, or sulphuric acids. Sparingly soluble in hot aqueous solutions of the caustic and carbonated alkalies. (Gericke, *Ann. Ch. u. Pharm.*, **100.** 208.)
(*Nitro Sulpho Benzene.*)
$C_{24} H_{9} N S_{2} O_{8} = \left\{ \begin{array}{l} C_{12} H_{4} (N O_{4}) S_{2} O_{4} \\ C_{12} H_{5} \end{array} \right.$

*Bi*NitroSulphoBenzid. Insoluble in water. Sparingly soluble in boiling alcohol, and ether. Soluble in strong nitric acid; but insoluble in dilute acids. (Gericke, *loc. cit.*)
$C_{24} H_{8} (N O_{4})_{2} S_{2} O_{4}$

NitroSulphoBenzidic Acid. *Vid.* NitroPhenylSulphurous Acid.

NitroSulphoBenzoic Acid.
$C_{14} H_{5} N S_{2} O_{14} = C_{14} H_{5} (N O_{4}) O_{2}, S_{2} O_{6}, 2 H O$

NitroSulphoBenzoate of Baryta.

I.) *normal.* Easily soluble in water.
$C_{14} H_{3} Ba_{2} N S_{2} O_{14} + 8 Aq$ & $6 Aq$

II.) *acid.*
$C_{14} H_{4} Ba N S_{2} O_{14} + 4 Aq$

NitroSulphoBenzoate of Silver. Easily soluble in water. Insoluble in alcohol.

NitroSulphoNaphthalic Acid. Very soluble in water, alcohol, and ether. (Laurent.)
(*Nitro Sulpho Naphthesic Acid. Sulphite of NitroNaphtoyl.*)
$C_{20} H_{7} N S_{2} O_{10}$

NitroSulphoNaphthalate of Ammonia. Soluble in water.

NitroSulphoNaphthalate of Baryta.
$C_{20} H_{6} Ba (N O_{4}) S_{2} O_{6}$ Soluble in water.

NitroSulphoNaphthalate of Lime. Tolerably soluble in water, and alcohol (more readily in dilute than in concentrated). (Laurent.)
$C_{20} H_{6} Ca (N O_{4}) S_{2} O_{6} + Aq$

NitroSulphoNaphthalate of Potash. Soluble in water. Slightly soluble in alcohol.

*Bi*NitroSulphoNaphthalic Acid. Not isolated.
$C_{20} H_{6} N_{2} S_{2} O_{14}$

*Bi*NitroSulphoNaphthalate of Ammonia.
$C_{20} H_{5} (N H_{4}) N_{2} S_{2} O_{14}$

NitroSulphoXylic Acid. *Vid.* NitroXyleneSulphurous Acid.

*Bi*NitroTartaric Acid. Soluble in water. The compound is very unstable. (Dessaignes.)
$C_{8} H_{4} N_{2} O_{20} = C_{8} H_{2} (N O_{4})_{2} O_{10}, 2 H O$

*Bi*NitroTartrate of Ammonia.
$C_{8} H_{3} (N H_{4}) (N O_{4})_{2} O_{12}$

NitroThein. *Vid.* Parabanate of Methyl.

NitroThionessal.
$C_{52} H_{14} N_{4} S_{2} O_{16}$

*Bi*NitroThymic Acid. Very sparingly soluble in water. Soluble in all proportions in alcohol, and ether. Its salts are only sparingly soluble in water. (Lallemand, *Ann. Ch. et Phys.*, (3.) **49.** 152.)
(*BiNitro Thymol. BiNitro Thymylic Acid. Hydrate of biNitro Thymyl.*)
$C_{20} H_{12} N_{2} O_{10} = C_{20} H_{11} (N O_{4})_{2} O, H O$

*Bi*NitroThymate of Lead. Very sparingly soluble in water.
$C_{20} H_{11} Pb (N O_{4})_{2} O_{2}$

*Bi*NitroThymate of Potash. Very sparingly soluble in water.

*Bi*NitroThymate of Silver. Very sparingly soluble in water.

*Ter*NitroThymic Acid. Sparingly soluble in cold water. Very soluble in alcohol, and ether. Its salts are more soluble than those of *bi*nitrothymic acid.
(*TerNitro Thymol. TerNitro Thymylic Acid.*)
$C_{20} H_{11} N_{3} O_{14} = C_{20} H_{10} (N O_{4})_{3} O, H O$

*Ter*NitroThymate of Lead. Ppt.
$C_{20} H_{10} Pb (N O_{4})_{3} O_{2}$

*Ter*NitroThymate *of protoxide* of Mercury. Ppt.

*Ter*NitroThymate of Potash. Soluble in water.

*Ter*NitroThymate of Silver. Ppt. (Lallemand, *loc. cit.*)

NitroTole. *Vid.* Hydride of NitroToluenyl.

NitroToluenylamin.
(*Nitro Toluidin.*)
$C_{14} H_{8} N_{2} O_{4} = N \left\{ \begin{array}{l} C_{14} H_{6} (N O_{4}) \\ H_{2} \end{array} \right.$

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NitroToluic Acid. *Vid.* NitroToluylic Acid.

NitroToluid. *Vid.* Hydride of NitroToluenyl.

NitroToluol. *Vid.* Hydride of NitroToluenyl.

NitroToluylic Acid. Very sparingly soluble in cold water. Soluble in wood-spirit, and in boiling alcohol. Unacted upon by concentrated sulphuric or nitric acids. (Noad.)
(*Nitro Toluic Acid.*)
$C_{16}H_7NO_8 = C_{16}H_6(NO_4)O_3, HO$

NitroToluylate of Ammonia. Soluble in water.

NitroToluylate of Baryta. Readily soluble in boiling, less soluble in cold water.
$C_{16}H_6Ba(NO_4)O_4$

NitroToluylate of Copper.
I.) *basic.* Ppt.

NitroToluylate of Ethyl. Sparingly soluble, or insoluble in water. Soluble in alcohol.
(*Nitro Toluic Ether.*)
$C_{16}H_6(C_4H_5)(NO_4)O_4$

NitroToluylate of Lime. More soluble than the baryta-salt in water.
$C_{16}H_6Ca(NO_4)O_5$

NitroToluylate of Methyl. Insoluble, or only slightly soluble, in water. Soluble in ether. Soluble in strong nitric acid, from which it is precipitated on the addition of water.
(*MethylNitro Toluic Ether.*)
$C_{16}H_6(C_2H_3)(NO_4)O_4$

NitroToluylate of Potash. Very soluble in water.

NitroToluylate of Silver. Readily soluble in boiling, less soluble in cold water. Sparingly soluble in alcohol.
$C_{16}H_6Ag(NO_4)O_4$

NitroToluylate of Soda. Very soluble in water.

NitroToluylate of Strontia. Somewhat more soluble than the baryta-salt in boiling water.

NitroTyrosin. Very difficultly soluble in cold, and only sparingly soluble in boiling water. Insoluble in alcohol or ether. Soluble in ammonia-water, and in aqueous solutions of the fixed alkalies. Also easily soluble in the dilute mineral acids. Acetic acid dissolves but little more of it than pure water.
$C_{18}H_{10}(NO_4)NO_6$

NitroTyrosin Baryta. Easily soluble in water.
$C_{18}H_9Ba(NO_4)NO_6$

NitroTyrosin Silver.
I.) $C_{18}H_8Ag_2(NO_4)NO_6 + 2\,Aq$ Somewhat soluble in water. (Stædeler.)
II.) $C_{18}H_8Ag_2(NO_4)_2NO_6$; Insoluble in water. (Strecker.)
$C_{18}H_9Ag(NO_4)NO_6$

***Bi*NitroTyrosin.** Only very sparingly soluble in cold, and rather difficultly soluble in hot water. Easily soluble in alcohol; much less soluble in ether. (Stædeler.)
$C_{18}H_9(NO_4)_2NO_6$

***Bi*NitroTyrosin Ammonia.**

***Bi*NitroTyrosin Baryta.** Soluble in hot, less soluble in cold water.
$C_{18}H_7Ba_2(NO_4)_2NO_6 + 4\,Aq$

***Bi*NitroTyrosin Lead.**

***Bi*NitroTyrosin Lime.** Only sparingly soluble in boiling water. Insoluble in alcohol or ether. Soluble in warm dilute acetic acid, from which it crystallizes out in great part on cooling.
$C_{18}H_7Ca_2(NO_4)_2NO_6 + 6\,Aq$

***Bi*NitroTyrosin Magnesia.** Soluble in water.

***Bi*NitroTyrosin Potash.** Soluble in water.

***Bi*NitroTyrosin Silver.** Ppt. Easily soluble in ammonia-water and in nitric acid.

***Bi*NitroTyrosin Soda.** Soluble in water.

Nitrous Ether. *Vid.* Nitrite of Ethyl.

Nitrous Oxide. *Vid. prot*Oxide of Nitrogen.

NitroValeric Acid. Readily soluble in warm, much less soluble in cold water. (Dessaignes.)
(*Nitro Valerianic Acid.*)
$C_{10}H_9(NO_4)O_4 = C_{10}H_8(NO_4)O_3, HO$

NitroValerate of Baryta. Easily soluble in water.

NitroValerate *of sesquioxide* **of Iron.** Ppt.

NitroValerate of Lead. Readily soluble in water.

NitroValerate of Lime. Easily soluble in water.

NitroValerate of Silver. Soluble in boiling water.
$C_{10}H_8Ag(NO_4)O_4$

NitroVeratric Acid. Sparingly soluble in water. Easily soluble in alcohol. (W. Merck.)
$C_{18}H_9NO_{12} = C_{18}H_8(NO_4)O_7, HO$

***Bi*NitroVeratric Acid.**

***Bi*NitroVeratrol.** Difficultly soluble in water, easily soluble in alcohol.
$C_{16}H_8N_2O_{12} = C_{16}H_8(NO_4)_2O_4$

NitrOxyBenzoic Acid. Easily soluble in warm water. (Gerland, *Ann. Ch. u. Pharm.*, 91. 193.)
$C_{14}H_5(NO_4)O_6$

NitrOxyBenzoate of Potash. Very sparingly soluble in cold, easily soluble in boiling water. (Gerland, *loc. cit.*)
$C_{14}H_4K(NO_4)O_6$

NitroXylene. Insoluble, or very sparingly soluble in water. Soluble in alcohol. (Church.)
(*NitroXylole. Hydride of NitroXylyl.*)
$C_{16}H_9(NO_4)$, or $\left.\begin{matrix}C_{16}H_8(NO_4)\\H\end{matrix}\right\}$

NitroXyleneSulphurous Acid. Not isolated.
(*Nitro SulphoXylic Acid.*)
$C_{16}H_9NS_2O_{10}$

NitroXyleneSulphite of Baryta. Soluble in water. (Church.)
$C_{16}H_8Ba(NO_4)S_2O_6$

Nonylene. Insoluble in water. Soluble in alcohol, though less abundantly than caproene, and in ether. (Fremy.)
(*Elaene. Pelargonenè.*)
$C_{18}H_{18}''$

Nucin (from *Cocos nucifera*). Difficultly soluble in alcohol. Insoluble in ether. Easily soluble in alkaline solutions. (Brandes.)

O.

Octo. See *Octo*, as prefix, under the generic name of the substance sought for.

Octyl.
(*Capryl.*)
$C_{16}H_{17}$ or $\left.\begin{matrix}C_{16}H_{17}\\C_{16}H_{17}\end{matrix}\right\}$

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Octylamin. Insoluble in water. Very easily soluble in alcohol, and ether. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 140.)
(*Caprylamin. Capryliaque.*)
$C_{16}H_{19}N = N\left\{\begin{matrix}C_{16}H_{17}\\H_2\end{matrix}\right.$

Octylate of *X*. *Vid.* Oxide of *X* & of Octyl.

Octylene. *Vid.* Caprylene.

OctylPhosphoric Acid.
(*CaprylPhospheric Acid.*)

OctylPhosphate of Baryta. Soluble in water.

OctylPhosphate of Lead. Soluble in water.

OctylPhosphate of Lime. Soluble in water. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 128.)

OctylSulphuric Acid. Very soluble in water, and alcohol. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 124.) All of its salts are soluble in water.
(*CaprylSulphuric Acid. SulphoCaprylic Acid.*)
$C_{16}H_{18}S_2O_8 = C_{16}H_{17}O, HO, S_2O_6$

OctylSulphate of Baryta. Extremely soluble in water, especially when this is warm, and in alcohol. (Bouis, *Ibid.*)
$C_{16}H_{17}BaS_2O_8 + 3 Aq$

OctylSulphate of Lead.
I.) *normal.* Soluble in water.
II.) *basic.* Soluble in water.

OctylSulphate of Lime. Its properties are similar to those of the baryta-salt. (Moschin, *Ann. Ch. u. Pharm.*, **87.** 116.)

OctylSulphate of Potash. Permanent. Soluble in water, and alcohol. (Bouis, *loc. cit.*, p. 126.)
$C_{16}H_{17}KS_2O_8 + Aq$

Odmyl(of Anderson). Soluble in alcohol.
$C_8H_8S_2$?

Odorin(of Unverdorben). *Vid.* Picolin.

ŒnanthAcetone. *Vid.* Oxide of Caproyl & of Œnanthoyl.

Œnanthic Acid(Anhydrous). Insoluble in water. Soluble in absolute and hydrated alcohol; it is, however, partially acidified by the latter.
$C_{28}H_{26}O_4$

Œnanthic Acid. [Delffs has expressed the opinion that œnanthic acid is identical with pelargonic acid; this idea is not generally admitted, however.] Very sparingly soluble, or insoluble in water. Easily soluble in alcohol, ether, and oils. Soluble in aqueous solutions of the caustic and carbonated alkalies.
(*Œnanthylous Acid. Sitinic Acid.*)
[Not to be confounded with *Œnanthylic Acid* ($C_{14}H_{14}O_4$).]
$C_{28}H_{28}O_6 = C_{28}H_{26}O_4, 2HO$

Œnanthate of Ammonia. Does not form a clear solution with water. (Delffs.)

Œnanthate of Baryta. Soluble in boiling water.

Œnanthate of Copper. Insoluble in water. Partially soluble, with decomposition, in alcohol.

Œnanthate of Ethyl. Not sensibly soluble in water. Very easily soluble in alcohol, even when this is dilute, and ether. (Liebig & Pelouze.)
$C_{28}H_{26}(C_4H_5)_2O_6$

Œnanthate of Lead. Insoluble in water. Readily soluble in hot, less soluble in cold alcohol. By washing with cold alcohol, it is decomposed to a hyperacid, and a basic, salt. (Liebig & Pelouze.)

Œnanthate of Potash.
I) *normal.* Known only in aqueous solution.
II.) *acid.*
$C_{28}H_{27}KO_8$

Œnanthate of Silver. Ppt.

Œnanthate of Soda. Soluble in water, and in alcohol; less readily when this is cold. (Mulder.)

Œnanthol. *Vid.* Hydride of Œnanthyl.

Œnanthylamid. Soluble in boiling, less soluble in cold water. (Chiozza, *Ann. Ch. u. Pharm.*, **91.** 103.) Soluble in boiling spirit. (Gerhardt's *Tr.*)
$C_{14}H_{15}NO_2 = N\left\{\begin{matrix}C_{14}H_{13}O_2\\H_2\end{matrix}\right.$

Œnanthylic Acid(Anhydrous).
(*Œnanthylic Œnanthylate.*)
$C_{28}H_{26}O_6 = \left.\begin{matrix}C_{14}H_{13}O_2\\C_{14}H_{13}O_2\end{matrix}\right\}O_2$

Œnanthylic Acid. Very sparingly soluble in water, easily soluble in alcohol, and ether. Soluble, without decomposition, in concentrated nitric acid, from which it is precipitated on the addition of water; but when the acid solution is boiled for a long time decomposition occurs.
(*Azoleic Acid. Aboleic Acid.*)
[Not to be confounded with *Œnanthic Acid* ($C_{28}H_{28}O_6$).]
$C_{14}H_{14}O_4 = C_{14}H_{13}O_3, HO$

Excepting those of the alkalies, most of its salts are difficultly soluble.

Œnanthylate of Ammonia. Very soluble in water. (Bussy.)

Œnanthylate of Baryta. Soluble in 57 pts. of water at 23°. (Bussy.) Less soluble in water than the caproate, but more soluble than the caprylate.
$C_{14}H_{13}BaO_4$

Very easily soluble in hot water; still more easily soluble in hot alcohol of 85%, from which it crystallizes out almost completely as the solution cools. (Arzbæcher.) Soluble in 392 pts. of alcohol. (Bussy.) Insoluble in ether.

Œnanthylate of Benzoyl. *Vid.* BenzŒnanthylic Acid(Anhydrous).

Œnanthylate of Copper. Sparingly soluble in water. Soluble in alcohol.

Œnanthylate of Ethyl. Insoluble in water. Easily soluble in alcohol, and ether.
$C_{14}H_{13}(C_4H_5)O_4$

Œnanthylate of Lead. Insoluble in water. Slightly soluble in boiling, and still less soluble in cold alcohol. (Tilley.)

Œnanthylate of Phenyl.
$C_{14}H_{13}(C_{12}H_5)O_4$

Œnanthylate of Potash. Very soluble in water. (Tilley.)

Œnanthylate of Silver. Insoluble in water. (Bussy.)
$C_{14}H_{13}AgO_4$

Œnanthylene. Insoluble in water. Soluble in alcohol. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 89.) Insoluble, or very sparingly soluble in water. Soluble in alcohol. (Limpricht.)
$C_{14}H_{14}''$

Œnanthylic Aldehyde. *Vid.* Hydride of Œnanthyl.

ŒnanthyloBenzoic Acid(Anhydrous). *Vid.* BenzŒnanthylic Acid(Anhydrous).

ŒnanthyloCuminic Acid.
(*Œnanthylate of Cumyl. Cuminate of Œnanthyl.*)
$C_{34}H_{24}O_6 = \left.\begin{matrix}C_{14}H_{13}O_2\\C_{20}H_{11}O_2\end{matrix}\right\}O_2$

Œnolin(coloring matter of wine). Insoluble in water. (Mulder.) Very sparingly soluble in cold, somewhat more soluble in hot water. (Glénard.) More readily soluble in water containing
(*Œnolic Acid.*)
$C_{20}H_{10}O_{10}$

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tartaric or acetic acid. Soluble in wood-spirit. Insoluble in bisulphide of carbon or chloroform. (Glénard.) Quite insoluble in alcohol alone, but dissolves in alcohol containing a trace of acetic acid; more slowly, though completely soluble in alcohol containing tartaric acid. (Mulder.) Readily soluble in alcohol. (Glénard.) Insoluble in ether, benzin, olive-oil, or oil of turpentine. [Compare "Rosito" and "Pourprit," which, according to Batilliat, occur as coloring matters in wine.]

Œnylamin. *Vid.* Propylamin.

Oils (*Essential or Volatile*). See Essences.

Oils (*Fixed or Fatty*). [Compare Fats.] Insoluble, or scarcely at all soluble in water. With the exception of castor-oil, and a few others, they are scarcely at all soluble in cold alcohol, though somewhat soluble, with decomposition, in boiling alcohol.

When a neutral oil is contaminated with a portion of free fatty acid, the whole may be dissolved in alcohol; or if oleic acid is added to a mixture of alcohol and a neutral oil, the latter will dissolve, and if the oleic acid is in large excess as compared with the oil, no precipitate is produced by the addition of more alcohol to the solution. (Pelouze, *C. R.*, 1855, **40.** 609.) Largely soluble in ether, benzin, and the various naphthas and oils obtained by the dry distillation of coal, &c., in oil of turpentine, and the other essential oils; also in the other fatty oils, in bisulphide of carbon, chloride of sulphur, protochloride of phosphorous, chloroform, fusel-oil, caprylic alcohol, acetone, chloride of ethyl, and the like. Many of them are soluble in concentrated acetic acid. And in butyric acid. (Chevreul, Barreswil.) In oil of ocótea. (Hancock.) In oil of mandarin. (Luca.)

They are not miscible with glycerin. (Parrish's *Pharm.*, p. 324.) Soluble, with combination, in concentrated sulphuric acid. Shaken with an aqueous, not too dilute solution of carbonate of potash they form emulsions without undergoing decomposition. When heated with aqueous solutions of the caustic alkalies, or of the alkaline carbonates under pressure, they are decomposed, with formation of soap and separation of glycerin.

It is remarkable that the fats and oils are much more slowly saponified by potash and soda than by lime. This appears to depend upon the fact that milk of lime mixes more readily with the fats than a solution of potash or soda. A view which is supported by the following experiment. When a neutral oil is dissolved in warm alcohol, and an alcoholic solution of potash added to it, the mixture is instantly saponified on being heated to boiling. So, too, if an oil be mixed with an excess of concentrated sulphuric acid the saponification is instantaneous and complete, the whole of the oil being converted into sulphoglyceric acid, and the sulphofatty acids. The saponification is immediate in these cases, because both the substances brought together and the products formed are capable of mixing together in all proportions, thus presenting numerous and intimate points of contact. (Pelouze, *C. R.*, 1855, **40.** 609.)

Oil of Almonds(from the kernels of *A. communis*). (*Ol. Amygdalæ.*) Soluble in 25 pts. of cold, and in 6 pts. of boiling alcohol.

1000 drops of alcohol, of 0.823, dissolve 3 drops of it at 12.5°. (Schubarth's *Tech. Chem.*) 4 vols. of ether, of 0.7563 sp. gr. dissolve 1.25 vols. of it. (Brande, *Phil. Trans.*, 1811, p. 264. [T.].) Miscible in all proportions with ether.

Oil (*essential*) **of Bitter Almonds.** *Vid.* Hydride of Benzoyl.

Oil of Arachis(from the fruit of *Arachis hypogœa*). (*Huile d'Arachide. Ol. arachadis. Peanut oil. Ground-nut oil.*) Insoluble in alcohol, and acetone. Soluble in all proportions in ether, chloroform, and benzin. (J. Winter, *Amer. Drug. Circular*, Nov. 1860, **4.** 310; from *Am. J. Pharm.*) Very sparingly soluble in alcohol. Readily soluble in ether. (Gerhardt's *Tr.*, **2.** 878.)

Oil of Asparagus(from the sprouts of *Asparagus officinalis*). Insoluble in water. Tolerably easily soluble in cold alcohol. Soluble in all proportions in ether, and oils. Also soluble in alkaline solutions and in nitric, chlorhydric and sulphuric acids. (Latour de Trie & Rozières.)

Oil[from the distillation] **of Asphaltum.** Insoluble in water. Easily soluble in alcohol, and ether. (Vœlckel, *Ann. Ch. u. Pharm.*, **87.** 143.)

Oil of Bassia(from seeds of *Bassia latifolia*). Sparingly soluble in absolute alcohol, but scarcely at all in ordinary alcohol. Easily soluble in ether.

Beech-Nut Oil(from the fruit of *Fagus sylvatica*). 1000 drops of alcohol, of 0.823, dissolve 4 drops of it at 12.5°. (Schubarth's *Tech. Chem.*)

Oil of Ben(from the fruit of *Moringa oleifera*, &c.). (*Behenœl. Ol. been.*) Completely soluble in boiling concentrated alcohol, and for the most part in boiling spirit also.

Oil(*essential*)**of Bitter Almonds.** *Vid.* Hydride of Benzoyl.

Oil of Brazil-Nuts(from the kernels of the fruit of *B. excelsa.*) (*Ol. Bertholetiæ.*)

Oil of Carapa(from *Carapa guianensis*). Sparingly soluble in alcohol. Easily soluble in ether. Soluble, with combination, in hot caustic alkaline solutions.

Castor-Oil(from the seeds of *Ricinus communis.*) (*Ol. Ricini.*) Easily soluble in 1 volume of absolute alcohol.

1 pt. of alcohol of 36° dissolves 3/5 of its weight. Soluble in all proportions in absolute alcohol. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 80.) Soluble in its own weight of alcohol of 0.820 sp. gr., and miscible in all proportions with absolute alcohol.

Soluble in all proportions in ether. (Brande, *Phil. Trans.*, 1811, p. 264. [T.].) When mixed in certain proportions with other oils it renders them soluble in alcohol. It also dissolves some alcohol, but this property diminishes with the strength of the alcohol. (Parrish's *Pharm.*, pp. 323, 330.) With alkalies it forms a soap which is completely soluble in water.

Cocoa-Nut Oil(from the kernels of *Cocus nucifera*, &c.). (*Oleum cocois.*) Contains cocinin, *q. v.*, and a fluid olein. As a whole, it is easily soluble in alcohol. (Wittstein's *Handw.*) Soluble in hot strong alcohol, and ether. Easily soluble in benzin, &c., and in the fatty and essential oils.

Cod-Liver Oil. (*Ol. morrhuæ. Ol. Jec. Aselli.*) The light-colored oil is soluble in 22 pts. of hot alcohol, of 0.825, and in all proportions in ether. The brown oil is very easily soluble in hot spirit. (Schubarth's *Tech. Chem.*)

In Europe several varieties of cod-liver oil are distinguished: —

I.) *Oleum Jecoris Aselli fuscum*(*dark brown*). Cold alcohol dissolves 5 or 6% of it, boiling alcohol 6 @ 7%.

II.) *Oleum Jecoris Aselli subfuscum*(*color of Malaga wine*). Cold alcohol dissolves 2 or 3% of it, and boiling alcohol 6 @ 7%.

III.) *Oleum Jecoris Aselli flavum*(*golden yellow*). 100 pts. of cold alcohol dissolve 2 or 3 pts. of it; 100 pts. of boiling alcohol 3 or 4 pts. (Kolbe's *Lehrb.*, **2.** 46.)

COLZA OIL(from the seeds of *Brasica camprestis oleifera*).

COTTON-SEED OIL.

OIL OF CRESS(from *Lepidium ruderale, &c.*). Slowly soluble in water. Readily soluble in alcohol, and ether. (Pless.) Soluble in concentrated sulphuric acid, from which it is precipitated on the addition of water.

CROTON OIL(from the seeds of *Croton Tiglium*). (*Ol. tiglii.*) Soluble in its own weight of alcohol of 0.796 sp. gr.

Soluble in about its own bulk of very strong alcohol, but after two or three days nearly all the oil separates. (Parrish's *Pharm.*, pp. 323, 332.) Easily soluble in ether.

OIL OF CYPERUS(*zeodary*)(from *Cyperus esculenta*). 1000 drops of alcohol, of 0.823, dissolve 4 drops of it at 12.5°. Very easily soluble in ether. (Schubarth's *Tech. Chem.*)

OIL OF THE DUTCH CHEMISTS. *Vid.* Chloride of Ethylene.

OILS, *Essential*. See ESSENCES or ESSENTIAL OILS.

OIL OF EUPHORBIA(from the seeds of *Euphorbia Lathyris*). (*Huile de Medicinier*[?]) Nearly insoluble in alcohol. Soluble in ether.

FILBERT OIL. *Vid.* Oil of Hazel-Nuts.

FLAX-SEED OIL. *Vid.* Linseed Oil.

OIL OF GARLIC. *Vid.* Sulphide of Allyl.

GRAPE-SEED OIL(from the seeds of *Vitis vinifera*). 100 drops of alcohol, of 0.823, dissolve 6 drops of it. (Schubarth's *Tech. Chem.*)

OIL OF GROUND-NUTS. *Vid.* Oil of Arachis.

OIL OF HAZEL-NUTS(from *Corylus avellana*). 1000 drops of alcohol, of 0.823, dissolve 3 drops of it at 12.5°. (Schubarth's *Tech. Chem.*)

HEMP OIL(from the seeds of *Cannabis sativa*). Soluble in all proportions in boiling alcohol. Soluble in 30 pts. of cold alcohol.

OIL OF HORSE-RADISH(from the root of *Cochlearia Armoracia*). Readily soluble in alcohol. Somewhat soluble in water. (Einhof.)

OIL OF HYOSCYAMUS. Soluble in 60 pts. of alcohol. Easily soluble in ether. (Schubarth's *Tech. Chem.*)

OIL OF JATROPHA. (*Ol. Cicinum. Oil of Physic Nut. Oil of Castor Nut. Oil of Barbadoes Nut (from Jatropha curcas).*) Very sparingly soluble in hot alcohol.

LARD OIL(expressed from hogs' lard). (*Ol. adipis.*)

LAUREL OIL(from the fruit of *Laurus nobilis.*) (*Laurel Butter.*) Cold alcohol removes an odorous volatile oil and a green coloring matter, leaving laurate of glyceryl (*q. v.*), which is the principal component. [See also Hydride of Benzoyl.]

LINSEED OIL(from the seeds of *Linum usitatissimum*). (*Flax-seed oil. Ol. lini.*) Soluble in 5 pts. of boiling, and in 40 pts. of cold alcohol, and in 1.6 pts. of ether.

100 drops of alcohol, of 0.823, dissolve 6 drops of it at 12.5°. (Schubarth's *Tech. Chem.*) 4 vols. of ether, of 0.7563 sp. gr. dissolve 2.5 vols. of it. (Brande, *Phil. Trans.*, 1811, p. 264. [T.].) Very old linseed oil is much more easily soluble in alcohol than that which has recently been expressed. (Kolbe's *Lehrb.*)

OIL OF MACE(from the nutmeg, *Myristica fragrans*). (*Ol. myristicæ adeps. Oil of Nutmegs.*) Readily soluble in boiling ether. (Parrish's *Pharm.*, p. 329.) Partially soluble in cold alcohol, and ether.

OIL OF MADIA(from *Madia Sativa*). Soluble in 30 pts. of cold, and in 6 pts. of boiling alcohol.

"OIL OF MUSTARD." *Vid.* SulphoCyanide of Allyl.

OIL OF BLACK MUSTARD(from *Sinapis nigra*). 1000 drops of alcohol of 0.823, dissolve 3 drops of it at 12.5°. Soluble in 4 pts. of ether. (Schubarth's *Tech. Chem.*)

OIL OF WHITE MUSTARD(from *Sinapis alba*). Forms a soap with soda entirely soluble in water, containing erucic acid.

NEATS-FOOT OIL(from the bones of oxen). (*Ol. bubulum.*)

NUT OIL(from *Juglans regia*). (*Walnut oil.*) 100 drops of alcohol, of 0.823, dissolve 6 drops of it at 12.5°. (Schubarth's *Tech. Chem.*)

OIL OF NUTMEGS. *Vid.* Oil of Mace.

OIL OF OLEFIANT GAS. *Vid.* Chloride of Ethylene.

OLIVE OIL(from the fruit of *Olea Europæa*). (*Sweet oil. Ol. olivæ.*) Nearly insoluble in alcohol. Soluble in 1.5 its weight of ether. (Parrish's *Pharm.*, pp. 323, 327.) Somewhat soluble in lignone. Readily soluble in benzin, chloroform, bisulphide of carbon, &c., &c.

Soluble in 2.7 pts. of ether. 1000 drops of alcohol, of 0.823, dissolve 3 drops of it at 12.5°. (Schubarth's *Tech. Chem.*) 4 vols. of ether, of 0.7563 sp. gr., dissolve 1.5 vols. of it. (Brande, *Phil. Trans.*, 1811, p. 264 [T.].)

PALM OIL or PALM BUTTER.

OIL OF PINE(from *Pinus picea* or *abies*).

"PINEY TALLOW"(from *Vateria indica*). Alcohol of 0.82 extracts 2% of an olein.

POPPY OIL(from the seeds of *Papaver somniferum*). (*Ol. Papaveris.*) Soluble in 25 pts. of cold, and in 6 pts. of boiling alcohol. Miscible in all proportions with ether.

100 drops of alcohol, of 0.823, dissolve at 12.5°, 8 drops of old poppy oil, and 4 drops of fresh. (Schubarth's *Tech. Chem.*)

PORPOISE OIL.

I.) (from *Delphinus Phocæna*). Soluble in 5 pts. of boiling alcohol, of 0.821 sp. gr. (Chevreul.)

II.) (from *D. globiceps*). 100 pts. of alcohol, of 0.81 sp. gr., dissolve 100 pts. of it at 70°. (Chevreul.)

When cooled to 0° both of these oils deposit a solid fat, and the supernatant oil is soluble in 0.67 pt. of alcohol, of 0.829 sp. gr., at 70°. (Chevreul.)

OIL OF PRUNES(from the kernels of *Prunus domestica*).

OIL OF RADISH(from *Raphanus sativus*). Tolerably soluble in water. (Pless.)

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Oil of Rape-Seed[from the seeds of *Brassica campestris var. oleifera* (*Rapsœl*); and from the seeds of *Brassica rapa* and *napus* (*Ruebœl*).]

Oil of Scurvy-Grass(from the herb *Cochlearia officinalis.*) Soluble in alcohol.

Sesami Oil (*Ol. sesami.*) (from the seeds of *Sesamum orientale*).

Oil of SunFlower(from the seeds of *Helianthus annuus*).

Skate-Liver Oil(from the livers of *Raia clavata* and *R. batis*). Insoluble in water. 100 pts. of alcohol, of 89% by vol., dissolve 1.5 pts. of it at 10°, and 14.5 pts. at the temperature of boiling. Much more soluble in ether, 100 pts. of boiling ether dissolving 88 pts. of it, the larger portion being deposited again on cooling. (Girardin & Preissier, *C. R.*, 1842, **14.** 619.)

Sperm Oil (*Ol. cetacei.*) (from *Physeter macrocephalus*). Tolerably easily soluble in alcohol of 0.82.

Oil of Tea(supposed to be expressed from the seeds of plants of the genera *Thea* and *Camelia*). Insoluble in alcohol. Very difficultly soluble in ether. (Thomson, *Ann. der Pharm.*, 1837, **23.** 205.)

Oil of Tobacco[empyreumatic]. Nearly insoluble in water. Miscible in all proportions with alcohol, and ether. (Zeise.)

Oils, *Volatile.* See Essences, or Essential Oils.

Oil of Walnuts. See Nut Oil.

Whale Oil.

I.) (from *Balæna rostrata*). (*Dægling Oil.*) Soluble in 22 pts. of spirit, and in 2 pts. of boiling absolute alcohol. (Scharling.)

Oil of Wine. (*Etherol. Light or sweet oil of wine. Oleum vini. Huile douce du vin. Weinœl. Isomeric with Etherine & Caprylene.*) $C_{16}H_{16}$ Insoluble in water. Readily soluble in alcohol, ether, and a mixture of alcohol and ether. Soluble, without decomposition, in cold concentrated sulphuric acid, from which it is precipitated on the addition of water. (Marchand.)

Oil of Wintergreen. (*Oil of Checkerberry.*) See Salicylate of Methyl.

Olanin(of Unverdorben). (Said to be a mixture of *Lutidin & Collidin.*) Very slightly soluble in water. Soluble in all proportions in alcohol, and ether.

Oleene. *Vid.* Caproylene.

Olefiant Gas. *Vid.* Ethylene.

Oleic Acid(of the Siccative oils). *Vid.* Olinic Acid.

Oleic Acid. (*Elaic Acid.*) (*Isomeric with Elaidic Acid.*) $C_{36}H_{34}O_4 = C_{36}H_{33}O_3, HO$ Insoluble in water. Soluble in alcohol, ether, oils, and creosote. (Reichenbach.) Soluble in all proportions in alcohol, either hot or cold. (Chevreul.) Soluble in 29.1 pts. of boiling ether.

Oleic acid, and other fatty acids, is dissolved in almost any quantity by a mixture of alcohol and oil of turpentine. (Rousseau, *J. Ch. Méd.*, **22.** 310. [Gm.].) Also soluble in cold concentrated sulphuric acid, in which solution a precipitate is formed on the addition of water.

The normal alkaline oleates are soluble in water, but the other metallic oleates, and the acid salts of the alkalies, are insoluble in water. As a general rule, the oleates are soluble in cold absolute alcohol, and ether.

Oleate of Ammonia. Soluble in cold water.

Oleate of Baryta.

I.) *normal.* $C_{36}H_{33}BaO_4$ Insoluble in water. Only slightly soluble in boiling alcohol. Soluble in oleic acid, with combination, forming a bi-salt soluble in alcohol. (Chevreul. [T.].) Ppt., formed in alcohol. Insoluble, or very sparingly soluble in ether. (Heintz, cited by Maskelyne, *J. Ch. Soc.*, 8. 13.) Soluble in boiling alcohol; from a litre of the saturated boiling alcoholic solution about 5 grms. of the salt is deposited as the solution cools. (Berthelot, *Ann. Ch. et Phys.*, (3.) **41.** 243.) Oleate of baryta may be recrystallized from moderately concentrated boiling alcohol. (Gottlieb.)

II.) *basic.* Soluble in ether. (Heintz, as above.)

Oleate *of sesquioxide* **of Chromium.**

Oleate of Cobalt.

Oleate of Copper.

Oleate of Ethyl. $C_{36}H_{33}(C_4H_5)O_4$ Readily soluble in alcohol.

Oleate of Glyceryl. *Vid.* Olein.

Oleate of Lead.

I.) *normal.* $C_{36}H_{33}PbO_4$ Slowly soluble in cold, quickly soluble in boiling ether. Also soluble in oil of turpentine, and naphtha. Its solubility in boiling ether distinguishes it from the lead salts of the solid fatty acids.

II.) [?] "*acid.*" Slowly soluble in ether. (Saint-Evre, *Ann. Ch. et Phys.*, (3.) **21.** pp. 443, 444.)

III.) *basic.*

Oleate of Lime. Slightly soluble in ether, and benzin. (Berthelot, *Ann. Ch. et Phys.*, (3.) **41.** 245.)

Oleate of Methyl.
(*Methyl Oleic Ether.*)
$C_{36}H_{33}(C_2H_3)O_4$

Oleate of Nickel.

Oleate of Potash.

I.) *normal.* Deliquescent. It attracts water from the air with so much avidity that 100 pts. of the salt will absorb 162 pts. of water from humid air; with 2 pts. of water it forms a jelly and dissolves completely in 4 pts. of water; but is decomposed by a larger quantity of water, with separation of a bi-salt. Soluble in alcohol. (Chevreul.) Soluble in 1 pt. of alcohol of 0.821 sp. gr., at 50°, this solution becomes muddy at 40.5°, and completely solid at 11.6°. Two pts. of the same alcohol dissolve 1 pt. of the salt and retain it in solution at 11.6°. 100 pts. of boiling ether dissolve 3.43 pts. of the salt and retain it at 11.6°. Insoluble in potash-lye, or in a concentrated aqueous solution of chloride of potassium. (Chevreul. [T.].)

II.) *acid.* Insoluble in water. Soluble in cold alcohol.

Oleate of Soda.

I.) *normal.* Hygroscopic. Easily soluble in 10 @ 12 pts. of water at 10°. (Chevreul.) Soluble in 10 pts. of boiling alcohol of 0.821 sp. gr. Ether has but little action upon it. (Chevreul.)

Oleate of Strontia.

Oleate of Zinc.

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OLEIN. Soluble in alcohol, ether, and benzin.
(*Bibasic Oleate of Glyceryl.*)
$C_{42} H_{40} O_8 = C_6 H_5 O_3, 2 H O, C_{36} H_{33} O_3$

***Di*OLÆIN.**
(*Monobasic Oleate of Glyceryl.*)
$C_{78} H_{74} O_{12} = C_6 H_5 O_3, H O, 2 C_{36} H_{33} O_3 + 2 Aq$

***Tri*OLEIN.** Insoluble in water. Very sparingly soluble in ordinary alcohol. Very soluble in ether. It is precipitated from the concentrated ethereal solution on the addition of common alcohol. (Berthelot, *Ann. Ch. et Phys.*, (3.) **41.** 243.)
(*Normal Oleate of Glyceryl.*
(*Probably identical with natural Olein 'Elain.'*).)
$C_{114} H_{104} O_{12} = C_6 H_5 O_3, 3 C_{36} H_{33} O_3$

Natural olein is insoluble in water, but is easily soluble in absolute alcohol, and in ether. (Chevreul.)

100 pts. of Olein.	Dissolve in pts. of alcohol, of 0.7952 sp. gr.
Of man,	81.08 at boiling, the solution beginning to become opaque at 77°.
Of the sheep,	81.12 at 75°, and the liquid becomes muddy at 63°.
Of the ox,	81.03 at 75°, ditto.
Of the hog,	81.08 at 75°, and the liquid becomes muddy at 62°.
Of the jaguar,	80.90 at 75°, and the liquid becomes muddy at 60°.
Of the goose,	81.08 at 75°, and the liquid becomes muddy at 51°.

(Chevreul, *Ann. Ch. et Phys.*, 1816, (2.) **2.** 367.)

OLEINAMID. Insoluble in water. Easily soluble in warm alcohol.
$C_{36} H_{35} N O_2 = N \left\{ \begin{array}{l} C_{36} H_{33} O_2 \\ H_2 \end{array} \right.$

OLEONE.
(*Elaone.*)

OLEOPHOSPHORIC ACID. Insoluble in water. Insoluble in cold, soluble in hot alcohol. Sparingly soluble in ether; less soluble than cholesterin in ether.

OLEOPHOSPHATE OF AMMONIA. Soluble in water.

OLEOPHOSPHATE OF POTASH. Soluble in water.

OLEOPHOSPHATE OF SODA. Soluble in water.
The other oleophosphates are insoluble in water.

OLINIC ACID.
(*Leinœlsæure. Oleic acid of the siccative oils.*)
$C_{46} H_{38} O_6 = C_{46} H_{37} O_5, H O(?)$

OLINATE OF LEAD. Soluble in ether.

OLIVIL. Sparingly soluble in cold water. Soluble in 32 pts. of hot water. Difficultly soluble in cold, but soluble in all proportions in boiling alcohol. Ether only dissolves traces of it. Also soluble in oils, and in concentrated acetic acid. Easily soluble in aqueous solutions of caustic potash, soda, and ammonia. Insoluble in dilute sulphuric acid. Decomposed by strong nitric, sulphuric and chlorhydric acids.
$C_{28} H_{18} O_{10}, \& + 2 Aq$

OLIVIN (of Mulder). Insoluble in water, alcohol, ether, boiling potash-lye, or boiling chlorhydric or dilute sulphuric acids. Soluble in hot concentrated sulphuric acid. Soluble in hot nitric acid, with subsequent decomposition. (Mulder.)
$C_{14} H_6 O_4$

OLIVIRUTIN. Insoluble in water. Soluble in alcohol, ammonia-water, and concentrated sulphuric acid. (Sobrero.)

OLOBIL. Less soluble in alcohol than myristic acid, but more readily soluble than this in ether. (Uricoechea, *Am. J. Sci.*, (2.) **19.** 245.)
$C_{24} H_{18} O_5$

OMBELLIC ACID. *Vid.* Anisic Acid.

ONOCERIN. Insoluble in water. Abundantly soluble in boiling alcohol. Very sparingly soluble in ether. Easily soluble in warm oil of turpentine. Soluble in concentrated sulphuric acid. (Hlasiwetz.)
$C_{12} H_{10} O$

ONONETIN. When crystallized from alcohol it is almost insoluble in water; but when precipitated by an acid from an alkaline solution it dissolves in hot water and crystallizes out as the solution cools. Easily soluble in alcohol. Sparingly soluble in warm ether. Easily soluble in alkaline solutions.
$C_{48} H_{22} O_{13}$

ONONIN. Insoluble in cold, very sparingly soluble in boiling water. Slowly soluble in boiling alcohol. Almost entirely insoluble in ether. Soluble in concentrated sulphuric acid. Decomposed by boiling concentrated nitric acid, and by warm dilute chlorhydric and sulphuric acids.
$C_{62} H_{34} O_{26}$

ONOSPIN. Readily soluble in boiling water and in alcohol. Almost insoluble in ether. Easily soluble in aqueous solutions of ammonia and of the fixed caustic alkalies. Soluble in concentrated sulphuric acid. Decomposed by warm dilute chlorhydric and sulphuric acids.
$C_{60} H_{35} O_{25}$

OPIAMMON. *Vid.* Opianylamid.

OPIANIC ACID. Sparingly soluble in cold, but very soluble in boiling water. Easily soluble in alcohol, and ether. Soluble in ammonia-water. After having been melted, it is no longer soluble in water, alcohol, or dilute alkaline solutions. The salts of opianic acid are soluble in water.
(*Isomeric with Œnolin.*)
$C_{20} H_{10} O_{10} = C_{20} H_9 O_9, H O$

OPIANATE OF AMMONIA. Partially soluble in water. Soluble in alcohol.

OPIANATE OF BARYTA. Efflorescent. Very readily soluble in water.
$C_{20} H_9 Ba O_{10} + 2 Aq$

OPIANATE OF ETHYL. Insoluble in water. Easily soluble in alcohol, and ether. Decomposed by boiling with water, or more quickly with solution of caustic potash. Insoluble in ammonia-water. (Wœhler.)
(*Opianic Ether.*)
$C_{20} H_9 (C_4 H_5) O_{10}$

OPIANATE OF LEAD. Sparingly soluble in water; more readily soluble in alcohol.
$C_{20} H_9 Pb O_{10} + 2 Aq$

OPIANATE OF LIME. Soluble in water.

OPIANATE OF SILVER. Soluble in water.
$C_{20} H_9 Ag O_{10} + x Aq$

OPIANIN. Identical with Narcotin, *q. v.*

OPIANOSULPHUROUS ACID. When treated with cold water, a part dissolves undecomposed while another portion undergoes decomposition. Decomposed by hot water. (Wœhler.)
(*Sulphite of Opianoyl.*)
$C_{20} H_8 S_2 O_{12}$

OPIANOSULPHITE OF BARYTA. Slowly soluble in water.
$C_{20} H_7 Ba S_2 O_{12} + 3 Aq$

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OpianoSulphite of Lead. Permanent. Somewhat soluble in water.
$C_{20} H_7 Pb S_2 O_{12} + 6 Aq$

Opianyl. *Vid.* Meconin.

*Di***Opianylamid.** Insoluble in cold water or dilute acids, and is only slightly attacked by long-continued boiling with water. Slowly but abundantly soluble in boiling alcohol, with partial decomposition. (Wœhler.)
(*Opiammone.*)
$C_{40} H_{19} N O_{16} = N \left\{ \begin{matrix} (C_{20} H_9 O_8)_2 \\ H \end{matrix} \right.$

*Tri***Opianylamid.** Insoluble in water. Sparingly soluble in cold, somewhat more readily soluble in boiling alcohol. Very sparingly soluble in ether. Soluble in cold concentrated sulphuric acid; unacted upon by chlorhydric acid; decomposed by nitric acid, and by a boiling solution of caustic potash. Insoluble in ammonia-water. (Anderson.)
(*Ter Opiammon. Tri Opianylamic Acid.*)
$C_{60} H_{29} N O_{26} = N \left\{ \begin{matrix} (C_{20} H_9 O_8)_3 \\ H \end{matrix} \right. . O, H O$

Opinin. Soluble in alcohol, and ether; and in dilute acids, with combination. (Parrish's *Pharm.*, p. 398.)
(*Porphyroxin.*)

Orcein. Sparingly soluble in water; still less soluble in saline solutions. Readily soluble in alcohol, from which it is precipitated on the addition of water. Scarcely at all soluble in ether. Easily soluble in aqueous solutions of caustic ammonia and potash. (Kane.)
(*Beta-Orcein. Lichen-Red.*)
$C_{14} H_7 N O_8$

Orcein with **Oxide of Copper.** Ppt.
$C_{14} H_7 N O_6, 2 Cu O + 8 Aq$

Orcein with **Oxide of Lead.** Ppt.
$2 C_{14} H_7 N O_6, 5 Pb O + 4 Aq$

Orcein with **Silver.** Ppt.
$C_{14} H_5 Ag_2 N O_6$

Orcein with **Oxide of Zinc.**
$C_{14} H_7 N O_6, 2 Zn O + 2 Aq$

Orcin. Hygroscopic. Very readily soluble in water, alcohol, and ether. Soluble in nitric acid, with decomposition when the solution is heated.
(*Alpha-Orcin.*)
$C_{14} H_8 O_4, \& + 2 Aq$

Orcin with **Oxide of Lead.** Insoluble in water.
$C_{14} H_6 Pb_2 O_4 ; 2 Pb O$

*Beta***Orcin.** *Vid.* BetaOrcin. It is also a synonyme of Orcein.

Orellin. Soluble in alcohol, and ether. Sparingly soluble in water. Soluble in the fatty oils, oil of turpentine, and in alkaline solutions.

Oreoselone. Insoluble in water, sparingly soluble in warm alcohol, and in ether. Soluble in alkaline solutions. (Schnedermann & Winckler.)
(*Oroselone. Isomeric with anhydrous Benzoic and BenzoylSalicylous Acids.*)
$C_{28} H_{10} O_6 = \left. \begin{matrix} C_{14} H_5 O_3 \\ C_{14} H_5 O_3 \end{matrix} \right\}$

Orlean. *Vid.* Annotto.

Orsellic Acid. Soluble in water, and in alcohol, especially if this be warm. Readily soluble in ether. It is much more soluble than leconoric acid in water. The orsellates of the alkalies and alkaline earths are soluble in water. (Stenhouse.)
(*Alpha Orsellenic Acid.*)
$C_{16} H_8 O_8 = C_{16} H_7 O_7, H O$

Orsellate of Baryta. Very soluble in water, and alcohol. (Stenhouse.)
$C_{16} H_7 Ba O_8$

Orsellate of Ethyl. Very sparingly soluble in cold, abundantly soluble in hot water. Soluble in 5 pts. of cold alcohol of 60%. Very readily soluble in alcohol, and ether. Insoluble in acetic acid. Soluble, without decomposition, in cold aqueous solutions of the caustic and carbonated alkalies and of caustic baryta, lime, and ammonia. Soluble in concentrated sulphuric acid; also in fuming nitric acid, from which it is precipitated unchanged on the addition of water. (Marx.)
(*PseudErythrin. Erythrin. Lecanoric Ether. Erythric Ether.*)
$C_{16} H_7 (C_4 H_5) O_8$

Orsellate of Ethyl & of Lead.
$C_{16} H_7 (C_4 H_5) O_8 ; 8 Pb O$

Orsellate of Lime. Very soluble in water, and alcohol.

Orsellate of Methyl. Soluble in boiling, less soluble in cold water; more soluble in water than orsellate of ethyl. Soluble in wood-spirit, and in alkaline solutions. (Schunck.)
$C_{16} H_7 (C_2 H_3) O_8$

Osmiamic Acid. Soluble in water, but the solution is very readily decomposed. Dilute solutions keep better than those which are more concentrated.
$Os_2 N O_5$, or $Os_2 N O_4$

Osmiamate of Ammonia. Readily soluble in water, and alcohol. (Fritzsche & Struve.)

Osmiamate of Baryta. Tolerably soluble in water. (Fritzsche & Struve.)
$Ba O, (Os_2 N O_5)$

Osmiamate *of dinoxide* **of Mercury.** Insoluble in water. (F. & S.)

Osmiamate *of protoxide* **of Mercury.**

Osmiamate of Lead. Ppt.

Osmiamate of Potash. Much more soluble in water than in alcohol. Insoluble in ether. (F. & S.)
$K O (Os_2 N O_5)$

Osmiamate of Silver. Very slightly soluble in water, and in cold nitric acid; more soluble in ammonia-water. Decomposed by hot nitric acid. (F. & S.)
$Ag O (Os_2 N O_5)$

Osmiamate of Soda. More soluble than the potash-salt.

Osmiamate of Zinc. Easily soluble. (F. & S.)

Osmiamid.
$N H_2 Os O_2$

Osmic Acid. Soluble to a considerable extent, though slowly, in water. It may even be melted in water without any acceleration of its rate of solubility. Easily soluble in alcohol and ether; both of these solutions deposit osmium in the course of a very few hours, unless much water is present. Soluble in ammonia-water, the solution undergoing decomposition when heated; also slowly on standing. (Berzelius.) The alkaline osmiates alone are soluble in water. (Fremy.)
$Os O_4$

Osmiate of Ammonia. Soluble in water. (Berzelius.)

Osmiate of Lead.

Osmiate of Lime. Soluble in an aqueous solution of osmic acid. (Tennant.)

Osmiate *of protoxide* **of Mercury.**

Osmiate of Potash. Soluble in water, the solution undergoing decomposition when boiled. Decomposed by alcohol. (Fremy, *Ann. Ch. et Phys.*, (3.) **44.** pp. 391, 392.)

Osmiate *of protoxide* **of Tin.**

Osmide of Iridium. Scarcely at all acted upon by aqua-regia.

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Osmide of Copper. Easily soluble in aqua-regia.

Osmide of Gold. Easily soluble in aqua-regia.

Osmious Acid. *Vid.* *ter*Oxide of Osmium. All the osmites, excepting those of potash and soda are insoluble in water.

Osmite of Baryta. Insoluble in water.

Osmite of Lead. Insoluble in water.

Osmite of Lime. Insoluble in water.

Osmite of Potash. Permanent in dry air.
$K O, Os O_2, 2 H O$ Sparingly soluble in cold water, the solution slowly decomposing; much more soluble in hot water, by which, however, it is immediately decomposed. Sparingly soluble in water containing nitrite of potash. Insoluble in alcohol, in water containing alcohol, or in ether. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 516; & (3.) **44.** pp. 391, 392.) Only slightly soluble in strong saline solutions. (W. Gibbs, *Am. J. Sci.*, (2.) **31.** 70.)

Osmite of Soda. Soluble in water. Insoluble in alcohol, or ether. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 524.)

OsmioCyanhydric Acid. Resembles Ru-
$Os Cy, 2 H Cy$ thenioCyanhydric Acid. (Claus, *Beiträge*, p. 99.)

OsmioCyanide of Potassium. Effloresces
$2 K Cy, Os Cy + 3 Aq$ in dry air. Resembles RuthenioCyanide of Potassium. (Claus, *Beiträge*, pp. 98, 99.)

Osmium. After having been strongly ignited,
Os it is insoluble in nitric or other acids or in aqua-regia. When less strongly heated it is slowly soluble in ordinary nitric acid, more readily in aqua-regia, and still more easily in hot concentrated nitric acid.

Ossein. Insoluble in cold water, in weak acids, alcohol, or ether. Very slowly soluble, with decomposition, in boiling water, the liquid forming a jelly on cooling; this change, and solution, occurs rapidly when the water is acidulated. (Fremy, *Ann. Ch. et Phys.*, (3.) **43.** 52.)

Othyl. *Vid.* Acetyl.

OthylUrea. *Vid.* AcetylUrea.

Otobit. Entirely insoluble in water. Some-
$C_{48} H_{36} O_{10}$ what soluble in hot, but very sparingly soluble in cold alcohol. Soluble in ether. (Uricoechea, *Ann. Ch. u. Pharm.*, **91.** 370.)

OxalAmylic Acid. *Vid.* AmylOxalic Acid.

OxalAmylic Ether. *Vid.* Oxalate of Amyl.

Oxalan. Insoluble in cold water. (Rosing &
$C_{30} H_{26} N_{14} O_{30}$ Schischkoff.)

Oxalic Acid. Effloresces in warm dry air.
$C_4 H_6 O_{12} = C_4 O_6, 2 H O + 4 Aq$ Soluble in 15.5 pts. of water at 10°, and in 9.5 pts. of water at 13.9°; in a very small quantity at 100°, and in almost every proportion at higher temperatures, deliquescing in its water of crystallization at 104.5°.

100 pts. of water
dissolve 6.9 pts. of the cryst. acid at 10°
" 10.5 " 12°
" 11.5 " 15°,
the sp. gr. of this solution being 1.045. Soluble in all proportions in boiling water. (Turner, in *Berzelius's Lehrb.*, **1.** 627.)

Soluble in 10 pts. of cold water.
" 1 " hot "
" 4 " cold alcohol, and more easily in hot alcohol. (Wittstein's *Handw.*) Soluble in 8 pts. of cold water, forming a solution of 1.045 sp. gr. (Richter); in 8.7 pts. of water at 15°, the solution saturated at this temperature containing 10.31 pts. of it. Soluble in 8.71 pts. of water at 18.75° (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) More soluble in water acidulated with nitric acid, even dissolving in 2 pts. of such water. (Berzelius.) Soluble in 2 pts. of water at 15°, and in 1 pt. of boiling water. (Bergman, *Essays*, **1.** 309.) 100 pts. of spirit of wine dissolve nearly 56 pts. of it at the temperature of boiling, but not more than 40 pts. at a moderate heat. (*Ibid.*, p. 311.) Difficultly soluble in ether. (*Ibid.*, p. 312.) An aqueous solution saturated at 8° is of 1.027 sp. gr. (Anthon, *Ann. der Pharm.*, 1837, **24.** 211.) The saturated aqueous solution boils at 112°, but the temperature continues to rise until the acid sublimes at 121°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 91.)

Soluble in boiling creosote, the solution solidifying on cooling. (Reichenbach.) Soluble in fixed and essential oils, but separates again on proper evaporation; "in a more violent heat also it separates by rising above the surface." (Bergman, *Essays*, **1.** 312.) Readily soluble in chlorhydric, acetic, and dilute sulphuric acids, from which it crystallizes again unchanged on cooling, &c. Decomposed by concentrated sulphuric acid, especially on boiling; also gradually decomposed by nitric acid. (Bergman, *Essays*, **1.** pp. 310, 311.) Insoluble in caoutchin, but is decomposed when boiled with it. (Himly.) The alkaline oxalates are soluble in water, but the other salts are, for the most part, insoluble, or only very slightly soluble, in water. None of them are soluble in alcohol.

Insoluble oxalates are decomposed when boiled with an aqueous solution of carbonate of soda, oxalate of soda going into solution. (Parrish's *Pharm.*, p. 357.)

Oxalate of Acetonin. Readily soluble in
$C_4 (C_{18} H_{18} N_2'') O_8 + 4 Aq$ water. Soluble in alcohol. Insoluble in ether. (Stædeler.)

Oxalate of Acetosamin. Soluble in water, from which it is precipitated as a paste on the addition of alcohol.

Oxalate of Allyl. Slowly decomposed by
(*Acrylic Oxalate.*) water; instantly decomposed by
$C_4 (C_6 H_5)_2 O_8$ an aqueous solution of potash. (Cahours & Hofmann.) Soluble in ether.

Oxalate of Alumina.

I.) *normal.* Very sparingly soluble or insoluble
$C_{12} (Al_2''')_2 O_{24}$ in water. Easily soluble in dilute acids. Slightly soluble in alcohol.

II.) *acid.* Deliquescent. Soluble in water. Sparingly soluble in spirit. (Bergman, *Essays*, **1.** 321.)

Oxalate of Alumina & of Baryta. Scarcely
$3 C_4 Ba_2 O_8; C_{12} (Al_2''')_2 O_{24} + 20 Aq$ at all soluble in cold water. Soluble in 30 pts. of boiling water. (Reece.)

Oxalate of Alumina & of Lime. Somewhat soluble in hot, less soluble in cold water. (Rees-Reece.)

Oxalate of Alumina & of Potash. Permanent. Easily soluble in water. (Wenzel.)

Oxalate of Alumina & of Soda. Solu-

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$C_{12}\,Na_2\,Al_2{}'''\,O_{24} + 6\,\mathrm{Aq}$

ble in water. (Bussy.) Less easily soluble in alcohol.

Oxalate of Alumina & of Strontia. Decomposed by boiling water. (Reece.)

$3\,C_4\,Sr_2\,O_8\,;\;C_{12}\,(Al_2{}''')_2\,O_{24} + 36\,\mathrm{Aq}$

Oxalate of *bi*AmidoBenzoic Acid. Soluble in water.

Oxalate of Ammonia.

I.) *normal.* Efflorescent. Soluble in 3 pts. of cold water (Gerhardt's *Tr.*); in about 20 pts. of cold water (Gmelin's *Handbook*); in about 28 pts. of cold water (Berzelius's *Lehrb.*); in 22.2 pts. of cold water; the saturated solution containing 4.5% of it (M. R. & P.); in 25 pts. of cold water, easily soluble in hot water. (Wittstein's *Handw.*) 100 pts. of water at 15.5 dissolve 4.5 pts. of it, the sp. gr. of the solution = 1.0186. Soluble in 24 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht, für* 1854, p. 76.) 100 pts. of the saturated aqueous solution, at the boiling point (103.3°), contain 29 pts. of the dry salt; or, 100 pts. of water at 103.3° dissolve 40.831 pts. of it, or, 1 pt. of the dry salt is soluble in 2.793 pts. of water at 103.3°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) When treated with boiling water, a small quantity of ammonia is evolved and the solution obtained exhibits an acid reaction. (Emmet, *Am. J. Sci.*, (1.) **18.** pp. 255, 256.) It is liable to form supersaturated solutions. (Ogden.) Readily soluble in water, but insoluble in spirit. (Bergman, *Essays*, **1.** 317.) Insoluble in alcohol.

$C_4\,(NH_4)_2\,O_8 + 2\,\mathrm{Aq}$

II.) *acid.* More difficultly soluble in water than the normal salt.

$C_4\,H\,(NH_4)\,O_8 + 2\,\mathrm{Aq}$

III.) *hyperacid.* Readily soluble in hot water. (Rabourdin.)

$C_4\,H\,(NH_4)\,O_8,\;C_4\,H_2\,O_8 + 4\,\mathrm{Aq}$

Oxalate of Ammonia & of Antimony. Decomposed by water. Somewhat soluble in dilute alcohol, from which it is precipitated on the addition of absolute alcohol. (Souchay & Lenssen.)

$C_{12}\,Sb'''\,(NH_4)_3\,O_{24} + 4\,\mathrm{Aq}$

Oxalate of Ammonia & of Bismuth. Readily soluble in hot water, with subsequent decomposition. Insoluble in alcohol or ether. (Souchay & Lenssen.)

$C_{36}\,Bi'''\,(NH_4)_{15}\,O_{72} + 24\,\mathrm{Aq}$

Oxalate of Ammonia & of Cadmium.

I.) $C_4\,Cd_2\,O_8,\,2\,NH_4\,O + 2\,\mathrm{Aq}$

II.) $2\,C_4\,Cd\,(NH_4)\,O_8,\,5\,C_4\,(NH_4)_2\,O_8 + 18\,\mathrm{Aq}$

III.) $2\,C_4\,Cd\,(NH_4)\,O_8,\,7\,C_4\,(NH_4)_2\,O_8 + 22\,\mathrm{Aq}$

IV.) $2\,C_4\,Cd\,(NH_4)\,O_8,\;3\,C_4\,(NH_4)\,O_8 + 14\,\mathrm{Aq}$ *Rammelsberg's salt.*)

All of these are decomposed by water; they are easily soluble in ammonia-water; and are insoluble in alcohol. (Souchay & Lenssen, *Ann. Ch. u. Pharm.*, **103.** 320.)

Oxalate of Ammonia & *of sesquioxide* of Chromium.

I.) *red salt.* Soluble like the red potash-salt. (Berlin.)

$C_8\,Cr_2{}'''\,(NH_4)\,O_{16} + 8\,\mathrm{Aq} =$ "$NH_4\,O,\,C_2\,O_3\,;\;Cr_2\,O_3,\,3\,C_2\,O_3 + 8\,\mathrm{Aq}.$"

II.) *blue salt.* Soluble in 1.3 pts. of water at 15°; and in less hot water. (Berlin.)

$C_8\,Cr_2{}'''\,(NH_4)\,O_{16},\,C_4\,(NH_4)_2\,O_8 + 6\,\mathrm{Aq} =$ "$3\,(NH_4\,O,\,C_2\,O_3);\;Cr_2\,O_3,\;3\,C_2\,O_3 + 6\,\mathrm{Aq}$

Oxalate of Ammonia & of Cobalt. Effloresces superficially. Difficultly soluble in cold, easily soluble in boiling water. (Winkelblech.)

$9\,C_4\,(NH_4)_2\,O_8;\;C_4\,Co_2\,O_8 + 2\,\mathrm{Aq}$

Oxalate of Ammonia & of Copper.

I.) $C_4\,(NH_4)\,Cu\,O_8 + \mathrm{Aq}$ Permanent. Sparingly soluble in water, with partial decomposition. Soluble in ammonia-water. (F. C. Vogel.)

Oxalate of Ammonia & of Glucina. Sparingly soluble in cold, much more soluble in hot water. (Debray, *Ann. Ch. et Phys.*, (3.) **44.** 35.)

$C_4\,(NH_4)_2\,O_8\,;\;C_4\,Gl_2\,O_8$

Oxalate of Ammonia & *of sesquioxide* of Iron.

I.) $C_8\,(NH_4)\,Fe_2{}'''\,O_{16};\;C_4\,(NH_4)_2\,O_8$ Soluble in 1.1[0.9] pt. of water at 20°, and in 0.79 pt. of boiling water. (Bussy.)

II.) Insoluble in water. [T.]

Oxalate of Ammonia & of Magnesia.

I.) $2\,C_4\,Mg\,(NH_4)\,O_8\,;\;C_4\,(NH_4)_2\,O_8 + 18\,\mathrm{Aq}$ Soluble in water, with partial decomposition.

II.) $5\,C_4\,Mg\,(NH_4)\,O_8\,;\;2\,C_4\,(NH_4)_2\,O_8 + 2\,\mathrm{Aq}$ Soluble in water, with partial decomposition.

III.) $C_4\,(NH_4)\,Mg\,O_8\,;\;2\,C_4\,(NH_4)_2\,O_8 + 8\,\mathrm{Aq}$ Efflorescent. Tolerably soluble in water, with partial decomposition. Soluble in aqueous solutions of ammoniacal salts. (Kayser; Souchay & Lenssen.)

IV.) $C_4\,Mg\,(NH_4)\,O_8\,;\;3\,C_4\,(NH_4)_2\,O_8 + 8\,\mathrm{Aq}$ Soluble in water, with partial decomposition. (Souchay & Lenssen, *Ann. Ch. u. Pharm.*, **99.** 41.)

V.) $C_4\,(NH_4,\,Mg)\,O_8;\;C_4\,Mg_2\,O_8 + 2\,\mathrm{Aq}$ Very difficultly soluble in water, 1 grain of it requiring more than 6 ounces of water for its solution. Soluble in chlorhydric acid. (Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1819, **27.** 21.) [Souchay & Lenssen could not obtain this salt.]

Oxalate of Ammonia & of Manganese.

I.) $C_4\,Mn\,(NH_4)\,O_8 + 2\,\mathrm{Aq}$

II.) $2\,C_4\,Mn\,(NH_4)\,O_8\,;\;C_4\,(NH_4)_2\,O_8 + 8\,\mathrm{Aq}$

III.) $C_4\,Mn\,(NH_4)\,O_8\,;\;2\,C_4\,(NH_4)_2\,O_8 + 8\,\mathrm{Aq}$

IV.) $C_4\,Mn\,(NH_4)\,O_8;\;3\,C_4\,(NH_4)_2\,O_8 + 8\,\mathrm{Aq}$ These compounds are all efflorescent; they are all decomposed by water. (Souchay & Lenssen, *Ann. Ch. u. Pharm.*, **102.** 50.) For Winkelblech's "basic salt" see AmmonioOxalate of Manganese.

Oxalate of Ammonia & *of dinoxide* of Mercury.

I.) *basic* (*of very variable composition*).

Oxalate of Ammonia & *of protoxide* of Mercury. Decomposed by water. Insoluble in alcohol or ether. (Souchay & Lenssen.)

$C_4\,Hg\,(NH_4)\,O_8 + 2\,\mathrm{Aq}$

Oxalate of Ammonia & of Nickel. Soluble in water. (Tupputi.)

Oxalate of Ammonia & of Palladium. (Kane, *Phil. Trans.*, 1842, p. 297.)

$C_4\,Pd\,(NH_4)\,O_8 + 2\,\mathrm{Aq}\ \&\ 8\,\mathrm{Aq}$

Oxalate of Ammonia & of Potash. Permanent. The oxalates of ammonia and of potash crystallize together in all proportions, forming

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double salts, which vary in solubility according to their composition; being less soluble in proportion as they contain more oxalate of ammonia. (Rammelsberg.)

OXALATE OF AMMONIA & OF SILVER. *Vid.* AmmonioOxalate of Silver.

OXALATE OF AMMONIA & OF TIN. $C_4 Sn (N H_4) O_8 + Aq$ Efflorescent. Very easily soluble in water. Insoluble in spirit. (Hausmann & Lœwenthal, *Ann. Ch. u. Pharm.*, **89.** 106.)

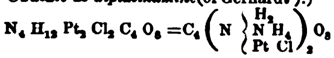
OXALATE OF AMMONIA & *of protoxide* OF URANIUM. $C_4 Ur (N H_4) O_8 + Aq$ Soluble in water. (Rammelsberg.)

OXALATE OF AMMONIA & *of sesquioxide* OF URANIUM. $N H_4 O, Ur_2 O_3, C_4 O_6 + 4 Aq$ Soluble in ammonia-water [and apparently in pure water]. (Peligot, *Ann. Ch. et Phys.*, (3.) **5.** 42.)

OXALATE OF AMMONIA & OF ZINC. $C_4 (N H_4) Zn O_8 + 8 Aq$ Efflorescent. Nearly insoluble in cold water. Decomposed by hot water, with separation of carbonate of zinc. (Kayser.)

OXALATE OF AMMONIORHODIUM. (Claus, *Beiträge*, p. 90.)

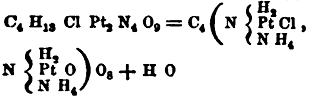
OXALATE OF AMMONIUMCHLORPLATIN(*ous*) AMMONIUM. (*Oxalate of Gros's Base. BiChlorhydro-Oxalate de diplatinamine*(of Gerhardt).)



$$N_4 H_{12} Pt_2 Cl_2 C_4 O_8 = C_4\left(N \left\{\begin{matrix} H_2 \\ N H_4 \\ Pt\ Cl \end{matrix}\right.\right)_2 O_8$$

Insoluble in water. Decomposed by sulphuric, nitric, and chlorhydric acids. (Gros, *Ann. der Pharm.*, 1838, **27.** 252.)

OXALATE OF AMMONIUMCHLORPLATIN(*ous*) AMMONIUM & OF AMMONIUM-OXYPLATIN(*ous*)AMMONIUM. (*Raewsky's Oxalate. Sesquichlorhydro-oxalate de diplatinamine*(of Gerhardt).)



$$C_4 H_{13} Cl\ Pt_2 N_4 O_9 = C_4\left(N \left\{\begin{matrix} H_2 \\ Pt\,Cl \\ N H_4 \end{matrix}\right.,\ N \left\{\begin{matrix} H_2 \\ Pt\ O \\ N H_4 \end{matrix}\right.\right) O_8 + H\ O$$

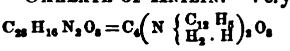
Sparingly soluble in water. (Raewsky.)

OXALATE OF AMYL. *Vid.* AmylOxalate of Amyl; and AmylOxalic Acid.

OXALATE OF *tetr*AMYLAMMONIUM. Deliquescent.

OXALATE OF AMYLANILIN. Very sparingly soluble in water.

OXALATE OF ANILIN. Very soluble in water.



$$C_{28} H_{16} N_2 O_8 = C_4\left(N \left\{\begin{matrix} C_{12} H_5 \\ H_2 . H \end{matrix}\right.\right)_2 O_8$$

Difficultly soluble in absolute alcohol. Insoluble in ether. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 150.) Less easily soluble in water, alcohol, or ether, than the other salts of anilin. (Runge.)

OXALATE OF ANISAMATE OF ETHYL. Soluble in alcohol? (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** pp. 346, 347.)

OXALATE OF ANTHRANILIC ACID.
$(C_{14} H_7 N O_4)_2, C_4 H_2 O_8$

OXALATE OF ANTIMONY. $C_{12} (Sb''')_2 O_{24}$ Insoluble in cold, decomposed by boiling water which abstracts the oxalic acid. (Peligot, *Ann. Ch. et Phys.*, (3.) **20.** 292.) Scarcely at all soluble in water, though slightly soluble in oxalic acid. It is precipitated when free oxalic acid is added to a solution of glass of antimony in acetic acid, but not from terchloride of antimony. (Bergman, *Essays*, **1.** 329.)

OXALATE OF ANTIMONY & OF POTASH.

I.) $C_{12} K_3 Sb''' O_{24}$ & $12 Aq = Sb O_3, 3 K O, 3 C_4 O_6 + 12 Aq$ Soluble in water, without decomposition. Decomposed by acids. (Souchay & Lenssen.)

II.) $2 (K O, 2 C_2 O_3); (Sb O_3, 3 C_2 O_3) + 4 Aq$ Soluble in water.

III.) $3 C_4 K_2 O_8 ; C_{12} (Sb''')_2 O_{24} + 9 Aq = 3 (K O, C_2 O_3); (Sb O_3, 3 C_2 O_3) + 9 Aq$ Completely soluble in water; the solution becoming turbid when boiled. (Rammelsberg.)

IV.) $5 C_4 K_2 O_8 ; 2 C_{12} (Sb''')_2 O_{24} + 7 Aq = 5 (K O, C_2 O_3) ; 2 (Sb O_3, 3 C_2 O_3) + 7 Aq$ Partially decomposed by water. (Rammelsberg.)

V.) $Sb O_3, 3 K O, 7 C_2 O_3 + 6 Aq$ & $8 Aq$ (Same as Bussy's "$Sb O_3, 3 K O, 6 C_2 O_3 + 6 Aq$.") Tolerably soluble in water. Decomposed by much water. (Peligot, *Ann. Ch. et Phys.*, (3.) **20.** 293.)

VI.) *White needles* (of Lassaigne).
$C_8 Sb''' K O_{16} + x Aq = K O, C_2 O_3 ; Sb O_3, 3 C_2 O_3$ Soluble in 9.5 pts. of water at 9°, and in less hot water. (Lassaigne, in *Berzelius's Lehrb.*)

Chlorhydric acid precipitates all the above mentioned solutions. (Rammelsberg.)

OXALATE OF ANTIMONY & OF SODA.

I.) $C_{12} Na_3 Sb''' O_{24}; C_4 Na_2 O_8 + 20 Aq = Sb O_3, 3 Na O, 3 C_4 O_6 ; 2 Na O, C_4 O_6 + 20 Aq$ Soluble in water without being decomposed either in the cold or when hot. Sparingly soluble in alcohol. Insoluble in ether. Decomposed by acids. (Souchay & Lenssen.)

II.) $2 C_{12} (Sb''')_2 O_{24} ; 5 C_4 Na_2 O_8 + 30 Aq = 5 (Na O, C_2 O_3); 2 (Sb O_3, 3 C_2 O_3) + 15 Aq$ Decomposed by water. (Rammelsberg.)

OXALATE OF ARGENT*bi*AMIN. (*Ammonio Oxalate of Silver.*)
$C_4 H_{12} Ag_2 N_4 O_8 = C_4\left(N_2 \left\{ H_6 . Ag \right)_2 O_8\right.$ Easily soluble in water. Decomposed by acids. (Souchay & Lenssen.)

OXALATE OF ASPARAGIN. Soluble in water.
$C_8 H_8 N_2 O_6, C_4 H_2 O_8$ (Dessaignes.)

OXALATE OF ARSENIOUS ACID? Readily soluble in water, and alcohol. (Bergman, *Essays*, **1.** 327.)

OXALATE OF ARSENIOUS ACID & OF POTASH.
$C_{12} K_3 As''' O_{24} + 6 Aq(?)$

OXALATE OF AZONAPHTHYLAMIN. Sparingly soluble in water; still less soluble in alcohol, and ether. (Zinin.)

OXALATE OF BARYTA.

I.) *normal.* Very difficultly soluble in water. $C_4 Ba_2 O_8 + 2 Aq$ When recently precipitated, 1 pt. of it dissolves in 2590 pts. of cold, and in 2500 pts. of hot water. It is much more readily soluble in water containing chloride of ammonium; still more readily in water acidified with acetic acid, and still more soluble in a solution of oxalic acid, especially if this be hot and concentrated. (Sonchay & Lenssen, *Ann. Ch. u. Pharm.*, **99.** 36.) Very sparingly soluble in cold water. (W. Wicke, *Ann. Ch. u. Pharm.*, **90.** 102.)

Oxalic acid, on being saturated with baryta, quickly deposits pellucid angular crystals, scarcely soluble in water. When these are boiled in water

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they split and yield an opaque powder; but on cooling, the small portion which has been dissolved again separates out in crystals containing an excess of acid. (Bergman, *Essays*, **1.** 320.) Scarcely at all soluble in spirit. (*Ibid.*) Partially decomposed by an aqueous solution of caustic potash. (*Ibid.*) When recently precipitated it is soluble in a cold aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 316; Brett, *Phil. Mag.*, 1837, (3.) **10.** 96), and also, though less readily, in a solution of nitrate of ammonia. (Brett, *Ibid.*)

When an equivalent of oxalate of baryta is boiled with one of carbonate of soda $\frac{85}{100}$ of it may be decomposed. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 347.) Soluble in an aqueous solution of citrate of soda. (Spiller.)

II.) *acid.* Difficultly soluble in cold water. $C_4 H Ba O_8 + 2 Aq$ Soluble in 392 pts. of water at 17°; gradually decomposed by hot water. Insoluble in alcohol. (Souchay & Lenssen, *loc. cit.*) Soluble in 336 pts. of water at 15.5°. Decomposed by hot water. Insoluble in alcohol or ether. (Clapton, *J. Ch. Soc.*, **5.** 223.) Soluble in 200 pts. of cold, and in 1 pt. of hot water. (Bucholz.) Sparingly soluble in cold, readily soluble in warm water. On the addition of spirit it is precipitated from the aqueous solution. (W. Wicke, *Ann. Ch. u. Pharm.*, **90.** 102.)

OXALATE OF BARYTA & *of sesquioxide* OF CHROMIUM. $C_8 Ba Cr_2''' O_{16}$; $C_4 Ba_2 O_8 + 12 Aq$ & $18 Aq = 3 (Ba O, C_2 O_3); (C_2 O_3, 3 C_2 O_3) + 12 Aq$ & $18 Aq$ Scarcely at all soluble in cold water. Soluble in 30 pts. of boiling water. (Rees-Reece.)

OXALATE OF BARYTA & OF IRON. $C_8 Ba Fe_2''' O_{16}$; $C_4 Ba_2 O_8 + 7 Aq$ & $21 Aq = 3 (Ba O, C_2 O_3); (Fe_2 O_3, 3 C_2 O_3) + 7 Aq$ & $21 Aq$ Scarcely at all soluble in cold water. Soluble in 30 pts. of boiling water. (Rees-Reece.)

OXALATE OF BENZIDIN. Tolerably sparingly $C_{24} H_{12} N_2, C_4 O_6, 2 H O$ soluble in water, and alcohol.

OXALATE OF BISMUTH.

I.) *normal.* Insoluble in water. Decomposed $C_{12} (Bi''')_2 O_{24} + 15 Aq = 2 Bi O_3, 3 C_4 O_6 + 15 Aq$ by prolonged contact with water. Soluble in acids. (Souchay & Lenssen.) Readily soluble in a warm aqueous solution of oxalic acid. (Pearson, *Phil. Mag.*, (4.) **11.** 207.)

II.) *basic.* Decomposed by boiling with water. $2 (Bi O_3, C_4 O_6) + 3 Aq$ Tolerably soluble in chlorhydric acid. Slightly soluble in strong nitric acid. Insoluble in cold dilute nitric acid. (Heintz.)

OXALATE OF BISMUTH & OF POTASH. De- $C_{12} K_3 Bi''' O_{24}$; $2 C_4 K_2 O_8 + 24 Aq = Bi O_3, 3 K O, 3 C_4 O_6; 2 (2 K O, C_4 O_6) + 24 Aq$ composed by water. Insoluble in alcohol or ether. (Souchay & Lenssen.)

OXALATE OF BROMANILIN. Sparingly soluble in water, and alcohol. Insoluble in ether.
$C_4\left(N \left\{ \begin{matrix} C_{12} H_4 Br \\ H_2 . H \end{matrix} \right.\right)_2 O_8$

OXALATE OF BRUCIN. Very sparingly soluble in absolute alcohol.

OXALATE OF CADMIUM.

I.) *normal.* Soluble in 13000 pts. of cold, and $C_4 Cd_2 O_8 + 4 Aq$ in 11000 pts. of boiling water. (Souchay & Lenssen, *Ann. Ch. u. Pharm.*, **103.** 315.) Insoluble in water. (Stromeyer.) Absolutely insoluble in ordinary alcohol, or in ether. A trifle more soluble in oxalic, and acetic acids than in water. Considerably more soluble in ammonia-water and in solutions of ammoniacal salts than in water. Easily soluble in an aqueous solution of oxalate of ammonia. Easily soluble in nitric, chlorhydric, and sulphuric acids, especially when these are warm. (Souchay & Lenssen, *loc. cit.*) Insoluble in an aqueous solution of oxalic acid. (Children.) Soluble in a cold aqueous solution of chloride of ammonium; less completely soluble in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 99, 334.) Also soluble in ammonia-water, and in aqueous solutions of the sulphate, nitrate, and succinate of ammonia. (Wittstein.) Easily soluble in ammonia-water. (H. Rose, *Tr.*) Insoluble in solutions of the alkaline oxalates.

OXALATE OF CADMIUM & OF POTASH. De- $C_4 Cd K O_8 + 2 Aq$ composed by water.

OXALATE OF CADMIUM & OF SODA. A diffi- $C_4 Cd Na O_8 + 2 Aq$ cultly soluble precipitate.

OXALATE *of protoxide* OF CERIUM. Insoluble $C_4 Ce_2 O_8 + 6 Aq$ in water or in an aqueous solution of oxalic acid. (Berzelius.) Soluble in a large excess of chlorhydric acid, but is completely precipitated from solutions which are somewhat, but not very acid. (H. Rose, *Tr.*) Soluble, without decomposition, in hot nitric acid.

OXALATE *of sesquioxide* OF CERIUM. Insolu- $C_{12} (Ce_2''')_2 O_{24}$ ble in water. Soluble in an aqueous solution of chloride of ammonium and in ammonia-water. (Berzelius.)

OXALATE OF CERIUM & OF POTASH. Insolu- $C_4 Ce K O_8$ ble in water. (Berzelius.)

OXALATE OF CETYLANILIN.

OXALATE OF CHLORANILIN.

I.) *acid.* Only sparingly soluble in cold, more soluble in boiling water, and alcohol.
$C_4\left(N \left\{ \begin{matrix} C_{12} H_4 Cl \\ H_2 . H \end{matrix} \right.\right) H O_8 + 2 Aq$

OXALATE OF CHINOLIN. *Vid.* Oxalate of Quinolein.

OXALATE OF *per*CHLORETHYL.
(*Chloroxalic Ether. Perchlorovinic Oxalate. PerChloroxalic Ether. Oxalate d'Ethyle perchloré.*)

I.) *normal.* Deliquescent in moist air. Insol- $C_{12} Cl_{10} O_8 = C_4 (C_4 Cl_5)_2 O_8$ uble in water. Immediately decomposed by alcohol, wood-spirit, amylalcohol, oil of turpentine, and acetone. Less rapidly decomposed by common ether, acetic ether, and the compound ethers in general. Acetate of methyl decomposes it the most slowly of any of its solvents. (Malaguti.)

II.) *acid.* *Vid. per*ChlorEthylOxalic Acid.
$C_4 (C_4 Cl_5) H O_8$

OXALATE OF *bi*CHLORMETHYL.
(*Chloromethylic Oxalate. Oxalate de Methylbichloré.*)

I.) *normal.* Decomposed at once by water.
$C_8 H_2 Cl_4 O_8 = C_4 (C_2 H Cl_2)_2 O_8$ (Malaguti.)

OXALATE OF *per*CHLORMETHYL. Decomposed (*Perchloromethylic Oxalate. Oxalate de Methylperchloré.*) $C_8 Cl_6 O_8 = C_4 (C_2 Cl_3)_2 O_8$ by most liquids; for example, by alcohol, wood-spirit, fusel-oil, and acetone. (Cahours, *Ann. Ch. et Phys.*, (3.) **19.** 344.)

OXALATE *of sesquioxide* OF CHROMIUM.

I.) *normal.*

a = violet modif. Very easily soluble in water. $C_{12} (Cr_2''')_2 O_{24}$ (Berlin; Brandenburg.) When the aqueous solution is heated to

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boiling the green modification is produced, but on cooling this is reconverted to the violet modif.

b = *green modif.* Deliquescent. Soluble in water, and in an aqueous solution of carbonate of ammonia. (T. Thompson, *Phil. Trans.*, 1827, Part I. pp. 214, 203.)

II.) ? Insoluble in water. (Hayes.)

$C_{12}Pb_3Cr_2{}'''O_{24} + 15\,Aq = 3\,(PbO, C_2O_3);\ Cr_2O_3, 3\,C_2O_3 + 15\,Aq$

Oxalate of Chromium & of Lead. While yet moist it is soluble in a boiling aqueous solution of normal oxalate of chromium, from which it separates out again on cooling. (Berlin.)

$C_{12}Ca_3Cr_2{}'''O_{24} + 18\,Aq\ \&\ 36\,Aq = 3\,(CaO, C_2O_3);\ Cr_2O_3, 3\,C_2O_3 + 18\,Aq\ \&\ 36\,Aq$

Oxalate of Chromium & of Lime. Soluble in more than 200 pts. of cold water; and in a much smaller quantity of boiling water; but the hot solution deposits nothing on cooling, or until it has been evaporated to a syrup, when red scales separate out. If the solution be evaporated to dryness on the water-bath the salt is converted into the green modification, and is obtained as an amorphous mass which is very easily and abundantly soluble in water; in solution it soon changes back to the violet modification however. It is decomposed when boiled with much water, — with separation of oxalate of lime.

Somewhat soluble in cold, decomposed by boiling water. (Reece.)

$C_8Cr_2{}'''MgO_{16} + x\,Aq = Cr_2O_3, 3\,C_2O_3;\ MgO, C_2O_3 + x\,Aq$

Oxalate of Chromium & of Magnesia. Soluble in water. (Berlin.)

Oxalate of Chromium & of Potash.

$C_8KCr_2{}'''O_6 + 8\,Aq\ \&\ 12\,Aq = KO, C_2O_3;\ Cr_2O_3, 3\,C_2O_3 + 8\,Aq\ \&\ 12\,Aq$

I.) *red salt.* Soluble in somewhat more than 10 pts. of cold water, and in all proportions in hot water. Alcohol precipitates it from the aqueous solution. (Berlin.)

$C_8KCr_2{}'''O_{16};\ C_4K_2O_8 + 6\,Aq = 3\,(KO, C_2O_3);\ Cr_2O_3, 3\,C_2O_3 + 6\,Aq$

II.) *blue salt.* Soluble in 5 pts. of water at 15°, Insoluble in alcohol. (Berlin.)

$C_{12}Ag_3Cr_2{}'''O_{24} + 9\,Aq = 3\,(AgO, C_2O_3);\ Cr_2O_3, 3\,C_2O_3 + 9\,Aq$

Oxalate of Chromium & of Silver. Soluble in more than 65 pts. of water at 15°, and in more than 9 pts. of boiling water. (Berlin.) Soluble in a warm aqueous solution of oxalate of chromium, separating out again unchanged on cooling.

Oxalate of Chromium & of Sodium.

$C_{12}Na_3Cr_2{}'''O_{24} + 9\,Aq = 3\,(NaO, C_2O_3);\ Cr_2O_3, 3\,C_2O_3 + 9\,Aq$

I.) *red salt.* Less soluble in cold water than the blue salt. (Rammelsberg.)

$a = C_{12}Na_3Cr_2{}'''O_{24} + 9\,Aq = 3\,(NaO, C_2O_3);\ Cr_2O_3, 3\,C_2O_3$

II.) *blue salt.* Slightly efflorescent. Easily soluble in water. Alcohol precipitates it from the aqueous solution. (Berlin.) More soluble in cold water than the red salt. (Rammelsberg.)

$b = C_{12}HNa_2Cr_2{}'''O_{24} + x\,Aq(?) = 2\,(NaO, C_2O_3);\ Cr_2O_3, 3\,C_2O_6$

Efflorescent. (Berlin, *Berzelius's Lehrb.*, 3. 1089.)

$C_{12}Sr_3Cr_2{}'''O_{24} + 18\,Aq = 3\,(SrO, C_2O_3);\ Cr_2O_3, 3\,C_2O_3 + 18\,Aq$

Oxalate of Chromium & of Strontia.

Oxalate of Cinchonidin (of Pasteur).

I.) Very sparingly soluble in water.

II.) Somewhat more soluble in water than No. I. (Leers, *Ann. Ch. u. Pharm.*, 82. 160.)

Oxalate of Cinchonin.

I.) *normal.* Insoluble in cold, sparingly soluble in boiling water. Readily soluble in alcohol, especially if it be warm. Readily soluble in oxalic acid.

II.) *acid.* Much more soluble than the normal salt in water.

Oxalate *of protoxide* of Cobalt.

$C_4Co_2O_8 + 4\,Aq$

I.) *normal.* Scarcely at all soluble in water. (Bergman, *Essays*, 1. 328.) Nearly insoluble in water or in an aqueous solution of oxalic acid. Soluble in 40000 pts. of a boiling aqueous solution of oxalic acid. (Winckelblech.) It is precipitated when free oxalic acid is added to the solution of cobalt in any acid. (Bergman, *Essays*, 1. 328.) Tolerably soluble in ammonia-water and still more easily soluble in a solution of carbonate of ammonia. [*Gm.*] Soluble in ammonia-water; also soluble, though less easily and quickly, in a solution of carbonate of ammonia. (H. Rose, *Tr.*) Slowly soluble in cold, but quickly soluble in a hot solution of normal oxalate of ammonia. (Winckelblech.) Sparingly soluble in hot aqueous solutions of sulphate, nitrate, and succinate of ammonia, and of chloride of ammonium. (Wittstein.)

$C_4Co_2O_8;\ 4\,CoO$

II.) *basic.* Insoluble, or very sparingly soluble in water. Decomposed by warm potash-lye, which abstracts the acid. (Berzelius, *Lehrb.*)

$C_4Co_2O_8;\ C_{12}(Co_2{}''')_2O_{24}$

Oxalate *of protoxide* & *of sesquioxide* of Cobalt. Deliquescent. Very easily soluble in water. (Winckelblech.) Easily soluble in water. (Bergman, *Essays*, 1. 328.)

$C_4Co\left(N\left\{\begin{matrix}H_3\\Co\end{matrix}\right.\right)O_8 + 6\,Aq$

Oxalate of Cobalt & of Cobaltammonium. Insoluble in water. Only partially soluble in oxalic acid, or ammonia-water.

Oxalate *of protoxide* of Cobalt & of Potash.

$C_4CoKO_8 + 6\,Aq$

I.) *normal.* Soluble in water. (Rammelsberg.)

II.) *basic.* Insoluble in water.

Oxalate of CobaltosoCobaltic Oxide & of Potash. Very soluble in water. (Winckelblech.)

$C_4(C_{36}H_{21}NO_6)_2H_2O_8 + 6\,Aq$

Oxalate of Codein. Soluble in 30 pts. of water at 15.5°, and in about 0.5 pt. of boiling water.

Oxalate *of dinoxide* of Copper. Soluble in ammonia-water, and in an aqueous solution of carbonate of ammonia. Incompletely soluble in aqueous solutions of sulphate, nitrate, and succinate of ammonia, and of chloride of ammonium. (Wittstein.)

$C_4Cu_2O_8 + 2\,Aq$

Oxalate *of protoxide* of Copper. Permanent. Insoluble in water. Nearly insoluble in a boiling aqueous solution of oxalic acid. Soluble in warm concentrated chlorhydric acid. (A. Vogel.) Scarcely at all soluble in water, unless the acid

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predominates. It is precipitated when free oxalic acid is added to solutions of copper, in sulphuric, nitric, chlorhydric, or acetic acid; in the last case so completely that very little copper remains in solution. (Bergman, *Essays*, **1.** 324.) Unacted upon by warm nitric acid. (Dujardin.) Soluble in aqueous solutions of caustic, and carbonated ammonia, and of succinate of ammonia. Imperfectly soluble in solutions of nitrate, and sulphate of ammonia, and of chloride of ammonium. (Wittstein.) Insoluble in aqueous solutions of nitrate of ammonia or of chloride of ammonium. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 98.) Soluble in aqueous solutions of the oxalates of ammonia, potash, and soda. (F. C. Vogel.)

Oxalate of Copper & of Cupr(*ic*)ammonium. Permanent.

$C_4\left(N\left\{\begin{matrix}H_3\\Cu\end{matrix}\right.\right)Cu\,O_8$

Oxalate of Copper & of Lithia. Soluble in water, with partial decomposition. (Troost.)
$C_4\,Cu\,Li\,O_8 + 2\,Aq$

Oxalate of Copper & of Potash.

a = $C_4\,Cu\,K\,O_8 + 2\,Aq$ Permanent. Sparingly soluble in cold water. Soluble in about 6 pts. of boiling water, with partial decomposition. Both of the hydrates (*a* & *b*) give up a portion of their water to alcohol; but the salt is insoluble in alcohol. Both of the hydrates are soluble, without decomposition, in water containing in solution normal oxalate of potash. (F. C. Vogel.)

b = $C_4\,Cu\,K\,O_8 + 4\,Aq$ Efflorescent.

Oxalate of Copper & of Soda. Permanent. Sparingly soluble, with separation of oxalate of copper, in water; but soluble, without decomposition, in an aqueous solution of oxalate of soda. (F. C. Vogel.)
$C_4\,Cu\,Na\,O_8 + 2\,Aq$

Oxalate of Cumidin.

I.) *mixture of the normal and acid salt.* Difficultly soluble in water; more soluble in boiling alcohol. (Nicholson, *J. Ch. Soc.*, **1.** 8.)

Oxalate of Cupr(*ic*)ammonium. Permanent. (F. C. Vogel.)

$C_4\left(N\left\{\begin{matrix}H_3\\Cu\end{matrix}\right.\right)_2 O_8 + 2\,Aq$

Oxalate of CyAnilin. Extremely soluble in water, the solution undergoing decomposition when evaporated. (Hofmann, *J. Ch. Soc.*, **1.** 166.)

Oxalate of Cyanethin. Soluble in water, and alcohol. (Kolbe & Frankland, *J. Ch. Soc.*, **1.** 72.)

Oxalate of CyanoCodein.

Oxalate of Cymidin. Soluble in water. (Barlow, *Ann. Ch. u. Pharm.*, 1856, **98.** 251.)

Oxalate of Delphin.

Oxalate of Didymium. Completely insoluble in water. Almost insoluble in a solution of oxalic acid, or in very dilute mineral acids. Soluble in warm chlorhydric, and nitric acid, separating out again as the solution cools. Slightly less soluble than oxalate of lanthanum in warm chlorhydric acid diluted with its own volume of water. (Marignac, *Ann. Ch. et Phys.*, (3.) **27.** 226; & (3.) **38.** 175.)
$C_4\,Di_2\,O_8 + 8\,Aq$

Oxalate of Emetin. Readily soluble in water.

Oxalate of Ethyl.
(*Oxalic Ether. Ethylic Oxalate. Vinic Oxalate.*)

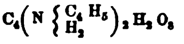
I.) *normal.* Very slightly soluble in water. Easily soluble in alcohol, from which water precipitates it, and in ether. Slowly decomposed by cold, rather quickly decomposed by hot water.
$C_{12}\,H_{10}\,O_8 = C_4\,(C_4\,H_5)_2\,O_8$

II.) *acid.* *Vid.* EthylOxalic Acid.
$C_4\,H\,(C_4\,H_5)\,O_8$

Oxalate of Ethyl*perchloré*. *Vid.* Oxalate of *per*ChlorEthyl.

Oxalate of Ethyl & of Methyl. It does not dissolve in water, except from decomposition. Slowly decomposed by cold water. Quickly decomposed by boiling water, with complete solution. (Chancel, *Ann. Ch. et Phys.*, (3.) **35.** 467.) Insoluble in cold water, but is gradually decomposed thereby. Completely soluble with decomposition in boiling water. Also soluble, with decomposition, in alcohol, wood-spirit, and oxalic acid. (Kolbe's *Lehrb.*, **1.** 258.)
(*Vinomethylic oxalate. Oxalvinomethylide.*)
$C_{10}\,H_8\,O_8 = C_4\,(C_2\,H_3)\,(C_4\,H_5)\,O_8$

Oxalate of Ethylamin. Soluble in water. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 489.)



$C_4\left(N\left\{\begin{matrix}C_4\,H_5\\H_2\end{matrix}\right.\right)_2 H_2\,O_8$

Oxalate of *di*EthylAmylamin. Deliquescent.

Oxalate of *tri*EthylAmylammonium.

Oxalate of EthylAnilin.

Oxalate of EthylChlorAnilin. More soluble than the salt of ChlorAnilin.

Oxalate of Ethylene. Soluble in ether. (Wurtz.)
$C_4\,(C_4\,H_4'')\,O_8$

Oxalate of EthylMethylConiin. Readily soluble in water. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **89.** 139.)

Oxalate of EthylNicotin. Soluble in water. (v. Planta & Kekulé, *Ann. Ch. u. Pharm.*, **87.** 6.)

Oxalate of *tri*EthylPhenylammonium.

Oxalate of EthylStrychnine.

Oxalate of Fucusin.

I.) *normal.* Much more soluble in water than the acid salt.

II.) *acid.* Not very soluble in cold water, but readily soluble in hot water, and in alcohol. (Stenhouse.)

Oxalate of Furfurin.

I.) *normal.* Very soluble in water. (Fownes.)
$C_4\,(C_{30}\,H_{12}\,N_2\,O_6'')_2\,H_2\,O_8$

II.) *acid.* Very sparingly soluble in cold, more readily soluble in hot water. (Fownes.)
$C_4\,(C_{30}\,H_{12}\,N_2\,O_6'')\,H_2\,O_8$

Oxalate of Glucina. Easily soluble in water. (Vauquelin.) Soluble in 1 pt. of water at 15.6°. [Y.]
$C_{12}\,(Gl_2''')_2\,O_{24}$

Oxalate of Glucina & of Potash. Sparingly soluble in cold water. By boiling water it is decomposed to a basic uncrystallizable [apparently more soluble] salt. (Debray, *Ann. Ch. et Phys.*, (3.) **44.** 33.)
$C_4\,K_2\,O_8;\ C_4\,Gl_2\,O_8$

Oxalate of Glycocoll. Permanent. Soluble in water; less soluble in alcohol. (Horsford, *Am. J. Sci.*, (2.) **4.** 62.)
$C_4\,(C_4\,H_5\,N\,O_4)_2\,O_8$

Oxalate of Guanin.
$3\,C_{10}\,H_5\,N_5\,O_2,\ 2\,C_4\,H_2\,O_8$

Oxalate of Harmalin.

I.) *normal.*

II). *acid.*

Oxalate of Harmin.

I.) *normal.* Sparingly soluble in water.

II.) *bi.* More soluble in water than the normal
$C_4(C_{26}H_{12}N_2O_2'')H_2O_8 + 2\,Aq$ salt.

Oxalate of HydrargEthyl, &c. *Vid.* Oxalate of MercurEthyl, &c.

Oxalate of IodAnilin. Difficultly soluble
$C_4\left(N \left\{ \begin{matrix} C_{12}H_4I \\ H_2 \end{matrix} \right. \right)_2 H_2O_8$ in water, and alcohol. Insoluble in ether.

Oxalate *of protoxide* **of Iron.**

I.) *normal.* Efflorescent. The mineral which
$C_4Fe_2O_8 + 4\,Aq$ occurs in nature is insoluble in water. (Rivero & Vauquelin.) The artificial salt is scarcely at all soluble in cold, and only very sparingly soluble in hot water. (A. Vogel.) Soluble in 4500 pts. of cold, and in 3800 pts. of hot water. (Souchay & Lenssen.) Insoluble in concentrated sulphuric acid, but soluble without decomposition, in warm dilute sulphuric acid. Soluble in cold concentrated chlorhydric acid. Scarcely soluble in cold, and but sparingly soluble in boiling, oxalic acid. (A. Vogel.)

II.) *acid?* (*Perhaps a mixed salt of the protoxide and sesquioxide*) When iron is dissolved in cold oxalic acid, greenish yellow crystals may be obtained, which are easily soluble in water and possess a superabundance of acid. (Bergman, *Essays*, **1.** 325.)

Oxalate *of sesquioxide* **of Iron.**

I.) *normal.* Nearly insoluble in water. (Bu-
$C_{12}(Fe''')_2O_{24}$ cholz.) Soluble in oxalic acid (Laugier), and in other acids.

II.) *acid.* This acid solution is capable of dissolving much oxalate of protoxide of iron or of manganese. (Berthier.)

Oxalate *of sesquioxide* **of Iron & of Lime.** Somewhat soluble in water, hence oxalic acid does not precipitate lime from solutions which contain sesquioxide of iron. (Reece.)

Oxalate *of protoxide* **of Iron & of Potash.**
$C_4FeKO_8 + 2\,Aq$ Soluble in water, from which solution it is precipitated on the addition of alcohol. (Souchay & Lenssen.)

Oxalate *of sesquioxide* **of Iron & of Potash.**
$C_{12}K_3Fe_2'''O_{24} + 6\,Aq$ Effloresces in dry air. Soluble in 14.3 pts. of cold water, and in 4.0[1.0] pts. of boiling water. Insoluble in alcohol. (Bussy.)

Oxalate *of sesquioxide* **of Iron & of Soda.**
$C_{12}Na_3Fe_2'''O_{24} + 6\,Aq$ Soluble in 2 pts. of water at 20°, and in 0.6 pt. of boiling water. (Bussy.) There are two other hydrates, one with 9, the other with 10 equivalents of Aq.

Oxalate *of sesquioxide* **of Iron & of Strontia.**
$C_{12}Sr_3Fe_2'''O_{24} + 18\,Aq$

Oxalate of Lanthanum. Insoluble in water. (Mosander.) Insoluble in water. Very sparingly soluble in dilute acids. Slightly more soluble than oxalate of didymium in warm chlorhydric acid diluted with its own volume of water. (Marignac, *Ann. Ch. et Phys.*, (3.) **27.** 226.)

Oxalate of Lead.

I.) *normal.* Very slightly soluble in water.
$C_4Pb_2O_8$ Its solubility is slightly greater, though it is still very sparingly soluble in water containing a little acetate and oxalate of ammonia, together with some free ammonia; or in water containing nitrate of ammonia in addition to these. (Fresenius, *Ann. Ch. u. Pharm.*, 1846, **59.** 125.) Scarcely at all soluble in water, unless this be acidulated. Insoluble in spirit. (Bergman, *Essays*, **1.** 324.) Completely insoluble in a solution of oxalic acid, even when this is hot. (Pearson, *Phil. Mag.*, (4.) **11.** 207.) Insoluble in acetic acid. (Vauquelin.) Soluble in a saturated aqueous solution of chloride of sodium. (Becquerel, *C. R.*, 1845, **20.** 1523.) When recently precipitated, it is soluble in an aqueous solution of chloride of ammonium, especially when this is warm, but the lead may be precipitated from this solution by adding an excess of caustic ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 96, 99.) Also soluble in boiling solutions of nitrate, and succinate of ammonia; but insoluble in solutions of caustic or carbonated ammonia. (Wittstein.)

From a solution of acetate of lead mixed with a somewhat considerable quantity of acetate of ammonia, the lead cannot be completely precipitated by means of oxalate of ammonia, not even when the mixture is made alkaline by means of ammonia. (Weppen, from *Arch. d. Pharm.*, (2.) **9.** 236; in *J. pr. Ch.*, 1837, **11.** 182.) Oxalate of lead is not precipitated from solutions containing citrate of soda. (Spiller.) Soluble in an aqueous solution of caustic potash and in nitric acid. Also soluble in an aqueous solution of oxalate of ammonia. (H. Rose, *Tr.*) Decomposed by an aqueous solution of carbonate of potash, even at the ordinary temperature, but the decomposition is not complete so long as the oxalate of potash which is formed is suffered to remain in contact with the other ingredients. (H. Rose.)

When an equivalent of oxalate of lead is boiled with an equivalent of carbonate of potash, in aqueous solution, $\frac{98.28}{100}$ of it may be decomposed; when boiled with an equivalent of carbonate of soda $\frac{96.4}{100}$ of it may be decomposed; and with an equivalent of sulphate of potash $\frac{8}{100}$ of it may be decomposed. While on the other hand, when an equivalent of carbonate of lead is boiled with one of oxalate of potash $\frac{15}{100}$ of it may be decomposed; and when an equivalent of sulphate of lead is boiled with one of oxalate of potash $\frac{88.21}{100}$ of it may be decomposed. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** pp. 348 – 353.) When an equivalent of teroxalate of lead is boiled with an equivalent of triphosphate of potash in aqueous solution $\frac{58}{100}$ of it may be decomposed. While, on the other hand, when $3\,PbO, PO_5$ is boiled with $KO, 3\,\overline{O}x$ it may be decomposed to the extent of $\frac{85.27}{100}$. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 354.)

II.) *basic.* Acetic acid dissolves out the excess
$C_4Pb_2O_8, 4\,PbO$ of oxide of lead, as does also a boiling solution of nitrate of lead. (Pelouze.)

Oxalate of Lead & of Potash. Permanent.
C_4PbKO_8

Oxalate of Lime. Permanent. Almost in-
$C_4Ca_2O_8 + 2\,Aq \;\&\; 6\,Aq$ soluble in water; the presence of free acetic, or oxalic acid increases its solubility slightly. It is soluble in strong acids. (Fresenius, *Quant.*, pp. 128, 772.) "The solubility of oxalate of lime (in water) is $\frac{1}{500000}$." (Malaguti, *Ann. Ch. et Phys.* (3.) **51.** 347.) Insoluble in water, acetic acid, or a solution of chloride of ammonium. (Scheele.) Insoluble in water, oxalic acid, or acetic acid. Easily soluble in chlorhydric and nitric acids. (Wittstein's *Handw.*) Even when recently precipitated, it does not appear to be soluble either in hot or cold aqueous solutions of chloride of ammonium (Brett, *Phil. Mag.*, 1837, (3.) **10.** 96; Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 316) or of nitrate of ammonia. (Brett, *Ibid.*)

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Insoluble in aqueous solutions, even when these are hot and concentrated, of the chlorides of ammonium, sodium, potassium, barium, strontium, and calcium: on the contrary, it is easily soluble in hot, tolerably concentrated solutions of salts of the "magnesia group" (*ex. gr.* of manganese, magnesia, &c.), from which solutions it is precipitated on the addition of an excess of oxalate of magnesia. Insoluble in solutions of the salts of oxalic acid. (Souchay & Lenssen, *Ann. Ch. u. Pharm.*, **100.** 323.) Soluble in an aqueous solution of chloride of magnesium, from which it is precipitated, together with some magnesia, by an excess of oxalate of ammonia.

Soluble in an aqueous solution of normal citrate of soda. (Spiller.) In presence of much chloride of calcium, of sodium, or of ammonium, it is completely soluble in protochloride of copper ($Cu\,Cl$), but after a while oxalate of copper separates out. (Reynoso.) Slightly soluble in water containing chloride of manganese. (Turner.) Very sparingly soluble in oxalic acid. (Bérard.) Slightly soluble in lactic acid. (Cap & Henry.) Soluble in considerable quantity in strong phosphoric acid, especially when this is warm. This solution may be largely diluted with water without being precipitated. (Neubauer, *Ann. Ch. u. Pharm.*, **99.** 223.) Insoluble in cold concentrated nitric acid; decomposed when heated therewith. Also decomposed by concentrated sulphuric acid. Tolerably soluble in chlorhydric and in slightly diluted nitric acid. From the saturated chlorhydric acid solution portions of it are precipitated both on addition of oxalic acid and of chloride of calcium. (Gladstone.)

Partially decomposed when boiled with an aqueous solution of carbonate of potash or of soda. (Dulong, *Ann. de Chim.*, **82.** 279.)

When one equivalent of oxalate of lime is boiled with an equivalent of carbonate of potash, in aqueous solution, $\frac{79.44}{100}$ of it may be decomposed, and when boiled with an equivalent of carbonate of soda $\frac{85}{100}$ of it may be decomposed. While, on the other hand, when an equivalent of carbonate of lime is boiled with one of oxalate of potash $\frac{28}{100}$ of it may be decomposed, and when boiled with an equivalent of oxalate of soda $\frac{18}{100}$ of it may be decomposed. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 348.) Also partially decomposed by concentrated aqueous solutions of caustic potash and soda. (Berzelius, *Lehrb.*, **3.** 419.) Decomposed by an aqueous solution of nitrate of silver, into nitrate of lime, which dissolves, and insoluble oxalate of silver. In order to effect this completely, 1 pt. of the 2 Aq salt should be mixed with 2.07 pts. of nitrate of silver and 20 pts. of water. An action of two or three hours at a temperature near 100° is sufficient to decompose several grammes of the oxalate, and if only a few centigrammes are operated upon a few minutes' trituration of the mixture is sufficient to transform all the oxalate of lime into oxalate of silver. (Chevreul, *C. R.*, 1859, **48.** pp. 713–715.)

Oxalate of lime is not precipitated when a neutral aqueous solution of oxalate of alumina is mixed with a neutral solution of the hyposulphite or nitrate of lime, or of chloride of calcium. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 21.) Lime cannot be entirely precipitated by oxalic acid from solutions which contain sesquioxide of chromium, of iron, or of alumina, since double oxalates which are somewhat soluble in water, form in the mixtures. (Reece.) Insoluble in an aqueous solution of cane sugar. (Bergman, *Essays*, **1.** 318.)

Oxalate of Lithia.

$C_4\,Li_2\,O_8$

I.) *normal.* Permanent. Readily soluble in water. (C. Gmelin.) Soluble in 13.1 pts. of water at 19.5°. Insoluble in alcohol or ether. (Souchay & Lenssen, *Ann. Ch. u. Pharm.*, **100.** 310.) Soluble in 13 pts. of water at 10°. (Rammelsberg.) Soluble in 15 pts. of water at the ordinary temperature. (Troost, *Ann. Ch. et Phys.*, (3.) **51.** 142.)

$C_4\,H\,Li\,O_8 + 2\,Aq$

II.) *acid.* Permanent. Somewhat [much (Troost)] less soluble than the normal salt in water. (C. Gmelin.) Soluble in 14.8 pts. of cold water. (Rammelsberg.) Soluble in 15 pts. of water. (Troost, *loc. cit.*) Nearly as soluble as the normal salt, being soluble in 12.8 pts. of water at 17°. (Souchay & Lenssen, *loc. cit.*)

Oxalate of Lobelin.

Oxalate of LuteoCobalt. Insoluble in hot or cold water. Readily soluble in oxalic acid. (Gibbs & Genth, *Smithson. Contrib.*, vol. **9.**)

$6\,N\,H_3 \cdot Co_2\,O_3,\ 3\,C_2\,O_3 + 4\,Aq$

Oxalate of Magnesia. Very sparingly soluble in water. 1 pt. of the recently precipitated salt dissolves in 1500 pts. of water at 16°, and in 1300 pts. of boiling water. Soluble, with decomposition, in chlorhydric acid. Only traces of it are dissolved by an aqueous solution of oxalate of soda, even when this is hot and concentrated. (Souchay & Lenssen, *Ann. Ch. u. Pharm.*, **99.** 39.) Very sparingly soluble in water, somewhat more soluble in water containing oxalic acid. (Bérard.) Insoluble in water or spirit, unless an excess of oxalic acid be present. (Bergman, *Essays*, **1.** 321.) Soluble in dilute nitric acid, from which it is precipitated on the addition of alcohol. (*Ibid.*, p. 443.) It is not precipitated from solutions containing ammoniacal salts. (H. Rose, *Tr.*)

$C_4\,Mg_2\,O_8 + 4\,Aq$

Oxalate of Magnesia & of Potash. Efflorescent. Nearly insoluble in cold, but soluble in hot water, with separation of oxalate of magnesia. (Kayser.)

$C_4\,K\,Mg\,O_8 + 6\,Aq$

Oxalate of Manganammonium & of Manganese. Decomposed by water. (Souchay & Lenssen.)

$C_4\left(N\left\{\begin{matrix}H_3\\Mn\end{matrix}\right.\right)Mn\,O_8 + 6\,Aq$

Oxalate of Manganese. Permanent. Soluble in 2460 pts. of cold, and in 1250 pts. of boiling water. The presence of a trace of oxalate of potash or of ammonia increases its solubility exceedingly. Insoluble in alcohol, or ether. (Souchay & Lenssen, *Ann. Ch. u. Pharm.*, **102.** 47.) Scarcely soluble in water, unless an excess of oxalic acid be present. It is precipitated when free oxalic acid is added to solutions of manganese in sulphuric, nitric, or chlorhydric acid. (Bergman, *Essays*, **1.** 329.) Oxalic acid produces after some time a precipitate in concentrated neutral solutions of the salts of protoxide of manganese, even in a concentrated solution of the sulphate, and the precipitate does not dissolve in free oxalic acid, but no precipitate forms in dilute solutions, nor in solutions containing chloride of ammonium. (H. Rose, *Tr.*) Soluble in 900 pts. of boiling water. (Berzelius's *Lehrb.*) Soluble in 900 pts. of cold water, and in less hot water. In a cold aqueous solution of oxalic acid (1 pt. acid to 10 pts. of water) it is no more soluble than in water; but it is much more soluble in this solution of

$C_4\,Mn_2\,O_8 + 4\,Aq\ \&\ 5\,Aq$

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oxalic acid when it is hot than in water. (Winckelbloch.) Not very soluble in dilute acetic acid. It forms turbid solutions in cold aqueous solutions of sulphate, nitrate, and succinate of ammonia, and of chloride of ammonium; these become clear when heated. (Wittstein.) Soluble in sulphuric and chlorhydric acids. (H. Rose, *Tr.*)

OXALATE *of sesquioxide* **OF MANGANESE.**

OXALATE *of protoxide* **OF MANGANESE & OF POTASH.** $C_4 K Mn O_8 + 2 Aq$ Insoluble in water. Soluble in an aqueous solution of oxalate of potash. (Winckelblech.)

OXALATE *of sesquioxide* **OF MANGANESE & OF POTASH.** $C_{12} K Mn_2''' O_{24} + 6 Aq = Mn_2 O_3, 3 K O, 3 C_4 O_6 + 6 Aq$ Soluble in water, from which it is precipitated on the addition of alcohol. (Souchay & Lenssen.)

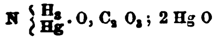
OXALATE OF MANGANESE & OF SODA.
$C_4 Mn Na O_8$; $C_4 Na_2 O_8 + 3 Aq$

OXALATE OF MELAMIN. $C_4 (C_6 H_6 N_6)_2 H_2 O_8$ Less soluble in water than nitrate of melamin.

OXALATE OF MELANILIN. $C_4 (C_{26} H_{13} N_3 . H) H O_8$ Sparingly soluble in cold, readily soluble in boiling water, and alcohol. Nearly insoluble in ether. (Hofmann, *J. Ch. Soc.*, **1.** 292.)

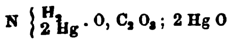
OXALATE OF MENAPHTHALIN. Difficultly soluble in water. Tolerably soluble in alcohol, and ether.

OXALATE OF MERCUR(*ic*)**AMMONIUM with** *prot***OXIDE OF MERCURY.**


$N \left\{ \begin{matrix} H_3 \\ Hg \end{matrix} \right. . O, C_2 O_3 ; 2 Hg O$

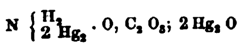
Soluble in 416 pts. of cold water, and in 476 pts. of cold alcohol. Insoluble in ether. Readily soluble in strong chlorhydric acid. Sparingly soluble in cold, more freely in hot nitric acid. (Harff.) [Burckhardt, *N. Br. Arch.*, **11.** 256. [*Gm.*] describes another compound which is soluble in water, with partial decomposition.]

OXALATE OF *di***MERCUR**(*ic*)**AMMONIUM with** *prot***OXIDE OF MERCURY.**


$N \left\{ \begin{matrix} H_2 \\ 2 Hg \end{matrix} \right. . O, C_2 O_3 ; 2 Hg O$

Insoluble in water. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 409.)

OXALATE OF *di***MERCUR**(*ous*)**AMMONIUM with** *din***OXIDE OF MERCURY.**


$N \left\{ \begin{matrix} H_2 \\ 2 Hg_2 \end{matrix} \right. . O, C_2 O_3 ; 2 Hg_2 O$

Insoluble in water, alcohol, or ether. Partially soluble in nitric acid. (Harff.)

OXALATE OF MERCURETHYL.
(*Oxalate of HydrargEthyl.*)

OXALATE *of dinoxide* **OF MERCURY.** $C_4 (Hg_2)_2 O_8 \& + 2 Aq$ Entirely insoluble in water, even boiling, or in alcohol, or ether. When boiled with water for some time it is partially decomposed with formation of some oxalate of protoxide of mercury, which dissolves. Insoluble in an aqueous solution of oxalic acid or of oxalate of potash. Sparingly soluble in solutions of ammoniacal salts. Easily soluble in warm solutions of cyanide of potassium and of sulphocyanide of potassium, with decomposition. Decomposed by solutions of caustic potash, and soda. Almost insoluble in cold, easily soluble in hot nitric acid. (Souchay & Lenssen, *Ann. Ch. u. Pharm.*, **103.** 310.) Insoluble in water, unless the [oxalic] acid predominates. (Bergman, *Essays*, **1.** 323.) Insoluble even in boiling water. (Burckhardt.) Scarcely at all soluble in cold water, requiring at least 1000 pts. of water to dissolve it. But by long washing it is decomposed to a basic and an acid salt. Somewhat more soluble in oxalic acid than in water. (Harff.) Insoluble in alcohol, or ether, in oxalic acid, or in dilute sulphuric, or nitric acids, but is slightly soluble in warm concentrated nitric, and sulphuric acids, from which solutions it separates on cooling, and upon the addition of water. (Burckhardt.)

OXALATE *of protoxide* **OF MERCURY.** $C_4 Hg_2 O_8 + 2 Aq$ Insoluble in cold water; very minute traces of it are dissolved by hot water. Absolutely insoluble in alcohol or ether. Insoluble in a solution of oxalic acid, even when this is hot and concentrated. Soluble in solutions of the ammoniacal salts, and especially of chloride of ammonium, in which it is extremely soluble. Easily soluble, with decomposition, in chlorhydric acid; less readily soluble in cold nitric acid of 1.2 sp. gr. (Souchay & Lenssen, *Ann. Ch. u. Pharm.*, **102.** 43.) Insoluble in cold water. (Harff.) [The statement of Harff, that by long-continued boiling with water the salt is decomposed to an insoluble basic, and a soluble acid compound has been shown by Souchay & Lenssen, *loc. cit.*, to have no foundation in fact.] Sparingly soluble in an aqueous solution of oxalic acid. (Harff.) Scarcely at all soluble in alcohol. Soluble in 416 pts. of ether. Perfectly insoluble in alcohol or ether. [By a misprint these contradictory statements are both referred to Burckhardt in Gmelin's *Handbook.*] Soluble in cold aqueous solutions of chloride of ammonium and of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.) Sparingly soluble in cold concentrated sulphuric acid. Tolerably soluble, without decomposition, in strong nitric acid. Very sparingly soluble in hot dilute nitric or sulphuric acids.

OXALATE *of dinoxide* **OF MERCURY & OF POTASH.** A solution of binoxalate of potash dissolves suboxide of mercury, and the solution deposits a double salt in oblique prisms. (Wenzel, [T.].)

OXALATE *of protoxide* **OF MERCURY & OF POTASH.** $C_4 K Hg O_8$ ("This is the same as Harff's *Oxalate of dinoxide of Mercury & of Potash.*" (Souchay & Lenssen).) Decomposed by water. Insoluble in alcohol or ether. (Souchay & Lenssen, *Ann. Ch. u. Pharm.*, **102.** 45.) Readily soluble in water. Insoluble in alcohol or ether. Gradually soluble in warm nitric, and sulphuric acids. When chlorhydric acid is added to the aqueous solution dichloride of mercury is precipitated. (Harff.)

OXALATE OF METHYL.
(*Oxamethol.*)

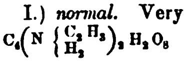
I.) *normal.* $C_4 (C_2 H_3)_2 O_8$ Soluble in cold water, but the solution soon decomposes, especially if it be heated. Easily soluble in alcohol, and wood-spirit, especially when these are warm. (Dumas & Peligot.)

II.) *acid.* *Vid.* MethylOxalic Acid.
$C_4 (C_2 H_3) H O_8$

OXALATE OF METHYLCHLORÉ. *Vid.* Oxalate of ChloroMethyl.

OXALATE OF METHYLAMIN.

I.) *normal.* Very soluble in water. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 464.)


$C_4 \left(N \left\{ \begin{matrix} C_2 H_3 \\ H_2 \end{matrix} \right. \right)_2 H_2 O_8$

II.) *acid.* Soluble in water, and alcohol. It crystallizes more readily than the normal salt. (Wurtz.)

OXALATE OF METHYLANILIN.

OXALATE OF METHYLETHYL.
$C_4 (C_2 H_3) (C_4 H_5) O_8$

OXALATE OF METHYLNICOTIN. Soluble in water.

Oxalate of MethylPhenidin (or of Anisidin).

Oxalate of MethylUramin. Very soluble in water.
$C_4\left(N_2\left\{\begin{matrix}C_2H_3\\ Cy\\ H_4\end{matrix}\right.\right)_2H_2O_8+4\,Aq$

Oxalate *of protoxide* of Molybdenum. Insoluble in water. Sparingly soluble in an aqueous solution of oxalic acid. (Berzelius, *Lehrb.*)

Oxalate *of binoxide* of Molybdenum. Soluble in water. From the aqueous solution ammonia throws down a basic salt insoluble in ammonia-water. (Berzelius, *Lehrb.*)
$C_4\,Mo''\,O_8$

Oxalate *of the blue oxide* of Molybdenum. Soluble in water. (Heyer.)

Oxalate of Molybdic Acid. Soluble in water, and alcohol. (Berzelius.)

Oxalate *of protoxide* of Molybdenum & of Potash. Soluble in water. (Berzelius.)

Oxalate *of binoxide* of Molybdenum & of Potash. Soluble in water. (Berzelius.)

Oxalate of Molybdic Acid & of Potash. Soluble in water. (Berzelius.)

Oxalate of Naphtylamin.

I.) *normal.*
$C_4\,(C_{20}\,H_9\,N)_2\,H_2\,O_8$

II.) *acid.* Soluble in water, and alcohol. (Zinin.)
$C_4\,(C_{20}\,H_9\,N)\,H\,H\,O_8$

Oxalate of Nickel. Insoluble in water. Very sparingly soluble in an aqueous solution of oxalic acid. Also soluble, with combination, in an aqueous solution of oxalate of ammonia. Tolerably soluble in the mineral acids. (Tupputi.) It is precipitated when free oxalic acid is added to solutions of nickel in sulphuric, nitric, or chlorhydric acids: it is soluble in water [or in the acid liquors resulting from the reaction just described] to a slight extent. (Bergman, *Essays*, **1.** 327.) Readily soluble in ammonia-water and in a solution of carbonate of ammonia. Incompletely soluble in solutions of sulphate, nitrate, and succinate of ammonia, and of chloride of ammonium. (Wittstein.)
$C_4\,Ni_2\,O_8+4\,Aq$

Oxalate of Nickel & of Nickelammonium. Insoluble in water. Soluble in ammonia-water. (Laugier.)
$C_4\left(N\left\{\begin{matrix}H_3\\ Ni\end{matrix}\right.\right)Ni\,O_8+6\,Aq$

Oxalate of Nickel & of Potash. Soluble in water. (Winckelblech.)
$C_4\,Ni\,K\,O_8$

Oxalate of Nickel & of Soda. Soluble in water.

Oxalate of Nicotin. Extremely deliquescent. Readily soluble in water, and in boiling alcohol. Insoluble in ether. (Schlœsing, *Ann. Ch. et Phys.*, (3.) **19.** 232.)

Oxalate of αNitrAnilin.

I.) *acid.* Somewhat soluble in alcohol. Insoluble, or very sparingly soluble in ether. (Muspratt & Hofmann.)
$C_4\left(N\left\{\begin{matrix}C_{12}\,H_4\,(N\,O_4)\\ H_2\,.\,H\end{matrix}\right.\right)H\,O_8$

Oxalate of βNitrAnilin. Sparingly soluble in water. (Arppe, *Ann. Ch. u. Pharm.*, **93.** 364.)

Oxalate of NitrAzoPhenylamin. Sparingly soluble in cold water. (Arppe.)
(*Oxalate of NitroPhenoylbiammonium.*)
$C_4\left(N_2\left\{\begin{matrix}C_{12}\,H_3\,(N\,O_4)''_2\\ H_4\,.\,H\end{matrix}\right.\right)_2O_8$

Oxalate of NitroCodein. Very soluble in water. (Anderson.)

Oxalate of NitroCumidin.

Oxalate of NitroHarmalin. Soluble in water, and in oxalic acid.

Oxalate of *bi*NitroMelAnilin. Very readily soluble in water. (Hofmann, *J. Ch. Soc.*, **1.** 308.)

Oxalate of Palladium. Insoluble in water.
$C_4\,Pd_2\,O_8$

Oxalate of PhenylAcetosamin. Soluble in water, and alcohol. (Natanson.)
(*Oxylate of AcetylAnilin.*)

Oxalate of *tri*Phenylamin. Hygroscopic. Soluble in water, and alcohol. (Gœssmann.)

Oxalate of PhenylCarbamic Acid.
$C_4\,(C_{14}\,H_7\,N\,O_4)_2\,H_2\,O_8$

Oxalate of PhenylUrea. Soluble in water.

Oxalate of Picolin. Readily soluble in water, and in alcohol, even in dilute. (Anderson.)

Oxalate of Piperidin. Soluble in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 86.)
$C_4\,(C_{10}\,H_{11}\,N)_2\,H_2\,O_8$

Oxalate of Platin(*ic*)ammonium. Soluble in boiling water. (Gerhardt.)
(*Oxalate of Platinamin. Ammonio-Oxalate of protoxide of Platinum.*)
$C_4\left(N\left\{\begin{matrix}H_3\\ Pt''\end{matrix}\right.\right)_2O_{10}+4\,Aq$

Oxalate *of protoxide* of Platinum. Soluble in water. (Dœbereiner.)
$C_4\,Pt_2\,O_8$

Oxalate *of binoxide* of Platinum. Soluble in water.
$C_4\,Pt''\,O_8$

Oxalate of Platinum & of Soda. Decomposed by moist air. Soluble in hot water. Insoluble in alcohol or ether. (Souchay & Lenssen.)
$C_4\,Pt\,Na\,O_8+4\,Aq$

Oxalate of Potash.

I.) *normal.* Soluble in 3 pts. of cold water, the saturated solution containing 25% of it. (Thomson.) Soluble in 2 pts. of cold water; more easily soluble in hot water. Insoluble in alcohol. (Wittstein's *Handw.*) 100 pts. of water at 10° dissolve 45 pts. of it. [T.] 100 pts. of the aqueous solution saturated at the boiling point (104.4°) contain 40 pts. of the dry salt; or 100 pts. of water at 104.4° dissolve 66.666 pts. of it; or 1 pt. of the salt is soluble in 1.5 pts. of water at 104.4°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) Easily soluble in water. Difficultly soluble in spirit. (Bergman, *Essays*, **1.** 315.) More soluble in water than the acid salt. [There is another hydrate with 6 equivalents of water.]
$C_4\,K_2\,O_8+2\,Aq$

II.) *acid.*
(*Binoxalate of Potash. Salt of Sorrel.*)

$a=C_4\,K\,H\,O_8+2\,Aq$ Efflorescent. More soluble in water than *b.* (Rammelsberg.)

$b=C_4\,K\,H\,O_8+2\,Aq$ Permanent. Sparingly soluble in cold water. Soluble in 14 pts. of boiling water (Wenzel); in 4 pts. of boiling water (Weltzien's *Syst.*). Soluble in 40 pts. of cold, and in 6 pts. of boiling water; the saturated cold solution containing 2.5% of it, and the saturated boiling solution 16%. (Berzelius's *Lehrb.*) Soluble in 96 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht, für* 1854, p. 76.) 100 pts. of boiling water dissolve 10 pts. of it. (Ure's *Dict.*) Insoluble in alcohol. (Gerhardt's *Tr.* & Wittstein's *Handw.*) Not entirely insoluble in boiling dilute alcohol. (Berzelius's *Lehrb.*) Soluble in 34 pts. of boiling alcohol. (Wenzel.) An aqueous solution saturated at 8° is of 1.014 sp. gr. (Anthon, *Ann. der Pharm.*, 1837, **24.** 211.)

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$c = 2\,C_4HKO_8 + Aq$

III.) *hyperacid.* Less soluble in water than No. II. Soluble in 20.174 pts. of water at 20.6°, *i. e.* 100 pts. of water dissolve 4.957 pts. of the salt at 20.6°. (Pohl, *Wien. Akad. Bericht*, **6.** 597.)

(*Quadroxalate.*)
$C_8KH_3O_{16} + 4\,Aq = KO, 3\,HO, 4\,C_2O_3 + 4\,Aq$

Oxalate of Potash & of Silver. Permanent. Easily soluble in water. (Wenzel. [T.].)

C_4KAgO_8

Oxalate of Potash & of Soda. Efflorescent. Easily soluble in water. (Wenzel.)

$C_4NaKO_8 + 2\,Aq$

Oxalate of Potash & of Thoria. Insoluble in water, in an aqueous solution of oxalic acid, or in other dilute acids. (Berzelius.)

Oxalate of Potash & *of protoxide* **of Tin.** Readily soluble in hot, less soluble in cold water. Insoluble in spirit. (Hausmann & Lœwenthal, *Ann. Ch. u. Pharm.*, **89.** 105.) Readily soluble in cold water, the solution undergoing decomposition when boiled. (Bouquet.)

C_4SnKO_8

Oxalate of Potash & *of protoxide* **of Uranium.** Insoluble in water. (Rammelsberg.)

$KO, 5\,UrO, 6\,C_2O_3 + 10\,Aq$

Oxalate of Potash & *of sesquioxide* **of Uranium.**

I.) $KO, Ur_2O_3, C_4O_6 + 3\,Aq$ Permanent. Soluble in water. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** 201.)

II.) $6\,KO, 2\,Ur_2O_3, 4\,C_4O_6 + 20\,Aq$ Permanent. More soluble in hot than in cold water. (Ebelmen, *Ibid.*, p. 203.)

Oxalate of Potash & *of binoxide* **of Vanadium.** Slowly soluble in water. (Berzelius.)

Oxalate of Potash & of Yttria. Insoluble, or very difficultly soluble in water. (Berzelius.)

C_4KYO_8

Oxalate of Potash & of Zinc. Efflorescent. Nearly insoluble in cold water. Decomposed by boiling water, with separation of oxalate of zinc. (Kayser.)

$C_4KZnO_8 + 4\,Aq$

Oxalate of PurpureoCobalt. Nearly insoluble in cold, and not very soluble in hot water, even when this contains free oxalic acid. (Gibbs & Genth, *Smithson. Contrib.*, vol. **9.**)

$5\,NH_3 . Co_2O_3, 2\,C_2O_3 + 3\,Aq$

Oxalate of PurpureoCobalt with Sulphate of PurpureoCobalt.

(*Oxalo Sulphate of PurpureoCobalt.*)

I.) *normal.* Much less soluble in water than the acid salt. The solution is easily decomposed on boiling. (Gibbs & Genth, *loc. cit.*)

$5\,NH_3 . Co_2O_3 \left\{\begin{matrix} SO_3 \\ C_2O_3 \end{matrix}\right. + 7\,Aq$

II.) *acid.* Soluble, without decomposition, in hot water. (G. & G., *loc. cit.*)

$5\,NH_3 . Co_2O_3 \left\{\begin{matrix} 2\,SO_3 \\ 2\,C_2O_3 \end{matrix}\right. + 3\,Aq$

Oxalate of Quinidin. Tolerably soluble in cold, more soluble in hot water. More soluble in water than the corresponding quinine salt.

$C_4(C_{40}H_{24}N_2O_4)_2H_2O_8 + 2\,Aq$

Oxalate of Quinine.

I.) *normal.* Very sparingly soluble in cold water.

$C_4(C_{40}H_{24}N_2O_4)_2H_2O_8$

Completely insoluble in water. (Bussy & Guibourt, *Journ. de Pharm. et Chim.*, 1852, (3.) **22.** 415.) Readily soluble in boiling, less soluble in cold alcohol. Soluble in oxalic acid.

II.) *acid.* Readily soluble in water.

Oxalate of Quinolein.

(*Oxalate of Leukol.*)

I.) *normal.* Exceedingly easily soluble in water, alcohol, and ether. Much more soluble in water than the oxalate of anilin. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 171.) [Hofmann says (*loc. cit.*) that the statement made by Runge, concerning the solubility of this compound, is erroneous.]

II.) *acid.* Soluble in water, and alcohol. (Gr. Williams.) More soluble in alcohol than the oxalate of anilin. (Hofmann.)

(*BinOxalate of Chinolin.*)
$C_4(C_{18}H_7N)H_2O_8$

Oxalate of RoseoCobalt. Nearly insoluble in water. Soluble in ammonia-water. (Gibbs & Genth, *Smithson. Contrib.*, vol. **9.**)

$5\,NH_3 . Co_2O_3, 3\,C_2O_3 + 6\,Aq$

Oxalate of Silver.

I.) *normal.* Scarcely at all soluble in water, and much less soluble in spirit. (Bergman, *Essays*, **1.** 323.) Absolutely insoluble in alcohol or ether.

$C_4Ag_2O_8$

Very sparingly soluble in cold, somewhat more soluble in hot water. Perfectly insoluble in alcohol or ether. Readily soluble in aqueous solutions of ammonia, and of carbonate of ammonia. (Souchay & Lenssen.) Soluble in nitric acid. (Bergman, *Essays*, **1.** 323); in a large quantity of nitric acid. (H. Rose, *Tr.*) Sparingly soluble in warm dilute nitric acid; easily soluble in hot strong nitric acid. (Souchay & Lenssen.) Easily soluble, with combination, in aqueous solutions of ammonia, carbonate of ammonia, and hot chloride of ammonium, also of sulphate or nitrate of ammonia forming clear solutions, which become turbid on cooling. (Wittstein.) Soluble in a hot aqueous solution of chloride of ammonium, and also, though very imperfectly, in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 97, 98.) Readily soluble, with decomposition, in aqueous solutions of the soluble hyposulphites. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 397.) Insoluble in solutions of the oxalates of potash, soda, or ammonia. It cannot be precipitated from solutions which contain citrate of soda. (Spiller.) Decomposed by very dilute chlorhydric acid, the oxalic acid being dissolved. (Chevreul, *C. R.*, 1859, **48.** 714.)

Oxalate of Sinamin.

Oxalate of Soda.

I.) *normal.* Permanent. Very difficultly soluble in water, though more readily in hot water than in cold. (Bergman, *Essays*, **1.** 316.) Only slightly soluble in water, especially when this is very cold. (Bœttger.) Next to antimoniate of soda, the oxalate is the most difficultly soluble soda salt. (Wittstein.)

$C_4Na_2O_8$

1 pt. of the anhydrous salt is soluble in 26.784 pts. of water at 21.8°; or 100 pts. of water dissolve 3.741 pts. of the salt at 21.8°. At the boiling point of the saturated aqueous solution 1 pt. of the salt is soluble in 16.02 pts. of water, or 100 pts. of water at this temperature dissolve 6.242 pts. of it. (Pohl, *Wien. Akad. Bericht*, **6.** 596.) Soluble in 36.4 pts. of water at the ordinary temperature, and in 24.6 pts. of water at 100° (Rammelsberg); in 31.1 pts. of water at 15.6°; and in

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15.8 pts. of boiling water. Insoluble in spirit or ether. (Souchay & Lenssen, *Ann. Ch. u. Pharm.*, **99.** 33.) Insoluble in spirit. (Bergman, *Essays*, **1.** 316.)

II.) *acid.* Permanent. 100 pts. of water at 7.7° dissolve 1.88 pts. of it, and at 28.3°, 3.49 pts. [T.] Soluble in 60.3 pts. of water at 15.5°, and in 4.7 pts. of boiling water. Sometimes the hot saturated solution deposits no crystals on cooling, but remains supersaturated until shaken or stirred. Only traces are dissolved by alcohol. Insoluble in ether. (Souchay & Lenssen, *Ann. Ch. u. Pharm.*, **99.** 33.)
(Bin.)
C_4HNaO_8+2Aq

Oxalate of Soda & *of protoxide* **of Tin.**
C_4SnNaO_8 (Bouquet.)

Oxalate of Soda & *of binoxide* **of Tin.** Like the potash salt. (Hausmann & Lœwenthal.)

Oxalate of Solanin. Very sparingly soluble in water.

Oxalate of StannEthyl. Insoluble in water.

Oxalate of StibEthylium. Very easily soluble in water.
$C_4(C_{16}H_{20}Sb)_2O_8$

Oxalate of StibMethylEthylium.

I.) *normal.* Tolerably soluble in water.
$C_4\left(Sb\left\{\begin{matrix}(C_4H_5)_3\\C_2H_3\end{matrix}\right.\right)_2O_8$

II.) *acid.* Very soluble in water. (Friedländer.)
$C_4\left(Sb\left\{\begin{matrix}(C_4H_5)_3\\C_2H_3\end{matrix}\right.\right)HO_8$

Oxalate of StibMethylium. Slowly deliquescent. Very soluble in water; less soluble in alcohol.

Oxalate of Strontia.

I.) *normal.* Permanent. Exceedingly difficultly soluble in water. 1 pt. of the recently (hot) precipitated salt dissolves in 12000 pts. of cold water, and in somewhat less hot water. "The statement of Hope [according to whom 1 pt. of the salt is soluble in 1920 pts. of boiling water] is an error." (Souchay & Lenssen, *Ann. Ch. u. Pharm.*, **102.** 35.) Soluble in a hot aqueous solution of chloride of ammonium, and still more readily in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 96.) Very slightly soluble in an aqueous solution of oxalic acid. (Bérard.) Exceedingly sparingly soluble in a concentrated solution of oxalic acid. Moderately soluble in solutions of ammoniacal salts. (Souchay & Lenssen, *loc. cit.*)
$C_4Sr_2O_8+2Aq$
(When precipitated from hot solutions).
And
$C_4Sr_2O_8+5Aq$
(When precipitated from cold solutions).

II.) *acid.* Efflorescent. Gradually decomposed by cold, instantly by hot water. "Wicke's statements concerning oxalate of strontia are erroneous." (Souchay & Lenssen.)
C_4HSrO_8+2Aq

Oxalate of Strychnine.

I.) *normal.* Readily soluble in water.
$C_4(C_{43}H_{22}N_2O_4)_2H_2O_8$

II.) *acid.*
$C_4(C_{42}H_{22}N_2O_4)H_2O_8$

Oxalate of Tantalum.

Oxalate of TellurEthyl. Sparingly soluble in water.
$C_4(C_8H_{10}Te_2)_2O_8+2Aq$

Oxalate of TellurMethyl. Easily soluble in water. (Wœhler & Dean.)

Oxalate *of binoxide* **of Tellurium.** Readily soluble in water.
$C_8Te''O_{16}$

Oxalate of Thoria. Insoluble in water or in oxalic acid; and very sparingly soluble in other dilute acids. (Berzelius.)
$C_4Th_2O_8$

Oxalate *of protoxide* **of Tin.**

I.) *normal.* Permanent. Very sparingly soluble either in hot or in cold water. Insoluble in a solution of oxalic acid. Difficultly soluble in cold dilute acids; readily soluble in hot chlorhydric acid, and with decomposition in nitric acid. Before it has been ignited it is tolerably easily soluble in a warm solution of chloride of ammonium, and of the other ammoniacal salts. (Hausmann & Lœwenthal, *Ann. Ch. u. Pharm.*, **89.** 104.) Insoluble in cold, partially decomposed by boiling water. (Bouquet.) When recently precipitated it is readily soluble in warm aqueous solutions of chloride of ammonium and nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 98.) Soluble in an aqueous solution of caustic potash. (H. Rose, *Tr.*) At the temperature of boiling, chlorhydric acid dissolves an almost unlimited quantity of stannous oxalate, and as the solution cools the whole of the oxalic acid separates out in crystals, but if a little water be added to the hot solution oxalate of protoxide of tin crystallizes out. (Bœttger.)
$C_4Sn_2O_8$

Oxalate *of binoxide* **of Tin.**

I.) *basic.* Soluble in water, as well as in chlorhydric, oxalic, and sulphuric acids, and in ammonia-water, from which it eventually separates as a body no longer soluble in ammonia-water, though still soluble in water. (Hausmann & Lœwenthal, *loc. cit.*)
$12\,SnO_2,\ C_4O_6+12\,Aq$

Oxalate of Titanium. Insoluble in water. Soluble in aqueous solutions of oxalic acid, and of bichloride of titanium.
$12\,TiO_2,\ C_4TiO_8+12\,Aq$

Oxalate of Toluidin. Sparingly soluble in cold, more readily soluble in boiling water, and alcohol. Insoluble in ether. (Muspratt & Hofmann.)
$C_4(C_{14}H_9N)H_2O_8$

Oxalate *of protoxide* **of Uranium.**

I.) *normal.* Permanent. Very sparingly soluble either in hot or cold water. Less soluble in boiling water than the oxalate of the peroxide (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** 32.) Difficultly soluble in chlorhydric acid. (Rammelsberg.)
$C_4Ur_2O_8+6\,Aq$

II.) *acid* (?). Insoluble in water.
$2\,C_4Ur_2O_8;\ C_4H_2O_8+4\,Aq$

Oxalate *of sesquioxide* **of Uranium.**

I.) *normal.* Soluble in 125 pts. of water at 14°, and in 29.4 pts. of water at 100°; or 100 pts. of water at 14° dissolve 0.8 pt. of it, and at 100°, 3.4 pts. It is a little more soluble in the strong acids than in water; but a concentrated solution of oxalic acid is nevertheless capable of precipitating it from any of the simple salts of the yellow oxide of uranium, even from the sulphate. Largely soluble in aqueous solutions of the alkaline oxalates with combination. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** 192.) Soluble in an aqueous solution of oxalate of potash, even in the cold. (Trommsdorff.) Sparingly soluble in cold, somewhat more soluble in hot water. Abundantly soluble in ammonia-water, with combination. (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** pp. 40, 42.)
$2\,Ur_2O_3,\ C_4O_6+6\,Aq$

II.) *basic.*
$3\,Ur_2O_3,\ C_4O_6+5\,Aq$

Oxalate of Urea.

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I.) *normal.* Abundantly soluble in boiling $C_4 (C_2 H_4 N_2 O_2)_2 H_2 O_8$ water, from which it separates out in great part as the solution cools. The aqueous solution saturated at 16° contains 4.16% of it; or 100 pts. of water at 16° dissolve 4.37 pts. of it; or 1 pt. of the salt is soluble in 22.88 pts. of water at 16°. If free oxalic acid be added to the saturated cold aqueous solution, a portion of the salt will be precipitated. More difficultly soluble in alcohol than in water; and the difference between the solvent power of hot and cold alcohol is much less than is the case with water. 100 pts. of alcohol, of 0.833 sp. gr. dissolve 1.6 pt. of it at 16°; or 1 pt. of the salt is soluble in 62.5 pts. of the alcohol. (Berzelius, in his *Lehrb.*, **3.** 344.)

Oxalate *of binoxide* **of Vanadium.**

I.) *normal*(?). Easily soluble in water.

II.) *basic.* Difficultly soluble in cold, more quickly soluble in hot water. (Berzelius, *Lehrb.*, **3.** 1055.)

Oxalate of Vanadic Acid. Soluble in water. (Berzelius.)

Oxalate of *tetra***Vinylium.**

I.) *normal.* Insoluble, or but sparingly soluble $C_4 (C_{16} H_{12} N)_2 O_8$ in alcohol.

II.) *acid.* Very deliquescent. Readily soluble in alcohol. (Heintz & Wislicenus.)

Oxalate of XanthoCobalt. Nearly insoluble in cold, $N O_2 . 5 N H_3 . Co_2 O_3, 2 C_2 O_3 + 5 Aq$ and only very slightly soluble in hot water. The aqueous solution is very readily decomposed by boiling. (Gibbs & Genth, *Smithson. Contrib.*, vol. **9.**)

Oxalate of Xylidin. Soluble in water.

Oxalate of Yttria. Insoluble in water, in $C_4 Yr_2 O_8 + 6 Aq$ oxalic acid, or in dilute chlorhydric acid. Soluble in nitric acid and in strong chlorhydric acid. More easily soluble in acids than the cerous oxalate. (Berzelius.)

Oxalate of Zinc.

I.) *normal.* Insoluble in water, excepting when $C_4 Zn_2 O_8 + 4 Aq$ the acid predominates. (Bergman, *Essays*, **1.** 328.) Scarcely at all soluble in water. (Favre, *Ann. Ch. et Phys.*, (3.) **10.** 164.) It is precipitated when free oxalic acid is added to a solution of zinc in sulphuric, nitric, or chlorhydric acid. (Bergman, *Essays*, **1.** 328.) Soluble in chlorhydric acid, and in ammonia-water. (Thomson.) Soluble in a hot aqueous solution of chloride of ammonium, and also, though somewhat less readily, in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.) The presence of chloride of ammonium does not sensibly hinder its precipitation. (H. Rose, *Tr.*) Soluble in a solution of carbonate of ammonia; but only imperfectly soluble in solutions of sulphate, nitrate, or succinate of ammonia, or of chloride of ammonium. (Wittstein.) Soluble in an aqueous solution of caustic potash, and in the acids generally.

Oxalate of Zirconia. Insoluble in water, $C_{12} (Zr_2''')_2 O_{24}$ or in a boiling aqueous solution of oxalic acid. (Dubois & Silveira; Berzelius, *Lehrb.*, **2.** 186.) Insoluble in water. Sparingly soluble in chlorhydric acid. (Vauquelin.) Insoluble in oxalic acid, and only dissolves in a large excess of chlorhydric acid. (H. Rose, *Tr.*) Soluble in an aqueous solution of oxalic acid. (Berlin.)

OxalAzoPhenylamic Acid. *Vid.* NitrAzoPhenylOxamic Acid.

OxalAzoPhenylamid. *Vid.* NitrAzoPhenylOximid.

OxalAzoPhenylimid. *Vid.* NitrAzoPhenylOximid.

Oxalhydric Acid. *Vid.* Saccharic Acid.

Oxalic Ether. *Vid.* Oxalate of Ethyl.

OxaloSulphate of *X*. *Vid.* Oxalate of *X* with Sulphate of *X*.

OxaloVinic Acid. *Vid* EthylOxalic Acid.

OxaloVinate of Ammonia. *Vid.* Oxamate of Ethyl.

OxaloVinoMethylid. *Vid.* Oxalate of Ethyl & of Methyl.

OxalUrAnilid. *Vid.* PhenylOxalUramid.

Oxaluric Acid. Very sparingly soluble in $C_6 H_4 N_2 O_8$ cold water. Decomposed by boiling with water. The alkaline oxalurates are easily soluble in water; those of the alkaline earths are difficultly soluble.

Oxalurate of Ammonia. Very sparingly $C_6 H_3 (N H_4) N_2 O_8$ soluble in cold water, though more readily soluble therein than the free acid. Easily soluble in hot water, without decomposition.

Oxalurate of Baryta.

I.) *normal.* Difficultly soluble in water.

II.) *basic.* Very sparingly soluble in water.

Oxalurate of Cinchonin. Decomposed by chlorhydric acid.

Oxalurate of Lime.

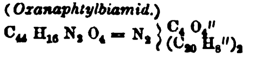
I.) *normal.* Sparingly soluble in water.

II.) *basic.* Very sparingly soluble in boiling water. Readily soluble in dilute acids, even in acetic acid.

Oxalurate of Silver. Soluble in hot, less $C_6 H_3 Ag N_2 O_8$ soluble in cold water. (Liebig & Wœhler.)

Oxalurate of Strychnine.

Oxalyl*di***Naphtyl***bi***amid.** Insoluble in water. (*Oxanaphtylbiamid.*)



$C_{44} H_{16} N_2 O_4 = N_2 \left\} \begin{matrix} C_4 O_4'' \\ (C_{20} H_8'')_2 \end{matrix} \right.$

Difficultly soluble in alcohol, even when this is boiling. (Zinin.)

Oxamic Acid. Difficultly soluble in cold

$C_4 H_3 N O_6 = N \left\{ \begin{matrix} C_4 O_4'' \\ H_2 \end{matrix} \right. . O, H O$

water. Soluble in boiling water, with decomposition. Soluble in anhydrous alcohol.

Oxamate of Allyl. Soluble in alcohol. (*AllylOxamethan. AllylOxamic Acid. AcrylicOxamate.*) $C_4 H_2 (C_6 H_5) N O_6$

Oxamate of Ammonia. Soluble in water; $C_4 H_2 (N H_4) N O_6 \& + 2 Aq \& 3 Aq$ much more readily in hot than in cold.

Oxamate of Amyl. Decomposed by boiling (*Oxamylene.*) $C_{14} H_{13} N O_6 = C_4 H_2 (C_{10} H_{11}) N O_6$ water, and by alkaline liquors. Soluble in alcohol. (Balard, *Ann. Ch. et Phys.*, (3.) **12.** 313.)

Oxamate of Baryta. The anhydrous salt is $C_4 H_2 Ba N O_6 + 3 Aq$ soluble in 537 pts. of water at 13°, and in 25.6 pts. of water at 100°. (Engstrœm.)

Oxamate of *per***ChlorEthyl.** Slightly soluble in cold, (*Chlor Oxamethan. Chloroxethamid. Oxamate of Ethylquintichloré.*) $C_8 H_2 Cl_5 N O_6 = C_4 H_2 (C_4 Cl_5) N O_6$ very soluble in boiling water. Easily soluble in alcohol and ether. (Malaguti.)

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Oxamate of Ethyl. Very sparingly soluble in cold, more readily in hot water. More readily soluble in alcohol than in water. (Dumas & Boullay.) Soluble in all proportions in water, and alcohol. (Liebig.) When boiled with water it is partially decomposed. (Dumas.)
(*Oxamethan. Oxalovinate of Ammonia. Oxalate of Ethyl & of Ammonia. Ether Oxamid.*)
$C_8H_7NO_6 = C_4H_2(C_4H_5)NO_6$

Oxamate of Ethyl*chloré*. *Vid.* Oxamate of ChlorEthyl.

Oxamate of Lead. Soluble in water. (Laurent, in his *Chemical Method*, p. 250.)

Oxamate of Lime. The anhydrous salt dissolves in 638 pts. of water at 13°, and in 24.6 pts. of boiling water. (Engstrœm.)
$C_4H_2CaNO_6 + 4Aq$

Oxamate of Lime & of Methyl. Soluble in warm, less soluble in cold water. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 466.)
$C_4HCa(C_2H_3)NO_6$

Oxamate of Magnesia. Soluble in 54.7 pts. of water at 14°, and in 4.98 pts. of boiling water. (Engstrœm.)
$C_4H_2MgNO_6 + 8Aq$

Oxamate of Methyl. Soluble in hot water. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 466.) Soluble in boiling, less soluble in cold alcohol. (Liebig.)
(*Oxamethylane. Methyl Oxamic Acid.*)
$C_6H_5NO_6 = C_4H_2(C_2H_3)NO_6$

Oxamate of Potash. Very soluble in water, less soluble in alcohol.
$C_4H_2KNO_6 + 2Aq$

Oxamate of Silver. Soluble in hot water.
$C_4H_2AgNO_6$

Oxamate of Soda. Efflorescent. Soluble in water. (Engstrœm.)
$C_4H_2NaNO_6 + Aq$

Oxamelánil. Only slightly soluble in water. Somewhat difficultly soluble in boiling, and still less soluble in cold alcohol. Insoluble in dilute acids. Soluble in dilute solutions of caustic ammonia, and potash, with subsequent decomposition. (Hofmann, *J. Ch. Soc.*, **2.** 308.)
(*Melan Oximid.*)
$C_{30}H_{11}N_2O_4 = N_2\left\{\begin{matrix}C_4O_4''\\(C_{12}H_5)_2\\C_2N\\H\end{matrix}\right.$

Oxamethan. *Vid.* Oxamate of Ethyl.

Oxamethol. *Vid.* Oxalate of Methyl.

Oxamethylan. *Vid.* Oxamate of Methyl.

Oxamid. Insoluble in cold, slightly soluble in boiling water. (Dumas.) Soluble in 10000 pts. of cold water. (O. Henry & Plisson.) Sparingly soluble in boiling water; its solubility being increased by the addition of chloride of calcium or of normal oxalate of potash. (Geuther.) Insoluble in alcohol or ether. (Dumas.) Somewhat more soluble in alcohol, and ether, than in boiling water. (Berzelius's *Lehrb.*, **1.** 637.)
$C_4H_4N_2O_4 = N_2\left\{\begin{matrix}C_4O_4''\\H_4\end{matrix}\right.$

Oxamid with *prot*Oxide of Mercury. Insoluble in alcohol or ether. (Dumas.)
$HgO, C_4H_4N_2O_4$

Oxamylan. *Vid.* Oxamate of Amyl.

Oxamylic Acid. *Vid.* AmylOxalic Acid.

OxaNaphtalid. *Vid.* Oxalyl*di*Naphtyl*bi*amid.

OxÁnilamid. *Vid.* PhenylOxamid.

OxAnilic Acid. *Vid.* PhenylOxamic Acid.

Oxanilid. *Vid.* *di*PhenylOxamid.

Oxide of AcePlatin. Insoluble in water. Very sparingly soluble in acetone. Sparingly soluble in concentrated chlorhydric acid. Not violently acted upon by nitric acid. Partially soluble in aqua-regia. (Zeise, *Ann. Ch. u. Pharm.*, 1840, **33.** 54.)
(*Aceplatinoxydul.*)

Oxide of Acetyl. *Vid.* Acetic Acid (Anhydrous).
$C_4H_3O_2, O$

***Per*Oxide of Acetyl.** Insoluble, or very sparingly soluble in water. Soluble in ether. (Brodie.)
$C_4H_3O_2, O_2$

Oxide of Acetylammonium (of Natanson). *Vid.* Hydrate of Acetosamin.

Oxide of Allyl. Almost insoluble in water. (Berthelot & De Luca.) Completely insoluble in water. (Hofmann & Cahours.)
(*Allyl Ether. Oxide of Acryl. Isomeric with Oxide of Mesityl.*)
C_6H_5O, or $\left.\begin{matrix}C_6H_5\\C_6H_5\end{matrix}\right\}O_2$

Oxide of Allyl & of Amyl.
$C_{16}H_{16}O_2 = \left.\begin{matrix}C_6H_5\\C_{10}H_{11}\end{matrix}\right\}O_2$

Oxide of Allyl & of Ethyl. Insoluble in water.
(*AllylEthylic Ether. Isomeric with Propione.*)
$C_{10}H_{10}O_2 = \left.\begin{matrix}C_6H_5\\C_4H_5\end{matrix}\right\}O_2$

Oxide of Allyl & of Glyceryl. *Vid. tri*-Allylin.

Oxide of Allyl & of Phenyl.

Oxide of Allyl & of Potassium.
$\left.\begin{matrix}C_6H_5\\K\end{matrix}\right\}O_2$

Oxide of Aluminum.
(*Alumina.*)

$a = Al_2O_3$ After ignition, it is very difficultly soluble in dilute acids. Slowly, but completely soluble when digested with warm, fuming chlorhydric acid. (Fresenius, *Quant.*, p. 132.) As it occurs in nature (Corundum, sapphire, &c., &c.) it is unacted upon by acids. Insoluble in water or alcohol.

$b = Al_2O_3, HO$ Occurs as the mineral *Diaspore*, which is insoluble in chlorhydric acid, and not at all acted upon by boiling concentrated sulphuric acid, unless it has been previously ignited.

$c = Al_2O_3, 2HO$ There are two modifications of this hydrate, α and β.

(β.) *Soluble modification.* Soluble in water, and still more readily soluble in acetic acid. The aqueous solution is coagulated to a greater or less extent by the mineral acids and by most vegetable acids; for example, by sulphuric, citric, tartaric, oxalic, chlorhydric, nitric, chromic, molybdic, racemic, suberic, salicylic, benzoic, gallic, lactic, cinnamic, butyric, valeric, camphoric, picric, uric, meconic, comenic, and hemipinic acids; and by many salts; also by alkalies, and decoctions of dye-woods. On the other hand, neither acetic, formic, boracic, arsenious, pyromeconic nor opianic acids, at least when they are but moderately concentrated, coagulate the aqueous solution. Nor is it coagulated by the acetates unless these are added in very large quantity, and even in this case the precipitate is redissolved when treated with water. The nitrates and chlorides coagulate it with difficulty; but the sulphates of soda, magnesia, and lime quickly produce coagulation. The precipitate produced when acids are added to the aqueous solution is not soluble in an excess of the acid, but by the long-continued action of concentrated sulphuric acid, and especially if this be

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hot, the precipitate is dissolved, with formation of ordinary tersulphate of alumina; boiling concentrated chlorhydric acid also dissolves it, but less readily than sulphuric acid. The precipitate is soluble in a boiling solution of caustic potash. (W. Crum, *Ann. Ch. u. Pharm.*, **89.** pp. 168, 180.)

d = $Al_2O_3, 3HO$ *(Ordinary precipitated hydrate.)* Insoluble in pure water. Easily soluble in aqueous solutions of potash, soda, or ethylamin (Sonnenschein); difficultly soluble in caustic ammonia, insoluble in carbonate of ammonia. Its solubility in caustic ammonia is very much diminished by the presence of ammonia salts, thus, when a neutral solution of alumina is treated with ammonia in excess the precipitate which at first forms is in great measure, but not entirely redissolved. If a few drops of a dilute solution of alum are poured into much ammonia-water, and the mixture shaken, an almost perfectly clear solution will be obtained, but after standing for a long time flocks of alumina separate out. If the last-named solution be filtered and boiled, flocks of alumina separate as the ammonia is gradually driven off; or if the cold filtered solution be treated with chloride of ammonium, or with sesquicarbonate of ammonia, a very considerable precipitate of alumina separates at once, and if sufficient NH_4Cl be added, the alumina will be completely precipitated. But the chlorides of potassium or sodium occasion no precipitate. (Fresenius, *Quant.*, pp. 131, 758; see also the London Edition, 1846, p. 571.)

The experiments of Fresenius have been corroborated by Malaguti & Durocher. According to the last-named chemists, hydrate of alumina is soluble, to a considerable extent, in solutions of ammonia, free from ammoniacal salts, not only when the alumina is in the nascent state, but even when it has been recently precipitated, being the more readily soluble when the volume of the liquid is large. In water containing carbonate of ammonia it is still somewhat soluble, though less so than in solutions of caustic ammonia. It is also slightly soluble in, or rather difficultly precipitated from, solutions containing chloride of ammonium, unless this salt be in large excess; as in all these cases, the alumina is more readily dissolved as the volume of the solution is greater, but it is finally all precipitated if the solutions are allowed to stand at rest in close vessels during several days. Sometimes when the solution of alumina in caustic ammonia is left to itself for a long time all the alumina is deposited, at other times only a portion of it separates out, and in other instances none at all was deposited at the end of a month. Entirely insoluble in a solution of sulphide of ammonium. [For numerical statements of the results of Malaguti & Durocher see their memoir, in *Ann. Ch. et Phys.*, (3.) **17.** 421.]

These experiments have also been repeated by J. Fuchs, who has in like manner corroborated them. Fuchs did not find, however, that the assertion of M. & D., with regard to the absolute insolubility of alumina in sulphide of ammonium, was correct. According to his experiments, 50 c. c. of a solution of ammonia-alum, containing 0.3939 grm. of anhydrous alumina, being treated with 50 c. c. water and 10 c. c. of a solution of sulphide of ammonium, and filtered after standing ten minutes, the precipitate weighed only 0.3825 grm. The same experiment being repeated with 100 c. c. of water, the amount of precipitate obtained = 0.3759, and with 200 c. c. water = 0.3642. (Fresenius, *Quant.*, pp. 131, 759.) When recently precipitated it is easily soluble in chlorhydric, and nitric acids; but after it has been collected upon a filter or allowed to stand for a long time beneath the liquid from which it was precipitated, it is much more difficultly soluble in these acids, being dissolved only after a much longer digestion.

Soluble in baryta water. (H. Rose, *Tr.*) Soluble in boiling aqueous solutions of the nitrates and chlorhydrates of the sesquioxides of iron, uranium, chromium, and bismuth, the nitrates of the din- and protoxides of mercury, bichloride of tin, and perchloride of antimony; the oxides in these salts being meanwhile precipitated. (Persoz, *Chim. Moléc.*, pp. 366, 367.) Insoluble in cyanhydric acid (Berzelius's *Lehrb.*, **3.** 467), or in a cold aqueous solution of cyanide of potassium, though a little dissolves on boiling. (H. Rose, *Tr.*)

The hydrate prepared by exposing aluminate of potash to the air is difficultly soluble in a solution of caustic potash, and is scarcely at all soluble in cold sulphuric, chlorhydric, or nitric acids; very slowly soluble in hot chlorhydric acid, more readily in hot sulphuric acid. (Bonsdorff, *Pogg. Ann.*, **27.** 275.) As it occurs in nature (as the mineral *Gibbsite* = $Al_2O_3, 3HO$) it dissolves readily and completely in concentrated sulphuric acid, but is only partially soluble in boiling concentrated chlorhydric acid; it dissolves at once in strong potash or soda lye. (Silliman, Jr., *Am. J. Sci.*, 1849, (2.) **7.** 412.)

Almost completely insoluble in a solution of carbonate of ammonia, even when no foreign salts are present. (H. Rose, *Tr.*) Sparingly soluble in solutions of the alkaline carbonates, though more so in hot than in cold. Somewhat soluble in aqueous solutions of caustic baryta and strontia.

Insoluble in solutions of the alkaline bicarbonates. (H. Rose, *Tr.*) Recently precipitated hydrate of alumina does not dissolve at the ordinary temperature in an aqueous solution of acetate of potash. (Osann, *Gilbert's Ann. der Phys.*, 1821, **69.** 295.)

When precipitated by caustic ammonia, in excess, it is liable to be insoluble in weak acids; but when precipitated by carbonate of ammonia or sulphide of ammonium, it is readily soluble in warm weak acids, even after it has been dried. (Ordway, *Am. J. Sci.*, (2.) **26.** 203.)

Hydrate of alumina, but only when moist, is soluble in sulphurous acid, from which solution it is completely reprecipitated, as hydrate, on boiling. If an excess of ammonia-water is added to the sulphurous-acid solution, a portion of the precipitate at first formed redissolves; but on boiling this is redeposited. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** pp. 76, 83, *et seq.*)

When left for a long time in contact with caustic ammonia in a close vessel it is converted into a granular condition, in which state it is difficultly soluble in acids. (Malaguti & Durocher, *Ann. Ch. et Phys.*, (3.) **17.** pp. 430, 431.) Somewhat soluble in an aqueous solution of acetate of soda. (Mercer.) Not precipitated by ammonia when in presence of citrate of soda. (Spiller.) Readily soluble in a solution of ethylamin. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **20.** 472.) Soluble also in amylamin. (Wurtz.) Soluble in aqueous solutions of sinkalin, of hydrated oxide of ethylpicolin, of hydrated oxide of stibethylium, of hydrated oxide of stibmethylium, and of hydrate of triethyltoluenylammonium. (Friedlænder.) Somewhat soluble in carbonic-acid water. (Saussure.) Soluble to a considerable extent in a warm aqueous solution of normal tartrate of potash. [T.] Very

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slightly soluble in an aqueous solution of cane-sugar. (Ramsey.)

When alum is precipitated by a fixed alkaline carbonate, a small portion of alumina remains in solution at first, but this is deposited by degrees after the solution has stood for a few days in the open air, and at a temperature sufficient to expel the carbonic acid. (Bergman, *Essays*, **1.** 46.)

Oxide of AmmonioIridium(hydrated). Soluble in water. (Claus, *Beiträge*, p. 91.)
$5\,NH_3 . Ir_2O_3 + x\,Aq$

Oxide of AmmonioRhodium(hydrated). Soluble in water. (Claus, *Beiträge*, pp. 85, 86.)
$5\,NH_3 . Rh_2O_3 + x\,Aq$

Oxide of Ammonium. Known only in combination. *Vid.* Ammonia.
(*Ammonia.*)
NH_4O

Oxide of Ammonium & of Butoyl. Almost insoluble in water. Easily soluble in alcohol, and ether.
$C_8H_{11}NO_2 = \left.\begin{matrix}C_8H_7\\NH_4\end{matrix}\right\}O_2$

Oxide of Ammonium & of Phosphorus. Insoluble in water. (Berzelius's *Lehrb.*)
NH_4O, P_2O

Oxide of Ammonium & of Valeroyl. Insoluble in water. Soluble in all proportions in alcohol, and ether. (Parkinson.)
(*Valerylide of Ammonium.*)
$C_{10}H_{13}NO_2 = \left.\begin{matrix}C_{10}H_9\\NH_4\end{matrix}\right\}O_2$

Oxide of AmmoniumChlorPlatin(*ous*)**ammonium.** Not isolated. But the hydrate appears to be soluble in water. (Berzelius, *Lehrb.*, **2.** 481.)
(*Gros's Base*)
$N_2H_6PtClO = N\left\{\begin{matrix}H_2\\PtCl\\NH_4\end{matrix}\right. . O$

Oxide of Amyl. Soluble in water. Soluble in concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water.
(*AmylEther.*)
$C_{10}H_{11}O$, or $\left.\begin{matrix}C_{10}H_{11}\\C_{10}H_{11}\end{matrix}\right\}O_2$

Oxide of Amyl & of Benzol. Insoluble in water. (Wicke.)
(*AmylBenzol Ether.*)
$C_{34}H_{28}O_4 = \left.\begin{matrix}C_{14}H_6''\\(C_{10}H_{11})_2\end{matrix}\right\}O_4$

Oxide of Amyl & of Capryl. *Vid.* Oxide of Amyl & of Octyl.

Oxide of Amyl & of Cetyl. Soluble in alcohol, and ether. (Becker.)
$\left.\begin{matrix}C_{10}H_{11}\\C_{32}H_{33}\end{matrix}\right\}O_2$

Oxide of Amyl & of Ethyl. Insoluble, or but sparingly soluble, in water. (Balard.)
(*Vinamylic Ether.*)
$C_{14}H_{16}O_2 = \left.\begin{matrix}C_4H_5\\C_{10}H_{11}\end{matrix}\right\}O_2$

Oxide of Amyl & of Methyl. Not miscible with water. (Williamson.)
(*Methamylic Ether. Methylate of Amyl. Amylate of Methyl.*)
$C_{12}H_{14}O_2 = \left.\begin{matrix}C_2H_3\\C_{10}H_{11}\end{matrix}\right\}O_2$

Oxide of Amyl & of Octyl. Insoluble in water. Soluble in alcohol, and ether. (Wills.)
(*Oxide of Amyl & of Capryl. AmylCaprylic Ether. AmylOctylic Ether. Octylate of Amyl. Amylate of Octyl.*)
$C_{26}H_{28}O_2 = \left.\begin{matrix}C_{16}H_{17}\\C_{10}H_{11}\end{matrix}\right\}O_2$

Oxide of Amyl & of Potash.
(*Amylate of Potash.*)
$\left.\begin{matrix}C_{10}H_{11}\\K\end{matrix}\right\}O_2$

Oxide of AmylNitroPhenylamin.
(*AmylNitroPhenidin. NitroPhenAmylidin.*)
$C_{22}H_{16}N_2O_8 = N\left\{\begin{matrix}C_{12}H_4(NO_4)\\C_{10}H_{11}\\H\end{matrix}\right. . O_2$

Oxide of Anilin. Soluble in water, alcohol, and ether. (Hofmann, *J. Ch. Soc.*, **10.** 207.)
(*Oxide of Phenylamin. AmidoPhenol.*)
$N\left\{\begin{matrix}C_{12}H_5\\H_2\end{matrix}\right. . O_2$

*Sub***Oxide of Antimony.** Decomposed by strong chlorhydric acid, to sesquichloride of antimony which dissolves, and metallic antimony.
$SbO(?)$

*Ter***Oxide of Antimony.**
(*Antimonious Acid. Antimonic Oxide. Protoxide of Antimony*)

$a = SbO_3$ Sparingly soluble in water, — best in boiling. Soluble in cold aqueous solutions of chloride of ammonium and nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.) Soluble in tartaric, and acetic acids, and is not reprecipitated from these solutions on the addition of water. (Berzelius, *Lehrb.*) Sparingly soluble in acetic acid. (Wenzel.) It does not dissolve in nitric acid, but is nevertheless not so insoluble therein as the *b* modification of oxide of tin, for the nitric liquor decanted from teroxide of antimony retains a trace of the latter. Soluble in chlorhydric acid, but the solution thus obtained becomes cloudy on the addition of water. (H. Rose, *Tr.*) Readily soluble in an aqueous solution of benzoic acid, forming a compound which is permanent in the air and easily soluble in water, and alcohol. (Trommsdorff.) Insoluble in pyrotartaric acid. (Arppe.) Insoluble in dilute, but soluble in concentrated alkaline solutions. (Fremy, *Ann. Ch. et Phys.*, (3.) **23.** 390.)

$b =$ *hydrated.* When recently precipitated, the hydrate is soluble even in dilute solutions of caustic potash and soda. (Dumas, *Tr.*) When precipitated by a solution of caustic potash from an acid solution of terchloride of antimony, it dissolves completely in a very large excess of the precipitant, and the solution thus obtained is neither troubled in the cold nor on boiling, on being diluted with water. Scarcely at all soluble in ammonia-water, or in solutions of carbonate of ammonia or bicarbonate of potash. Completely soluble in an aqueous solution of carbonate of potash, especially when this is warm; but on leaving this solution to itself for a long time, teroxide of antimony gradually crystallizes out, and the same remark is true of the solution in caustic potash. A solution of carbonate of soda behaves like that of carbonate of potash, though it dissolves somewhat less of the oxide, and on standing the latter is even more completely deposited from the solution than is the case with carbonate of potash. (H. Rose, *Tr.*) Soluble in solutions of the caustic alkalies; but these solutions are decomposed on the addition of water. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 496.) When recently precipitated it is soluble, though but sparingly, in succinic acid. (Wenzel, Dœpping.)
$SbO_3, 2\,HO$

Many of the salts of teroxide of antimony are decomposed by water, with separation of sparingly soluble basic salts. Those which are insoluble in water are soluble in chlorhydric acid.

Oxide of ArsenAmyl(?) Soluble in water. (W. Gibbs.)

Oxide of Arsen*di***Ethyl.** Not isolated.

Oxide of Arsen*tri***Ethyl.** Insoluble in water. Readily soluble in spirit, and ether. Water precipitates it from the alcoholic solution. Readily soluble in dilute nitric acid. Insoluble in dilute sulphuric
$As\left\{(C_4H_5)_3O_2\right.$

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or chlorhydric acid. (Landolt, *Ann. Ch. u. Pharm.*, **89.** pp. 318, 325.)

Oxide of ArsenEthylium(hydrated). Hygroscopic. Soluble in water. (Landolt, *Ann. Ch. u. Pharm.*, **89.** 332.)
(*Hydrate of tetraEthylArsenammonium.*)
$As\left\{(C_4H_5)_4O, HO\right.$

Oxide of Arsenic. Insoluble in water, or in cold acids. Decomposed by warm acids.
AsO

Oxide of ArsenMethyl. Permanent. Slowly, but abundantly soluble in cold water. Very easily soluble in hot water, and in alcohol, ether, and bisulphide of carbon. (Bæyer.)
C_2H_3As'', O_2

Oxide of ArsenTriMethyl. Very deliquescent.
$(C_2H_3)_3As, O_2$

Oxide of ArsenMethylAmylium.

Oxide of ArsenMethylEthylium(hydrated). Very deliquescent. Soluble in water. (Cahours & Riche.)

Oxide of ArsenMethylium(hydrated). Very deliquescent. Soluble in water. (Cahours & Riche.)

Prot**Oxide of Barium.**
(*Baryta.*)

a = anhydrous. Soluble in about 50 pts. of water. (Wittstein's *Handw.*); in 29 pts. of water (Bineau, *C. R.*, **41.** 510); in 35 pts. of water at 13°, in 7.5 pts. at 47°, and in 5.6 pts. at 70°. (Osann.) 100 pts. of water at 15.5 dissolve 5 pts. of it; at 100°, 50 pts. (Ure's *Dict.*) Soluble in 20 pts. of water at 10°, and in 10 pts. of boiling water; the solution saturated at 10° containing 4.76% of it, and the boiling saturated solution 9.09%. (Mohr, Redwood & Procter's *Pharmacy.*) When prepared by calcining the carbonate, it is soluble in 900 pts. of water; but is more readily soluble when obtained by igniting the nitrate. (Bergman, *Essays*, **1.** 30.) The aqueous solution saturated at 15.56° contains 2.6% of it. (Dalton, in his *New System*, Pt. **2.** p. 524.)
BaO

An aqueous solution of sp. gr.	Contains per cent of Ba O.
1.6	30
1.3	19
1.03	2.6
1.02	1.8
1.01	0.9

(Dalton, in his *New System*, Pt. **2.** p. 524.)

After having been very strongly ignited, baryta does not become heated by contact with water, combining with it very slowly; but when obtained by calcining nitrate of baryta at a low temperature, it combines with water with evolution of much heat, forming a powdery hydrate when a small quantity of water is employed; with more water, the crystalline hydrate may be obtained, and this dissolves completely in hot water. (H. Rose, *Tr.*)

Soluble, with combination, in absolute alcohol, and anhydrous wood-spirit. Insoluble in ether.

b = monohydrated. Soluble in 20 pts. of cold, and in 2 pts. of boiling water. (H. Davy); in from 150 to 200 pts. of boiling alcohol (Berzelius); the aqueous solution is not precipitated by alcohol. (Gmelin.) Soluble in an aqueous solution of cane-sugar (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 156); in an aqueous solution of mannite (Favre, *Ann. Ch. et Phys.* (3.) **11.** 76); in an aqueous solution of sorbine (Pelouze); in a hot aqueous solution of quercite, from which a good deal of hydrate of baryta separates on cooling, and more on the addition of alcohol. (Dessaignes.)
BaO, HO

c = octohydrated. Soluble in 3 pts. of boiling water, and in 20 pts of water at 15° (Otto Graham); in 17.5 pts. of water at 15.5°, and in all proportions in hot water. (Hope, *Edinburgh Trans.*, **4.** 36. [T.].) Fuses in its own water of crystallization at a temperature below 100°. Soluble in 19 pts. of water at the ordinary temperature, and in 2 pts. of boiling water. Somewhat soluble in spirit. (Wittstein's *Handw.*) 100 pts. of water at 15.5° dissolve 57 pts. of it, and an unlimited amount of it at 100°. (Ure's *Dict.*) Readily soluble, even in the cold, in an aqueous solution of chloride of ammonium. (H. Rose, *Tr.*) Slightly soluble in an aqueous solution of waterglass (acid silicate of soda or potash). (Bolley; compare Ordway, *Am. J. Sci.*, (2.) **32.** 338; **33.** 33.)
$BaO, 8HO$ (others say $7HO$ & $9HO$)

Most of the salts of baryta are insoluble in water; but all of them, excepting the sulphate, are soluble in dilute chlorhydric, and nitric acids. (Gmelin's *Handbook*, **3.** 137.)

Per**Oxide of Barium.**

I.) *anhydrous.* Decomposed by warm water. It combines with cold water to form the following hydrate.
BaO_2

II.) *hydrated.* Very sparingly soluble in cold water, the solution undergoing decomposition when heated to 100°. (Thénard.)
$BaO_2, 6HO$

Oxide of Barium & of Methyl. Not decomposed when boiled with water. Soluble in wood-spirit. (Graham, *et al.*, *J. Ch. Soc.*, **8.** 132.)
(*MethylAlcoholate of Baryta.*)
$\left.\begin{matrix}C_2H_3\\Ba\end{matrix}\right\}O_2 + Aq$

Oxide of BenzEthyl. *Vid.* Oxide of Toluenyl.

Oxide of Benzol & of Ethyl. Insoluble in water. Easily soluble in alcohol, and ether. (Wicke, *Ann. Ch. u. Pharm.*, **102.** 364.)
(*EthylBenzolEther.*)
$C_{22}H_{16}O_4 = \left.\begin{matrix}C_{14}H_6\\(C_4H_5)_2\end{matrix}\right\}O_4$

Oxide of Benzol & of Methyl. Insoluble in water. Easily soluble in alcohol, wood-spirit, and ether. (Wicke, *Ann. Ch. u. Pharm.*, **102.** 363.)
(*MethylBenzol Ether.*)
$C_{18}H_{12}O_4 = \left.\begin{matrix}C_{14}H_6''\\(C_2H_3)_2\end{matrix}\right\}O_4$

Per**Oxide of Benzoyl.** Soluble in ether.
$C_{14}H_5O_2, O_2$

Oxide of Benzyl. *Vid.* Oxide of Toluenyl.

Oxide of BisEthyl. *Vid.* Oxide of Bismuth-Ethyl.

Sub**Oxide of Bismuth.** Decomposed, with partial solution, by the strong acids and by dilute nitric acid. Soluble in hot chlorhydric acid. (A. Vogel.)
BiO_2

Ter**Oxide of Bismuth.** Insoluble in water. Easily soluble in those acids with which it forms soluble salts.
(*Sesquioxide of Bismuth.*)
BiO_3, or Bi_2O_3'' & $+ HO$

When recently precipitated it is soluble in a solution of chloride of ammonium, but insoluble in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 98.) Sesquioxide of bismuth cannot decompose a solution of chloride of ammonium when boiled therewith. (H. Rose, *Tr.*) It is not precipitated from solutions which contain citrate of soda. (Spiller.) Insoluble in aqueous solutions of the caustic or carbonated alkalies, of carbonate or nitrate of ammonia; or of amylamin. (Wurtz.)

Most of its salts are decomposed by water, with

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separation of an insoluble basic salt; but this may be redissolved by adding a sufficient quantity of chlorhydric or nitric acid.

*Per***OXIDE OF BISMUTH.** *Vid.* Bismuthic Acid.

OXIDE OF BISMUTHETHYL. Insoluble in alcohol. Easily soluble in an aqueous solution of caustic potash. (Duenhaupt.)

C_4H_5Bi,O_2

OXIDE OF BROMETHISE. *Vid.* Hydride of *ter*BromAcetyl.

OXIDE OF BROMOCHLORETHYL. Insoluble in water.

$C_4Cl_3Br_2O$

OXIDE OF BUTYL.

(*Oxide of Tetryl. Butylic Ether.*)

C_8H_9O or $\left.\begin{matrix}C_8H_9\\C_8H_9\end{matrix}\right\}O_2$

OXIDE OF BUTYL & OF ETHYL.

$\left.\begin{matrix}C_8H_9\\C_4H_5\end{matrix}\right\}O_2$

OXIDE OF BUTYL & OF POTASSIUM. Somewhat soluble in butylic alcohol (hydrate of butyl). (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **42.** 137.)

(*Butylate of Potash.*)

$\left.\begin{matrix}C_8H_9\\K\end{matrix}\right\}O_2$

OXIDE OF CACODYL. Very sparingly soluble in water. Miscible in all proportions with alcohol, and ether. Abundantly soluble in phosphoric acid. Soluble, without decomposition, in cold, somewhat dilute, nitric acid. Also soluble in a solution of caustic potash. (Bunsen.)

(*Alkarsin.*)

$(C_2H_3)_2AsO$

OXIDE OF CACODYL with NITRATE OF SILVER. Insoluble in cold, decomposed by boiling nitric acid.

$3C_8H_{12}As_2O_2; 2(AgO, NO_5)$

*Bin***OXIDE OF CACODYL.** *Vid.* Cacodylate of Cacodyl.

*Sub***OXIDE OF CADMIUM.** Decomposed, with partial solution, by dilute acids.

Cd_2O

*Prot***OXIDE OF CADMIUM.** Insoluble in water. Easily soluble in acids. Soluble in ammonia-water; but insoluble in solutions of caustic or carbonated potash or soda, or in carbonate of ammonia. It is not precipitated from solutions which contain citrate of soda. (Spiller.) Very soluble in ammonia-water, the proportion of ammonia necessary for its solution being incomparably smaller than that required in order to dissolve oxide of zinc. (H. Rose, *Tr.*) Soluble in a cold aqueous solution of chloride of ammonium; less completely soluble in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 99, 334.) Even after having been calcined, oxide of cadmium dissolves easily in a warm solution of chloride of ammonium, ammonia being evolved; on cooling this solution a sparingly soluble double salt separates out. (H. Rose, *Tr.*) Insoluble in aqueous solutions of methylamin or amylamin. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** pp. 452, 492.) Hydrate of cadmium, even when recently precipitated, is by itself very sparingly soluble in cyanhydric acid, but when mixed with recently precipitated carbonate of copper and then treated with cyanhydric acid, both of the precipitates are dissolved, with combination. (Schueler, *Ann. Ch. u. Pharm.*, **87.** 48.) The presence of many non-volatile organic substances prevents its precipitation by caustic potash. (H. Rose, *Tr.*)

(*Cadmic Oxide.*)

CdO & $+ HO$

Most of the salts of cadmium are soluble in water. Those insoluble in water are soluble in sulphuric, chlorhydric, and nitric acids, and in cold aqueous solutions of sulphate, nitrate, and benzoate of ammonia, and of chloride of ammonium.

OXIDE OF CALCIUM.

(*Lime.*)

I.) *anhydrous.* Soluble in 778 pts. of water at 15.56°, in 972 pts. of water at 54.44°, and in 1270 pts. of water at 100°; the solution saturated at 15.6° containing 0.128% of it, and the saturated boiling solution 0.079%. (Dalton, in his *New System*, **2.** 510.) Soluble in 656 pts. of water at 0°, in 752 pts. of water at 15.6°, and in 1280 pts. of water at 100°. (Phillips.) Soluble in 700 pts. of water which has been completely deprived of carbonic acid by violent boiling for half an hour. (Bergman, *Essays*, **1.** 33.) Soluble in 758 pts. of cold water. (T. Thomson, in his *System of Chem.*, London, 1831, **1.** 437.)

CaO

Soluble in 729 @ 733 pts. of water at ordinary temperatures, and in 1310 @ 1350 pts. of boiling water; the experimental results actually obtained in the last case were 1495, 1370, and 1311 pts. of boiling water. (Wittstein.) Soluble in 450 pts. of water at 20° (Davy); in 780 pts. of water at 18°, and in 1500 pts. at 100° (Bineau, *C. R.*, **41.** 510); in 960 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 75.) 100 pts. of water at 15.5° dissolve 0.2 pt. of it. (Ure's *Dict.*)

Dalton urges the incorrectness of the statements of previous observers, "some of whom say that water takes up $\frac{1}{500}$ of its weight of lime, others $\frac{1}{800}$. The fact is that few have tried the experiment with due care." (*Loc. cit.*)

When a solution of lime which has been heated for some time at 100°, and has ceased to deposit any precipitate at that temperature, is heated more strongly in a closed tube, a new precipitate is formed, and this may be increased almost *ad libitum.* 4000 grains of lime-water were diluted with 2000 grains of water, and set aside for two hours. Upon being then heated to 100° upon a water-bath, a precipitate appeared, which being collected was found to amount to 2 grains of hydrate of lime. 4000 grains of lime-water diluted with an equal quantity of pure water, and occasionally agitated, for three days, in a stoppered phial, became slightly turbid when carefully heated in the water-bath, and deposited a small quantity of hydrate of lime, of which 0.15 grain was recovered. (Graham, *Phil. Mag.*, 1827, (2.) **2.** pp. 22–24.)

Alcohol dissolves a trace of it (Bonastre); but precipitates it from the aqueous solution. (Gmelin.) Insoluble in ether. (Gmelin.)

Very soluble in an aqueous solution of cane-sugar, dissolving therein in much larger quantity than in water (Lowitz), with evolution of heat. (Peligot.) 100 pts. of cane-sugar dissolved in water dissolve 55.6 pts. of lime (Osann); 50 (Ure); 49.6 (Daniell); 29 @ 30.6 (Hunton); 23 pts. (Soubeiran.) The sugar solution at 100° takes up $\frac{1}{4}$ equiv. lime for each equiv. of sugar; at 0°, if it contains no less than 25% of sugar it takes up 2 equivs. lime for 1 equiv. of sugar. (Dubrunfaut.)

Far from causing the decomposition of sugar when in contact with it, lime adds to its stability. A solution of sugar boiled during 48 hours with $\frac{1}{6}$ an equivalent of lime did not undergo the slightest alteration, while a similar solution boiled without lime, under conditions otherwise similar, lost all its sugar after 12 hours of ebullition. (Dubrunfaut.) Contrary to the assertion of Soubeiran (1842), the quantity of lime which dissolves in an aqueous

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solution of sugar is proportional to the density [and temperature (Dubrunfaut)] of the latter. In the table below are given the results of experiments in which finely pulverized hydrate of lime was added by small portions to solutions of sugar, of the given densities: a large excess of lime being employed, and the mixtures frequently agitated.

Composition of the syrup taken, i. e. sugar dissolved in 100 pts. of water.	Sp. gr. of the syrup.	Sp. gr. of the syrup after saturation with CaO,HO.	100 pts. of the residue dried at 120° contain	
			Lime.	Sugar.
40.0	1.122	1.179	21.0	79.0
37.5	1.116	1.175	20.8	79.2
35.0	1.110	1.166	20.5	79.5
32.5	1.103	1.159	20.3	79.7
30.0	1.096	1.148	20.1	79.9
27.5	1.089	1.139	19.9	80.1
25.0	1.082	1.128	19.8	80.2
22.5	1.075	1.116	19.3	80.7
20.0	1.068	1.104	18.8	81.2
17.5	1.060	1.092	18.7	81.3
15.0	1.052	1.080	18.5	81.5
12.5	1.044	1.067	18.3	81.7
10.0	1.036	1.053	18.1	81.9
7.5	1.027	1.040	16.9	83.1
5.0	1.018	1.026	15.3	84.7
2.5	1.009	1.014	13.8	86.2

(Péligot, *C. R.*, 1851, **32.** 335.)

"The statement of Ure (*Dict.*) to the effect that 'sugar dissolved in water at the temperature of 10° is capable of dissolving half its weight of lime,' I believe will be found too large a proportion, for, after repeated trials, I find its composition the same for every temperature between 10° and 54.4° at which the solution is made and filtered; and from which solutions, carefully evaporated under 82°, (the compound being insoluble at higher temperatures,) and then dried at 100°, 100 grs. give from 22.5 to 23.5 per cent of lime." (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 152.) On heating the solution of lime in sugar-water, a copious precipitate is formed, which redissolves on cooling. See Sucrate of Lime, under SUGAR. When one attempts to saturate with lime a syrup which contains more than about 30% of sugar, the solution becomes at first very viscous, and then after a time solidifies. (Péligot, *loc. cit.*, p. 336.)

Berthelot has studied the solubility of lime in more dilute solutions of sugar, thus,—

Wt. of sugar contained in 100 cc. of the solution (at 5°).	Wt. of lime contained in 100 cc. of the preceding liquid saturated with lime.	Relation between the lime and the sugar.	
		Lime.	Sugar.
4.850	1.031	17.5	82.5
2.401	0.484	16.8	83.2
2.000	0.433	17.8	82.2
1.660	0.364	18.0	82.0
1.386	0.326	19.0	81.0
1.200	0.316	20.8	79.2
1.058	0.281	21.0	79.0
0.960	0.264	21.6	78.4
0.400	0.194	32.7	67.3
0.191	0.172	47.4	52.6
0.096	0.154	61.6	38.4
0.000 (pure water.)	0.148		

(Berthelot, *Ann. Ch. et Phys.*, 1856, (3.) **46.** 176.) For Berthelot's discussion of the relative influences of sugar and water in causing the solution, see the cited memoir. Soluble in an aqueous solution of mannite. (Favre, *Ann. Ch. et Phys.*, (3.) **11.** 76.)

Wt. of mannite contained in 100 cc. of the solution (at 5°).	Wt. of lime contained in 100 cc. of the preceding liquid saturated with lime.	Relation between the lime and mannite.	
		Lime.	Mannite.
9.60	0.753	7.3	92.7
4.80	0.372	7.2	92.8
2.40	0.255	9.6	90.4
1.92	0.225	10.5	89.5
1.60	0.207	11.4	88.6
1.37	0.194	12.5	87.5
1.20	0.193	13.9	86.1
1.07	0.190	15.1	84.9
0.96	0.186	16.2	86.8
0.192	0.155	44.6	55.4
0.096	0.154	61.6	38.4
0.000	0.148		

(Berthelot, *Ann. Ch. et Phys.*, 1856, (3.) **46.** 177.) For Berthelot's discussion of the relative influence of mannite and water in causing this solution, see his memoir.

Solubility of Lime in Glycerin.

Wt. of glycerin contained in 100 cc. of the solution (at 5°)	Wt. of lime contained in 100 cc. of the preceding liquid saturated with lime.	Relation between the wt. of lime and of glycerin.	
		Lime.	Glycerin.
10.00	0.370	3.6	96.4
5.00	0.240	4.6	95.4
2.86	0.196	6.4	93.6
2.50	0.192	7.1	92.9
2.00	0.186	8.5	91.5
1.00	0.165	14.2	85.8

(Berthelot, *Ann. Ch. et Phys.*, 1856, (3.) **46.** 178.) For B.'s discussion of the relative influence of glycerin and water in causing the solution of the lime, see his memoir.

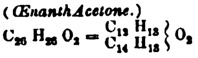
Concentrated solutions of lime in mannite or glycerin afford an abundant precipitate on being heated; but, as is the case with sucrate of lime, these precipitates redissolve as the mixture cools. (Berthelot, *Ann. Ch. et Phys.*, 1856, (3.) **46.** 179.)

Soluble in an aqueous solution of sorbine (Pelouze); and to a slight extent in a solution of quercite. Soluble, with combination, in an aqueous solution of monobasic sucrate of lime. (Soubeiran; Péligot.) Precisely as soluble at 15.56° in water containing a little gum as in pure water. (Dalton, *loc. cit.*, p. 510.) Much more soluble in an aqueous solution of gelatin than in pure water. Readily soluble in most acids.

II.) *hydrated.* (*Hydrate of Lime.*) CaO, HO Soluble in 584 pts. of water at 15.56°, in 729 pts. of water at 54.44°, and in 952 pts. of water at 100°. (Dalton, in his *New System*, **2.** 510.) Largely soluble in an aqueous solution of acetate of soda. (Mercer, *Rep. Br. Assoc.*, 1844, p. 32.) Precipitated hydrate of lime is very readily soluble, even at the ordinary temperature, in an aqueous solution of chloride of ammonium. (H. Rose, *Tr.*) A solution of 1 pt. of caustic potash or soda in 100 pts. of water will not dissolve more than $\frac{1}{50000}$ pt. of hydrate of lime when the latter is mixed with it. Hydrate of lime is soluble in ammonia-water, however. (Pelouze, *Ann. Ch. et Phys.*, (3.) **33.** 11.) [But very dilute solutions of caustic potash or soda may be mixed with lime-water without occasioning any precipitate. F. H. S.] No precipitate is produced when a solution of a lime salt is treated with caustic potash or soda, if the solution is diluted with 50 pts. of water. (Bergman, cited by Berthollet, *Ann. de Chim.*, **37.** 166.) As soluble in an aqueous solution of caustic potash which has been prepared (by means of hydrate of lime) from 1 pt. of carbonate of potash and 50 pts. of water, as it is in pure water. (Berzelius's *Lehrb.*, **2.** 65.) Slightly soluble in an aqueous solution of waterglass (acid silicate of soda or potash). (Bolley; compare Ordway, *Am. J. Sci.*, (2.) **32.** 338; **33.** 33.)

*Per*OXIDE OF CALCIUM. Decomposed by water, especially when heated therewith to temperatures near 100°.
$Ca\ O_2 + H\ O$

OXIDE OF CAPROYL & OF ŒNANTHOYL. Soluble in spirit.
(*ŒnanthAcetone.*)



$C_{26}\ H_{26}\ O_2 = \left.\begin{matrix} C_{12}\ H_{13} \\ C_{14}\ H_{13} \end{matrix}\right\} O_2$

OXIDE OF CAPRYL. *Vid.* Oxide of Octyl.
$C_{16}\ H_{17}\ O$

OXIDE OF CARBON. *Vid.* Carbonic Oxide.

*Prot*OXIDE OF CERIUM.
(*Cerous Oxide.*)

I.) *hydrated.* Insoluble in water or in aqueous solutions of caustic potash or ammonia. Soluble in a solution of carbonate of ammonia. Readily soluble in acids. In presence of non-volatile organic matters like tartaric acid, it is not precipitated by ammonia, but potash precipitates it in spite of the presence of tartaric acid.
$Ce\ O, H\ O$

*Sesqui*OXIDE OF CERIUM.
(*Ceric Oxide.*)

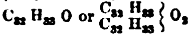
I.) *anhydrous.* Insoluble in water. After having been ignited, it is so little soluble in chlorhydric acid that only a faint trace dissolves on boiling; but if a little alcohol be added to the acid, the sesquioxide is reduced and solution ensues. It dissolves in concentrated sulphuric acid only when this is heated. Impure sesquioxide of cerium, containing oxide of lanthanum and oxide of didymium, dissolves easily in warm chlorhydric acid, with evolution of chlorine. (H. Rose, *Tr.*) Nearly insoluble in dilute acids. Nearly insoluble in nitric acid diluted with 100 pts. of water. Soluble in hot concentrated chlorhydric acid, chlorine being evolved and protochloride of cerium formed. Easily soluble in hot concentrated sulphuric acid.
$Ce_2\ O_3$

After having been calcined it is almost impossible to dissolve it, if it is pure, either in concentrated chlorhydric or nitric acids, even after long-continued boiling. (Marignac, *Ann. Ch. et Phys.*, (3.) **27.** 212.)

II.) *hydrated.* Insoluble in water. Soluble in concentrated acids; but not in dilute acids, with which it combines to form basic salts, a portion of it being dissolved only when oxide of lanthanum and oxide of didymium are present. (Mosander, cited by H. Rose, *Tr.*) Readily soluble in weak nitric or chlorhydric acid; but not in formic, acetic, or fluorhydric acids. (Ordway, *Am. J. Sci.*, (2.) **26.** 205.) Insoluble in aqueous solutions of the caustic alkalies or ammonia; but slightly soluble in solutions of the alkaline carbonates. (Dumas, *Tr.*, **7.** 222.) Somewhat soluble in an aqueous solution of carbonate of ammonia, those samples which are contaminated with lanthanum or didymium being much less soluble than the pure oxide. (H. Rose, *Tr.*)
$Ce_2\ O_3, 3\ H\ O$

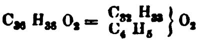
*Prot*OXIDE OF CERIUM with *Sesqui*OXIDE OF CERIUM. Dilute acids dissolve out Ce O, leaving $Ce_2\ O_3$; the latter being first attacked by concentrated acids. Soluble in chlorhydric acid, with evolution of chlorine. (Beringer.) When prepared by igniting the protonitrate, it is insoluble in chlorhydric acid alone; but when in fine powder, it dissolves with tolerable rapidity in chlorhydric acid which contains protochloride of iron. (Marignac, *Ann. Ch. et Phys.*, (3.) **27.** 223.)
(*CerosoCeric Oxide.*)
$3\ Ce\ O;\ 2\ Ce_2\ O_3$

OXIDE OF CETYL. Insoluble in water. Easily soluble in ether, and alcohol. Unacted upon by boiling chlorhydric or nitric acids, or by aqua-regia.
(*Cetylic Ether.*)



$C_{32}\ H_{33}\ O$ or $\left.\begin{matrix} C_{32}\ H_{33} \\ C_{32}\ H_{33} \end{matrix}\right\} O_2$

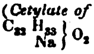
OXIDE OF CETYL & OF ETHYL. Easily soluble in alcohol, and ether. (Becker.)



$C_{36}\ H_{38}\ O_2 = \left.\begin{matrix} C_{32}\ H_{33} \\ C_4\ H_5 \end{matrix}\right\} O_2$

OXIDE OF CETYL & OF POTASSIUM.
(*Cetylate of Potash.*)

OXIDE OF CETYL & OF SODIUM. Unacted upon by boiling water. Decomposed by chlorhydric acid. (Fridau.) Unacted upon by boiling acids.
(*Cetylate of Soda.*)



$\left.\begin{matrix} C_{32}\ H_{33} \\ Na \end{matrix}\right\} O_2$

OXIDE OF *ter*CHLORACETOYL. *Vid.* ChlorOxethose.

OXIDE OF CHLORETHYL.
(*ChlorEtheral. Mono-chlorinated Vinic Ether. Oxychlorure d'Ethène. Oxyde d'Ethylchloré.*)
$C_4\ H_4\ Cl\ O$

OXIDE OF *bi*CHLORETHYL. Slowly soluble in water, with decomposition. Soluble in absolute alcohol. (Malaguti.)
(*Bichlorinated Vinic Ether. Oxyde d'ethyle bichloré.*)
$C_4\ H_3\ Cl_2, O$

OXIDE OF *per*CHLORETHYL. Insoluble in water. Soluble in alcohol. Unacted upon by a solution of caustic ammonia, and only very slightly attacked by an alcoholic solution of potash. (Malaguti, *Ann. Ch. et Phys.*, (3.) **16.** 18.)
(*Perchlorinated Vinic Ether. Chlorure de Chloroxethose. Oxyde d'ethyle perchloré.*)
$C_4\ Cl_5, O$

OXIDE OF CHLORINE. *Vid.* HypoChloric Acid.

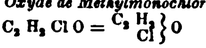
*Per*OXIDE OF CHLORINE. *Vid.* HypoChloric Acid.

OXIDE OF CHLOROBENZYLENE. *Vid.* Chloride of Benzoyl.

OXIDE OF *bi*CHLOROBENZYLENE. *Vid.* Chloride of ChloroBenzoyl.

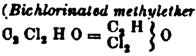
OXIDE OF *ter*CHLORO*bi*BROMETHYL. Insoluble in water. Soluble in alcohol. (Malaguti, *Ann. Ch. et Phys.*, (3.) **16.** 25.)
(*Bromide of Chloroxethose. Oxyde d'ethyle perchlorobromé.*)
$C_4\ Cl_3\ Br_2\ O$

OXIDE OF CHLOROMETHYL. Very slowly decomposed by cold water. (Regnault.)
(*Monochlorinated methylether. Oxyde de Methylmonochloré.*)



$C_2\ H_2\ Cl\ O = \left.\begin{matrix} C_2\ H_2 \\ Cl \end{matrix}\right\} O$

OXIDE OF *bi*CHLOROMETHYL.
(*Bichlorinated methylether.*)



$C_2\ Cl_2\ H\ O = \left.\begin{matrix} C_2\ H \\ Cl_2 \end{matrix}\right\} O$

OXIDE OF *ter*CHLOROMETHYL.
$C_2\ Cl_3\ O$

OXIDE OF CHLOROSULPHETHYL. Insoluble in water. Soluble in alcohol, and ether. (Malaguti.)
(*Chlorosulphovinic Ether. Etherchlorosulfuré.*)
$C_4\ H_3\ Cl\ S\ O$

*Prot*OXIDE OF CHROMIUM (hydrated). Decomposed by water, especially when this is boiling hot. (Péligot, *Ann. Ch. et Phys.*, (3.) **12.** 539.) Insoluble in dilute, slowly soluble in strong acids. Most of its salts are very sparingly soluble in cold water, but more readily soluble in hot water. (Moberg.)
(*Chromous oxide.*)
$Cr\ O, H\ O$

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*Sesqui*Oxide of Chromium (green modif).

a = anhydrous. Cr_2O_3 When prepared by gently igniting the hydrate, it is difficultly soluble in chlorhydric acid, but after having been strongly ignited it is insoluble in chlorhydric acid. (Fresenius, *Quant.*, p. 133.) If prepared by heating the hydrate only sufficiently to expel its water, it is easily soluble in acids, though much less so than the hydrate. But after strong ignition it is almost entirely insoluble in acids, though slowly dissolved by boiling sulphuric acid. (Gm.)

b = terhydrated. $Cr_2O_3, 3HO$ Insoluble in water. Easily soluble in cold solutions of caustic potash or soda; much less readily soluble in cold caustic ammonia; the presence of chloride of ammonium has no influence upon its solubility in ammonia. Easily soluble in acids. On boiling, it separates entirely from its solution in cold potash, soda, or ammonia. (Fresenius, *Quant.*, p. 132.) Hydrate of chromium is not soluble in potash-lye when in presence of oxide of lead or oxide of zinc, insoluble compounds with these oxides being formed. (Chancel.) If, after precipitation, it be thoroughly washed with water, it is perfectly insoluble in ammonia-water, even concentrated; but if acids, as chlorhydric, sulphuric, or nitric acids, be present the ammonia unites with them to form salts, in which terhydrate of chromium is soluble. (Vincent, *Phil. Mag.*, (4.) **14.** 192.) The purple modification of terhydrated sesquioxide of chromium is also, when pure, insoluble in ammonia-water. (Vincent, *loc. cit.*)

When precipitated by means of carbonate of ammonia from hot solutions, it is insoluble in weak acids; but when precipitated from cold solutions by caustic ammonia, it is soluble in dilute acids. (Ordway, *Am. J. Sci.*, (2.) **26.** 202.) Soluble in a cold aqueous solution of sinkalin, and is reprecipitated on boiling.

Insoluble in an aqueous solution of cyanide of potassium, but slightly soluble in a mixture of cyanhydric acid and cyanide of potassium. (F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4.** 99.) Insoluble in an aqueous solution of amylamin. (Wurtz.) It is not precipitated by ammonia-water from solutions which contain citrate of soda. (Spiller.)

A number of other hydrates have been described, and several chemists have attributed to the amount of water contained in them the variations in solubility, &c., which are exhibited by different samples of hydrated chromic oxide. It is probable, however, that these variations depend in great measure upon the condition of aggregation and allotropic state in which the sample may happen to be, rather than upon the amount of water with which it is combined. Thus: —

$Cr_2O_3, 4HO$ Insoluble in a solution of potash.

$Cr_2O_3, 5HO$

$Cr_2O_3, 6HO$

$Cr_2O_3, 8HO$ Entirely insoluble in alkaline solutions, being the hydrate which is precipitated when the alkaline solution of the 9 H O hydrate is boiled. (Fremy, *Ann. Ch. et Phys.*, (3.) **23.** 388.)

$Cr_2O_3, 9HO$ Insoluble in water. Readily soluble in cold solutions of the caustic alkalies, from which the 8 H O hydrate is precipitated on boiling the solution. (Fremy, *loc. cit.*)

Most of the salts of chromic oxide which are insoluble in water are readily soluble in chlorhydric acid.

*Prot*Oxide of Chromium with *Sesqui*Oxide of Chromium.
(*Chromoso Chromic Oxide.*
Magnetic Oxide of Chrome.)

I.) $Cr_3O_4 = CrO, Cr_2O_3$ But feebly attacked by acids. (Péligot, *Ann. Ch. et Phys.*, (3.) **12.** 540.)

II.) $2 \text{ (or 3) } CrO, Cr_2O_3$ Not soluble in any acid, or in aqua-regia. (Bunsen.)

*Bin*Oxide of Chromium. *Vid.* Chromate of Chromium.
(*Brown Oxide of Chromium.*)

*Prot*Oxide of Cobalt.
(*Cobalt Oxide. Cobaltous Oxide.*)

a = CoO Soluble in acids. After ignition it is insoluble in a solution of carbonate of potash.

Insoluble in aqueous solutions of chloride of ammonium or nitrate of ammonia, though the hydrated oxide is soluble. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 98.) Even after having been ignited, protoxide of cobalt dissolves in a hot aqueous solution of chloride of ammonium, ammonia being evolved. (H. Rose, *Tr.*) Soluble in boiling aqueous solutions of the nitrates of nickel, and cerium, the oxides in these salts being precipitated. (Persoz, *Chim. Moléc.*, p. 365.)

b = hydrated. CoO, HO Insoluble in water, or in a solution of caustic potash. (H. Rose, *Tr.*; Fresenius, *Quant.*, p. 138.) Soluble, to a considerable extent, in concentrated potash-lye. (Vœlker, *Ann. Ch. u. Pharm.*, 1846, **59.** 34.) [The remark of Sandrock (see under *sesqui*Oxide of Iron) attributing an analogous case of solution to silicic acid contained in the potash-lye may perhaps explain this instance also.] When recently precipitated it is soluble in paratartaric acid. Easily soluble in acids, and in solutions of sulphate, nitrate, and succinate of ammonia, and of chloride of ammonium. (Wittstein.) Soluble in aqueous solutions of caustic, and of carbonated ammonia, also soluble either when recently precipitated or dry, in a boiling solution of chloride of ammonium. (Demarçay, *Ann. der Pharm.*, 1834, **11.** 251.) Soluble in cold aqueous solutions of chloride of ammonium, and nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 98.) Readily soluble in an aqueous solution of cyanide of potassium. (F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4.** 98.) Soluble in a strong solution of carbonate of potash, also in solutions of caustic potash or soda, from which solutions water precipitates it. (Gmelin.) Many non-volatile organic substances, like tartaric acid, prevent its precipitation by the alkalies. (H. Rose, *Tr.*) It is not precipitated by caustic potash from solutions containing tartaric acid, or citrate of ammonia. (Spiller.) Insoluble in an aqueous solution of methylamin or of amylamin. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** pp. 452, 492.)

*Sesqui*Oxide of Cobalt.

a = anhydrous. Co_2O_3 Soluble in boiling concentrated chlorhydric acid.

b = hydrated. $Co_2O_3, 3HO$ Insoluble in water. Slowly soluble, without decomposition, in acetic acid. Soluble in cold phosphoric, arsenic, sulphuric, nitric, and chlorhydric acids, at first without decomposition, but by the action of heat and light reduction occurs. Racemic, citric, oxalic, and tartaric acids dissolve it, with reduction; it is also soluble in solutions of sulphurous and nitrous acids.

Its best solvent is acetic acid, which dissolves it

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slowly, but completely, without reduction, forming a solution which is not decomposed by boiling. Unacted upon by ammonia-water, even when this is boiling. Soluble, with decomposition, in an aqueous solution of oxalate of ammonia.

Insoluble in a boiling aqueous solution of chloride of ammonium. (H. Rose, *Tr.*)

*Prot*Oxide of Cobalt with *Sesqui*Oxide of Cobalt.

(*Magnetic Oxide of Cobalt.*
Cobaltoso Cobaltic Oxide.)

I.) $Co_3O_4 = CoO.Co_2O_3$

a = *anhydrous*. Insoluble in water, or in boiling chlorhydric or nitric acids, or in aqua-regia. Difficultly but completely soluble in concentrated sulphuric acid. (Schwarzenberg, *Ann. Ch. u. Pharm.*, **97.** 211.)

b = $Co_3O_4 + 3HO$ Soluble in oxalic acid. Soluble in chlorhydric acid, with evolution of chlorine. (Gibbs & Genth, *Smith. Contrib.*, vol. **9.**)

c = $Co_3O_4, 7HO$ Soluble in some of the weak acids, especially in acetic acid. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 261.)

II.) $Co_6O_7 = 4CoO, Co_2O_3$ Unacted upon by boiling nitric or sulphuric acids.

III.) $Co_8O_9 = 6CoO, Co_2O_3$

*Din*Oxide of Copper.

(*Sub Oxide of Copper. Red Oxide of Copper.*)

a = *anhydrous*. Permanent. Insoluble in water. Soluble in much concentrated chlorhydric acid, with combination. Decomposed by phosphoric, sulphuric, oxalic, tartaric, acetic, and other acids, especially by nitric acid even when very dilute. The native mineral is soluble in chlorhydric acid, and, with effervescence, in nitric acid.

Cu_2O

Soluble in a boiling aqueous solution of chloride of ammonium. (H. Rose, *Tr.*) Dinoxide of copper, both when recently precipitated or ignited, dissolves to a certain extent when boiled in an excess of potash-lye, — the solution is colorless. (Chodnew, *J. pr. Ch.*, 1843, **28.** 221.)

b = *hydrated*. Oxidizes in the air. Soluble in all the acids, even the weakest, with combination. (Fremy, *Ann. Ch. et Phys.*, (3.) **23.** 391.) Soluble in aqueous solutions of caustic ammonia and of carbonate of ammonia, also slightly in a solution of caustic potash. (Chodnew?)

*Prot*Oxide of Copper.

a = *anhydrous*. As good as insoluble in water. Easily soluble in acids, with combination and evolution of heat. Less easily soluble in ammonia-water.

CuO

Soluble in a cold aqueous solution of chloride of ammonium (Brett, *Phil. Mag.*, 1837, (3.) **10.** 335); a very free evolution of ammonia occurring when the solution is boiled. (L. Thompson, *Ibid.*, p. 179.) Ignited oxide of copper dissolves completely, though difficultly and slowly, in a boiling aqueous solution of chloride of ammonium, also, though more difficultly, in a solution of nitrate of ammonia. (H. Rose, *Tr.*) Soluble in boiling aqueous solutions of the nitrates and chlorhydrates of the sesquioxides of alumina, glucina, uranium, chromium, iron, and bismuth, the nitrates of the din- and protoxides of mercury, chloride of antimony, and the proto- and bichlorides of tin, with precipitation of the oxides contained in these salts; but is unacted upon by boiling solutions of the nitrates or chlorides of the protoxides of magnesia, manganese, cobalt, nickel, zinc, cerium, or iron, by the nitrates of silver, lead, or cadmium, dichloride of copper or the protochlorides of mercury or uranium. (Persoz, *Chim. Moléc.*, pp. 362, 363.) Slowly and sparingly soluble in cold, rapidly soluble in hot sulphurous acid, with decomposition. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 79.) Not only hydrate of copper, but even ignited oxide of copper, dissolves on continued boiling in potash-lye, and the more readily and abundantly in proportion as this is more concentrated. (Chodnew, *J. pr. Ch.*, 1843, **28.** 221.) Unlike the hydrated oxide, anhydrous oxide of copper, when heated with cane-sugar, resists its action; but a solution of saccharate of lime, or any other alkaline saccharate, boiled with it is capable of dissolving and deoxidizing it, though with more difficulty than the hydrate. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 155.)

b = *trihydrate*. Insoluble in water, or in dilute alkaline solutions. Easily soluble in a warm aqueous solution of chloride of ammonium. (H. Rose, *Tr.*) Much more difficultly soluble than the monohydrate (*c*) in an aqueous solution of caustic potash. (Chodnew, *J. pr. Ch.*, 1843, **28.** 220.)

(*Black Hydrate of Copper.*)
$3CuO, HO$

c = *monohydrate*. Insoluble in water. Decomposed on being boiled with water. Extremely easily soluble in acids. Soluble in ammonia-water, and in aqueous solutions of ammoniacal salts.

(*Blue Hydrate of Copper.*)
CuO, HO

Soluble in an aqueous solution of chloride of ammonium, even in the cold, and of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 98, 335.) When recently precipitated, and yet moist, a certain portion of it dissolves in an aqueous solution of cyanide of potassium. (F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4.** 96.) Tolerably soluble in an aqueous solution of amylamin. Easily soluble in a solution of methylamin; less easily soluble in a solution of ethylamin. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** pp. 452, 472.) Slightly soluble in aqueous solutions of the carbonates, and especially the bicarbonates of potash and soda. (Berzelius, *Lehrb.*, **2.** 559.)

Slightly soluble in cold aqueous solutions of caustic potash, and soda (Proust), but the solution is decomposed, and the oxide of copper precipitated, on boiling. (Berthollet.) A small quantity of oxide of copper dissolves in an excessively large proportion of a concentrated solution of caustic potash, forming a bluish liquor, from which it is not easy to precipitate the oxide of copper either by diluting with water or boiling. (H. Rose, *Tr.*) When a large excess of caustic potash is added to a cold, dilute solution of sulphate, nitrate, or chloride of copper, the precipitate which falls at first may be completely redissolved; the solution obtained is of a blue color, but contains much less copper than that obtained by ignition as described below; it is not rendered cloudy in the least by boiling, but becomes clearer; hence Proust's assertion, that water precipitates oxide of copper from it, is not corroborated. (Chodnew, *J. pr. Ch.*, 1843, **28.** pp. 220, 221.) When a nitric-acid solution of copper is treated with an excess of caustic potash, free from carbonate, and the mixture filtered, there is obtained a lilac-colored filtrate which contains copper. This experiment shows that, contrary to the ordinary opinion, recently precipitated hydrate of copper is soluble in caustic potash which contains no carbonate of potash. (Roloff, *Gehlen's N. all. Journ.*,

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der Ch., **6.** 440 [Ch.].) Soluble to a considerable extent in concentrated potash-lye, and the solution may be diluted with much water, or evaporated to dryness, without depositing the oxide of copper. (Vœlker, *Ann. Ch. u. Pharm.*, 1846, **59.** 34.) Insoluble in aqueous solutions of caustic potash or soda, unless these contain organic matter, in which case a portion of the oxide dissolves. It is reprecipitated, however, on the addition of water. (Berzelius, *Lehrb.*, **2.** 558.) According to Vœlker (*loc. cit.*), the presence of organic matter is not necessary for the solution of oxide of copper in caustic potash, and this statement of Berzelius consequently erroneous. When protoxide or dinoxide of copper, or metallic copper, are ignited with pure hydrate of potash, the melted mass allowed to cool, and then treated with water, no inconsiderable amount of protoxide of copper will be dissolved, a bluish solution being obtained, and this solution, if immediately filtered off, is not decomposed by the further addition of water, but remains clear, no matter how much of the latter is added. But if, instead of being filtered directly, the blue solution is allowed to stand in contact with the insoluble portion of oxide of copper which has not entered into combination with the potash, it becomes completely colorless in the course of a few days, and no longer contains any copper. The presence of some carbonate of potash does not interfere with the above reactions. If the solution is neutralized with chlorhydric acid, most of the copper is precipitated as hydrate; but, as is usual in concentrated saline solutions, some of the copper remains dissolved. (Chodnew, *J. pr. Ch.*, 1843, **28.** pp. 219, 220.) Entirely soluble in very concentrated solutions of caustic potash, but this solution is readily decomposed when gently heated. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 510.)

Largely soluble in an aqueous solution of acetate of soda. (Mercer, *Rep. Br. Assoc.*, 1844, p. 32.) Somewhat soluble in an aqueous solution of waterglass (acid silicate of soda or potash). (Ordway, *Am. J. Sci.*, (2.) **32.** 338; compare *Ibid.*, **33.** 33.) Soluble in an aqueous solution of sorbin. (Pelouze.) It is not precipitated from solutions which contain citrate of soda. (Spiller.)

Insoluble in an aqueous solution of cane-sugar, unless an alkali or alkaline earth be also present. (Peschier.) Recently precipitated hydrate of copper dissolves abundantly in mixed solutions of cane-sugar and a caustic alkali, as potash, soda, or lime; but only sparingly in mixed solutions of sugar and baryta or strontia; on boiling these solutions dinoxide of copper is precipitated after a time. (Becquerel.) Hydrate of copper is not precipitated on the addition of caustic potash or soda from solutions which contain tartaric acid, cane-sugar, and many other non-volatile organic substances; in presence of certain other organic bodies, like grape-sugar, the dinoxide is precipitated on adding potash to solutions of salts of protoxide of copper.

Soluble, with combination, in aqueous solutions of the sucrates of lime, baryta, strontia, potash, and soda, precipitates of double sucrates being formed when the solutions of the first three of these are heated, but no precipitate is formed at 100° in the two last-mentioned solutions, unless an excess of free sugar be present, in which event dinoxide of copper falls. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** pp. 153, 156.) A portion of hydrated oxide of copper having been agitated with a strong solution of sugar in the cold during three days without any effect, the mixture was then brought to boil; and though none of the hydrate was dissolved, yet it did not part with its water, and become brown as in ordinary cases, though after a time dinoxide of copper was formed. But if prior to the boiling the smallest quantity of potash or other alkali had been added, a part of the hydrate would have been immediately dissolved, then acted upon by the free sugar present and precipitated as dinoxide. (Hunton, *loc. cit.*, p. 154.) Insoluble in simple aqueous solutions of the sucrates of potash, baryta, and lime, but dissolves immediately in mixtures of these with an excess of cane-sugar. (Peligot.)

Those of the salts of protoxide of copper which are insoluble in water are soluble in sulphuric, chlorhydric, and nitric acids, or, at all events, give up their copper to the acid.

***Per*Oxide of Copper.** Insoluble in water.
$Cu\,O_2$ Decomposed by acids. (Thénard.)

Oxide of Copper & of Cupr(*ic*)ammonium.
$2\left(N\left\{\begin{matrix}H_3\\Cu\end{matrix}\right)O,\ Cu\,O,\ +\ 6\ Aq\right.$ Insoluble in water. (Kane.)

Oxide of Copper with Sulphate of Lead.
$Cu\,O,\ H\,O;\ Pb\,O,\ S\,O_3$ Occurs as the mineral *Linarite*. Nitric acid dissolves out the copper, leaving sulphate of lead.

Oxide of Cresyl & of Ethyl.

Oxide of Cumoyl & of Potassium. Decomposed by water. (Gerhardt & Chiozza.)
(*Cuminol Potassium.*)
$C_{20}\,H_{11}\,K\,O_2 = \left.\begin{matrix}C_{20}\,H_{11}\\K\end{matrix}\right\}O_2$

Oxide of Cupr(*ic*)*bi*amin. Deliquescent, with decomposition. Very readily decomposed by water. Soluble in ammonia-water. (Malaguti & Sarzeau, *Ann. Ch. et Phys.*, (3.) **9.** pp. 436, 438.)
$N_2\left\{H_6\,.\,Cu\,O + 4\,Aq\right.$

***Prot*Oxide of Didymium.**

a = anhydrous. Insoluble in water. Soluble
$Di\,O$ in boiling aqueous solutions of ammoniacal salts. Very easily soluble in dilute acids, even after having been strongly ignited. (Marignac, *Ann. Ch. et Phys.*, (3.) **38.** 156.) The ignited oxide is, however, less soluble in dilute nitric acid than protoxide of lanthanum. (Marignac, *Ibid.*, (3.) **27.** 226.) The ignited oxide is readily soluble in acids, even dilute, being more soluble in dilute acids than oxide of cerium, but less so than oxide of lanthanum. Soluble in a mixed aqueous solution of chloride of potassium, chlorite of lime, and chloride of lanthanum.

b = hydrated. Insoluble in water. (Marignac,
$Di\,O,\ H\,O$ *loc. cit.*, (3.) **38.** 156.) Insoluble in aqueous solutions of caustic potash or ammonia, but is slightly soluble at the ordinary temperature in a solution of chloride of ammonium. (H. Rose, *Tr.*)

***Per*Oxide of Didymium.** Soluble, with de-
$Di\,O_x$ composition, in dilute acids; also soluble in boiling aqueous solutions of ammoniacal salts. (Marignac, *Ann. Ch. et Phys.*, (3.) **38.** 156.)

Oxide of Erbium. Readily soluble in acids.
$E\,O$ (H. Rose, *Tr.*)

Oxide of Ethyl. Soluble in 9 pts. of water; in 10 pts. (Dalton); in 14 pts. (Boullay); in about 10 pts. at the ordinary temperature. (De Lauraguais, *Mem. Paris*, 1758, p. 29. [T.].) The sp. gr. of this solution is 0.96, and it boils at 95°, with evolution of ether. (Dalton.) Soluble in 10 pts. of water at 18.75°. (Abl, from
(*Ether. Vinic Ether. Sulphuric Ether. Ethylic Oxide.*)
$C_4\,H_5\,O$ or $\left.\begin{matrix}C_4\,H_5\,O\\C_4\,H_5\,O\end{matrix}\right\}$

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Œsterr. Zeitschrift für Pharm., **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) The aqueous solution saturated at 12° is of 0.983 sp. gr.: this agrees with the determination of Boullay, that water can take up $\frac{1}{14}$ of ether, for, taking the sp. gr. of ether as 0.729, the calculated sp. gr. of B.'s solution would be 0.982. At higher temperatures ether is less soluble in water, hence the solution saturated at 12° becomes cloudy even from the warmth of the hand. (Schiff, *Ann. Ch. u. Pharm.*, 1859, **111.** 374.)

An alcoholic solution of sp. gr.	Contains of ether per cent.
0.720	100
0.732	90
0.744	80
0.756	70
0.768	60
0.780	50
0.792	40
0.804	30
0.816	20
0.828	10
0.830	0

(Dalton, [*T.*] See also Schiff's table and formulæ under ALCOHOL.) Miscible in all proportions with alcohol, methylal, bisulphide of methyl, sulphocyanide of methyl, bisulphide of carbon, and liquid carbonic acid (Thilorier); also in all proportions with naphtha. Miscible, with the aqueous solution of chlorhydric acid. (Boullay.) A saturated aqueous solution of acetate of potash causes ether to separate from its alcoholic solution better than pure water.

Ether dissolves many organic compounds, as the volatile oils, resins, fats, alcohols, acetone, lignone, tannic acid, and most of the alkaloids; most highly hydrogenized substances, as resins, fats, &c., which are but sparingly soluble in alcohol, while it is without action upon many substances which dissolve in alcohol.

OXIDE OF *tri*ETHYLAMYLPHOSPHONIUM (hydrated). Soluble in water.
$P\left\{\begin{matrix}(C_4H_5)_3\\ C_{10}H_{11}\end{matrix}\right. . O, HO$

OXIDE OF ETHYL*Chloré*. *Vid.* Oxide of ChlorEthyl.

OXIDE OF ETHYL*perChloréBromé*. *Vid.* Oxide of *ter*Chloro*bi*BromEthyl.

OXIDE OF ETHYL*ChloroSulfuré*. *Vid.* Oxide of ChloroSulphEthyl.

OXIDE OF ETHYL*Sulfuré*. *Vid.* Oxide of *bi*SulphEthyl.

OXIDE OF ETHYL & OF METHYL. Only slightly soluble in water.
(*Vinomethylic Ether. Ethylate of Methyl. Methylate of Ethyl. Vinomethylide.*)
$C_6H_8O_2 = \left.\begin{matrix}C_2H_3\\ C_4H_5\end{matrix}\right\} O_2$

OXIDE OF ETHYL & OF OCTYL. Insoluble in water. Readily soluble in alcohol, and ether.
(*Oxide of Capryl & of Ethyl. EthylCaprylic Ether.*)
$C_{20}H_{22}O_2 = \left.\begin{matrix}C_{16}H_{17}\\ C_4H_5\end{matrix}\right\} O_2$

OXIDE OF ETHYL & OF POTASSIUM. Decomposed by water. Soluble in alcohol.
(*Ethylate of Potash. Alcool potassée.*)
$\left.\begin{matrix}C_4H_5\\ K\end{matrix}\right\} O_2$

OXIDE OF ETHYL & OF SODIUM. Decomposed by water. Soluble in alcohol.

OXIDE OF ETHYL & OF SULPHOBENZOYL. *Vid.* SulphoBenzoate of Ethyl.

OXIDE OF ETHYL & OF TOLUENYL. Insoluble in water. (Cannizzaro.)
(*EthylToluenyl Ether. EthyloBenzylic Ether. VinoBenzylic Ether. Benzylovinic Ether. Benzylate of Ethyl. Ethylate of Benzyl.*)
$C_{18}H_{12}O_2 = \left.\begin{matrix}C_4H_5\\ C_{14}H_7\end{matrix}\right\} O_2$

OXIDE OF ETHYL with ZINCMETHYL.
$2\,C_4H_6Zn_2 ; C_8H_{10}O_2$

OXIDE OF *tri*ETHYLMETHYLPHOSPHONIUM (hydrated). Soluble in water.

OXIDE OF ETHYL*tri*PHENYLAMMONIUM (hydrated). Sparingly soluble in water; the solution undergoing decomposition when boiled. Easily soluble in alcohol. (Gœssmann.)

OXIDE OF *tri*ETHYLPHOSPHIN. Very readily deliquescent. Soluble in all proportions in water, and alcohol; less soluble in ether. Readily soluble in acids. Insoluble in concentrated potash-lye. (Hofmann.)
$P\left\{(C_4H_5)_3O_2\right.$

OXIDE of *tetra*ETHYLPHOSPHONIUM (hydrated). Very deliquescent. Soluble in water. (Hofmann & Cahours.)
$P\left\{(C_4H_5)_4O, HO\right.$

OXIDE OF FUSCOCOBALT(*iaque*). Not isolated. The salts of fuscocobalt are soluble in water, from which they are precipitated on the addition of alcohol. Slowly decomposed by ebullition. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** pp. 286, 310.)

OXIDE OF GLUCINUM.
(*Glucina.*)

a = *anhydrous.* Difficultly soluble in acids, after it has been ignited, especially in nitric acid; but boiling concentrated nitric acid dissolves it with tolerable rapidity. (Debray, *Ann. Ch. et Phys.*, (3.) **44.** 15.) Slowly but completely soluble in acids, after ignition. (Schaffgotsch.) Insoluble in water. Soluble in acids, often with much difficulty after having been ignited. When obtained by igniting sulphate of glucina at a white heat, it is soluble in chlorhydric acid, though complete solution can be effected only by long-continued digestion; it is also very difficultly soluble in sulphuric acid. But strongly ignited glucina may readily be dissolved by fusing it with bisulphate of potash, and treating the mass with water. After having been ignited at a white heat, it is completely insoluble in a boiling concentrated aqueous solution of chloride of ammonium. (H. Rose, *Tr.*) After having been ignited, it is insoluble either in hot or cold potash-lye, and is almost insoluble in a solution of carbonate of ammonia. (H. Rose, *Tr.*)
Gl_2O_3

b = *hydrated.* Insoluble in water. Soluble in cold alkaline solutions, excepting ammonia. It is reprecipitated from its alkaline solutions on the addition of chloride of ammonium. On boiling the solution in dilute caustic potash or soda, the hydrate of glucina is completely reprecipitated after a time; the solution in concentrated caustic potash, on the other hand, may be boiled without precipitating it, though on diluting with water and again boiling precipitation occurs. There is a certain degree of dilution at which the precipitation is most rapid and complete, while in presence of a larger or smaller amount of water the separation is only imperfect. After having thus been precipitated from an alkaline solution, it is insoluble in cold concentrated potash-lye, but dissolves therein on boiling. The hydrate is also soluble in aqueous solutions of the alkaline carbonates, especially of
$Gl_2O_3, 3HO$

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carbonate of ammonia, excepting that which has been precipitated from a boiling alkaline solution, which is insoluble. This last is, however, easily soluble in acids. (Berzelius, *Lehrb.*, **2.** 170.) On cooling the alkaline liquor from which the glucina has been precipitated by boiling, only very little of the latter is redissolved, unless its quantity is relatively very small, but in cases where only a few particles of the hydrate are present they disappear on cooling, and reappear on heating the liquid. Hydrate of glucina, thus precipitated and washed to remove adhering potash, dissolves readily in a cold solution of caustic potash, but it does not thus dissolve unless it has been washed. (H. Rose, *Tr.*, **1.** 48.) Readily soluble in acids. Soluble in an aqueous solution of carbonate of ammonia, unless it has been precipitated by boiling from an alkaline solution (or been ignited) in which case it is very sparingly dissolved, — with solutions of carbonate of potash and caustic potash the same reactions occur. (Schaffgotsch.) Very slightly soluble in an aqueous solution of carbonate of lithia. (C. Gmelin.) Soluble in sulphurous acid. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 75.)

Soluble in boiling aqueous solutions of the nitrates and chlorhydrates of the sesquioxides of alumina, uranium, iron, chromium, and bismuth, the nitrates of *din* and *prot*oxide of mercury, in bichloride of tin and perchloride of antimony, the oxides in these salts being meanwhile precipitated. (Persoz, *Chim. Molec.*, pp. 366, 367.) Soluble in baryta-water, from which it is reprecipitated on the addition of an ammoniacal salt, but is not precipitated by boiling. (H. Rose, *Tr.*) As obtained on precipitating by boiling its solution in carbonate of potash, it is soluble in a solution of caustic potash. (H. Rose, *Tr.*) When recently prepared, it dissolves completely, though very slowly, in a boiling aqueous solution of chloride of ammonium, ammonia being evolved. (H. Rose, *Tr.*)

Oxide of Glyceryl. Soluble in ether.
(Glyceryl Ether.)
$C_{12}H_{10}O_6 = (C_6H_5''')_2, O_6$

***Prot*Oxide of Gold.** After it has been dried
(Aurous Oxide.)
$Au O, H O$

it is completely insoluble in water. But if at the moment of its preparation it be placed in contact with distilled water, it appears sometimes to dissolve, forming a colored solution. This solution may remain limpid during two or three days, but at the end of this time the oxide will be entirely precipitated. If a soluble salt be added to the solution while it is warm, the oxide will be instantly precipitated. This apparent solubility seems to be analogous to that presented by Prussian blue, several metallic oxides, purple of Cassius, iodide of starch, or perhaps even starch itself. (L. Figuier, *Ann. Ch. et Phys.*, (3.) **11.** 337.) [F. says Berzelius operated on an impure substance.] In general, it is insoluble in water or alcohol (which has no action upon it). (Figuier, *loc. cit.*) Decomposed by chlorhydric acid (Berzelius), slowly in the cold, at once when heated. (Figuier, *loc. cit.*) Soluble in iodhydric, and bromhydric acids, with combination. Unacted upon by sulphuric, nitric, acetic, or tartaric acids. Soluble in cold aqua-regia. When in the nascent state, it dissolves in solutions of caustic potash, and soda. It combines with ammonia, forming an explosive compound. (Figuier, *loc. cit.*) Slightly soluble in an aqueous solution of caustic potash, but the solution soon undergoes decomposition, with deposition of metallic gold. (Berzelius, *Lehrb.*) Insoluble in water, but sometimes remains suspended for a long time in water, from which it may readily be separated, however, by the action of heat. Insoluble in the oxyacids, even when these are concentrated. (H. Rose, *Tr.*)

"*Intermediate Oxide of Gold*," $Au_2 O_2$ Is now admitted to have been a mixture.

***Ter*Oxide of Gold.** Insoluble in water, and
(Sesqui Oxide of Gold. Auric Acid. Auric Oxide.)
$Au O_3 \& + H O$

in most acids. Easily soluble in concentrated nitric acid, from which water precipitates it. Soluble in chlorhydric, and bromhydric acids. Decomposed when boiled with iodhydric acid. Fluorhydric acid dissolves a trace of it. Easily soluble in solutions of potash and soda. (Fremy, *Ann. Ch. et Phys.*, (3.) **31.** 482.) Unacted upon by cold, decomposed by boiling alcohol. Soluble, with decomposition and combination, in boiling alkaline liquors when precipitated in their presence. When in the gelatinous state (from the decomposition of an aurate) it is easily soluble in caustic potash, but when precipitated at the temperature of boiling from a neutral mixture of terchloride of gold and carbonate of soda, it is very difficultly soluble in a solution of potash. (L. Figuier, *Ann. Ch. et Phys.*, (3.) **11.** 361.) A solution of gold in aqua-regia is only imperfectly precipitated by alkaline solutions, a part of the precipitate being redissolved by the precipitant. (Bergman, *Essays*, **1.** 54.) Recently precipitated hydrate of gold is almost entirely insoluble in a cold aqueous solution of hydrate of potash, but on boiling it for a long time in the latter a large quantity may be dissolved. It is insoluble in ammonia-water, or in solutions of the alkaline bicarbonates. (H. Rose, *Tr.*) As precipitated from its solution in acetic acid, it is soluble in a solution of caustic potash, and in solutions of the alkaline carbonates. (H. Rose, *Tr.*) Hydrate of gold is soluble, with combination, in aqueous solutions of the cyanides of potassium, and of ammonium. (Himly, *Ann. Ch. u. Pharm.*, **42.** pp. 158, 343.) Soluble in an aqueous solution of cyanide of potassium.

The hydrated oxide is easily soluble in chlorhydric acid, but only in a large excess of nitric, or sulphuric acid. It is not acted upon by phosphoric, carbonic, or boracic acids. Most vegetable acids readily reduce it. Sparingly soluble in boiling aqueous solutions of chloride of potassium or chloride of sodium. (Pelletier.) Soluble in selenic acid. (Mitscherlich.)

Hydrated oxide of gold, even when recently precipitated, is almost insoluble in most of the acids. Concentrated sulphuric acid dissolves a small quantity of it, but this may be reprecipitated on diluting with water. Insoluble in dilute nitric acid. Fuming nitric acid dissolves a minute trace of it. Both sulphuric and nitric acids precipitate it from its solution in caustic potash, and when added in excess only dissolve very small quantities of the precipitated oxide. Scarcely, or not at all, attacked by phosphoric acid. Insoluble in fluorhydric acid. Of all the oxyacids acetic acid dissolves the most oxide of gold, when the hydrate is digested with it in the cold for a long time. After prolonged standing a portion of the sesquioxide separates out again, part of it being reduced to the metallic state; on boiling the solution a precipitate of sesquioxide falls at once, but it cannot all be separated thus. On adding acetic acid

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to the solution of oxide of gold in caustic potash the hydrated oxide is precipitated, but a tolerably large proportion of it redissolves, even in the cold, on adding an excess of acetic acid. Oxalic acid reduces it at once. Its best solvent is chlorhydric acid, which dissolves it easily and rapidly. (H. Rose, *Tr.*)

*Per*Oxide of Hydrogen. Miscible in all HO_2 proportions with water. Combines with hydrated acids, as phosphoric, sulphuric, chlorhydric, fluorhydric, nitric, oxalic, citric, and acetic acid.

Oxide of Iodine. Soluble in water.
(*Iodic Oxide.*)

*Prot*Oxide of Iridium. The anhydrous oxide IrO, & $+ HO$ is very sparingly soluble in boiling acids; the hydrate is more readily soluble in acids than the anhydrous oxide; it is also soluble in aqueous solutions of potash, and soda.

*Sesqui*Oxide of Iridium.

a = *anhydrous.* Insoluble in water or acids; Ir_2O_3 and even in fused bisulphate of potash.

b = *hydrated.* Insoluble in water. Soluble in Ir_2O_3, HO acids; and in aqueous solutions of potash, soda, and ammonia.

*Bin*Oxide of Iridium.

a = *anhydrous.* Insoluble in acids.
IrO_2

b = *hydrated.* Almost completely insoluble in $IrO_2, 2HO$ dilute sulphuric or nitric acid. Slowly but completely soluble in chlorhydric acid. (Claus.) It appears to be soluble in aqueous solutions of the caustic and carbonated alkalies. (Berzelius.)

*Ter*Oxide of Iridium. *Vid.* Iridic Acid.

"*Blue*Oxide of Iridium." Soluble in acids, especially in chlorhydric acid.

*Sub*Oxide of Iron. Difficultly soluble in Fe_4O dilute sulphuric or chlorhydric acid. Easily soluble in nitric acid. (Marchand.)

*Prot*Oxide of Iron.

a = *anhydrous.* After ignition it is only difficultly FeO soluble in acids. (Berzelius, *Lehrb.*)

b = *hydrated.* Soluble in about 150000 parts FeO, HO of water, the solution decomposing in contact with the air. (Bineau, *C. R.*, **41.** 510.) Readily soluble in acids. Partially soluble in ammonia-water. Soluble in a solution of chloride of ammonium.

Does not appear to be soluble in aqueous solutions of chloride of ammonium or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.) It is not completely precipitated by potash from solutions which contain chloride of ammonium, and not at all by ammonia, if a sufficient quantity of the chloride has been added. After having once been precipitated by ammonia, a great part of it, but not the whole, can be dissolved by adding chloride of ammonium. (H. Rose, *Tr.*)

Soluble to a slight extent in an aqueous solution of waterglass (acid silicate of soda or potash), the more readily in proportion as this solution is more concentrated; such solutions may be freed from iron by precipitating a fraction of the silicate with alcohol, the iron going down with the first portions of the silicate. (Ordway, *Am. J. Sci.*, (2.) **32.** pp. 338, 353, 162, & **33.** 33.) Sparingly soluble in a solution of acetate of soda. (Mercer.) It is not precipitated by potash or soda from solutions containing citrate of soda. (Spiller.) When freshly precipitated hydrate of protoxide of iron is treated with a mixed solution of cane-sugar and potash, a trace of it is dissolved; but it is not soluble even in a boiling solution of pure cane-sugar. Even when the hydrate is precipitated, by means of potash, from some one of its combinations in presence of a solution of cane-sugar, the amount of iron dissolved is extremely small, and this appears to be held in solution by the alkali. (Gladstone, *J. Ch. Soc.*, **7.** 197.) In presence of some non-volatile organic substances it is not precipitated by the caustic alkalies; thus, from a solution containing much tartaric acid ammonia does not precipitate it. (H. Rose, *Tr.*)

Those of the salts of protoxide of iron which are insoluble in water dissolve in chlorhydric acid.

*Sesqui*Oxide of Iron.
(*PerOxide of Iron. Ferric Oxide.*)

a = *anhydrous.* After having been ignited it is Fe_2O_3 only slowly soluble in acids, but is much more soluble in chlorhydric than in nitric acid. Slowly soluble in dilute, more rapidly in concentrated chlorhydric acid, and more rapidly when gently heated than when boiled. (Fresenius, *Quant.*, p. 140.) Very slowly soluble in acids, unless they are concentrated, but is very much more easily soluble than the ignited protoxide, although the affinity of the sesquioxide for acids is less than that of the protoxide. (Berzelius, *Lehrb.*, **2.** 707.) Sesquioxide of iron does not dissolve in a solution of chloride of ammonium, even when this is warm. (H. Rose, *Tr.*) Ignited sesquioxide of iron is insoluble in an aqueous solution of caustic potash. (Chodnew, *J. pr. Ch.*, 1843, **28.** 222.) As it occurs in nature (*Hematite, red iron ore, specular iron, &c.*) the oxide dissolves rather easily in hot chlorhydric acid, but is not very readily soluble in acids.

b = *terhydrated.* Insoluble in water, or in solutions of the alkalies, or of ammoniacal salts.
(*Ordinary Hydrated Oxide of Iron.*)
$Fe_2O_3, 3HO$

When recently precipitated it is readily soluble in acids. (Fresenius, *Quant.*, p. 139.) Slightly soluble in aqueous solutions of ammonia and of ammoniacal salts. (Odling.) Does not appear to be soluble in aqueous solutions of chloride of ammonium or carbonate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.) Slightly soluble in a concentrated aqueous solution of caustic potash, but insoluble in a dilute solution. Solutions may be obtained either by boiling the recently precipitated hydrate with potash-lye, or by igniting it with caustic potash and treating the cooled mass with water; they are colorless. (Chodnew, *J. pr. Ch.*, 1843, **28.** pp. 221, 222.) Recently precipitated oxide of iron is slightly soluble in highly-concentrated potash-lye, free from carbonic acid; on passing a certain quantity of carbonic acid into this solution, oxide of iron separates out. (Vœlker, *Ann. Ch. u. Pharm.*, 1846, **59.** 34.) Sandrock denies the truth of the above assertions, maintaining that the solubility of hydrate of iron in solutions of caustic potash depends upon the silicic acid with which the latter is usually contaminated. Slightly soluble in strong solutions of the alkaline carbonates. Not soluble in a strong aqueous solution of carbonate of potash unless this be added in excess to a solution containing iron.

Freshly precipitated hydrate of iron is not at all acted upon by strong solutions of carbonate of potash. (Grotthaus.) Hydrated sesquioxide of iron is not soluble in a concentrated aqueous solution of carbonate of potash, but when the solution

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of a salt of sesquioxide of iron is supersaturated with carbonate of potash, the hydrate at first precipitated redissolves: it is again thrown down, however, on heating the solution or diluting it with water. (Thomson's *System of Chem.*, London, 1831, **2.** 779.) Readily soluble in a concentrated aqueous solution of carbonate of ammonia, and is again precipitated when the solution is diluted with water. (Thomson's *System of Chem.*, London, 1831, **2.** 777.) When precipitated by carbonate of ammonia, oxide of iron is easily soluble in an excess of the precipitant. (Wœhler, *Ann. Ch. u. Pharm.*, 1840, **34.** 235.) Completely soluble in a large excess of carbonate of ammonia; on adding pure ammonia to this solution no immediate precipitate is formed, but after some time the sesquioxide separates out completely. (H. Rose, *Tr.*) Soluble in aqueous solutions of the alkaline bicarbonates, with combination. (Berzelius, *Lehrb.*, **3.** 626.) [Compare Carbonate of Iron.] Soluble in aqueous solutions of water-glass (acid silicate of soda or potash). (Ordway. See under *Prot*Oxide of Iron.)

Insoluble in fumaric acid, even when recently precipitated. When recently precipitated it is easily soluble in an aqueous solution of bitartrate of potash, but after having been dried it is very difficultly soluble therein. So also it is easily soluble in tartaric acid while moist, but after drying it is scarcely at all soluble in cold and only very sparingly soluble in boiling tartaric acid. (Werther.) Easily soluble in acetic, citric, and other acids. (Wittstein.) Moist hydrate of sesquioxide of iron is immediately dissolved by sulphurous acid, and even the native hydrate is sensibly soluble therein. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 78.) Carbonic-acid water takes up scarcely any sesquioxide of iron, except at the instant of its precipitation. This statement refers to well-washed carbonic acid, for if not thus purified, and contaminated with the mineral acid by which it was prepared, it would, of course, exert a solvent action. (Bergman, *Essays*, **1.** pp. 49, 50.)

Sparingly soluble in a solution of carbonate of magnesia. (Bischof.) Insoluble in aqueous solutions of ethylamin or of amylamin. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** pp. 472, 492.) Soluble in a boiling solution of nitrate of bismuth, oxide of bismuth being precipitated. (Persoz, *Chim. Moléc.*, p. 366.) Easily soluble in aqueous solutions of the sucrates of lime, baryta, strontia, potash and soda, being at the same time reduced to protoxide, while soluble double sucrates are formed. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** pp. 155, 156.) Unacted upon by an aqueous solution of cane-sugar. (Gladstone.) Slightly soluble in an aqueous solution of cane-sugar, from which solution the iron can be precipitated by sulphide of ammonium, but not by caustic ammonia, nor by ferrocyanide of potassium. (Peschier.)

Many organic substances prevent the precipitation of oxide of iron from its solutions: thus, in presence of tartaric acid, sugar, &c., it is not precipitated by the alkalies or alkaline carbonates; in presence of oxalic acid it is not precipitated by ferrocyanide or by sulphocyanide of potassium. (*Ot. Gr.*) It is not precipitated by ammonia from solutions containing pyrophosphate of soda. (H. Rose, *Pogg. Ann.*, 1849, **76.** 19.) It is not precipitated by ammonia from solutions containing citrate of soda. (Spiller.) Nor is it precipitated by the alkalies from solutions containing pectic acid. (H. Rose.)

After standing under water for a long time it becomes crystalline, and passes into the hydrate $2\,Fe_2\,O_3, 3\,H\,O$, and is no longer soluble in acetic acid. (Wittstein.) Dry hydrate of iron which has been exposed for some time to sunlight ceases to be soluble in acetic acid. (Bergman, *Essays*, **1.** 163.) Hydrated oxide of iron is, in certain cases, either insoluble or but very sparingly soluble in strong acetic acid: according to Trautwein, only the true terhydrate is abundantly soluble. Jansenn, on the other hand, thinks that as the basic chlorhydrates and sulphates of sesquioxide of iron are but sparingly soluble in acetic acid, the presence of these compounds is to be suspected in the difficultly soluble samples of the hydrate. He maintains also that when an excess of alkali has been used to precipitate the hydrate, that the latter contains a portion of the alkali in combination, and that this compound is difficultly soluble in acetic acid.

When recently precipitated by alkalies in the cold, it is easily soluble in dilute acids. But when prepared by boiling very dilute solutions of its salts, it is but slowly soluble in dilute acids. That also which is deposited from the oxidation of a solution of protoxide of iron exposed to the air is in the difficultly soluble modification. (Ordway, *Am. J. Sci.*, (2.) **26.** 199.) If recently precipitated hydrate of iron be boiled with water during 7 or 8 hours its properties will be materially changed, it being now scarcely at all acted upon by boiling concentrated nitric acid, and soluble in concentrated chlorhydric acid only after long-continued digestion or boiling. It is soluble, however, in acetic, or dilute chlorhydric, or nitric acids, from which solutions it is precipitated by the addition of small quantities of alkaline salts or of sulphates, or by concentrated chlorhydric or nitric acids, the precipitate thus obtained redissolving on the addition of much water. (Pean de Saint-Gilles, *Ann. Ch. et Phys.*, (3.) **46.** 47.) If a solution of acetate of sesquioxide of iron is maintained at a temperature approaching 100° during several hours, its properties are entirely changed. The addition of a trace of sulphuric acid or of an alkaline salt causes the precipitation of a hydrate of iron which is insoluble in cold acids. Dilute nitric or chlorhydric acids do not precipitate anything from the changed solution of acetate of iron, but when these acids are concentrated they produce a precipitate which is soluble in pure water after it has been dried; and the new solution thus obtained is again precipitated by concentrated chlorhydric and nitric acids, but not by alcohol. On the other hand, on the addition of the slightest trace of a salt (even calcareous water) all the hydrate of iron is precipitated, as it is also when the solution is boiled. The composition of this hydrate is probably $Fe_2\,O_3, H\,O$. (Pean de St.-Gilles, *loc. cit.*)

Other hydrates of iron have been described, as,

$2\,Fe_2\,O_3, 3\,H\,O$ Much less easily soluble in acetic and citric acids than the terhydrate. (Wittstein.)

*Prot*Oxide of Iron with *Sesqui*Oxide of Iron.
(*FerrosoFerric Oxide.*)
$Fe_3\,O_4 = Fe\,O, Fe_2\,O_3\ \&\ + H\,O$

Insoluble in water. Soluble in chlorhydric acid, with decomposition, the Fe O being dissolved more rapidly than $Fe_2\,O_3$. (Berzelius, *Lehrb.*, **2.** 710.) Insoluble in nitric acid at the ordinary temperature. (Millon, *Ann. Ch. et Phys.*, (3.) **6.** 100.) As it occurs in nature (*Magnetite*) it is insoluble in nitric acid, but dissolves in hot chlorhydric acid.

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Oxide of Isoprene.
$C_{10}H_8O$

***Prot*Oxide of Lanthanum.**

a = *anhydrous.* $La O$ Easily soluble in acids, even after ignition. The ignited oxide is more readily soluble in dilute nitric acid than oxide of didymium. (Marignac, *Ann. Ch. et Phys.*, (3.) **27.** 226.) In contact with water it gradually combines with it at the ordinary temperature to form the hydrate; this reaction is very rapid when the water is at 100°, and occurs as well with samples which have been heated to whiteness, the oxide not being modified by long-continued ignition. Easily soluble in dilute acids. (H. Rose, *Tr.*)

b = *hydrated.* Insoluble in water, or in alkaline solutions. Easily soluble in dilute acids. Not in the least soluble in an aqueous solution of carbonate of ammonia. (Mosander.) Soluble in a boiling aqueous solution of chloride of ammonium, with evolution of ammonia. (H. Rose, *Tr.*)

***Sub*Oxide of Lead.** Pb_2O Decomposed, with partial solution, by dilute and concentrated acids, and by aqueous solutions of caustic potash and soda.

***Prot*Oxide of Lead.**

a = *anhydrous.*
$Pb O$

α = *crystalline.* Not readily soluble in acids. (Calvert.) Soluble in a hot aqueous solution of caustic potash, from which it separates out again as the solution cools. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 489.)

β = *amorphous.* (*Litharge. Massicot.*) Not entirely insoluble in water. (Dumas, *Tr.*; H. Rose, *Tr.*) Somewhat soluble in pure water, but insoluble in water which contains even a trace of salt in solution (Guyton-Morveau; H. Rose, *Tr.*) Litharge dissolves in an aqueous solution of cane-sugar only when very finely pulverized; it is less soluble therein than red lead. (Peschier.) Soluble to a certain extent in glycerin. An aqueous solution of glucose can dissolve a large quantity of oxide of lead.

Litharge dissolves almost instantly in a solution of normal acetate of lead kept boiling in a silver basin. (Rochleder.) Readily soluble in acids. (Calvert.) Its best solvents are nitric and acetic acids. Soluble, though somewhat slowly, in a warm aqueous solution of chloride of of ammonium, and also, though still more slowly, in a warm solution of nitrate of ammonia. (H. Rose, *Tr.*) Soluble in concentrated solutions of the caustic alkalies. (Fremy, *Ann. Ch. et Phys.*, (3.) **23.** 390.)

Soluble in a boiling aqueous solution of nitrate of copper, with precipitation of oxide of copper; partially soluble in boiling solutions of the nitrates of cadmium and of protoxide of manganese, with corresponding precipitation of the oxides of cadmium and manganese. Unacted upon by boiling solutions of the nitrates of magnesia, silver, cobalt, nickel, and cerium. (Persoz, *Chim. Moléc.*, pp. 364, 365.)

b = *hydrated.* $2 Pb O, H O$ Perceptibly soluble in water. (Odling.) Soluble in from 10000 to 12000 pts. of water. (Yorke.) Soluble in about 7000 pts. of water. (v. Bonsdorff, *Pogg. Ann.*, 1837, **41.** 307, *note.*) When prepared by the dry way (i. e. litharge) oxide of lead is not sensibly soluble in water, but when prepared in the moist way this is by no means the case; my results accord with those of Bonsdorff, who found it soluble in 7000 pts. of water. (Bineau, *C. R.*, **41.** 509.)

The presence of carbonic, and sulphuric acids, and of various salts, prevents in great part the solution of oxide of lead. (Morveau.) Soluble in aqueous solutions of caustic potash, soda, lime, and baryta; on boiling these solutions anhydrous oxide of lead separates out. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 489.) Very readily soluble, even in dilute alkaline liquors. (Fremy, *Ann. Ch. et Phys.*, (3.) **23.** 390.) Completely soluble in an aqueous solution of caustic potash, especially when this is warm; on strongly evaporating the solution thus obtained a portion of oxide of lead separates in the anhydrous state and does not redissolve on cooling. (H. Rose, *Tr.*) 11 pts. of potash and 13 pts. of soda dissolve 1 pt. of oxide of lead. (Berzelius, *Lehrb.*) Insoluble in ammonia-water, or in a solution of carbonate of ammonia, but it dissolves, both when dry or recently precipitated, in a boiling solution of chloride of ammonium. (Demarçay, *Ann. der Pharm.*, 1834, **11.** 251.) Somewhat soluble in an aqueous solution of waterglass (acid silicate of soda or potash). (Ordway, *Am. J. Sci.*, (2.) **32.** 338; compare *Ibid.*, **33.** 33.) When recently precipitated, it is soluble in a hot aqueous solution of chloride of ammonium. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 96); a free evolution of ammonia occurring when the mixture is boiled. (L. Thompson, *Ibid.*, p. 179.) An excess of caustic ammonia precipitates all the lead from this solution. (Brett, *Ibid.*, p. 99.) Soluble in aqueous solutions of hydrate of triethyltoluenylammonium; of sorbin (Pelouze); and of the acetates (Mercer, *Rep. Br. Assoc.*, 1844, p. 32.) Soluble, with combination, in aqueous solutions of the sucrates of lime, baryta, strontia, potash, and soda. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** pp. 155, 156.) It is not precipitated from solutions which contain citrate of soda. (Spiller.) Most of the salts of lead which are insoluble in water dissolve in nitric acid.

***Sesqui*Oxide of Lead.** $Pb_2O_3 = Pb O, Pb O_2$ Insoluble in water, or in an aqueous solution of caustic potash. Protoxide of lead is dissolved out from it by nitric, sulphuric, fluorhydric, and acetic acids. Chlorhydric acid dissolves it completely in the cold, from which it may be reprecipitated by alkalies, but in the course of a few minutes the solution undergoes decomposition, chlorine being evolved. Decomposed by oxalic and formic acids. (Wickelblech, *Ann. der Pharm.*, 1837, **21.** pp. 29, 31; compare Jacquelain, *J. pr. Ch.*, 1851, **53.** 153.)

"Red Oxide of Lead." (*Minium. Mixture of Protoxide of Lead* ($Pb O$) *and Peroxide of Lead* ($Pb O_2$); as, $Pb_3O_4 = 2 Pb O, Pb O_2$) Protoxide of lead is dissolved out from it by dilute nitric and sulphuric acids, also by the weaker acids, as acetic acid. It is not decomposed by oxalic acid. (Levol.) Concentrated acetic acid combines with it (as a whole), forming a compound which is soluble in acetic acid; this solution when left to itself gradually deposits peroxide of lead, and this is also at once precipitated when the solution is diluted with water. (Berzelius, *Lehrb.*, **2.** 620.) The solution of minium in acetic acid may either remain clear, or become cloudy from decomposition, according to the strength of the acid employed. When treated with an excess of acetic acid of 8° B. minium is quickly dissolved, but in the course of a few minutes the solution undergoes decomposition, with separation of per-

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oxide of lead. This decomposition may be facilitated by adding water to the solution. But if the minium be treated with a large excess of crystallizable acetic acid, solution occurs much more rapidly than before, and the resulting liquid may be preserved unchanged for months if atmospheric moisture be excluded. On warming acetic acid with an excess of minium to about 40°, the liquor deposits on cooling acetate of peroxide of lead, a compound decomposable by water. (Jacquelain, *J. pr. Ch.*, 1851, **53.** 152.) Red lead is more abundantly soluble than litharge in an aqueous solution of cane-sugar. (Peschier.)

*Per*OXIDE OF LEAD. (See also PLUMBIC ACID.) $Pb\,O_2$ Insoluble in water. Decomposed by cold chlorhydric, cyanhydric, bromhydric, and iodhydric acids. Other strong acids do not attack it in the cold, but when hot they decompose it. Insoluble in moderately strong nitric, sulphuric, or acetic acids. Soluble, with decomposition, in nitrate of dinoxide of mercury. (Levol.) Decomposed by ammonia-water.

OXIDE OF LEAD & OF SILVER. $2\,Pb\,O, Ag\,O$ Easily soluble in nitric acid. Insoluble in a solution of caustic potash. (Wœhler.)

OXIDE OF LEAD with OXYGUANIN. Ppt.

OXIDE OF LITHIUM.

a = *anhydrous.* $Li\,O$ Slowly soluble in water, with but slight disengagement of heat. (Troost, *Ann. Ch. et Phys.*, (3.) **51.** 115.)

b = *hydrated.* Does not deliquesce in the air. $Li\,O, H\,O$ (Arfvedson.) Hygroscopic. (Troost.) Slowly soluble in water. (Troost.) Much less soluble than hydrate of potash or of soda, and apparently not more soluble in hot than in cold water. (C. Gmelin.) More soluble than hydrate of baryta in water. Very sparingly soluble in alcohol (Gmelin), by which it is partially precipitated from the aqueous solution.

*Per*OXIDE OF LITHIUM.
$Li\,O_2$

OXIDE OF LUTEOCOBALT. Known only in aqueous solution. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 281; Gibbs & Genth, *Smithson. Contrib.*, vol. **9.** p. 48.) The salts of luteocobalt are generally more soluble in water than the corresponding salts of roseocobalt; they are usually very stable in the presence of acids, but are decomposed by long heating with sulphuric acid. When hydrated they usually effloresce in dry air. (G. & G., *Ibid.*, p. 35.) They possess considerable stability, and resist the action of boiling water during some time, so that by working quickly they may be dissolved in boiling water and purified by crystallization, without being decomposed. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 280.)

OXIDE OF MAGNESIUM.
(*Magnesia.*)

a = *anhydrous.* $Mg\,O$ Less soluble in water than oxide of silver, protoxide of lead, or protoxide of mercury ($Hg\,O$), since it requires from 50000 to 100000 pts. of water to dissolve it. If carbonic acid be present it is much more readily soluble. (Bineau, *C. R.*, **41.** 510.) Soluble in 55368 pts. of water either boiling or at the ordinary temperature. The experiments of which this number is the mean were made upon chemically pure $Mg\,O$, which had been prepared with great care. "The varying results obtained by previous observers, probably depend upon impurities in the $Mg\,O$ used by them." (Fresenius, *Ann. Ch. u. Pharm.*, 1846, **59.** 123.) Soluble in 16000 pts. of water at the ordinary temperature. (Dalton, in his *New System*, Pt. **2.** p. 516.) Soluble in 7900 pts. of cold water. (Kirwan.) Soluble in 5760 pts. of water at 15.5°, and in 36000 pts. of water at 100°. (Fyfe, *Edinburgh Journ.*, **5.** 305 [T.].) Easily soluble in sulphurous acid, even in the cold (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 75), and in acids generally. As it occurs in nature (*Periclase* = $Mg\,O$ with 0.04 pt. of $Fe\,O$) anhydrous oxide of magnesium is insoluble in acids, unless it be in fine powder, and the acid warm, in which case it dissolves slowly. (Berzelius, *Lehrb.*, **3.** 445.)

Magnesia which has not been heated above 300° evolves much heat when treated with water, but that which has been ignited even to dull redness does not evolve heat with water. It dissolves readily in acids, even in dilute sulphuric acid, the action being somewhat slower in case the magnesia has been strongly heated; after having been exposed to the heat of a porcelain furnace it dissolves very slowly in acids. (H. Rose, *Tr.*)

Insoluble in water. Only slowly soluble in acids. (Bergman, *Essays*, **1.** pp. 431, 457.) Slowly soluble in aqueous solutions of ammoniacal salts, with evolution of ammonia. (*Ibid.*, p. 432.) Soluble in boiling aqueous solutions of the nitrates of manganese, silver, nickel, cobalt, zinc, and cerium, the oxides contained in these salts being, meanwhile, precipitated. (Persoz, *Chim. Moléc.*, p. 365.)

b = *hydrated.* $Mg\,O, H\,O$ Soluble in 5142 pts. of water at 15.5° (Fyfe); in 5800 pts. of water at 15.5°. (O. Henry.) The presence in water of lime, sulphate of lime, or potash, does not interfere with its solvent action upon hydrate of magnesia. (O. Henry.) Soluble in ammonia-water, but insoluble in a solution of potash. (Odling.) Soluble in aqueous solutions of chloride of ammonium, and of other ammoniacal salts. (H. Rose, *Tr.*) Insoluble in an aqueous solution of amylamin. (Wurtz.) Slightly soluble in an aqueous solution of waterglass (acid silicate of soda or potash). (Bolley; compare Ordway, *Am. J. Sci.*, (3.) **32.** 338; **33.** 33.) Soluble in an aqueous solution of cane-sugar.

Boiling alcohol dissolves a trace of it. (Bonastre.) None of the earths above, i. e. more electro-negative than, magnesia are soluble in alcohol. The native hydrate (*Brucite* = $Mg\,O, H\,O$) is soluble in acids.

*Prot*OXIDE OF MANGANESE.
(*Manganous Oxide.*)

a = *anhydrous.* $Mn\,O$ Oxidizes when exposed to the air. Insoluble in water. Easily soluble in acids.

Readily soluble in a solution of chloride of ammonium when this is gently heated, with evolution of ammonia. (H. Rose, *Tr.*)

b = *hydrated.* $Mn\,O, H\,O$ Rapidly oxidized by the air. Insoluble in water or in alkaline solutions. Easily soluble in acids. Soluble in aqueous solutions of ammoniacal salts.

Insoluble in ammonia-water, or in a solution of carbonate of ammonia. It dissolves, however, both when recently precipitated or dry, in a boiling solution of chloride of ammonium. (Demarçay, *Ann. der Pharm.*, 1834, **11.** 251.) Readily soluble, even in the cold, in aqueous solutions of chloride of ammonium and nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 98, 335.) In presence of ammoniacal salts hydrate of manganese is not completely precipitated by caustic potash or ammonia in the cold, but the precipitated hydrate is nevertheless much less readily soluble than the hydrate of magnesia in solutions of ammoniacal salts. (H. Rose, *Tr.*) The presence

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of non-volatile organic substances may prevent the caustic alkalies from precipitating it from its solutions; thus, in presence of tartaric acid it is not precipitated by ammonia. (H. Rose, *Tr.*) Slightly soluble in an aqueous solution of waterglass (acid silicate of soda or potash). (Ordway, *Am. J. Sci.*, (2.) **32.** 338; compare *Ibid.*, **33.** 33.) It is not precipitated by caustic potash from solutions which contain cane-sugar. (Lassaigne.) It is not precipitated by potash from solutions containing citrate of soda. (Spiller.) Insoluble in an aqueous solution of amylamin. (Wurtz.)

Most of its salts are soluble in water; all of them are soluble in chlorhydric acid and in dilute sulphuric acid.

*Sesqui*OXIDE OF MANGANESE.
(*Manganic Oxide.*)

a = *anhydrous.* Decomposed by boiling with nitric acid. (Berthier); or with sulphuric acid. (Turner.) Soluble, without decomposition [or rather with only very slight decomposition], in cold chlorhydric acid, and in sulphuric acid when this is gently warmed. When these solutions are heated, it is reduced to the protoxide. (Berzelius, *Lehrb.*, **2.** 760.) When perfectly pure, neither the sesquioxide itself nor its hydrate dissolves in sulphuric acid, either cold or hot, but if it contain any of the protoxide, solution occurs. Insoluble in an aqueous solution of chloride of ammonium at the ordinary temperature, but after long-continued boiling with a concentrated solution, a small portion of it is reduced to protoxide, which dissolves. (H. Rose, *Tr.*)
Mn_2O_3

b = Mn_2O_3, HO Occurs native as the mineral *Manganite* which is soluble in chlorhydric acid, with evolution of chlorine, but insoluble in nitric acid.
(*Gray Oxide of Manganese. Gray Manganese Ore.*)

c = *hydrated.* Insoluble in water. When pure it is insoluble in sulphuric acid [see above, *a*], though when heated with the concentrated acid it combines with it to form the insoluble green sulphate of the sesquioxide. (H. Rose, *Tr.*) Very easily soluble in tartaric and citric acids. (Schubarth, *Tech.*) Insoluble in an aqueous solution of chloride of ammonium at the ordinary temperature. (H. Rose, *Tr.*) Insoluble in an aqueous solution of cane-sugar. (Peschier.)
$Mn_2O_3, 3HO$

*Prot*OXIDE OF MANGANESE with *sesqui*OXIDE OF MANGANESE.
(*ManganosoManganic Oxide.*)
$Mn_3O_4 = MnO, Mn_2O_3$ & 4 Aq

Insoluble in water. Soluble only in hot concentrated phosphoric acid, and in small quantity in cold concentrated sulphuric, chlorhydric, oxalic, and tartaric acids.

When treated with a dilute acid, particularly nitric acid, it is decomposed, Mn O being dissolved, while hydrated peroxide remains undissolved. (Berzelius, *Lehrb.*, **2.** 761.) Unacted upon by a boiling aqueous solution of chloride of ammonium. Decomposed by acids, even dilute, protoxide of manganese being dissolved out. (Otto.)

*Per*OXIDE OF MANGANESE. *Vid.* Manganate of Manganese.
(*Black Oxide of Manganese. Bin Oxide of Manganese.*)
$3\,MnO_2 = Mn_2O_3, MnO_2$

OXIDE OF MERCURALLYL(hydrated). Soluble in water. (Zinin.)
(*Oxide of HydrargAllyl.*)

OXIDE OF MERCUR(*ic*)AMMONIUM with *prot*-OXIDE OF MERCURY.
$N\left\{\begin{matrix}H_3\\Hg\end{matrix}\right. . O; 2\,HgO + 2\,Aq$

Soluble in a large excess of an aqueous solution of carbonate of ammonia. Soluble in warm chlorhydric acid. (Wittstein.)

OXIDE OF *bi*MERCUR(*ic*)AMMONIUM with *prot*-OXIDE OF MERCURY.
(*OxidoAmidide of Mercury. Ammonide of Mercury.*)
$N\left\{\begin{matrix}H\\2\,Hg\end{matrix}\right. . O; 2\,HgO$ & + Aq & 3 Aq

Insoluble in water, or alcohol. Very readily soluble in warm aqueous solutions of nitrate of ammonia, and chloride of ammonium, with decomposition in both cases; it is also soluble in solutions of sulphate, acetate, and oxalate of ammonia. Traces of it are dissolved by ammonia-water. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 396.) Decomposed to a certain extent by aqueous solutions of the alkaline chlorides, with formation of protochloride of mercury (Hg Cl), which dissolves; this decomposition is greater in hot than in cold solutions. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 180.)

OXIDE OF MERCUR(*ous*)ETHYL(hydrated).
(*Hydrated Oxide of HydrargEthyl.*)
$C_4H_5Hg_2O, HO$

Readily soluble in water, and alcohol.

*Din*OXIDE OF MERCURY.
(*Sub Oxide of Mercury. Black Oxide of Mercury. Improperly prot Oxide of Mercury.*)
Hg_2O

Insoluble in water, although it has a disagreeable taste. (Dumas, *Tr.*) Insoluble in alcohol, or in ether.

Soluble in an aqueous solution of chloride of ammonium (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97); a very free evolution of ammonia occurring when the mixture is boiled (L. Thompson, *Ibid.*, p. 179); less soluble in a solution of nitrate of ammonia. (Brett, *loc. cit.*) When treated with aqueous solutions of the alkaline chlorides it is decomposed to a certain extent, with formation of protochloride of mercury (Hg Cl), which dissolves; this decomposition is greater in hot than in cold solutions, but is in either instance very much less marked than is the case with the protoxide (Hg O), hence a method is afforded of distinguishing between the two oxides and their respective salts. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 178, *et seq.*, & 186.) Somewhat soluble in cold aqueous solutions of the alkaline cyanides. (Jahn, *Ann. der Pharm.*, 1837, **21.** 164 (*note*).) Insoluble in aqueous solutions of caustic potash or ammonia. Insoluble in cold dilute nitric acid. (H. Rose, *Tr.*) Partially soluble, with decomposition, in aqueous solutions of chloride of ammonium, and of carbonate of ammonia. Insoluble in dilute chlorhydric acid. Soluble in strong acetic acid.

Those of its salts which are insoluble in water are for the most part soluble in nitric acid.

*Prot*OXIDE OF MERCURY.
(*Red Oxide of Mercury. Improperly per(or bin) Oxide of Mercury.*)

a = *anhydrous.* Permanent. Whether prepared in the dry or in the wet way, it is soluble in from 20000 to 30000 pts. of water. (Bineau, *C. R.*, **41.** 509.) Slightly soluble in boiling water. (Donovan.) Water dissolves traces of it. Insoluble in alcohol. (Wittstein's *Handw.*)
HgO

Scarcely at all soluble in water. When treated with aqueous solutions of the alkaline chlorides it is decomposed to a certain extent, with formation of protochloride of mercury (Hg Cl), which dissolves; this decomposition is greater in hot than in cold solutions, and is in any event much more strongly marked than is the case with the dinoxide; hence a method of distinguishing between the two oxides and their salts, is afforded. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 177, *et seq.* & 186.) Soluble in an aqueous solution of chloride of ammonium, especially when this is hot (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97); a very free evolution of ammonia occurring when the mixture is boiled. (L. Thompson, *Ibid.*, p. 179.) Also soluble in a solution of nitrate of ammonia. (Brett, *loc. cit.*) Soluble in boiling aqueous solutions of the nitrates of sesquioxide of iron and of bismuth, with precipitation of the oxides of iron and bismuth. (Persoz, *Chim. Moléc.*, p. 366.) Scarcely at all acted upon by a boiling aqueous solution of oxalic acid. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 352.)

b = hydrated. Sparingly soluble in cold, somewhat more abundantly soluble in hot water. (Anthon, Marchand, Boudet, Gossman.) Slightly soluble in water. (Thompson.) Insoluble in ammonia-water.

$HgO, 3HO$

Soluble in boiling baryta-water. (Bucholz.) Insoluble in aqueous solutions of caustic or carbonated fixed alkalies. (H. Rose, *Tr.*) When recently precipitated it is readily soluble, with combination, in a cold aqueous solution of oxalic acid. After the precipitate has been allowed to become dry it is somewhat less readily dissolved by oxalic acid. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 352.) Partially soluble in an aqueous solution of carbonate of ammonia. (Weppen, from *Arch. d. Pharm.*, (2.) **9.** 236; in *J. pr. Ch.*, 1837, **11.** 183.) Somewhat soluble in an aqueous solution of waterglass (acid silicate of soda or potash). (Ordway, *Am. J. Sci.*, (2.) **32.** 338; compare *Ibid.*, **33.** 33.) It is not precipitated by carbonate of soda, from solutions which contain chloride of sodium. (E. O. Brown.) Chloride of sodium hinders its precipitation from a solution of the chloride by the alkalies. (Voit.) It is not precipitated from solutions which contain citrate of soda. (Spiller.)

For the influence of organic matters in preventing the precipitation of oxide of mercury by the alkalies see H. Rose's *Traité*, **1.** 185.

Those of the salts of protoxide of mercury which are insoluble in water are nearly all soluble in nitric and chlorhydric acids; some of them are also soluble in aqueous solutions of chloride of ammonium and of nitrate of ammonia.

Almost all the salts of protoxide of mercury which are insoluble in water are soluble, when recently precipitated, in aqueous solutions of the chlorides of ammonium and sodium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** pp. 316, 317.) Many salts of both the oxides of mercury are decomposed by water to acid and basic salts.

***Prot*OXIDE OF MERCURY with UREA.**

I.) $2HgO; C_2H_4N_2O_2$

II.) $3HgO; C_2H_4N_2O_2$ Insoluble in boiling water. (Liebig, *J. Ch. Soc.*, **6.** 3.)

III.) $4HgO; C_2H_4N_2O_2$ Insoluble in boiling water.

OXIDE OF MESITYL(?) Insoluble in water. Miscible in all proportions with alcohol, and ether. (Fittig.)

$C_{12}H_{10}O_2$

OXIDE OF METHYL. Water dissolves 37 volumes of it at 18°. (Dumas & Péligot.) Alcohol and wood-spirit dissolve much more of it. Largely soluble in concentrated sulphuric acid, from which it separates on the addition of water.

(*Methyl(ic) Ether. Wood Ether. Isomeric with Hydrate of Ethyl.*)

C_2H_3O, or $\left.\begin{matrix}C_2H_3\\C_2H_3\end{matrix}\right\}O_2$

OXIDE OF METHYL & OF OCTYL. Insoluble in water. Readily soluble in alcohol, and ether.

(*Oxide of Capryl & of Methyl. Methyl Caprylic Ether.*)

$C_{18}H_{20}O_2 = \left.\begin{matrix}C_{16}H_{17}\\C_2H_3\end{matrix}\right\}O_2$

OXIDE OF METHYL & OF POTASSIUM.

(*Methylate of Potash.*)

$\left.\begin{matrix}C_2H_3\\K\end{matrix}\right\}O_2$

OXIDE OF METHYL & OF SODIUM.

$\left.\begin{matrix}C_2H_3\\Na\end{matrix}\right\}O_2$

OXIDE OF METHYL & OF TOLUENYL.

(*Methyl Toluenyl Ether.*)

$C_{16}H_{10}O_2 = \left.\begin{matrix}C_2H_3\\C_{14}H_7\end{matrix}\right\}O_2$

OXIDE OF METHYL with ZINCMETHYL.

$2C_4H_6Zn_2; C_4H_6O_2$

OXIDE OF METHYL*chloré*. *Vid.* Oxide of ChloroMethyl.

OXIDE OF *tri*METHYLPHOSPHIN.

$P\left\{(C_2H_3)_3, O_2\right.$

OXIDE OF *tetra*METHYLPHOSPHIN. *Vid.* Hydrate of *tetra*MethylPhosphin.

***Prot*OXIDE OF MOLYBDENUM.**

(*Molybdous Oxide.*)

a = anhydrous. Insoluble in water, acids, or alkaline solutions.

MbO

b = hydrated. Difficultly soluble in acids. When recently precipitated it is soluble in an aqueous solution of carbonate of ammonia, but is insoluble in solutions of the caustic or carbonated fixed alkalies. (Dumas, *Tr.*) Difficultly soluble in acids. Insoluble in aqueous solutions of the caustic alkalies or of the fixed alkaline carbonates. Soluble in an aqueous solution of carbonate of ammonia, from which it is precipitated on boiling. (Berzelius, *Lehrb.*, **2.** 348.)

***Bin*OXIDE OF MOLYBDENUM.**

(*Molybdic Oxide. Brown or Violet-Brown Oxide of M.*)

a = anhydrous. After ignition it is insoluble in acids. When digested with boiling concentrated sulphuric acid, or a solution of bitartrate of potash, a trace of it dissolves at first, but none of it is dissolved subsequently by these liquids. Nitric acid converts it into molybdic acid. Neither chlorhydric nor fluorhydric acid have any action upon it. Nor is it dissolved by potash-lye.

MbO_2

b = hydrated. When recently precipitated it is sparingly soluble in pure water. Slightly soluble in alcohol, but far less readily than in water. Less soluble in saline solutions, in ammonia-water, or a solution of chloride of ammonium than in water. After having been dried, the hydrate is no longer soluble in water. Insoluble in aqueous solutions of the caustic alkalies. When once precipitated it is only very sparingly soluble in an aqueous solution of an alkaline carbonate, but if a solution of a salt of binoxide of molybdenum is treated with an excess of a solution of an alkaline carbonate, the precipitate which at first forms (and which is not a carbonate) will be completely dissolved. Solutions of the alkaline bicarbonates dissolve it more readily than those of the monocarbonates; it is partially reprecipitated when these solutions are boiled and completely precipitated from its solution in carbonate of ammonia on boiling. (Berzelius, *Lehrb.*, **2.** pp. 349 – 351.)

MbO_2, HO

"OLIVE GREEN" and "BLUE." } **OXIDES OF MOLYBDENUM.** *Vid.* Molybdate of Molybdenum.

***Ter*Oxide of Molybdenum.** *Vid.* Molybdic Acid.

***Prot*Oxide of Nickel.**

NiO *a* = *anhydrous.* Insoluble in water. Easily soluble in chlorhydric acid, and in the acids generally, even after having been ignited, though, as a rule, it has less affinity for acids than oxide of cobalt. Very slowly soluble in ammonia-water. Insoluble in aqueous solutions of caustic potash or soda. Ignited oxide of nickel resists the solvent action of a solution of chloride of ammonium to an extraordinary degree, though the recently precipitated hydrate is easily soluble therein. (H. Rose, *Tr.*) The native oxide of nickel described by Bergemann is scarcely at all soluble in acids.

Those of its salts which are insoluble in water dissolve for the most part in chlorhydric or sulphuric acid.

NiO, HO *b* = *hydrated.* Permanent. Almost entirely insoluble in water. (Fresenius, *Quant.*, p. 136.) Slightly soluble in water. (Tupputi.) Soluble in an aqueous solution of cyanide of potassium. (F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4.** 97.) Soluble in an aqueous solution of carbonate of ammonia and in ammonia-water; also soluble, either when dry or recently precipitated, in a boiling solution of chloride of ammonium. (Demarçay, *Ann. der Pharm.*, 1834, **11.** 251.) Insoluble in solutions of caustic potash or of soda. Or of methylamin or amylamin. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** pp. 452, 492.) It is not precipitated by caustic potash from solutions containing citrate of soda. (Spiller.) A very large number of non-volatile organic substances, and particularly tartaric acid, prevent the precipitation of hydrate of nickel from its solutions by the alkalies. (H. Rose, *Tr.*)

***Sesqui*Oxide of Nickel.**

(*Per Oxide of Nickel.*)

Ni_2O_3 *a* = *anhydrous.* Soluble, with decomposition, in nitric, sulphuric, and chlorhydric acids, also in ammonia-water, and a solution of carbonate of ammonia, with reduction to the protoxide in each case.

$Ni_2O_3, 3HO$ *b* = *hydrated.* Soluble in dilute acids, being reduced to the protoxide. (Winckelblech.) Slowly soluble in acetic acid, being reduced meanwhile to the state of protoxide. (H. Rose, *Tr.*) Insoluble in a solution of potash, but soluble in solutions of ammonia and of ammonia-salts. (Odling.)

***Per*Oxide of Nickel.**

***Prot*Oxide of Nitrogen.**

(*Nitrous Oxide.*)

NO *a* = *liquid.* When mixed, in the liquid state, with water, it causes the latter to freeze; so also with concentrated sulphuric or nitric acids. Miscible with alcohol, and with ether.

b = *gas.* At the ordinary temperature, water absorbs 0.78 @ 0.86 vol. of it. (W. Henry.)
" 0.80 vol. of it. (Dalton.)
" 0.76 " (Th. de Saussure.)
" 0.54 " (H. Davy.)
at 18° 0.708 " (Pleischl.)
On boiling the aqueous solution, the gas is evolved unchanged. (Priestley.)

Water absorbs about 80% (by vol.) of it. Davy makes it only 54%, but he was not aware that the quantity is increased in proportion to the purity of the residuary gas; Dr. Henry finds from 78 to 86%. (Dalton, in his *New System*, Pt. **2.** 342.)

1 vol. of water, under a pressure of 0m.76 of mercury, at °C.	Dissolves of nitrous oxide gas, — vols., reduced to 0°C. and 0m.76 pressure of mercury.
0°	1.3052
1°	1.2605
2°	1.2172
3°	1.1752
4°	1.1346
5°	1.0954
6°	1.0575
7°	1.0210
8°	0.9858
9°	0.9520
10°	0.9196
11°	0.8885
12°	0.8588
13°	0.8304
14°	0.8034
15°	0.7778
16°	0.7535
17°	0.7306
18°	0.7090
19°	0.6888
20°	0.6700
21°	0.6525
22°	0.6364
23°	0.6216
24°	0.6082

(Bunsen's *Gasometry*, pp. 287, 128, 158.)

1 vol. of alcohol, under a pressure of 0m.76 of mercury, at °C.	Dissolves of nitrous oxide gas, — vols., reduced to 0°C. and 0m.76 pressure of mercury.
0°	4.1780
1°	4.1088
2°	4.0409
3°	3.9741
4°	3.9085
5°	3.8442
6°	3.7811
7°	3.7192
8°	3.6585
9°	3.5990
10°	3.5408
11°	3.4838
12°	3.4279
13°	3.3734
14°	3.3200
15°	3.2678
16°	3.2169
17°	3.1672
18°	3.1187
19°	3.0714
20°	3.0253
21°	2.9805
22°	2.9368
23°	2.8944
24°	2.8532

(Bunsen's *Gasometry*, pp. 287, 128, 159.)

100 volumes of	Absorb at 18° and the ordinary pressure, vols. of N O
Water	76
Alcohol of 0.840 sp. gr	158
Rectified naphtha (rock oil) of 0.784 sp. gr.	254
Oil of lavender (freshly distilled) of 0.880 sp. gr.	275
Olive-oil of 0.915 sp. gr.	150
A saturated aqueous solution of chloride of potassium (containing 26 per cent of K Cl) of 1.212 sp. gr.	29.

(Th. de Saussure, *Gilbert's Ann. Phys.*, 1814, 47. pp. 167, 169.)

1 vol. of oil of turpentine absorbs from 2.5 to 2.7 vols. of it. (Saussure, in *Gm.*, **14.** 270.) It is not absorbed by aqueous solutions of salts of the protoxide of iron.

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*Bin*OXIDE OF NITROGEN. (*Deut Oxide of Nitrogen. Nitric Oxide.*) NO_2 1 vol. of water at the ordinary temperature absorbs 0.1 vol. of it (H. Davy); about 0.05 vol. of it. (Henry, *Phil. Trans.*, 1803, p. 274. [T.].) 1 vol. of water, free from air, absorbs about $\frac{1}{18}$ [= 0.0556] vol. of it; but only $\frac{1}{27}$ [= 0.037] of it can be expelled again by other gas, whence it would seem that a small portion of the gas actually combines with the water, while the greater part is, like most other gases, mechanically retained by external pressure. (Dalton, in his *New System*, Pt. **2.** p. 334.)

1 vol. of alcohol, under a pressure of 0m.76 of mercury, at °C.	Dissolves of nitric oxide gas, — vols., reduced to 0°C. and 0m.76 pressure of mercury.
0°	0.31606
1°	0.31262
2°	0.30928
3°	0.30604
4°	0.30290
5°	0.29985
6°	0.29690
7°	0.29405
8°	0.29130
9°	0.28865
10°	0.28609
11°	0.28363
12°	0.28127
13°	0.27901
14°	0.27685
15°	0.27478
16°	0.27281
17°	0.27094
18°	0.26917
19°	0.26750
20°	0.26592
21°	0.26444
22°	0.26306
23°	0.26178
24°	0.26060

(Bunsen's *Gasometry*, pp. 287, 128, 159.)

Alcohol absorbs nearly its own volume of nitric oxide; this cannot be expelled by heating. (Priestley.) Caoutchin absorbs a small quantity of it. (Himly.) Absorbed by glacial acetic acid, and by a strong solution of tartaric acid.

Rapidly absorbed by strong aqueous solutions of certain salts of protoxide of iron, particularly the protosulphate. (Priestley.) 1 vol. of a solution of protosulphate of iron, containing 1 grain of the salt in every 6 grain measures, and of 1.081 sp. gr., was found to absorb 6 vols. of nitric oxide gas. (Dalton, in his *New System*, Pt. **2.** p. 335.) Also soluble in solutions of the salts of protoxide of tin; and of protoxide of chromium. (Péligot.) It is not absorbed by a solution of persulphate of iron. (Dalton, *loc. cit.*) Priestley found that 130 ounce measures of nitric oxide, over water, disappeared in a day or two, when a phial containing 96 water-grain measures of strong nitric acid was enclosed with the gas. Davy's experiments indicate that less of it is absorbed by dilute than by concentrated nitric acid. (Dalton, *loc. cit.*, pp. 326, 327.) By repeated trials, Dalton found that 100 vols. of nitric acid of 1.30 sp. gr. agitated with nitric oxide take up about 20 times their volume of the gas. If the acid be twice as strong, or but half as strong, it makes little difference, the quantity of gas absorbed being nearly as the real acid, within certain limits of sp. gr. Very dilute acid (as 1 to 100 water) seems to have scarcely any more power than pure water of absorbing the gas. (Dalton, *loc. cit.*, p. 366.) 100 pts. of nitric acid of 1.4 sp. gr. absorb 90 pts. of it. (Priestley, in *Berzelius's Lehrb.*, **1.** 523.) Soluble in bromine, and, very sparingly, in concentrated sulphuric acid. (Berthelot.)

*Bin*OXIDE OF NITROGEN with SULPHITE OF POTASH. NO_2; KO, SO_2 Easily soluble in water. Insoluble in alcohol. (Berzelius, *Lehrb.*, **3.** 119.)

OXIDE OF OCTYL.
(*Oxide of Capryl. Caprylic Ether.*)
$C_{16}H_{17}O$, or $\left.\begin{matrix}C_{16}H_{17}\\C_{16}H_{17}\end{matrix}\right\}O_2$

OXIDE OF OCTYL & OF PELARGOYL. (*Pelargone. Pelargyride of Octyl.*) $C_{34}H_{34}O_2 = \left.\begin{matrix}C_{18}H_{17}\\C_{16}H_{17}\end{matrix}\right\}O_2$ Easily soluble in ether. (Cahours, *J. Ch. Soc.*, **3.** 241.)

OXIDE OF OCTYL & OF POTASSIUM. $\left.\begin{matrix}C_{16}H_{17}\\K\end{matrix}\right\}O_2$ Decomposed by water. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 112.)

OXIDE OF OCTYL & OF SODIUM. $\left.\begin{matrix}C_{16}H_{17}\\Na\end{matrix}\right\}O_2$ More soluble in *cold* than in warm alcohol (hydrate of octyl). (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 112.)

*Prot*OXIDE OF OSMIUM.

a = OsO

b = *hydrated.* Slightly soluble in an aqueous solution of caustic potash. Slowly but completely soluble in acids. (Berzelius.)

*Sesqui*OXIDE OF OSMIUM. Os_2O_3 Sparingly soluble in acids. Soluble in ammonia-water, and in aqueous solutions of the fixed caustic alkalies. (Berzelius, *Lehrb.*)

"BLUE OXIDE OF OSMIUM." (*Osmiate of Osmium.*) When dry it is insoluble in water, but after having been moistened and exposed to the air a portion of it dissolves in water. Soluble in sulphuric acid.

*Bin*OXIDE OF OSMIUM.

a = OsO_2 Insoluble in acids.

b = *hydrated.* Insoluble in acids. Partially soluble in a cold aqueous solution of carbonate of potash, from which it is precipitated when the solution is boiled.

*Ter*OXIDE OF OSMIUM. (*Osmious Acid.*) OsO_3 Not isolated. Soluble in an aqueous solution of caustic potash.

OXIDE OF "OXYCOBALTIAQUE" (of Fremy). Not isolated. The salts of oxycobaltiaque are usually only slightly soluble in an ammoniacal liquor. They are decomposed, with effervescence, by cold water, and more rapidly by hot water. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 270.)

*Din*OXIDE OF PALLADIUM(?) Pd_2O Decomposed by acids, salts of the protoxide being formed. (Kane, *Phil. Trans.*, 1842, p. 279.)

*Prot*OXIDE OF PALLADIUM.
(*Palladious Oxide.*)

a = *anhydrous.* PdO Difficultly soluble in acids, being dissolved only after long-continued boiling.

b = *hydrated.* Easily soluble in acids. Soluble in aqueous solutions of caustic ammonia, carbonate of ammonia, and, still more readily, of chloride of ammonium (Fischer); also in solutions of the caustic and carbonated alkalies (Berzelius); also in solutions of the alkaline bicarbonates. (H. Rose, *Tr.*) Easily soluble in a cold aqueous solution of caustic potash, from which it is reprecipi-

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tated on heating. Insoluble in aqueous solutions of biborate or phosphate of soda. (Claus, *Beiträge*, pp. 34, 38.)

Those of its salts which are insoluble in water are soluble in ammonia-water. (Fischer.)

***Bin*OXIDE OF PALLADIUM.**
$a = Pd\,O_2$

b = *hydrated.* Only slowly soluble in acids, even when it is moist.

OXIDE OF PARACACODYL. Very sparingly
$C_4\,H_6\,As\,O$ soluble in water. Towards other solvents it behaves like oxide of cacodyl, *q. v.* (Bunsen.)

***Bin*OXIDE OF PHENYL.** *Vid.* OxyPhenic Acid.

OXIDE OF PHOSPHORUS. There are two al-
(*Phosphoric Oxide.*) lotropic modifications.
$P_2\,O$

I.) *a.* "*Red modification.*" Insoluble in water, alcohol, ether, volatile or fixed oils, or bisulphide of carbon. (Leverrier.) Its compounds with the alkalies are sparingly soluble in water.

II.) *β.* "*Yellow modification.*" Very sparingly
or "*Hydrate of Phosphoric Oxide.*" soluble in water.
$P_2\,O, H\,O$ (Leverrier.) Insoluble in alcohol, or ether. Soluble in an aqueous solution of caustic potash, from which it is precipitated on the addition of alcohol. (Otto-Graham.)

OXIDE OF PHOSPHORUS & OF POTASSIUM.
$P_2\,O, K\,O$ Insoluble in water. Slightly soluble in alcohol. Insoluble in an aqueous solution of caustic potash; but when left in contact therewith it is gradually dissolved, with decomposition, especially if the solution is warm. (Berzelius, *Lehrb.*, **3.** 137.)

OXIDE OF PICRAMYL. *Vid.* Hydride of Benzoyl.

OXIDE OF PLATIN(*ic*)*bi*AMIN. Not isolated.

OXIDE OF PLATIN(*ic*)AMMONIUM. Nearly in-
(*Platinamin*(of Gerhardt). soluble in boiling water.
$N \left\{ \begin{matrix} H_3 \\ Pt'' \end{matrix} \right. . O_2 + 2\,Aq$ Easily soluble in hot dilute acids, even in acetic acid, with combination, forming salts which are sparingly soluble in water. Boiling potash lye neither dissolves nor decomposes it. (Gerhardt.)

OXIDE OF *di*PLATIN(*ic*)AMMONIUM.
(*Fulminating Platinum.*)

I.) *hydrated.* Easily soluble, with combination,
$N \left\{ Pt_2'' \right. . O, H\,O + 2\,Aq$ in chlorhydric acid. Acetic acid precipitates it from the solution obtained by dissolving chloroplatinate of ammonium in boiling caustic soda. (Gerhardt, in his *Traité*, 1856, **4.** 620 (*note*).)

OXIDE OF PLATIN(*ous*)*bi*AMIN.
(*Ammonio protoxide of Platinum.*
Platinite of Ammonia.)

a = *hydrated.* Deliquescent. Easily soluble in
$N_2 \left\{ H_6 \right. . Pt'\,O, H\,O$ water, and the solution is not decomposed by boiling. (Reiset, *Ann. Ch. et Phys.*, (3.) **11.** 422.) Very soluble in water; less soluble in alcohol. (Peyrone, *Ann. Ch. et Phys.*, (3.) **12.** 209.)

OXIDE OF PLATIN(*ous*)AMMONIUM. Com-
$N \left\{ \begin{matrix} H_3 \\ Pt' \end{matrix} \right. . O$ pletely insoluble in water or ammonia-water. It combines with acids, forming peculiar insoluble compounds. (Reiset, *Ann. Ch. et Phys.*, (3.) **11.** 423.)

***Prot*OXIDE OF PLATINUM.**
(*Platinous Oxide.*)

a = *anhydrous.* Soluble in sulphurous, and in
$Pt\,O$ concentrated sulphuric acids. Easily soluble in strong cold chlorhydric acid. When in the nascent state, it is soluble in some of the vegetable acids.

b = *hydrated.* Soluble in water[?]. (Liebig.) Soluble in alkaline solutions. Partially soluble in chlorhydric acid, — with separation of metallic platinum.

***Bin*OXIDE OF PLATINUM.**
(*Platinic Oxide.*)

a = *anhydrous.*
$Pt\,O_2$

b = *hydrated.* Insoluble in dilute acetic acid.
$Pt\,O_2, 2\,H\,O$ Soluble in the mineral acids. (Wittstein.)

OXIDE OF *di*PLUMB(*ic*)*tri*ETHYL(hydrated).
$Pb_2\,(C_4\,H_5)_3\,O, H\,O$ Sparingly soluble in water. Very easily soluble in alcohol, and ether.

***Sub*OXIDE OF POTASSIUM.** Decomposed by
$K_2\,O$ water.

***Prot*OXIDE OF POTASSIUM.**
(*Potash. Potassa.*)
$K\,O$

a = *anhydrous.* Combines with water with great violence. Soluble in 1 pt. of water. (Bineau, *C. R.*, **41.** 510.) Compounds of potash are generally less soluble than those of soda.

b = *hydrated.* Quickly deliquescent. Soluble
$K\,O, H\,O$ in 0.5 pt. of cold water, with evolution of heat (Lœwitz); the saturated solution containing 66.66% of it. Soluble in 1 pt. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht, für* 1854, p. 76.) The saturated aqueous solution boils at about 158°, but the temperature is rapidly elevated if one continues to heat the solution. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.)

An aqueous solution of sp. gr.	Contains per cent of anhydrous K O.	Boils at °C.
2.4	100	
2.2	84	red heat
2.0	72.4	315.56°
1.88	63 6	215.56°
1.78	56.8	188.22°
1.68	51.2	160°
1.60	46.7	143.33°
1.52	42.9	135.56°
1.47	39.6	129.44°
1.44	36.8	123.89°
1.42	34.4	118.89°
1.39	32.4	115.56°
1.36	29.4	112.22°
1.33	26.3	109.44°
1.28	23.4	106.66°
1.23	19.5	104.44°
1.19	16.2	103.33°
1.15	13.0	101.66°
1.11	9.5	101.11°
1.06	4.7	100.56°

(Dalton, in his *New System*, Pt. **2.** p. 476.)

Dalton remarks that he "would have the results in the above table considered only as an approximation to truth; but it will certainly have its use till a more complete and accurate one be obtained." Otto, in his *Lehrbuch*, **2.** 83, on the other hand, remarking upon the accuracy of Dalton's determinations, says, that almost identically similar

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results were obtained in his laboratory by Mehrens. [Dalton's table is incorrectly printed in Gmelin's Handbook.]

Quantity of Anhydrous Potash (K O) contained in solutions of various densities.

An aqueous solution of sp. gr. at (15°)	Contains per cent of K O.
1.3300	28.290
1.3131	27.158
1.2966	26.027
1.2805	24.895
1.2648	23.764
1.2493	22.632
1.2342	21.500
1.2268	20.935
1.2122	19.803
1.1979	18.671
1.1839	17.540
1.1702	16.408
1.1568	15.277
1.1437	14.145
1.1308	13.013
1.1182	11.882
1.1059	10.750
1.0938	9.619
1.0819	8.487
1.0703	7.355
1.0589	6.224
1.0478	5.002
1.0369	3.961
1.0260	2.829
1.0153	1.697
1.0050	0.5658

(Tuennermann, in *Trommsdorff's Neues Journ. der Pharm.*, **18.** 2, 5; cited in *Gmelin's Handbook*, **3.** 15.)

From the tables of Tuennermann and Dalton, Schiff calculates the following table for hydrate of potash, by means of the formula: —

$$D = 1 + 0.00656\, p + 0.000127\, p^2 - 0.00000085\, p^3;$$

in which D = the sp. gr. of the solution and p the percentage of substance in the solution.

Sp. gr.	Per cent of K O, H O.	Sp. gr.	Per cent of K O, H O.
1.036	5	1.411	40
1.077	10	1.475	45
1.124	15	1.539	50
1.175	20	1.604	55
1.230	25	1.667	60
1.288	30	1.729	65
1.349	35	1.790	70

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **107.** 300.)

Sp. gr.	Per cent of K O.	Sp. gr.	Per cent of K O.
1.58	53.06	1.28	27.86
1.56	51.58	1.26	26.34
1.54	50.09	1.24	24.77
1.52	48.46	1.22	23.14
1.50	46.45	1.20	21.25
1.48	44.40	1.18	19.34
1.46	42.31	1.16	17.40
1.44	40.17	1.14	15.38
1.42	37.97	1.12	13.30
1.40	35.99	1.10	11.28
1.38	34.74	1.08	9.20
1.36	33.46	1.06	7.02
1.34	32.14	1.04	4.77
1.32	30.74	1.02	2.44
1.30	29.34	1.00	0.00

(Richter, in *Schubarth's Tech. Chem.*, **1.** 282.)

Abundantly soluble in strong alcohol. Soluble in wood-spirit. Readily soluble in glycerin. Soluble in not less than 25 pts. of ether (Boullay); in much more than 25 pts. of ether. (Connell.) Soluble in an aqueous solution of mannite. (Favre, *Ann. Ch. et Phys.*, (3.) **11.** 76.) Insoluble in acetone. Readily soluble in fusel-oil (hydrate of amyl). (Pelletan.)

c = $2\,KO, 3\,HO$

d = $KO, 5\,HO$ (*Crystallized potash. Caustic salt.*) Quickly deliquescent. Soluble in water, with reduction of the temperature.

***Per*Oxide of Potassium.** KO_2 Instantly decomposed by cold water.

Oxide of PurpureoCobalt. $5\,NH_3 . Co_2O_3, O_2$ Known only in aqueous solution. (Gibbs & Genth, *Smithson. Contrib.*, vol. **9.**)

***Prot*Oxide of Rhodium.**

a = *anhydrous.*
$Rh\,O$

a = *crystallized.*
b = *amorphous.* } Insoluble in water.

b = *hydrated.* *Insoluble* in an excess of an aqueous solution of alkali, despite the assertions to the contrary which have been made in the books. (Fremy, *Ann. Ch. et Phys.*, (3) **44.** 397.)

***Sesqui*Oxide of Rhodium.**
(*Rhodic Oxide.*)

a = *anhydrous.* Rh_2O_3 Insoluble in water, in a boiling aqueous solution of caustic potash, or in any acid, when pure; but when mixed with oxide of iridium it dissolves in aqua-regia. (Claus, *Beiträge*, p. 65.)

b = *hydrated.* $Rh_2O_3 + 5\,Aq$ Insoluble in water. Exceedingly easily soluble in all acids, and in a concentrated aqueous solution of caustic potash, especially when recently precipitated and moist; on diluting the alkaline solution a portion of it is reprecipitated. Does not separate from the alkaline solution when this is heated. (Claus, *Beiträge*, pp. 67, 68, 21, 38.) Soluble in aqueous solutions of the fixed caustic alkalies. (Descotils.) When prepared by the decomposition of fused rhodiate of potash it is insoluble in acids; but when prepared by decomposing chlororhodiate of potassium or sodium by means of an alkaline carbonate it dissolves in acids. (Berzelius.) According to Claus (*Beiträge*, pp. 64, 65), the compounds $2\,Rh\,O$, Rh_2O_3; &c., of Berzelius were merely mixtures of metallic rhodium and sesquioxide of rhodium.

***Bin*Oxide of Rhodium.**

a = *anhydrous.* $Rh\,O_2$ Insoluble in strong nitric acid. (Claus, *Beiträge*, p. 66.)

b = *hydrated.* Soluble in chlorhydric acid, the solution evolving chlorine when heated. (Claus, *Beiträge*, pp. 21, 68.)

Oxide of RoseoCobalt. Known only in solution. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 296; Gibbs & Genth, *Smithson. Contrib.*, vol. **9.** p. 20 of the memoir.)

The salts of the roseocobalt are generally nearly insoluble in cold water; soluble, without decomposition, in warm water slightly acidulated, but are easily decomposed when the neutral aqueous solution is boiled. (G. & G., *Ibid.*, p. 7.) Scarcely soluble in cold water; they are more soluble in boiling water, which decomposes them after a time. (Fremy, *loc. cit.*)

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***Prot*Oxide of Ruthenium.** Insoluble in acids.
(*Ruthenious Oxide.*)
$Ru O$

***Sesqui*Oxide of Ruthenium.**

a = *anhydrous.* Insoluble in acids.
$Ru_2 O_3$

b = $Ru_2 O_3, 3 H O$ Easily soluble in acids. Insoluble in alkaline solutions.

When contaminated with oxide of rhodium it dissolves in cold aqueous solutions of caustic potash and ammonia; from the potash solution it is reprecipitated on the application of heat. (Claus, *Beiträge*, p. 45.) Oxide of ruthenium is the least soluble in ammonia of any of the oxides of the so-called platinum metals. (Claus, *Beiträge*, p. 38.)

***Bin*Oxide of Ruthenium.**
(*Ruthenic Oxide.*)

a = *anhydrous.* Insoluble in acids.
$Ru O_2$

b = *hydrated.* Soluble in acids.
$Ru O_2, 2 H O$

Oxide of Selenium. But slightly soluble in water, or in sulphuretted hydrogen water; no more soluble in aqueous solutions of the caustic alkalies than in pure water. (Berzelius.)
(*Selenic Oxide.*)
$Se O$(?)

Oxide of Silicon(hydrated). It is dissolved in part, with decomposition, by water, at ordinary temperatures, but not at temperatures lower than 0°. Soluble, with decomposition, in aqueous solutions of the caustic and carbonated alkalies. Unacted upon by acids, excepting fluorhydric acid, which dissolves it, with combination.
$Si_2 O_3, 2 H O$

***Din*Oxide of Silver.** Soluble in strong oxygen acids, and in ammonia-water, with separation of metallic silver.
(*Sub Oxide of Silver.*)
$Ag_2 O$

***Prot*Oxide of Silver.** Soluble in about 3000 pts. of water. (Bineau, *C. R.*, **41.** 509.) Slightly soluble in water. (Bucholz; Fischer.) Somewhat soluble in pure water. (Berzelius, *Lehrb.*) The hydrated oxide is perceptibly soluble in water. (Odling.) While moist, it is slightly soluble in water, but does not form any combination with water. (H. Rose, *Tr.*) Soluble in 96 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht, für* 1854, p. 75.) Soluble in aqueous solutions of ammonia; and of the alkaline hyposulphites, chlorides, and cyanides. (Parkes.) When recently precipitated, it gradually dissolves in an aqueous solution of sulphocyanide of ammonium.
$Ag O$

Sparingly soluble in an aqueous solution of amylamin; but readily soluble in a solution of methylamin. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** pp. 453, 492.) Also soluble in aqueous solutions of ethylamin (Wurtz), of hydrated oxide of ethyltriphenylammonium ("ethylbicinnamylamin"), and of thiosinamin.

Insoluble in aqueous solutions of caustic potash or soda. Said to be slightly soluble in baryta-water. (Berzelius, *Lehrb.*, **2.** 507.) Somewhat slowly soluble in a boiling aqueous solution of nitrate of ammonia, with evolution of ammonia. (H. Rose, *Tr.*) Soluble in boiling aqueous solutions of the nitrates of manganese, nickel, cobalt, zinc, copper, and cerium, with precipitation of their several oxides. (Persoz, *Chim. Moléc.*, pp. 364, 367.) Easily soluble in nitric acid, and in some other acids.

The affinity of oxide of silver for acids is greater than that of oxide of zinc or oxide of copper. Of its salts which are insoluble in water, most dissolve in nitric acid, ammonia, and the alkaline hyposulphites. (Herschel.)

***Per*Oxide of Silver.** Permanent. Is not decomposed by water at the ordinary temperature. Soluble, with evolution of oxygen, in most acids. When treated with chlorhydric acid it evolves chlorine. (Wallquist, *J. pr. Ch.*, **31.** 181.) Unacted upon by boiling water or by nitric acid, but is decomposed by chlorhydric, chloric, phosphoric, and sulphuric acids; also by aqueous solutions of ammonia, chloride of ammonium, and (boiling) chloride of sodium.
$Ag O_2$

Oxide of Silver with OxyGuanin. Ppt.

Oxide of Silver with Urea. Readily soluble in nitric acid. Difficultly soluble in ammonia-water. (Liebig, *J. Ch. Soc.*, **6.** 4.)
$3 Ag O ; C_2 H_4 N_2 O_2$

***Sub*Oxide of Sodium.** Decomposed by water.
$Na_2 O$(?)

***Prot*Oxide of Sodium.**
(*Soda.*)

a = *anhydrous.* Soluble in 0.75 pt. of water. (Bineau, *C. R.*, **41.** 510.) Compounds of soda are generally more soluble than those of potash.
$Na O$

b = *hydrated.* Deliquescent.
$Na O, H O$

100 pts. of water (at °C)	Dissolve	
	pts. of dry soda.	pts. of hydrate of soda.
18°	41.43	60.53
32°	45.72	72.91
55°	63.53	100.00
70°	71.98	116.75
80°	78.30	127.02

(Osann.)

The solution saturated at ordinary temperatures contains 36.8% of dry soda, and is of 1.5 sp. gr.; it boils at 130°.

The saturated aqueous solution boils at about 216° C. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 91.)

An aqueous solution of sp. gr.	Contains per cent of Na O.	Boils at
2.00	77.8	red heat.
1.85	63.6	315.56°
1.72	53.8	204.44°
1.63	46.6	148.89°
1.56	41.2	137.78°
1.50	36.8	129.44°
1.47	34.0	123.89°
1.44	31.0	120.00°
1.40	29.0	116.66°
1.36	26.0	112.78°
1.32	23.0	108.89°
1.29	19.0	106.66°
1.23	16.0	104.44°
1.18	13.0	102.78°
1.12	9.0	101.11°
1.06	4.7	100.56°

(Dalton, in his *New System*, Pt. **2.** p. 496.)

Dalton remarks upon his table that "it will be found moderately accurate; but I could not give it the attention it deserves."

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Quantity of Soda in aqueous solutions at 15°.

Sp. gr.	Per cent of Na O.	Sp. gr.	Per cent of Na O.
1.4285	30.220	1.2392	15.110
1.4193	29.616	1.2280	14.506
1.4101	29.011	1.2178	13.901
1.4011	28.407	1.2058	13.297
1.3923	27.802	1.1948	12.692
1.3836	27.200	1.1841	12.088
1.3751	26.594	1.1734	11.484
1.3668	25.989	1.1630	10.879
1.3586	25.385	1.1528	10.275
1.3505	24.780	1.1428	9.670
1.3426	24.176	1.1330	9.066
1.3849	23.572	1.1233	8.462
1.3273	22.967	1.1137	7.857
1.3198	22.363	1.1042	7.253
1.3143	21.894	1.0948	6.648
1.3125	21.758	1.0855	6.044
1.3053	21.154	1.0764	5.440
1.2982	20.550	1.0675	4.835
1.2912	19.954	1.0587	4.231
1.2843	19.341	1.0500	3.626
1.2775	18.730	1.0414	3.022
1.2708	18.132	1.0330	2.418
1.2642	17.528	1.0246	1.813
1.2578	16.923	1.0163	1.209
1.2515	16.319	1.0081	1.601
1.2453	15.714	1.0040	0.302

(Tuennermann, in *Trommsdorff*'s *Neues Journ. der Pharm.*, **18.** 2, 11; and Gmelin's *Handbook*, 3. 76.)

From the tables of Dalton and Tuennermann, Schiff calculates the following table for hydrate of soda, by means of the formula: —

$D = 1 + 0.0118\,p - 0.00003\,p^2 + 0.0000002\,p^3$; in which D = the sp. gr. of the solution and p the percentage of substance in the solution.

Sp. gr.	Per cent of Na O, H O.	Sp. gr.	Per cent of Na O, H O.
1.059	5	1.437	40
1.115	10	1.488	45
1.170	15	1.540	50
1.225	20	1.591	55
1.279	25	1.643	60
1.332	30	1.695	65
1.384	35	1.748	70

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **107.** 301.)

Sp. gr.	Per cent of Na O
1.00	0.00
1.02	2.07
1.04	4.02
1.06	5.89
1.08	7.69
1.10	9.43
1.12	11.10
1.14	12.81
1.16	14.73
1.18	16.73
1.20	18.71
1.22	20.66
1.24	22.58
1.26	24.47
1.28	26.33
1.30	28.16
1.32	29.96
1.34	31.67
1.35	32.40
1.36	33.08
1.38	34.41

(Richter, in *Schuburth's Tech. Chem.*, **1.** 327.)

Readily soluble in alcohol. Soluble in wood-spirit. Soluble in fusel-oil (hydrate of amyl). (Pelletan.) An aqueous solution containing 20% of caustic soda is precipitated (as a more concentrated solution) by alcohol, but no such precipitation occurs when alcohol is added to weaker solutions. (Ordway, *Am. J. Sci.*, (2.) **33.** 30.) Soluble in an aqueous solutions of mannite. (Favre, *Ann. Ch. et Phys.*, (3.) **11.** 76.) Readily soluble in glycerin. Soluble to a certain extent in ether.

*Per*Oxide of Sodium. Decomposed at once by cold water.
$Na\,O_2$

Oxide of Stann(*ous*)Amyl. Somewhat soluble in boiling alcohol. Nearly insoluble in ether.
$C_{10}H_{11}Sn\,O$ or $\left.\begin{matrix}C_{10}H_{11}Sn\\ C_{10}H_{11}Sn\end{matrix}\right\}O_2$

Oxide of Stann(*ic*)Amyl. (*Oxide of biStannAmyl.*) Very sparingly soluble in absolute alcohol. Readily soluble in ether and in a mixture of alcohol and ether.
$C_{10}H_{11}Sn_2\,O$ or $\left.\begin{matrix}C_{10}H_{11}Sn_2\\ C_{10}H_{11}Sn_2\end{matrix}\right\}O_2$

Oxide of *di*Stann(*ic*)*di*Amyl.
$Sn_2(C_{10}H_{11})_2\,O$

Oxide of *di*Stann(*ic*)*tri*Amyl. Insoluble in water. Soluble in ether..
$Sn_2(C_{10}H_{11})_3\,O$

Oxide of *di*Stann(*ic*)*tetra*Amyl. Easily soluble in alcohol.
$Sn_2(C_{10}H_{11})_4\,O$

Oxide of Stann(*ous*)Ethyl. Insoluble in water, alcohol, or ether. Easily soluble, with combination, in acids, and in alkaline solutions. (Frankland.)
$C_4H_5Sn\,O$ or $\left.\begin{matrix}C_4H_5Sn\\ C_4H_5Sn\end{matrix}\right\}O_2$

Oxide of Stann(*ic*)Ethyl. (*Oxide of biStannEthyl.*)
$C_4H_5Sn_2\,O$ or $\left.\begin{matrix}C_4H_5Sn_2\\ C_4H_5Sn_2\end{matrix}\right\}O_2$

Oxide of *hexa*Stann*tetra*Ethyl. Soluble in ether.

Oxide of *tetra*Stann*penta*Ethyl. Sparingly soluble in water. Readily soluble in alcohol, and ether. Its salts are readily soluble in alcohol.
$Sn_4(C_4H_5)_5\,O$

Oxide of *tetra*Stann*tri*Ethyl. Soluble in an aqueous solution of caustic potash. Its salts are scarcely at all soluble in water; but are soluble in alcohol.

Oxide of *tetra*StannEthyl. Perfectly insoluble in water. Sparingly soluble in boiling alcohol; more soluble in ether.
$Sn_4C_4H_5\,O$

Oxide of *di*Stann*tri*Ethyl. The hydrated oxide is moderately soluble in water. Tolerably easily soluble in spirit, even dilute. Soluble in absolute alcohol, and in ether. Its salts are all soluble in alcohol, and ether.
$Sn_2(C_4H_5)_3\,O$

Oxide of Stann(*ous*)Methyl. Insoluble in ammonia-water, alcohol, or ether. Soluble in an aqueous solution of caustic potash. (Cahours & Riche.)
$C_2H_3Sn\,O$ or $\left.\begin{matrix}C_2H_3Sn\\ C_2H_3Sn\end{matrix}\right\}O_2$

Oxide of Stib*di*Amyl. Soluble in ether.
$(C_{10}H_{11})_2Sb\,O$ or $\left.\begin{matrix}(C_{10}H_{11})_2Sb\\ (C_{10}H_{11})_2Sb\end{matrix}\right\}O_2$

Oxide of Stib*tri*Amyl. Insoluble in water. Sparingly soluble in hydrated alcohol, and ether. Easily soluble in absolute alcohol. Readily soluble, with combination, in acids. Most of its salts are insoluble in alcohol. (Berlé.)
$Sb\left\}(C_{10}H_{11})_3\,O_2\right.$

Oxide of Stib*tri*Ethyl. Deliquescent. Readily soluble in water, and alcohol. Somewhat more sparingly soluble in ether. Its salts are readily
$Sb\left\}(C_4H_5)_3\,O_2\right.$

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soluble in water, but are only sparingly soluble in alcohol. (Lœwig & Schweitzer; Merck.)

Oxide of StibEthylium(hydrated). Very easily soluble in water, and alcohol. Insoluble in ether. (Lœwig.) The salts of stibethylium are very easily soluble in water, and alcohol.
$Sb \left\{ (C_4\,H_5)_4\,O,\ H\,O \right.$

Oxide of Stib*tri*Methyl.
$Sb \left\{ (C_2\,H_3)_3\,O_2 \right.$

Oxide of StibMethyl*tri*Ethylium(hydrated). Readily soluble in water, and alcohol. Its salts are all more or less soluble in water, and alcohol. Some of them are deliquescent, others are permanent. (Friedlænder.)
$Sb \left\{ \begin{matrix} C_2\,H_3 \\ (C_4\,H_5)_3 \end{matrix} \right. .\,O,\ H\,O$

Oxide of StibMethylium(hydrated). Very deliquescent. Easily soluble in water, and alcohol. Insoluble in ether.
$Sb \left\{ (C_2\,H_3)_4\,O,\ H\,O \right.$

The salts of stibmethylium are easily soluble in water, more difficultly soluble in alcohol, and almost insoluble in ether.

***Sub*Oxide of Stilbese.** *Vid.* Benzil.

Oxide of Strontium.
(*Strontia.*)
$Sr\,O$

a = *anhydrous.* Soluble in about 160 pts. of water at 15.56°, the solution being of 1.008 sp. gr., nearly; and in about 50 pts. of boiling water; whence it appears that strontia is much less soluble than baryta, and much more soluble than lime. (Dalton, in his *New System*, Pt. **2.** p. 527.) Soluble in 130 pts. of water at 20°. (Bineau, *C. R.*, **41.** 510.) Soluble in 40 pts. of cold, and in 20 pts. of hot water. (Dumas, *Tr.*, **6.** 263.)

Very sparingly soluble in alcohol. (Gmelin.) Insoluble in ether.

b = *hydrated.*
$Sr\,O,\ H\,O$

c = *crystallized.* Soluble in 50 pts. of cold, and in 2.4 pts. of boiling water. (Bucholz.) Soluble in 50 pts. of water at 15.56°, the sp. gr. of the solution being nearly 1.008. (Dalton, *loc. cit.*) Soluble in 51.4 pts. of water at 15.56°, and in about 2 pts. of boiling water. (Hope, *Edinburgh Trans.*, **4.** 44. [T.].) Soluble in 52 pts. of water at 15°, and in 2.4 pts. of boiling water. (Berzelius's *Lehrb.*) Soluble in 48 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) Less soluble in water than the hydrate of baryta. (H. Rose, *Tr.*) Soluble in an aqueous solution of chloride of ammonium, even at the ordinary temperature. (*Ibid.*) Soluble in an aqueous solution of cane-sugar. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 156.)
$Sr\,O,\ 8\,H\,O$

***Per*Oxide of Strontium.** Decomposed by water at temperatures approaching 100°.
$Sr\,O_2$

Oxide of Styracyl. Insoluble in water. Soluble in alcohol, and ether. (Ramdohr.)
(*Oxide of Styryl.*)
$C_{18}\,H_9\,O$

Oxide of *bi*SulphEthyl. Insoluble in water. Soluble in alcohol, and ether. (Malaguti.)
(*Bisulphuretted Vinic Ether. Ether sulfuré.*)
$C_4\,H_5\,S_2\,O$

Oxide of Sulphur. See **Hyposulphurous Acid.**

Oxide of Tantalum. Unacted upon by acids. (Berzelius.)
$Ta_2\,O_3$

Oxide of TellurAmyl. Soluble in water. (Wœhler & Dean.)

Oxide of TellurEthyl. Soluble in water. (Mallet.)
$\left. \begin{matrix} C_4\,H_5\,Te \\ C_4\,H_5\,Te \end{matrix} \right\} O_2$

Oxide of Tellurium. There are two allotropic modifications: —
(*Tellurous Acid.*)
$Te\,O_2$

α (*granular, crystalline*). Very slightly soluble in water. Sparingly soluble in acids or in boiling aqueous solutions of caustic ammonia or the carbonated alkalies. Easily soluble in solutions of caustic potash, and soda.

β (*amorphous, precipitated*). Soluble to a not inconsiderable extent in water. When the aqueous solution is heated to 40° it is decomposed, and the insoluble (*α*) modification deposited. Easily soluble in nitric, and in other acids. The nitric-acid solution soon suffers decomposition, the insoluble (*α*) modification being deposited, but this does not occur with the solutions in other acids. Easily soluble in ammonia-water and in aqueous solutions of the carbonated alkalies. It is modification *β* which unites with bases to form salts. *Vid.* Tellurites. (Berzelius, *Lehrb.*, **2.** pp. 237 – 241.) Insoluble either in concentrated or dilute acetic acid. (*Ibid.*, **3.** 1145.) Easily soluble in acids, especially in chlorhydric acid. On the addition of water to the acid solution some of the hydrated oxide, together with a basic salt, is precipitated. Insoluble in acetic acid. Soluble in aqueous solutions of caustic potash, soda, and ammonia; and in warm solutions of the alkaline carbonates.

Oxide of TellurMethyl. Deliquescent. Easily soluble in water, and alcohol. (Wœhler & Dean, *Ann. Ch. u. Pharm.*, **93.** 234.)
$\left. \begin{matrix} C_2\,H_3\,Te \\ C_2\,H_3\,Te \end{matrix} \right\} O_2$

Oxide of Thorium.
(*Thorina* or *Thoria.*)
$Th\,O$

a = *anhydrous.* After ignition it is perfectly insoluble in concentrated chlorhydric, or nitric acids, but is soluble in hot concentrated sulphuric acid. After ignition it is insoluble in acids, excepting sulphuric acid. By digesting with dilute sulphuric acid, at a temperature at which the excess of acid may evaporate, a salt soluble in water is obtained. Insoluble in solutions either of the caustic or carbonated alkalie. (Berzelius, *Lehrb.*, **2.** 192.) When prepared by calcining oxalate of thoria, however, it is soluble in chlorhydric acid. (Berlin.)

b = *hydrated.* Insoluble in water, or alcohol. When moist it is very readily soluble in acids; but is much more difficultly soluble after having been dried. Insoluble in aqueous solutions of the caustic alkalies, but tolerably easily soluble in solutions of the carbonated alkalies, being more soluble at the ordinary temperature than in hot solutions. When a saturated solution of hydrate of thoria in carbonate of ammonia is heated in a closed flask to 60°, the larger portion of the hydrate is precipitated, but after the solution has become cold, the precipitate redissolves in the course of a few hours. More soluble in a mixture of caustic and carbonated ammonia than in carbonate of ammonia alone. (Berzelius, *Lehrb.*, **2.** 192.) It is not precipitated by alkalies from solutions which contain tartaric or citric acids. (H. Rose, *Tr.*)
$Th\,O,\ H\,O$

***Prot*Oxide of Tin.**
(*Stannous Oxide.*)
$Sn\,O$

a = *anhydrous.* Permanent. Soluble in acids. Insoluble in dilute alkaline solutions. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 460.)

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Very slowly and slightly soluble in a boiling aqueous solution of chloride of ammonium. (H. Rose, *Tr.*)

b = hydrated. $2\,Sn\,O, H\,O$ Decomposed to *a* on boiling with water. More readily soluble in acids than metallic tin or the anhydrous protoxide. (Berzelius.) Soluble in aqueous solutions of caustic potash, and soda, even dilute; sparingly soluble [insoluble (H. Rose, *Tr.*)] in a solution of carbonate of ammonia; nearly insoluble in ammonia-water, and in a solution of carbonate of potash (Wittstein); soluble also in solutions of caustic lime, and baryta: all these alkaline solutions are decomposed on boiling. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** pp. 460, 465.) Sparingly soluble in an aqueous solution of acetate of soda. (Mercer.) It is not precipitated by ammonia from solutions containing citrate of soda. (Spiller.) Somewhat soluble in an aqueous solution of waterglass (acid silicate of soda or potash). (Ordway, *Am. J. Sci.*, (2.) **32.** 338; compare *Ibid.*, **33.** 33.) Soluble in aqueous solutions of hydrated oxide of stibethylium, and of hydrate of triethyltoluenylammonium. Those of the salts of protoxide of tin which are insoluble in water are soluble in chlorhydric acid and in a solution of chloride of ammonium, i. e. if they have not been ignited.

When boiled with a very dilute solution of caustic potash, so long as it continues to dissolve, 16 pts. of oxide to 1 pt. of potash will be taken up. When this solution is evaporated, it forms a jelly which slowly dries up to a mass, which is still soluble in water; but if this mass is ignited, the compound of potash and tin is decomposed, and water now dissolves nothing but potash from the mixture. A solution of carbonate of potash also dissolves hydrate of tin, under certain conditions. Thus, when a solution of carbonate of potash is poured upon the hydrate it combines therewith, but the resulting compound does not dissolve in the alkaline liquid. If the latter be now decanted, the precipitate washed with a little cold water, and then treated with a larger quantity of pure water, an emulsion-like liquid is obtained, in which, however, carbonate of potash produces a precipitate. This action of the alkaline carbonates is due to the formation of a certain quantity of bicarbonate, by the action of the oxide of tin. When precipitated with basic succinate of ammonia, oxide of tin is completely insoluble. (Berzelius, *Lehrb.*, **2.** 191.) Even when recently precipitated it is only sparingly soluble in an aqueous solution of chloride of ammonium, either hot or cold. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 98.)

"YELLOW OXIDE OF TIN." *Vid.* MetaStannate of Soda.

*Per*OXIDE OF TIN.

a = anhydrous. *(Stannic Oxide.)* $Sn\,O_2$ Insoluble in water, acids, concentrated alkaline solutions or caustic ammonia. Not absolutely insoluble in dilute nitric acid. (Mülder, *Die Silberprobirmethode*, p. 12.) Only traces of it can be dissolved by long-continued ebullition in chlorhydric or concentrated sulphuric acid. (H. Rose, *Tr.*)

b = hydrated. Soluble, with combination, in

α) $Sn\,O_2, H\,O$ *(Ordinary Oxide of Tin. Stannic Acid.)* chlorhydric and sulphuric acids, even when these are dilute. Soluble in alkalies. One modification of it is soluble, another is insoluble, in caustic ammonia. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 481.) Easily soluble in an aqueous solution of caustic potash, but on adding to this solution still more potash a precipitate may form, since stannate of potash is difficultly soluble in a concentrated solution of potash; on adding water, however, this may be immediately redissolved. Somewhat soluble, though sparingly, in ammonia-water. Completely soluble in an aqueous solution of carbonate of potash, but not completely soluble in a solution of carbonate of soda. Carbonate of ammonia behaves like caustic ammonia. Insoluble in aqueous solutions of the alkaline bicarbonates or of chloride of ammonium. Easily soluble in acids, especially in dilute sulphuric and in nitric and chlorhydric acids. From all these acid solutions the oxide may be reprecipitated by largely diluting with water and then boiling, the precipitation being the more complete in proportion as less acid and more water is present. (H. Rose, *Tr.*) While still moist it is slightly soluble in nitric acid; but from this solution it gradually separates on standing, and coagulates at once when the liquid is heated to 50°; if nitrate of ammonia be added to the solution, this remains clear at the ordinary temperature. If the oxide precipitated by heating the solution is treated first with ammonia, and then with nitric acid, it redissolves. (Berzelius, *Lehrb.*, **2.** 596.) Soluble in solutions of the alkaline sulphides. (Berzelius, *Lehrb.*, **2.** 600.) Soluble in an excess of an aqueous solution of hydrate of triethyltoluenylammonium. It is not precipitated by ammonia from solutions which contain citrate of soda. (Spiller.) Though insoluble in nitric acid, peroxide of tin dissolves when treated with nitric acid and ammonia. (Thénard, *Ann. de Chim.*, **43.** 218. [T.].)

On drying the hydrate which has been precipitated from the bichloride by ammonia it preserves all its properties, and dissolves easily in chlorhydric acid; on heating it to 50° it loses its water, but is otherwise unchanged; heated to 80° it becomes more difficultly soluble in chlorhydric acid, a portion remaining undissolved; but that which does dissolve is still the modif. α; on heating to 130° it loses no more water, but a portion of it is still soluble in chlorhydric acid; on ignition it ceases to be soluble in chlorhydric acid, being less soluble therein in proportion as it has been more strongly heated. (H. Rose, *Tr.*, **1.** 252.)

Most of the salts of α oxide of tin are soluble in water, without decomposition. Those of them which are insoluble in water dissolve in chlorhydric acid; they are insoluble, however, in solutions of chloride of ammonium.

β) *(Anomalous Oxide. MetaStannic Acid.)* $Sn_5\,O_{10}, 5\,H\,O$ (of Fremy). Insoluble in water, or in nitric or sulphuric acids. Sparingly soluble in chlorhydric acid. (Fresenius, *Quant.*, p. 154.) Insoluble in nitric acid, even when previously treated with caustic ammonia (Berzelius, *Lehrb.*), in concentrated sulphuric acid, only swelling up therein. Scarcely at all dissolved by chlorhydric acid, but combines therewith to a salt which is insoluble in chlorhydric acid; this compound is soluble in water, however. (Berzelius, *Lehrb.*)

When metallic tin is oxidized by means of nitric acid, the oxide (β) obtained is completely insoluble in an excess of the acid and in water; if this oxide be freed from adhering nitric acid, by careful washing, and then treated with chlorhydric acid, it does not dissolve, but on heating the mixture of chlorhydric acid and oxide, and subsequently adding water, a clear solution is obtained,

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which, however, behaves with many reagents in an entirely different manner from an aqueous solution of sublimed bichloride of tin or a chlorhydric acid solution of the oxide α. (H. Rose, *Tr.*, **1.** 247.) On diluting the chlorhydric solution of modif. β with much water, and then boiling, a portion of the oxide (β) is reprecipitated, and this reaction occurs more readily than with the chloride of the other modification (α). (H. Rose, *Tr.*) Neither of the modifications of binoxide of tin are soluble in a solution of chloride of ammonium, even after long-continued ebullition. (H. Rose, *Tr.*, **1.** 253.)

Entirely insoluble in caustic ammonia. Soluble in solutions of the alkalies; if such alkaline solution be neutralized by an acid, another hydrate of tin is precipitated insoluble in nitric acid, but soluble in all proportions in caustic ammonia. (Fremy, *Ann. Ch. et Phys.*, (3.) **23.** 402.) Insoluble in acids, in a solution of caustic ammonia, or of carbonate of ammonia. Imperfectly soluble in solutions of the alkalies or alkaline carbonates. (Fremy, in *Gm.*) Insoluble in a solution of carbonate of potash. (H. Rose.)

The oxide (β) obtained by the action of nitric acid on metallic tin is completely soluble in an aqueous solution of caustic potash, as is also the hydrate precipitated on neutralizing the chlorhydric-acid solution; solutions thus obtained are apt to be cloudy at first, but clear up after a time on standing. The addition of more potash is liable to produce a slight precipitate, but this disappears again on the addition of water. [Compare Stannate of Potash (β).] Insoluble in aqueous solutions of the alkaline carbonates or bicarbonates. (H. Rose, *Tr.*)

The salts of β oxide of tin are generally difficultly soluble in water, and are decomposed thereby to insoluble basic salts and free acid. (Berzelius, *Lehrb.*)

*Prot*OXIDE OF TIN with *bin*OXIDE OF TIN. While yet moist, it is tolerably easily and completely soluble in ammonia-water. (Berzelius.) Difficultly soluble in dilute, more easily soluble in concentrated chlorhydric acid.

(*Sesqui Oxide of Tin.*)
$Sn_2O_3 = SnO, SnO_2$

OXIDE OF TITANIUM. Insoluble in acids, even fluorhydric.

(*Titanous Oxide.*)
TiO

*Sesqui*OXIDE OF TITANIUM. When prepared in the moist way it is insoluble in water or ammonia-water, but quickly oxidizes to titanic acid. It is soluble in the oxygen acids, but is oxidized very readily in these solutions. (Berzelius, *Lehrb.*, **2.** 386.) When prepared in the dry way it is soluble in great part in acids. (Berthier.) Soluble in sulphuric acid. Unacted upon by chlorhydric or nitric acid. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **20.** 392.)

(*Black Oxide of Titanium.*)
Ti_2O_3

OXIDE OF TOLUENYL. Insoluble in water. Decomposed by concentrated sulphuric acid and by phosphoric acid. (Cannizaro, *Ann. Ch. u. Pharm.*, **92.** 115.)

(*Oxide of Benzyl. Oxide of Benz-Ethyl. Benzylic Ether. Toluenyl Ether. Benzol Ether.*)
$C_{14}H_7O$, or $\left.\begin{matrix}C_{14}H_7\\C_{14}H_7\end{matrix}\right\}O_2$

OXIDE OF TUNGSTEN. Insoluble in water. Sparingly soluble in cold, more readily soluble in hot chlorhydric and sulphuric acids. Readily soluble, with decomposition, in a concentrated solution of caustic potash. Insoluble in boiling ammonia-water. (Riche.)

(*Tungstous Oxide. Brown Oxide of Tungsten.*)
WO_2

"BLUE OXIDE OF TUNGSTEN." *Vid.* Tungstate of Tungsten.

(*Tungstic Oxide.*)

OXIDE OF TURPENTINE-OIL. Soluble in water, alcohol, and ether, and crystallizes from the hot solutions on cooling. (Sobrero.)

(*Isomeric with Campholic Acid.*)
$C_{20}H_{18}O_4$

*Sub*OXIDE OF URANIUM(?). Ppt. Decomposed by water, and by exposure to the air. (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** 22.)

Ur_4O_3(?)

*Prot*OXIDE OF URANIUM.

(*Formerly mistaken for metallic Uranium.*)

a = *anhydrous.* When prepared in the dry way, it is unacted upon by dilute chlorhydric or sulphuric acid, even when these are boiling. Soluble in concentrated sulphuric acid, and in nitric acid. (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** 25.)

UrO

b = *hydrated.* Easily soluble in dilute acids, with combination. (Péligot, *loc. cit.*) Insoluble in aqueous solutions of the caustic alkalies, or of the carbonates of potash, soda, or ammonia. (Berzelius, *Lehrb.*, **2.** 778.) Soluble in aqueous solutions of the alkaline carbonates, especially of carbonate of ammonia. (Rammelsberg.)

*Sesqui*OXIDE OF URANIUM.

(*Uranic Oxide.*)

a = *anhydrous.* Easily soluble in nitric acid. (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** 9.)

Ur_2O_3

b = *hydrated.* Permanent. Insoluble in water. Very easily soluble in cold dilute nitric acid. (Malaguti, *Ann. Ch. et Phys.*, (3.) **9.** 463.) Easily soluble in acids. (Berzelius, *Lehrb.*) Soluble in boiling aqueous solutions of the nitrates of the sesquioxides of iron and bismuth, and of the din- and protoxides of mercury, with precipitation of the oxides in these salts. (Persoz, *Chim. Moléc.*, p. 366.) Not decomposed by a boiling aqueous solution of chloride of ammonium, which nevertheless dissolves a very small quantity of it. (H. Rose, *Tr.*) Insoluble in aqueous solutions of caustic ammonia, potash, or soda. Easily soluble in an aqueous solution of sesquicarbonate of ammonia, and of bicarbonate of potash, or of soda; also soluble, though less readily, in a dilute solution of monocarbonate of potash. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** 220.) Soluble in aqueous solutions of carbonate or bicarbonate of potash, and of soda. (Chevreul.) When in presence of non-volatile organic substances, like tartaric acid, it is not precipitated by the alkalies. (H. Rose, *Tr.*) Most of its compounds with acids are easily soluble in acids. For its compounds with bases, see URANIC ACID.

Ur_2O_3, HO

*Prot*OXIDE OF URANIUM with *Sesqui*OXIDE OF URANIUM.

I.) $Ur_3O_4 = UrO, Ur_2O_3$
(*Olive-green Oxide of Uranium. Tritoxide of Uranium.*)

a = *anhydrous.* Soluble in acids, with decomposition, forming salts of the proto- and sesquioxide. (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** 27.) Not attacked by cold dilute acids. Easily soluble in nitric acid. Soluble in warm, very dilute sulphuric acid. On digesting with chlorhydric acid a portion dissolves while the residue contains more of the protoxide than at first, since the sesquioxide dissolves by preference. Insoluble, even when hydrated, in an aqueous solution of caustic

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potash. (H. Rose, *Tr.*) After ignition, it is but difficultly soluble in dilute chlorhydric or sulphuric acid; it is more readily soluble in hot strong acids, being completely dissolved by concentrated sulphuric acid. (Arfvedson.)

b = *hydrated.* Easily soluble in acids, excepting when it has been boiled with water for a long time. Soluble in aqueous solutions of the alkaline carbonates.

II.) $Ur_4O_5 = 2\,UrO ; Ur_2O_3$ (*Black Oxide of Uranium. Deutoxide of Uranium.*) Soluble in acids, with decomposition, forming salts of the proto- and sesquioxide. (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** 26.)

*Sub*Oxide of Vanadium. Insoluble in water, VO acids, or alkaline solutions, when out of contact with the air.

*Bin*Oxide of Vanadium.
(*Vanadic Oxide. Vanadous Acid.*)

a = *anhydrous.* After ignition it is only slowly, VO_2 though completely, soluble in acids.

b = *hydrated.* Insoluble in water. Soluble in VO_2, HO acids. Exceedingly sparingly soluble in succinic acid. (Berzelius.) Soluble in aqueous solutions of the caustic, carbonated, and bicarbonated alkalies, including carbonate of ammonia. Most of the hydrated salts of vanadic oxide are soluble in water.

"Purple Oxide of Vanadium." Soluble in water.

"Green Oxide of Vanadium." *Vid.* Vanadiate of Vanadium.
(*Yellow Oxide of Vanadium. Yellow-Green Oxide of Vanadium. Orange-Yellow Oxide of Vanadium.*)

Oxide of Yttrium.
(*Yttria.*)

a = *anhydrous.* After ignition it is scarcely YO soluble in acids. (Odling.) Readily soluble in acids. Insoluble in ammonia-water. Difficultly soluble in a solution of caustic potash. (Wœhler.) Readily soluble in acids; even after having been subjected to a very intense red heat it dissolves easily in chlorhydric acid. The calcined oxide evolves much heat, and dissolves, when treated with dilute acids. (H. Rose, *Tr.*)

b = *hydrated.* Insoluble in water, or in aque- YO, HO ous solutions of the caustic alkalies, either cold or boiling, but soluble in solutions of the alkaline carbonates.

Completely insoluble in a solution of caustic potash. Ammonia-water precipitates it even from solutions which contain a certain proportion of an ammoniacal salt, but there must not be too much of the latter. When recently precipitated, it dissolves easily in a warm solution of chloride of ammonium, ammonia being evolved, but with the calcined oxide this reaction is slower and incomplete. (H. Rose, *Tr.*) Easily soluble in an aqueous solution of carbonate of ammonia, with combination; on boiling this solution the hydrate of yttria is completely reprecipitated, unless other saline substances are present, when the precipitate which at first forms on boiling is soon redissolved. Also soluble in a solution of carbonate of soda. (Berzelius, *Lehrb.*, **2.** 176.) Soluble in sulphurous acid. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 75.) Readily soluble in the acids generally. The presence of non-volatile organic substances, like tartaric acid, does not prevent its precipitation by ammonia, though the precipitation may be somewhat retarded. In presence of tartaric acid, carbonate of soda does not produce any precipitate, at least for several days, unless ammonia be also added. (H. Rose, *Tr.*)

*Sub*Oxide of Zinc. Exceedingly slowly soluble in boiling acids.

Oxide of Zinc. Insoluble in water. Readily $ZnO \;\&\; + HO$ soluble in acids, even after having been strongly ignited. Some samples of oxide of zinc are sensibly soluble in water, others are not, according to the method of their production. However, water never dissolves more than a millionth pt. of its weight. (Bineau, *C. R.*, **41.** 510.) When moist it is readily soluble in aqueous solutions of caustic potash, soda, and ammonia, and of carbonate of ammonia; but after ignition it dissolves in them with difficulty. It is partially reprecipitated from its saturated solution in concentrated caustic ammonia, when this is diluted with water. Anhydrous oxide of zinc is soluble in concentrated, but insoluble in dilute, aqueous solutions of the caustic alkalies. The hydrated oxide, on the other hand, is very easily soluble, even in dilute alkaline liquors. (Fremy, *Ann. Ch. et Phys.*, (3.) **23.** 390.) On boiling the solution in potash for a considerable time, the oxide of zinc is completely reprecipitated, especially if the solution has been diluted with water. (H. Rose, *Tr.*) Its solubility in ammonia-water is greatly increased by the presence of traces of potash and ammonia salts, by most of the phosphates, by arsenic, chlorhydric, sulphuric, nitric, acetic, carbonic, tartaric, citric, and sulphurous acids; succinic and benzoic acids increase its solubility in ammonia-water only when this is very dilute; boracic, iodhydric, chloric, arsenic, oxalic, and gallic acids do not promote its solution in ammonia-water, but combine with it together with some ammonia. (Schindler.) Caustic ammonia does not produce any precipitate when added to strongly acid solutions. (H. Rose, *Tr.*) Soluble both when dry or recently precipitated in a boiling aqueous solution of chloride of ammonium. (Demarçay, *Ann. der Pharm.*, 1834, **11.** 251.) When recently precipitated it is soluble in a hot aqueous solution of chloride of ammonium (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97); a very free evolution of ammonia occurring when the mixture is boiled. (L. Thompson, *Ibid.*, p. 179.) Somewhat less soluble in a solution of nitrate of ammonia. (Brett, *Ibid.*, p. 97.) Somewhat soluble in an aqueous solution of waterglass (acid silicate of soda or potash). (Ordway, *Am. J. Sci.*, (2.) **32.** 338; compare *Ibid.*, **33.** 33.) Abundantly soluble in carbonic-acid water, from which it is precipitated by caustic alkalies, and partially by alkaline carbonates, though not by the bicarbonates. (Bergman, *Essays*, **1.** 50.) Anhydrous oxide of zinc is soluble in sulphurous acid. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 81.) Somewhat soluble in an aqueous solution of methylamin, but insoluble in a solution of amylamin. (A. Wurtz.) Soluble in an aqueous solution of oxide of stibmethylethylium. (Friedlænder.) Tolerably readily soluble in a boiling aqueous solution of cyanide of potassium. (Gore.) Soluble in an aqueous solution of cyanide of potassium. (F. & E. Rodgers, *Phil. Mag.*, 1834, (3.) **4.** 97.) Soluble in a boiling aqueous solution of nitrate of sesquioxide of iron, with precipitation of ferric oxide, and in a boiling solution of nitrate of lead, with formation of dinitrate of lead. Unacted upon by boiling solutions of the nitrates of cobalt, nickel, and cerium. (Persoz, *Chim. Moléc.*, pp. 365, 367, 368.) Insoluble in an aqueous solution of cane-sugar. (Peschier.) The presence of

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some non-volatile organic substances, like tartaric acid, hinders the precipitation of oxide of zinc from its solution, by means of the alkalies; but this effect is much less marked than with most other oxides. (H. Rose, *Tr.*)

*Per*Oxide of Zinc. Insoluble in water. Decomposed by acids. (Thénard.)

Oxide of Zirconium.
(*Zirconia.*)

a = *anhydrous.* After ignition it is insoluble in acids, excepting hot concentrated sulphuric acid. The best method of dissolving it is to reduce it to a fine powder and treat this with sulphuric acid which has been diluted with one part of water, and to heat the mixture gently in a platinum vessel until all the water has been evaporated, and then expel the excess of acid at a temperature below ignition. (Berzelius, *Lehrb.*, **2.** 187.)
$Zr_2 O_3$

b = *hydrated.* Insoluble in water, or alcohol. Hydrate of zirconium, even when moist, is only very sparingly soluble in sulphurous acid, and the portion dissolved is entirely reprecipitated on boiling the solution. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 76.) When precipitated from cold solutions it is readily soluble in acids, but when precipitated from hot solutions or washed with hot water, it dissolves only in concentrated acids after long-continued digestion at high temperatures. After having been dried, it is more difficultly soluble in acids than when moist.
$2 Zr_2 O_3, 3 H O$

Slowly, difficultly, and but slightly soluble in an aqueous solution of carbonate of ammonia. Insoluble in solutions of the fixed alkaline carbonates; but if the solution of a zirconium salt is precipitated by carbonate of potash or of soda, and an excess of either of these be added, the precipitate (carbonate of zirconia, *q. v.*) which at first forms is redissolved. Under these circumstances it is much more soluble in solutions of the alkaline bicarbonates than in the simple carbonates. Insoluble in solutions of the ammoniacal salts (excepting the carbonate as above), even when these are boiling. (Berzelius's *Lehrb.*, **2.** 188.) Insoluble in aqueous solutions of caustic potash, soda, or ammonia. Soluble in an aqueous solution of mixed tartrate of ammonia and caustic ammonia.

The presence of chloride of ammonium does not prevent its precipitation by the caustic alkalies, but this precipitation does not occur in the presence of non-volatile organic substances like tartaric acid. (H. Rose, *Tr.*)

OxIodic Acid. *Vid.* PerIodic Acid.

Oxuric Acid. (Probably impure Alloxanic Acid.) Very readily soluble in water, and alcohol. (Vauquelin.)

Oxurate of Ammonia. Soluble in water.

Oxurate of Lead. Somewhat soluble in water.

Oxurate of Lime.

I.) *normal.* Permanent. Soluble in more than 40 pts. of cold water; and in less hot water.

II.) *basic.* Sparingly soluble in cold, much more soluble in hot water.

Oxurate *of dinoxide* of Mercury. Ppt.

Oxurate of Potash. Soluble in water.

Oxurate of Silver. Somewhat soluble in water.

Oxurate of Soda. Soluble in water.

OxyAcanthin (from *Berberis vulgaris*). Almost insoluble in cold water. When recently precipitated it is sparingly soluble in boiling water. Easily soluble in alcohol, ether, and the fatty and essential oils. Soluble, with combination, in dilute mineral acids, but is decomposed by concentrated acids.
(*Berbin.*)

OxyAmmonide of *X.* *Vid.* AmmonioOxide of *X.*

OxyBenzoic Acid. Permanent. Sparingly soluble in cold, easily soluble in boiling water, and alcohol. Its alkaline salts are readily soluble in water; those of the alkaline earths are more difficultly soluble in water, while the other salts are insoluble in water, or alcohol. They are all soluble in acids. (Gerland, *Ann. Ch. u. Pharm.*, **91.** 189.)
(*Isomeric with Salicylic and Ampelic Acid.*)
$C_{14} H_6 O_6 = C_{14} H_5 O_5, H O$

OxyBenzoate of Lead.
$C_{14} H_5 Pb O_6$

OxyBromide of Antimony. Insoluble in water. (Serullas.)
(*Basic hydrobromate of Antimony.*)

OxyBromide of Calcium. Decomposed by water.

OxyBromide of Cerium. Insoluble in water. (Dumas, *Tr.*)

OxyBromide of Copper. Insoluble in water. Decomposed by acids, even by carbonic acid. (Balard.)

OxyBromide *of sesquioxide* of Iron. *Vid.* Bromide of Iron (basic).

OxyBromide of Lead. Insoluble in water.
$Pb Br; Pb O$

OxyBromide *of protoxide* of Mercury. Insoluble in cold, sparingly soluble in hot water. Easily soluble in alcohol. (Lœwig.) Insoluble in alcohol. (Rammelsberg.)
$Hg Br; 3 Hg O$

OxyBromide of Phosphorus. Slowly decomposed by water. (Ritter, *Ann. Ch. u. Pharm.*, **95.** 210.)
$P O_2 Br_3$

OxyBromide of TellurEthyl.
$C_4 H_5 Te O; C_4 H_5 Te Br$

OxyBromide of Tungsten.
$W_2 O_5; W_2 Br_5$
$W Br_2 O$ (Riche).

OxyChlorAmidide of Mercury. *Vid.* Chloride of *tetra*MercurAmmonium.

OxyChloride of Antimony. All the chlorine may be removed by the long-continued action of hot water (Malaguti); also by carbonic-acid water. Insoluble in an aqueous solution of cane-sugar. (Peschier.)
(*Powder of Algaroth.*)
$Sb Cl_3; 5 Sb O_3$

OxyChloride of Bismuth. Totally insoluble in water. Almost entirely insoluble in very dilute chlorhydric acid; somewhat soluble in less dilute chlorhydric acid, from which it is again precipitated on the addition of water. (H. Rose, *Pogg. Ann.*, **83.** 145.) Soluble in hot nitric acid. (Jacquelin.)
$Bi Cl_3; 2 Bi O_3$

OxyChloride of Calcium. Decomposed by water, and alcohol. (H. Rose.)
$Ca Cl; 3 Ca O + 16 Aq$

OxyChloride of Cerium. Insoluble in acids.

OxyChloride of Chromium.

I.) $Cr_2 O_2 Cl + Aq$ Deliquescent. Soluble in water when moist; but after having been dried at 120°, it dissolves very slowly in water. Very soluble in alcohol. (Péligot, *Ann. Ch. et Phys.*, (3.) **16.** 296.)

II.) $Cr_2 O Cl_2 + Aq$ [Compare *basic sesqui*Chloride of Chromium.]

OxyChloride of Citryl. *Vid.* OxyChloro-Citric Acid.

OxyChloride *of dinoxide* of Copper.
$Cu_2 Cl ; 2 Cu O$

OxyChloride *of protoxide* of Copper.
I.)
$a = Cu Cl ; 2 Cu O$
$b =$ *ditto* $+ Aq$ Soluble in a strong aqueous solution of protochloride of copper ($Cu Cl$); also in strong chlorhydric acid, not in excess. (Gladstone, *J. Ch. Soc.*, **8.** 214.)
$c =$ *ditto* $+ 3 Aq$ & $4 Aq$
II.)
$a = Cu Cl ; 3 Cu O$
$b =$ *ditto* $+ 4 Aq$ Insoluble in water. Easily soluble in acids.
$c =$ *ditto* $+ 5 Aq$ Very slightly soluble in water. Soluble in ammonia-water. Soluble in chlorhydric and nitric acids, even when these are highly dilute. (F. Field, *J. Ch. Soc.*, **7.** 194.)
$d =$ *ditto* $+ 6 Aq$
III.) $Cu Cl ; 4 Cu O$, & $+ 6 Aq$ Insoluble in water.

OxyChloride of Didymium. Insoluble in water. Soluble in dilute acids. (Marignac, *Ann. Ch. et Phys.*, (3.) **38.** 161.)
$Di Cl ; 2 Di O + 3 Aq$

OxyChloride of Ethene. *Vid.* Oxide of ChlorEthyl.

OxyChloride of Ethylidene. Not decomposed by cold water, but is quickly decomposed on heating. (Lieben.)
$C_8 H_8 Cl_2 O_2$

OxyChloride of Gold. Soluble in water, and in an aqueous solution of caustic potash. (Fremy, *Ann. Ch. et Phys.*, (3.) **31.** 481.)

OxyChloride of Iridium. Ppt.

OxyChloride of Iron. *Vid. basic sesqui*-Chloride of Iron.

OxyChloride of Lead.
I.) $3 Pb Cl ; Pb O$ Swells up in water.
II.) $Pb Cl ; Pb O$
III.) $Pb Cl ; 2 Pb O$ Easily soluble in acids.
IV.) $Pb Cl ; 3 Pb O$ Almost insoluble in water. Slightly soluble in aqueous solutions of the caustic alkalies. Decomposed by acids. (Vauquelin.)
V.) $Pb Cl ; 5 Pb O$
VI.) $Pb Cl ; 6$ or $7 Pb O$(?) Completely soluble in an aqueous solution of caustic potash. Nitric acid dissolves the oxide of lead, leaving the normal salt.
(*Cassel Yellow.*)

OxyChloride of Lime. *Vid.* OxyChloride of Calcium.

OxyChloride of Mercury ($Hg O$).
(*Improperly ChloroMercurate of Mercury.*)
I.) $Hg O ; 2 Hg Cl$ Somewhat soluble in water. (Roucher, *Ann. Ch. et Phys.*, (3.) **27.** 353.) Oxychloride of mercury is very sparingly soluble in water, but acquires the property of dissolving in considerable quantity when treated with solutions of the alkaline chlorides. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 180.)
II.) $2 Hg O ; Hg Cl$ Almost insoluble in water. Decomposed by boiling water; also by long-continued contact with cold water.
III.) $3 Hg O ; Hg Cl$ Very sparingly soluble in cold, more soluble in hot water. (Guibourt; Donavan.) Decomposed by boiling water. (Millon.)
IV.) $4 Hg O ; Hg Cl$ Does not appear to be decomposed by cold water when it is perfectly pure. Decomposed by a large quantity of boiling water. (Roucher, *loc. cit.*)
V.) $5 Hg O ; Hg Cl$
VI.) $6 Hg O ; Hg Cl + Aq$ Unacted upon by cold water.
VII.) $6 Hg O ; Hg Cl$

[The reader should consult Roucher's original memoir cited above; compare also Millon, *Ann. Ch. et Phys.*, (3.) **18.** 387.]

OxyChloride of Molybdenum. Very soluble in water.
$Mb Cl_2 ; Mo O_2$(?)

OxyChloride of Nickel. Sparingly soluble in water. (Berzelius.)
$Ni Cl ; Ni O + Aq$

OxyChloride of Palladium. Insoluble in water. (Berzelius.) Soluble in acids. (Kane, *Phil. Trans.*, 1842, p. 282.)
$3 Pd O, Pd Cl + 4 Aq$

OxyChloride of Phosphorus. *Vid.* Chlor-Oxide of Phosphorus.

OxyChloride of Platinum. Insoluble in water. Appears to be soluble in a solution of caustic potash. Combines with ammonia-water, but is not dissolved thereby. Soluble in chlorhydric acid. (Kane, *Phil. Trans.*, 1842, p. 298.)
$Pt Cl ; 3 Pt O$

OxyChloride of SelenEthyl. Soluble in water, and in absolute alcohol. (Joy.)
$C_4 H_5 Se O ; C_4 H_5 Se Cl$

OxyChloride of Sulphide of Carbon. *Vid.* Sulphite of Chloride of *ter*ChloroMethyl.

OxyChloride of Sulphur. Exists under two modifications; one of which (crystalline) is decomposed with extreme violence by water, alcohol, and dilute acids. The other (liquid) is insoluble in water, alcohol, or weak acids, and is only slowly decomposed by them. (Millon, *Ann. Ch. et Phys.*, (3.) **29.** 238.)
(*Hypochlorosulphuric compound.*)
$S_2 O_3 Cl_2$

OxyChloride of TellurEthyl. Sparingly soluble in cold water; much more readily soluble in ammonia-water. Soluble in boiling, less soluble in cold alcohol. (Wœhler.)
$C_4 H_5 Te O ; C_4 H_5 Te Cl$

OxyChloride of TellurMethyl. Soluble in alcohol. (Wœhler & Dean.)
$C_2 H_3 Te O ; C_2 H_3 Te Cl$

OxyChloride of Thorium. Decomposed by water.

OxyChloride of Tin. Insoluble in water. Soluble in an aqueous solution of caustic potash, from which solution metallic tin separates after a time. (Berzelius.) Soluble in chlorhydric, acetic, dilute nitric and sulphuric acids. (J. Davy.)
$Sn Cl ; Sn O + 3 Aq$

OxyChloride of Tungsten.
I.) $W Cl_2 O$ Immediately decomposed by water. (Riche.)

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II.) $W Cl O_2$ Slowly decomposed by water. (Riche.)

OxyChloride of Zinc. Insoluble in water. $Zn Cl; 9 Zn O$ Somewhat soluble in ammonia-water. Easily soluble in acids. (Schindler.)

OxyChloride of Zirconium. *Vid. Sesqui*-Chloride of Zirconium(*basic*).

OxyChloroCarbonate of Methylene. *Vid.* ChloroCarbonate of Methyl.

OxyChloroCarbonic Ether. *Vid.* ChloroCarbonate of Ethyl.

OxyChloroCitric Acid. (*Oxychloride of Citryl.*) $C_{12} H_8 O_{12} Cl_2$ Deliquesces, with decomposition. Decomposed by most of the common solvents, the only liquid by which it can be washed and freed from mother-liquor being (with the possible exception of benzin) bisulphide of carbon, in which it is insoluble, or very sparingly soluble. (Pebal, *Ann. Ch. u. Pharm.*, 1856, **98.** 72.)

OxyChloroNaphthalenose. Insoluble in $C_{18} H_8 Cl_6 O_2$? water. Slightly soluble in alcohol, and ether. Soluble in concentrated sulphuric acid. (Laurent.)

OxyCobaltiCyanide of Lead. Insoluble $Pb_3 Co_2 Cy_6, 6 Pb O, 8 H O$ in water. Soluble in acids. (Zwenger.)

OxyCopaivic Acid. See Resins of Copaiba, under Resins.

OxyCuminic Acid. Sparingly soluble in $C_{20} H_{12} O_6$ cold, more soluble in boiling water; more readily soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 338.)

OxyCuminate of Silver.
$C_{20} H_{11} Ag O_6$

OxyCyanide of Lead. Ppt.
$Pb Cy; 2 Pb O$

OxyCyanide of Mercury.

I.) $Hg Cy; Hg O$ Sparingly soluble in cold, tolerably easily soluble in boiling water. (Schlieper; Johnston.) Somewhat soluble in spirit. (Kuehn.) Soluble, with decomposition, in aqueous solutions of caustic potash, chloride of potassium, and cyanide of potassium. (Johnston.) Decomposed by acids.

II.) $Hg Cy; 3 Hg O$ Somewhat more soluble in water than the normal cyanide of mercury. (Kuehn.)

OxydoChloride of *X*. *Vid.* OxyChloride of *X*.

OxyFluoride of Antimony. Permanent.
$Sb O_3; Sb Fl_3$

OxyFluoride of Cobalt. Insoluble in $2 (Co O; Co Fl) + Aq$ water. (Berzelius.)

OxyFluoride of Copper. Insoluble in $Cu Fl; Cu O + Aq$ water. (Berzelius.)

OxyFluoride of Lead. Soluble in water. [Insoluble in aqueous solutions of the alkaline fluorides ?]

Oxygen. 100 vols. of water absorb 4.6 vols. of O oxygen gas at the ordinary temperature; hence 1 kilogrm. of water contains 0.0464 grm. of oxygen. (Otto-Graham.) Soluble in 27 pts of water at the ordinary temperature. (Pelouze & Fremy.) 100 vols. of water dissolve 0.925 vol. of oxygen. (Gay-Lussac, cited by Fernet, *Ann. Ch. et Phys.*, (3.) **47.** 360.) 100 vols. of arterial blood dissolve from 10 to 13 vols. of oxygen. (Magnus.)

1 vol. of water, under a pressure of $0^m.76$ of mercury, at °C.	Dissolves of oxygen gas, — vols., reduced to 0°C. and $0^m.76$ pressure of mercury.
0°	0.04114
1°	0.04007
2°	0.03907
3°	0.03810
4°	0.03717
5°	0.03628
6°	0.03544
7°	0.03465
8°	0.03389
9°	0.03317
10°	0.03250
11°	0.03189
12°	0.03133
13°	0.03082
14°	0.03034
15°	0.00289
16°	0.02949
17°	0.02914
18°	0.02884
19°	0.02858
20°	0.02838

(Bunsen's *Gasometry*, pp. 286, 128, 153.)

1 vol. of alcohol under a pressure of $0^m.76$ of mercury at any temperature from 0° to 24° C. dissolves 0.28397 vol. of oxygen gas, reduced to 0° and $0^m.76$ pressure of mercury. (Bunsen's *Gasometry*, pp. 286, 128, 158.) 100 vols. of water at 18° dissolve 6.5 vols. of it. 100 vols. of alcohol, of 0.84 sp. gr., at 18° dissolve 16.25 vols. of it. (Th. de Saussure, *Gilbert's Ann. Phys.*, 1814, **47.** 167.) Insoluble in ether. (Dœbereiner.) Abundantly absorbed by oil of turpentine. The oil, in the course of a fortnight's exposure to the air, absorbs its own volume of oxygen, but does not give it off again on boiling. (Brandes.) 1 vol. of oil of turpentine took up in 4 months 20 vols. of oxygen; in 9 months more, 27.2 vols.; in the tenth month, at a temperature of 18° to 20°, somewhat more than 1 vol. daily; but in the following 33 months, only 9 vols. more; making the quantity of oxygen absorbed in the whole 43 months 128 vols. (Saussure, *Gm.*, **14.** 247.) Oil of turpentine in absorbing oxygen acquires new properties, being converted into "ozonized oil of turpentine"; in which compound part of the absorbed oxygen appears to be more intimately, a second portion (amounting to 5.2% of the oil) less intimately combined, inasmuch as the latter may be transferred to other bodies, and still exhibit the properties of free ozone. (Schœnbein.) The formation of ozonized oil of turpentine takes place on agitating the oil with cold air in presence of light, the action going on the more quickly, the more numerous the points of contact of the oil and the air, the brighter the light, and the lower the temperature. (*Gm.*, **14.** 256.) It is absorbed in large quantities at the ordinary temperature by oil of lavender, carbonic acid being given off meanwhile. At 24° oil of lavender absorbed the following quantities of oxygen: In the first 12 hours, none; in the two following days, 1.39 vols. daily; in the following week, 6.17 vols. daily; altogether in 4½ months, 111 vols.; in the following 30 months, 8 vols.; therefore, in 34½ months, 119 vols.; in the same interval 22.1 vols. of carbonic acid were formed and the oil became somewhat yellowish. Kept over mercury in the shade during four winter months, below 12°, it absorbed 52 vols. of oxygen, 2 vols. of carbonic acid being formed.

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(Saussure, *Gm.*) Oxygen is absorbed by oil of lemon, whilst carbonic acid, nitrogen, and hydrogen go off. In a week the oil absorbed 0.8 vol.; in the two following months, as a daily average, 1.07 vols.; after four weeks at 23°, daily 1.7 vols.; within a year 141.7 vols.; in the following 30 months scarcely 2 vols.; and yielded 16.6 vols. of carbonic acid, 0.66 vol. nitrogen, and 0.29 vol. hydrogen. (Saussure, *Gm.*, **14.** 298.) 1 vol. of caoutchin absorbs in 14 days, 45 vols. of oxygen, without becoming saturated; in 3 weeks, at 20°, it absorbs 2 vols. of oxygen.

Many metallic oxides are soluble in water; several of them are soluble in alcohol.

None of the protoxides, excepting, perhaps, protoxide of uranium, loses its solubility in acids by exposure to a red heat. Most of the protoxides (like $Mg\,O$) form only insoluble *basic* salts, while the sesquioxides (like $Al_2\,O_3$) enter into numerous gum-like soluble sub-acid combinations. (Ordway, *Am. J. Sci.*, (2.) **26.** pp. 206, 208.) Many salts of the metallic oxides are soluble in ether, though fewer than in alcohol.

OxyGuanin. $C_{10}\,H_7\,N_4\,O_9$ Insoluble in water, alcohol, or ether. Unacted upon by cold chlorhydric, phosphoric, acetic, oxalic, and dilute sulphuric acids; but is in part dissolved by them when warm, separating out again for the most part as the solutions cool. Soluble, without decomposition, in an excess of nitric acid. Easily soluble in aqueous solutions of caustic potash, soda, ammonia, lime, and baryta. Insoluble in solutions of the alkaline carbonates; but sparingly soluble in solutions of the alkaline bicarbonates. (Kerner, *Ann. Ch. u. Pharm.*, **103.** 253.)

OxyIodide of Antimony. (*Basic Hydriodate of Antimony.*) $Sb\,I_3;\ 5\,Sb\,O_3$ Insoluble in water. Decomposed by long-continued washing with hot water, or solutions of the caustic or carbonated alkalies. (Serullas.)

OxyIodide of Bismuth.

I.) $Bi\,I_3;\ 2\,Bi\,O_3$ Completely insoluble in water. Insoluble in aqueous solutions of the iodides or chlorides of potassium and of sodium. Very incompletely decomposed by a solution of caustic potash, even when this is boiling; more easily and completely decomposed by a boiling solution of carbonate of ammonia. (Arppe, in *Berzelius's Lehrb.*)

II.) $2\,Bi\,I_3;\ 5\,Bi\,O_3$ Behaves like No. I. Somewhat soluble in tartaric acid, and in a solution of bitartrate of potash. Easily soluble in chlorhydric acid, and in solutions of sulphide of ammonium and caustic potash. Decomposed by nitric acid, with separation of oxide. Only slowly acted upon by sulphuric acid.

OxyIodide of Cadmium. Insoluble in water.

OxyIodide of Cobalt. Insoluble in water. $Co\,I;\ Co\,O$ (Rammelsberg.)

OxyIodide of Lead.

I.) $Pb\,I;\ Pb\,O$ Insoluble in boiling water. (Caventou; Brandes); or in boiling ether. (Vogel.) Decomposed by acetic acid. (Brandes; Denot.) Unaltered by a solution of iodide of potassium. (Brandes.)

II.) $Pb\,I;\ 2\,Pb\,O$ Insoluble in boiling water.

III.) $Pb\,I;\ 3\,Pb\,O + 2\,Aq$

IV.) $Pb\,I;\ 5\,Pb\,O$ Insoluble in boiling water.

OxyIodide of *di***Mercur(***ic***)ammonium.** $N\left\{\begin{matrix}H_2\\2\,Hg\end{matrix}\right. \cdot I;\ 2\,Hg\,O$ Permanent. Soluble in chlorhydric acid. Insoluble in ammonia-water.

OxyIodide of Mercury. $Hg\,I;\ 3\,Hg\,O$ Decomposed by water. Soluble in iodhydric acid.

OxyIodide of Nickel. $Ni\,I;\ 9\,Ni\,O + 15\,Aq$ Insoluble in water, or ammonia-water. Decomposed by boiling alcohol, and by a boiling aqueous solution of caustic potash. Soluble in acetic acid.

OxyIodide of TellurEthyl. $C_4\,H_5\,Te\,I;\ C_4\,H_5\,Te\,O$ Sparingly soluble in water. Readily soluble in ammonia-water.

OxyIodide of Zinc. $Zn\,I,\ 3\,Zn\,O + 2\,Aq$ Insoluble in cold, slightly soluble in boiling water. (Millon, in *Berzelius's Lehrb.*, **3.** 676.)

OxyMethylene. $C_4\,H_4\,O_4$ Insoluble in water, alcohol, or ether, when merely boiled with them, but when heated with water to 100° in a sealed tube for several hours it dissolves completely without alteration. (Butlerow.)

OxyMuriatic Acid. *Vid.* Chlorine.

OxyNaphtylamin. *Vid.* Naphtamein.

OxyPeucedanin. Insoluble in cold ether. $C_{14}\,H_{11}\,O_7$ (Erdmann.)

OxyPhenic Acid. (*BinOxide of Phenyl. PyroCatechine. PyroCatechucic Acid. PyroMorinTannic Acid.*) $C_{12}\,H_6\,O_4 = C_{12}\,H_4\,O_2,\ 2\,H\,O$ Readily soluble in water, alcohol, and (when the acid has been prepared from pyroligneous acid) also in ether. (Buchner, *Ann. Ch. u Pharm.*, **96.** 189.) Readily soluble in water; still more soluble in alcohol; but very sparingly soluble in ether. (Zwenger.) Very sparingly soluble in ether. (Buchner.) Easily soluble in water, alcohol, and ether. (Reinsch.) Soluble in concentrated sulphuric, and chlorhydric acids. (Zwenger.)

OxyPhenate of Lead. $C_{12}\,H_4\,Pb_2\,O_4$ Permanent. Nearly insoluble in water. Readily soluble in acetic acid. (Zwenger.)

OxyPicric Acid. (*Styphnic Acid. Artificial Tannin. Artificial Bitter.*) $C_{12}\,H_3\,N_3\,O_{16} = C_{12}\,H\,(N\,O_4)_3\,O_2,\ 2\,H\,O$ Soluble in 104 pts. of water at 25° (Erdmann); in 88 pts. of water at 62°. (Bœttger & Will.) More easily soluble in alcohol, and ether. (B. & W.) More readily soluble in strong acetic acid than in water. Easily soluble in concentrated nitric acid; less soluble in strong chlorhydric acid. On the addition of water it is partially precipitated from both of these solutions. (B. & W.)

OxyPicrate of Ammonia.

I.) *normal.* $C_{12}\,H\,(N\,H_4)_2\,(N\,O_4)_3\,O_4$ More soluble in water than the monobasic salt. Less soluble in an aqueous solution of carbonate of ammonia than in pure water.

II.) *acid.* $C_{12}\,H_2\,(N\,H_4)\,(N\,O_4)_3\,O_4$ Less soluble in water than the normal salt.

OxyPicrate of Ammonia & of Cobalt.

OxyPicrate of Ammonia & *of protoxide* of Copper. $C_{12}\,H\,(N\,H_4)\,Cu\,(N\,O_4)_3\,O_4 + 8\,Aq$ Tolerably soluble in water. (Bœttger & Will.)

OxyPicrate of Baryta.

I.) *normal.* Very sparingly soluble in water. $C_{12}\,H\,Ba_2\,(N\,O_4)_3\,O_4 + 4\,Aq$

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OxyPicrate of Cadmium.

OxyPicrate of Cobalt. Readily soluble in water. (Bœttger & Will.)
$C_{12}HCo_2(NO_4)_3O_4 + 8Aq$

OxyPicrate of Cobalt & of Potash.
$C_{12}HCoK(NO_4)_3O_4 + 2Aq$

OxyPicrate *of protoxide* of Copper.
I.) *normal.* Soluble in water. (Bœttger & Will.)
$C_{12}HCu_2(NO_4)_3O_4 + 9Aq$

OxyPicrate of Copper & of Potash.
$C_{12}HCuK(NO_4)_3O_4 + 4Aq$

OxyPicrate *of protoxide* of Iron. Readily soluble in water. Readily alterable.

OxyPicrate *of sesquioxide* of Iron.

OxyPicrate of Lead.
I.) *basic.* Almost insoluble in water. (Bœttger & Will.)
$C_{12}H_2Pb(NO_4)_3O_4, 2PbO + 3Aq$

OxyPicrate of Lime.
I.) *normal.* Very soluble in water.
$C_{12}HCa_2(NO_4)_3O_4 + 7Aq$

OxyPicrate of Magnesia. Very readily soluble in water.

OxyPicrate of Manganese.
II.) *acid* Very easily soluble in water.
$C_{12}H_2Mn(NO_4)_3O_4 + 12Aq$

OxyPicrate of Nickel. Very readily soluble in water. (Bœttger & Will.)

OxyPicrate of Nickel & of Potash. Difficultly soluble in water.
$C_{12}HNiK(NO_4)_3O_4 + 4Aq$

OxyPicrate of Potash.
I.) *normal.* Soluble in 58 pts. of water at 23°; much less soluble in water containing caustic potash or carbonate of potash. (Erdmann.)
$C_{12}HK_2(NO_4)_3O_4 + Aq$

II.) *acid.* Soluble in water.
$C_{12}H_2K(NO_4)_3O_4 + 2Aq$

OxyPicrate of Silver.
I.) *normal.* Sparingly soluble in water; on boiling, the aqueous solution is decomposed. (Bœttger & Will.)
$C_{12}HAg_2(NO_4)_3O_4 + 2Aq$

OxyPicrate of Soda.
I.) *normal.* Readily soluble in water. (Bœttger & Will.)
$C_{12}HNa_2(NO_4)_3O_4 + 5Aq$
II.) *acid.*

OxyPicrate of Strontia.
I.) *normal.* More readily soluble than the baryta salt. (Bœttger & Will.)
$C_{12}HSr_2(NO_4)_3O_4 + 4Aq$

OxyPicrate of Urea.
$2C_2H_4N_2O_2, C_{12}H_2N_3O_{15}$

OxyPicrate of Zinc. Deliquescent. Is the most soluble of any of the oxypicrates.

OxyPinitannic Acid. Readily soluble in water. (Kawalier.)
$C_{14}H_8O_9$

OxyPinitannate of Lead. Ppt.

OxyPorphyric Acid.

OxyPorphyrate of Ammonia. Readily soluble in an aqueous solution of carbonate of ammonia.

"**OxyProtein.**" Insoluble in water.
(*BinOxide of Protein.*)

OxyPyrolic Acid. Soluble in 42 pts. of water at 20°; much more soluble in boiling water. Soluble in alcohol. (Arppe, *Ann. Ch. u. Pharm.*, **95.** 248.)
$C_{14}H_{12}O_{10} = C_{14}H_{10}O_8, 2HO$

OxyPyrolate of Baryta. Tolerably soluble in water.

OxyPyrolate of Silver.
$C_{14}H_{10}Ag_2O_{10}$

OxyPyrolate of Soda.

OxySelenide of Antimony.

OxySulphide of Ammonium & of Uranium.
$NH_4S, 2Ur_2S_3; 21(NH_4O, 2Ur_2O_3 + 3Aq)$ Ppt.

OxySulphide of Antimony. Chlorhydric and tartaric acids dissolve out the oxide, leaving the sulphide of antimony undissolved.
$SbO_3; 2SbS_3$

OxySulphide of Barium.
I.) $BaO, 10HO; 3(BaS, 6HO)$
II.) $BaO, 10HO; BaS, 10HO$
III.) $4(BaO, 10HO); 3(BaS, 6HO)$
Decomposed by boiling water, hydrate of baryta crystallizing out as the solution cools. (H. Rose.)

OxySulphide of Calcium. Decomposed by much water (H. Rose.) Soluble in 400 pts. of cold water; decomposed by boiling water. (Buchner.) Insoluble in alcohol. (Gm.) Soluble in alcohol. (Gay-Lussac.) Permanent in dry air. Very sparingly soluble in cold water. Hot water dissolves a much larger portion, but does not deposit it on cooling. An aqueous solution saturated at 0° @ 7.2° was of 1.0105 sp. gr. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 12.)
$5CaO, CaS_5 + 20Aq$

OxySulphide of Cobalt. Cold chlorhydric acid dissolves out only the oxide of cobalt; but hot chlorhydric acid decomposes it entirely.
$CoO; CoS$

OxySulphide of Cyanogen. *Vid.* PerSulphoCyanogen.

OxySulphide of Didymium. Insoluble in water. Soluble in dilute chlorhydric acid, with decomposition. (Marignac, *Ann. Ch. et Phys.*, (3.) **38.** 158.)
$DiO_2; DiS$

OxySulphide of Manganese. Permanent. Soluble in acids, with decomposition. (Arfvedson.)
$MnO; MnS$

OxySulphide of Zinc. Soluble, with decomposition, in chlorhydric acid.

OxySulphoCarbonic Acid. Unknown.
(*DiSulpho Carbonic Acid*(of Gerhardt).
Carbonyl Sulfosæure(of Weltzien).)
$C_2H_2S_4O_2 = \left.\begin{matrix}HO\\HO\end{matrix}\right\}C_2S_4$ or $\left.\begin{matrix}C_2O_2''\\H_2\end{matrix}\right\}S_4$

OxySulphoCarbonate of Allyl.
(*AllylXanthic Acid.*)
$C_8H_6S_4O_2 = C_2H(C_6H_5)S_4O_2$

OxySulphoCarbonate of Allyl & of Potassium.
$C_2K(C_6H_5)S_4O_2$

OxySulphoCarbonate of Ammonium & of Amyl. Soluble in water; the solution subsequently undergoing gradual decomposition. Soluble in alcohol and in ether. (M. W. Johnson, *J. Ch. Soc.*, **5.** pp. 143, 148.)
(*AmylXanthogenamate of Ammonia.*
AmyldiSulpho Carbonate of Ammonia.)
$C_2(NH_4)(C_{10}H_{11})S_4O_2$

OxySulphoCarbonate of Ammonium & of Ethyl. Very soluble in water, and alcohol. (Zeise.) Insoluble in ether.
(*Ethyl diSulpho Carbonate of Ammonia.*)
$C_2(NH_4)(C_4H_5)S_4O_2$

OxySulphoCarbonate of Amyl.
(*Amyl diSulpho Carbonic Acid. Amyl-OxySulpho Carbonic Acid. Amylo-Xanthic Acid. Xanthamylic Acid.*)

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I.) $C_{12}H_{12}O_2S_4 = \left.\begin{matrix}C_{10}H_{11}O\\ HO\end{matrix}\right\} C_2S_4$; or $\left.\begin{matrix}C_2O_2''\\ H.C_{10}H_{11}\end{matrix}\right\} S_4$ Soon decomposed by water. Insoluble in an aqueous solution of chloride of potassium.

II.) $C_{22}H_{22}O_2S_4 = C_2(C_{10}H_{11})_2S_4O_2$

OxySulphoCarbonate of Amyl & of Copper. Ppt.

OxySulphoCarbonate of Amyl & of Ethyl. $C_2(C_{10}H_{11})(C_4H_5)S_4O_2$ Decomposed by concentrated ammonia-water.

OxySulphoCarbonate of Amyl & of Lead. $C_2(C_{10}H_{11})PbS_4O_2$ Ppt. (Balard, *loc. cit.*) Soluble in alcohol. (Johnson.)

OxySulphoCarbonate of Amyl & of Manganese. Ppt. (Balard.)

OxySulphoCarbonate of Amyl & of Methyl. $C_2(C_{10}H_{11})(C_2H_3)S_4O_2$

OxySulphoCarbonate of Amyl & of Potassium. $C_2(C_{10}H_{11})KS_4O_2$ Soluble in water. More soluble in hot than in cold alcohol. Somewhat soluble in ether. (Balard, *Ann. Ch. et Phys.*, (3.) **12.** 307.) Only slightly soluble in anhydrous ether. (Kolbe's *Lehrb.*, **1.** 322.)

OxySulphoCarbonate of Amyl & of Silver. Ppt.

"*Bin*OxySulphoCarbonate of Amyl." *Vid.* SulphoCarbonidate of Amyl.

OxySulphoCarbonate of Baryta & of Ethyl. (*EthyldiSulpho Carbonate of Baryta.*) $C_2Ba(C_4H_5)S_4O_2 + 2\,Aq$ Soluble in water, and alcohol. (Zeise.)

OxySulphoCarbonate of Cetyl. (*CetyldiSulphoCarbonic Acid.*) $C_{34}H_{34}O_2S_4 = C_2H(C_{32}H_{33})S_4O_2$ Most of its compounds, with metallic bases, are insoluble in alcohol. (De la Provostaye & Desains, *Ann. Ch. et Phys.*, (3.) **6.** 500.)

OxySulphoCarbonate of Cetyl & of Lead. Ppt., in alcohol.

OxySulphoCarbonate of Cetyl & of Mercury(Hg). Ppt., in alcohol.

OxySulphoCarbonate of Cetyl & of Potash. $C_2K(C_{32}H_{33})S_4O_2$ Insoluble in water, which, however, tends to decompose it. Very abundantly soluble in warm, but only sparingly soluble in cold alcohol, and ether. (Provostaye & Desains, *Ibid.*, p. 495.)

OxySulphoCarbonate of Cetyl & of Silver. Ppt., in alcohol.

OxySulphoCarbonate of Cetyl & of Zinc. Ppt., in alcohol.

OxySulphoCarbonate of Copper(Cu_2) & of Ethyl. $C_2Cu_2(C_4H_5)S_4O_2$ Insoluble in water, alcohol, or ether. Not sensibly soluble in ammonia-water. (Zeise.)

OxySulphoCarbonate of Ethyl.
(*EthyldiSulpho Carbonic Acid. Xanthogenic Acid. Xanthic Acid.*)

I.) $C_2H(C_4H_5)S_4O_2$ Very sparingly soluble in water. Miscible in all proportions with caoutchin. (Himly.) The alkaline salts of this compound are soluble in water. (Zeise.)

II.) $C_2(C_4H_5)_2S_4O_2$ (*Xanthic Ether. Xanthelene. DiSulphoCarbonate of Ethyl.*) Insoluble in water. Miscible in all proportions with alcohol, and ether. (Zeise, *Ann. Ch. et Phys.*, (3.) **17.** 341; and (3.) **20.** 124. Debus.)

OxySulphoCarbonate of Ethyl & of Lead. (*EthyldiSulphoCarbonate of Lead.*) $C_2(C_4H_5)PbS_4O_2$ Permanent. Soluble in water. (Laurent, *Method*, p. 250.) Insoluble in cold water, but is slowly decomposed by boiling with water. Tolerably soluble in warm, less soluble in cold alcohol. Insoluble in ether. (Zeise; Courbe.) Boiling acetic acid has no action upon it, and it is scarcely at all attacked by dilute sulphuric acid.

OxySulphoCarbonate of Ethyl & of Lime. Soluble in alcohol. (Zeise.)

OxySulphoCarbonate of Ethyl & of Mercury(Hg). Soluble in a solution of oxysulphocarbonate of ethyl and of potash.

OxySulphoCarbonate of Ethyl & of Methyl. $C_2(C_4H_5)(C_2H_3)S_4O_2$ Insoluble in water. Easily soluble in alcohol, and ether. (Chancel, in *Gerhardt's Tr.*, **1.** 182.)

OxySulphoCarbonate of Ethyl & of Potash. (*EthyldiSulphoCarbonate of Potash. Xanthate of Potash.*) $C_2(C_4H_5)KS_4O_2$ Readily soluble in water, and alcohol. The aqueous solution is decomposed when heated above 50°. Soluble in 5 @ 6 pts. of absolute alcohol; and this solution is not decomposed by boiling, unless 8% or more of water be present. Very sparingly soluble in ether. Insoluble in naphtha. (Zeise.)

OxySulphoCarbonate of Ethyl & of Silver. Soluble in water. (Laurent, in his *Method*, p. 250.)

OxySulphoCarbonate of Ethyl & of Soda. $C_2(C_4H_5)NaS_4O_2$ Soluble in water, and alcohol. (Zeise.)

OxySulphoCarbonate of Ethyl & of Zinc. Sparingly soluble in water; more readily soluble in dilute alcohol. (Zeise.)

OxySulphoCarbonate of Methyl.

I.) (*MethyldiSulphoCarbonic Acid. SulphoCarboMethylic Acid. Methyl-Xanthic Acid.*) $C_2H(C_2H_3)S_4O_2$ Not isolated.

II.) (*MethylXanthic Ether. DiSulphoCarbonate of Methyl. SulphoCarboMethylic Ether.*) $C_2(C_2H_3)_2S_4O_2$ Insoluble in water. Abundantly soluble in alcohol, and ether. (Zeise, *Ann. Ch. et Phys.*, (3.) **20.** 122.)

OxySulphoCarbonate of Methyl & of Lead. $C_2(C_2H_3)PbS_4O_2$

OxySulphoCarbonate of Methyl & of Potassium. $C_2(C_2H_3)KS_4O_2$ Soluble in wood-spirit. (Dumas & Peligot.)

"*Bin*OxySulphoCarbonate of Methyl." $C_4H_3S_4O_2$ *Vid.* SulphoCarbonidate of Methyl.

OxySulphoCarbonate of Potassium & of Propyl. $C_2(C_6H_7)KS_4O_2$

*Bin*OxySulphoCarbonate of *X*. *Vid.* SulphoCarbonidate of *X*.

OxySulphoCyanate of Ethyl. $C_{12}H_{10}N_2S_2O_4$ Easily soluble in water, and alcohol, though less readily in the former than in the latter. (Debus.)

OxySulphoCyanide of *X*. *Vid.* *basic*SulphoCyanide of *X*.

OxySulphuret of *X*. *Vid.* OxySulphide of *X*.

OxyXanthic Acid. *Vid.* EthylSulphoCarbonic Acid.
$C_6 H_6 S_2 O_4$

OxyThymoyl. Insoluble in water or alcohol. Very sparingly soluble in ether. Insoluble in aqueous alkaline solutions. (Lallemand, *Ann. Ch. et Phys.*, (3.) **49.** 167.)
$C_{24} H_{16} O_6$

Ozokerite. Contains several different substances, some of which are soluble in boiling alcohol, while others are insoluble therein.
(A fossil resin.)
$C_{40} H_{40}''(?)$

P.

Palladium. Slowly soluble in boiling concentrated sulphuric acid. Gradually soluble in chlorhydric acid, when in contact with the air. Somewhat difficultly soluble in nitric acid (more rapidly if it contain nitrous acid); and in aqua-regia at the ordinary temperature.
Pd

Palladium is more readily soluble in acids than any of the other so-called platinum metals; dissolving, though with difficulty, in concentrated nitric acid, and with extreme ease in aqua-regia. (Claus, *Beiträge*, p. 37.) Somewhat soluble in concentrated, but not in dilute iodhydric acid. (H. Rose, *Tr.*) Palladium is feebly attacked by iodhydric acid, hydrogen being disengaged. (H. Deville, *C. R.*, 1856, **42.** 896.)

Palmic Acid. *Vid.* Ricinelaidic Acid.

Palmin. *Vid.* Ricinelaidin.

Palmitic Acid. Insoluble in water. Soluble in hot, sparingly soluble in cold alcohol. Very soluble in ether. Soluble in hot concentrated sulphuric acid, from which solution it is precipitated on the addition of water. (Maskelyne, *J. Ch. Soc.*, **8.** 5.) Insoluble in water. Soluble in all proportions in alcohol of 0.820, at 50°, separating out in part as the solution cools. Extremely soluble in ether. Also soluble in a mixture of alcohol and ether. (Lawrence Smith, *Ann. Ch. et Phys.*, (3.) **6.** pp. 45, 52.) Its alkaline salts are soluble in water.
(Ethalic Acid. Cetylic Acid. Olidic Acid.)
$C_{32} H_{32} O_4 = C_{32} H_{31} O_3, H O$

Palmitate of Ammonia. Insoluble in cold water.

Palmitate of Amyl. Soluble in ether.
$C_{32} H_{31} (C_{10} H_{11}) O_4$

Palmitate of Baryta. Insoluble, or very sparingly soluble in water, or alcohol. (Maskelyne, *J. Ch. Soc.*, **8.** 8.)
$C_{32} H_{31} Ba O_4$

Palmitate of Cetyl. Insoluble in water. Soluble in 40 pts. of boiling alcohol, of 0.821 sp. gr., and in 7 pts. of boiling absolute alcohol. Also soluble in hot ether, separating out again for the most part as the solution cools, in wood-spirit, and the fatty and essential oils. Somewhat difficultly saponified by potash.
(Spermaceti. Cetin. Ethalate of Ethal. Cetylate of Cetyl.)
$C_{32} H_{31} (C_{32} H_{33}) O_4$

100 pts. of boiling alcohol, of 0.821 sp. gr. dissolve 2.5 pts. of it, the greater part being deposited again as the solution cools; more soluble in absolute alcohol, and in ether, also in oil of turpentine, the fatty oils, benzin, chloroform, lignone, creosote, coal-oils, &c.

Palmitate of Copper. Ppt.
$C_{32} H_{31} Cu O_4$

Palmitate of Ethyl. Insoluble in water. Soluble in alcohol. (Maskelyne, *J. Ch. Soc.*, **8.** 11.)
(Ethalic Ether.)
$C_{32} H_{31} (C_4 H_5) O_4$

Palmitate of Glyceryl. *Vid.* Palmitin.

Palmitate of Glycocoll. Soluble in hot, less soluble in cold spirit. (Horsford, *Am. J. Sci.*, (2.) **4.** 63.)
$C_{32} H_{31} (C_4 H_5 N O_4) O_4 + 10 Aq$

Palmitate of Lead. Insoluble, or very sparingly soluble in water, or alcohol. (Maskelyne, *J. Ch. Soc.*, **8.** 9.) Insoluble in cold ether. (Lawrence Smith, *Ann. Ch. et Phys.*, (3.) **6.** 42.)
$C_{32} H_{31} Pb O_4$

Palmitate of Lime. Insoluble in water, or ether. Slightly soluble in warm alcohol of 0.820. (Lawrence Smith, *Ann. Ch. et Phys.*, (3.) **6.** 42.) Insoluble in ether. (Shueler.)

Palmitate of Magnesia. Insoluble, or very sparingly soluble in water or alcohol. (Maskelyne, *J. Ch. Soc.*, **8.** 9.) Soluble in boiling alcohol, from which it separates almost completely on cooling.
$C_{32} H_{31} Mg O_4$

Palmitate of Methyl.
$C_{32} H_{31} (C_2 H_3) O_4$

Palmitate of Myricyl. Insoluble in cold alcohol. Easily soluble in ether. Soluble in creosote. Soluble in 200 pts. of boiling alcohol; and in 99 pts. of cold ether. Easily soluble in oil of turpentine. Soluble in naphtha. (Wittstein's *Handw.*)
(Myricin.)
$C_{32} H_{31} (C_{60} H_{61}) O_4$

Palmitate of Potash. Soluble in a small quantity of water. Decomposed by much water. Completely soluble in alcohol. Insoluble in ether.
$C_{32} H_{31} K O_4$

Palmitate of Silver. Insoluble in warm water. (L. Smith, *Ann. Ch. et Phys.*, (3.) **6.** 47.)
$C_{32} H_{31} Ag O_4$

Palmitate of Soda. Soluble in water, and in dilute alcohol. Also soluble in absolute alcohol. More readily decomposed by water than the potash salt. (Maskelyne, *J. Ch. Soc.*, **8.** 8.) Soluble in water, in water containing carbonate of soda, and in absolute alcohol. (Lawrence Smith, *Ann. Ch. et Phys.*, (3.) **6.** 47.)
$C_{32} H_{31} Na O_4$

Palmitin. Soluble in hot, less soluble in cold ether. (Berthelot, *Ann. Ch. et Phys.*, (3.) **41.** 238.)
(MonoPalmitate of Glyceryl.)
$C_{38} H_{38} O_8 = C_6 H_5 O_3, 2 H O, C_{32} H_{31} O_3$

***Di*Palmitin.** Soluble in hot ether. (Berthelot, *loc. cit.*)
(BiPalmitate of Glyceryl.)
$C_{70} H_{68} O_{10} = C_6 H_5 O_3, H O, 2 C_{32} H_{31} O_3$

***Tri*Palmitin.** Insoluble in water. Almost insoluble in hot alcohol. Insoluble, or nearly so in cold ether. Easily soluble in boiling ether. Very slowly acted upon by an aqueous solution of caustic potash. (Maskelyne, *J. Ch. Soc.*, **8.** 7.) Very sparingly soluble in boiling alcohol. Soluble in all proportions in hot ether. (Boudet & Pelouze ?) Almost insoluble in cold, more soluble in boiling alcohol. Soluble in all proportions in boiling ether.
(TerPalmitate of Glyceryl. Same as natural Palmitin.)
$C_{102} H_{98} O_{12} = C_6 H_5 O_3, 3 C_{32} H_{31} O_3$

Sparingly soluble in cold, soluble in hot ether (Berthelot, *loc. cit.*)

Palmitonic Acid(?) (Schwarz.)
$C_{31} H_{31} O_4 = C_{31} H_{30} O_3, H O$

Palmitone. (*Ethalone.*) $C_{62}H_{62}O_2 = \left.\begin{matrix}C_{32}H_{31}O_2\\C_{30}H_{31}\end{matrix}\right\}$ Soluble in strong boiling alcohol. Highly soluble in benzin. Unacted upon by dilute nitric acid, or by an aqueous solution of caustic potash. (Maskelyne, *J. Ch. Soc.*, **8.** 12.)

Panacone. $C_{22}H_{19}O_6$ Insoluble in water, or ether. Soluble in alcohol. Soluble in concentrated sulphuric acid. (Garrigues, *Ann., Ch. u. Pharm.*, **90.** 234.)

Panaquilone(from the root of *Panax quinque folius*). $C_{24}H_{25}O_{18}$ Easily soluble in water, and alcohol. Insoluble in ether. Soluble, with decomposition, in strong acids. (Garrigues, *Ann. Ch. u. Pharm.*, **90.** 232.)

Papaveric Acid(from *Papaver Rhœas*). (*Rhœadic Acid.*)

Papaverin. $C_{40}H_{21}NO_8 = N\left\{\begin{matrix}C_{40}H_{20}O_8''\\H\end{matrix}\right.$ Insoluble in water. Sparingly soluble in cold, more soluble in hot alcohol, and ether. (G. Merck.) Insoluble in an aqueous solution of caustic potash. More soluble than narcotin in boiling alcohol. Soluble in nitric acid, without decomposition, if this is not added in too great excess. (Anderson.) Most of its salts are difficultly soluble in water.

Papyrin. (*Vegetable Parchment.*)

Parabanic Acid. $C_6H_2N_2O_6$ Permanent. More soluble than oxalic acid in water. Easily soluble in water. Soluble in boiling alcohol. Insoluble in iodide of ethyl.

Parabanate of Ammonia. $C_6(NH_4)_2N_2O_6$ Known only in solution, and this gradually decomposes on standing. (Berzelius, *Lehrb.*, **3.** 323.)

Parabanate of Methyl. (*DiMethyl Parabanic Acid. Nitro Thein. Cholestrophan.*) $C_6(C_2H_3)_2N_2O_6$ Soluble in 3 pts. of cold water; and in much less hot water. Readily soluble in alcohol, and ether. (Stenhouse.)

Parabanate of Silver. $C_6Ag_2N_2O_6$ Insoluble in boiling water. Soluble in ammonia-water, and in nitric acid.

Parabanate of Urea. $C_2H_4N_2O_2, C_6HN_2O_6$ Sparingly soluble in cold water. Soluble in boiling alcohol. (Hlaziwetz.)

ParaBenzin. (*ParaBenzole.*) $C_{12}H_6$

ParaBenzoic Acid. *Vid.* Benzoic Acid (Amorphous).

ParaCajputene. $C_{40}H_{32}$ Insoluble in water, alcohol, or oil of turpentine. Soluble in ether. (Max. Schmidl.)

ParaCamphoric Acid. (*Racemic Camphoric Acid.*) $C_{20}H_{16}O_8$

ParaCellulose. Insoluble in an aqueous solution of cupramin, but becomes soluble after being treated with acids or aqueous solutions of the alkalies, or after being boiled with water during 24 hours. Soluble in concentrated chlorhydric and sulphuric acids, and in boiling potash-lye. (Fremy.)

ParaCholic Acid. (*ParaGlycocholic Acid.*) $C_{52}H_{43}NO_{12}$ Insoluble in water. Its salts are identical with those of cholic acid in solubility, as in all other respects.

ParaComenic Acid. $C_{12}H_4O_{10}$ Sparingly soluble in water. Less soluble than pyromeconic acid in water, and alcohol.

ParaCyanide of Silver.

ParaCyanogen. $C_{12}N_6$ Insoluble in water. (Delbrueck.) Insoluble in alcohol. Soluble in hot concentrated chlorhydric, and sulphuric acids (Johnston); according to Berzelius, it is not dissolved, but is merely held in suspension by the sulphuric acid. Insoluble in nitric acid or in ammonia-water; but it dissolves in an aqueous solution of caustic potash, probably with decomposition. (Johnston.) Soluble in concentrated nitric, sulphuric, and chlorhydric acids, and is reprecipitated from the two last on the addition of water. Soluble in warm concentrated aqueous solutions of caustic and carbonated alkalies. (Johnston; Thaulow, in *Berzelius's Lehrb.*, **1.** 337.)

ParaEllagic Acid. *Vid.* RufiGallic Acid.

"**Paraffin.**" Consists of several isomeric bodies, some of which are more soluble than others in alcohol. (Hofstædter, *Ann. Ch. u. Pharm.*, **91.** 330.) A specimen melting at 66.2° was insoluble in water, and was unacted upon by caustic potash, or by concentrated sulphuric or nitric acids. It dissolved in warm creosote, separating out again on cooling. It was difficultly soluble in cold alcohol. 100 pts. of boiling alcohol of 94% dissolved 3.5 pts. of it, the solution becoming solid on cooling. Warm ether dissolved about 130 to 140 pts. of it, the solution solidifying on cooling. It was easily soluble in warm oil of turpentine, and very easily in warm olive-oil, almond-oil, and castor-oil. A fossil substance, dug from a peat-bog, melting at 107.5°, exhibited the same solubility as the specimen above described, and resembled it in all respects, excepting the melting-point, and in containing less hydrogen. (Trommsdorff, *Ann. der Pharm.*, 1837, **21.** 128.) A specimen fusing at 58.25° and congealing at 54.50° dissolved in 3358.8 pts. of cold alcohol, of 0.833 sp. gr., and in 137.4 pts. of boiling alcohol, of 0.833 sp. gr.; in 78 pts. of cold, and in 9 pts. of boiling ether; in 33.5 pts. of cold oil of turpentine; and in 167.25 pts. of cold olive-oil. (E. Spiess.)

1 pt. of benzin dissolves 0.3 pt. of paraffin * at 20°
" " 0.7 " " 23°
" " 4.0 " " 39°
" " 5.0 " " 43°
" " 7.7 " " 46°

(Vogel & Scheller, *Dingler's Polytech. Journ.*, **164.** 221.)

1 pt. of chloroform dissolves 0.16 pt. of paraffin* at 17°, and 0.22 pt. at 23°. (Vogel & Scheller, *Dingler's Polytech. Journ.*, **164.** 221.)

1 pt. of bisulphide of carbon dissolves 1 pt. of paraffin* at 23°. (Vogel & Scheller, *Dingler's Polytech. Journ.*, **164.** 221.) Soluble in creosote, and eupion (coal-oil). (Reichenbach.) [Compare Melene.]

ParaGlobularetin. $C_{24}H_{16}O_8$ Soluble in alcohol, from which it is precipitated on the addition of water. Insoluble in ether. (Walz.)

ParaLactic Acid(of Heintz). *Vid.* SarcoLactic Acid.

ParaMaleic Acid. *Vid.* Fumaric Acid.

ParaMeconic Acid. *Vid.* Comenic Acid.

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* Obtained from oil distilled from lignite; the sample examined melted at 48°, and solidified at 45°.

ParaMenispermin. (*Isomeric with Menispermin.*) $C_{18}H_{11}NO_2$ Insoluble in water. Readily soluble in boiling alcohol. Sparingly soluble in ether. Soluble in dilute acids. (Pelletier & Courbe.)

ParaMidic Acid. *Vid.* Mellith*ter*amic Acid.

ParaMid. *Vid.* Mellithamid.

ParaMucic Acid. (*ParaSchleimsæure. Isomeric with Mucic and Saccharic Acids.*) $C_{12}H_{10}O_{16}$ Soluble in 73.6 pts. of cold, and in 17.2 pts. of boiling water; or 100 pts. of boiling water dissolve 5.8 pts. of it. (Malaguti.) More soluble than mucic acid in water. (Laugier.) Soluble in alcohol. (Malaguti.)

Its salts are more soluble than those of mucic acid, but are converted into the latter when their aqueous solutions are boiled.

ParaMucate of Ammonia. Is the only paramucate which is less soluble than the corresponding mucate. It is almost insoluble in boiling water.

ParaMucate of Silver.

ParaMylene. $C_{20}H_{20}$ Insoluble in water. (Kolbe's *Lehrb.*, 1. 390.)

ParaMylone (from the infusorium *Euglena viridis*). $C_{24}H_{20}O_{20}$ Insoluble in water, dilute acids, ammonia-water, alcohol, ether, or saline solutions. Soluble, without decomposition, in strong potash-lye. (Gottlieb.)

ParaNaphthalin. (*Anthracene. Pyrene.*) $C_{30}H_{12}''$(?) Insoluble in water. Scarcely at all soluble in alcohol, or ether. [Soluble in the oils of coal-tar.] Its best solvent is oil of turpentine.

ParaNicene. $C_{10}H_{12}$(?) Insoluble in water. Soluble in alcohol, and ether. (St. Evre.)

ParaNicine. $C_{20}H_{13}N$ Insoluble in water. Soluble in alcohol, and ether. Also, with combination, in dilute nitric, acetic, chlorhydric, and oxalic acids. (St. Evre.)

ParaNitrAnilin. *Vid.* NitrAnilin(α).

ParaPectic Acid. $C_{24}H_{15}O_{21}, 2HO$ Soluble in water. The aqueous solution rapidly decomposes, with formation of metapectic acid. (Fremy, *Ann. Ch. et Phys.*, (3.) **24.** 37.) Alcohol precipitates it from the aqueous solution.

ParaPectate of Ammonia. Soluble in water.

ParaPectate of Baryta. Ppt.

ParaPectate of Lead. Ppt.
$C_{24}H_{15}O_{21}, 2PbO$

ParaPectate of Potash. Soluble in water. Insoluble in alcohol.

ParaPectate of Soda. Soluble in water.

ParaPectin. $C_{64}H_{40}O_{56}, 6HO$ Very soluble in water. Insoluble in alcohol. Decomposed by alkaline solutions, and by boiling acids. (Fremy, *Ann. Ch. et Phys.*, (3.) **24.** 14.)

ParaPectin with Lead. Ppt.
$C_{64}H_{40}O_{56}, 6HO, 2PbO$

ParaPicolin. $N\left\{C_{12}H_7'''\right.$ Soluble in all proportions in alcohol, ether, and the fatty and essential oils.

ParaPyroCitric Acid. *Vid.* Itaconic Acid

ParaSalicyl. *Vid.* BenzoSalicyl.

ParaTartralic Acid. $C_8H_4O_{10}$ Deliquescent. Soluble in water. In aqueous solution it changes to racemic acid; so also the solutions of its salts.

ParaTartralate of Baryta. Soluble in water.

ParaTartralate of Lead.

ParaTartralate of Potash. Soluble in water.

ParaTartralate of Soda. Soluble in water. (Fremy.)

ParaTartramid.
$C_8H_8N_2O_8 = N_2\left\{\begin{matrix}C_8H_4O_8''\\H_4\end{matrix}\right.$

ParaTartaric Acid. (*Racemic Acid. Uvic Acid. Vinic Acid. Traubensæure.*) $C_8H_6O_{12} + 2Aq = C_8H_4O_{10}, 2HO + 2Aq$ Permanent. Less soluble than tartaric acid in water, and alcohol. Soluble in 5.7 pts. of water, at 15°; and in 48 pts. of alcohol, of 0.809 sp. gr., at the ordinary temperature. (Walchner.) Soluble in 57.5 pts. of water at 15°; the saturated solution containing 17.39% of it. Less soluble in alcohol than in water. (Mohr, Redwood & Procter's *Pharmacy*.) Very sparingly soluble in a concentrated solution of tartaric acid.

Soluble in boiling creosote; the solution solidifies on cooling. (Reichenbach.)

ParaTartrate of Ammonia.

I.) *normal.* $C_8H_4(NH_4)_2O_{12}$ Very soluble in water. Scarcely at all soluble in alcohol. (Fresenius.)

II.) *acid.* $C_8H_5(NH_4)O_{12}$ Permanent. Soluble in 100 pts. of water at 20°; and much more soluble in boiling water. Insoluble in alcohol. (Fresenius.)

ParaTartrate of Ammonia & of Arsenious Acid. $C_8H_4(AsO_2)(NH_4)O_{12} + Aq$ Efflorescent. Soluble in 10.62 pts. of water at 15°; the solution undergoes decomposition when it is evaporated. (Werther.)

ParaTartrate of Ammonia & *of sesquioxide* of Iron. Easily soluble in water. (Walchner.)

ParaTartrate of Ammonia & of Soda. $C_8H_4Na(NH_4)O_{12} + 2Aq$ & $8Aq$ Efflorescent, Readily soluble in water, the solution undergoing decomposition when boiled. (Fresenius.) The aqueous solution saturated at 11° marks 23° Baumé, and at 21°, 28° Baumé. This salt consists of a mixture of the right and left tartrates of ammonia and of soda. (Pasteur, *Ann. Ch. et Phys.*, (3.) **28.** pp. 58, 64.)

ParaTartrate of Antimony & of Potash.
$C_8H_4K(SbO_2)O_{12}$ & $+ Aq$

ParaTartrate of Arsenious Acid & of Potash. $C_8H_4K(AsO_2)O_{12} + 8Aq$ Slowly efflorescent. Soluble in 7.96 pts. of water at 15°; the solution undergoing decomposition when evaporated. (Werther.)

ParaTartrate of Arsenious Acid & of Soda. $C_8H_4Na(AsO_2)O_{12} + 5Aq$ Soluble in 14.59 pts. of water at 19°. (Werther.)

ParaTartrate of Baryta. $C_8H_4Ba_2O_{12} + 5Aq$ Almost insoluble in cold water. Soluble in 200 [2000 ?] pts. of boiling water. Easily soluble in chlorhydric and nitric acids. (Fresenius.) Insoluble in acetic acid or in aqueous solutions of caustic potash, chloride of ammonium (hot), nitrate of ammonia, or succinate of ammonia. (Walchner.) Soluble in hot paratartaric acid, from which it is deposited on cooling.

ParaTartrate of Boracic Acid & of Potash. Hygroscopic. Readily soluble in water. (Fresenius.)

ParaTartrate of Boracic Acid & of Soda. Deliquescent. Soluble in water. (Fresenius.)

ParaTartrate of Cadmium. $C_8H_4Cd_2O_{12}$ Insoluble in water or in ordinary alcohol. (Schiff.)

ParaTartrate *of protoxide* of Cerium. Ppt. Readily soluble in paratartaric acid. (Beringer.)

ParaTartrate of Chromium. Soluble in water; from which solution it is precipitated on the addition of alcohol; after drying, this precipitate is not soluble in water, unless this be acidulated with paratartaric acid. (Fresenius.)

ParaTartrate of Cobalt. Sparingly soluble in cold or hot water; more readily soluble in paratartaric acid; and still more readily in chlorhydric acid, or an aqueous solution of caustic potash. (Fresenius.)

ParaTartrate of Cobalt & of Potash. Sparingly soluble in water. Easily soluble in paratartaric acid, and in an aqueous solution of caustic potash. (Fresenius.)

ParaTartrate *of dinoxide* of Copper. Tolerably soluble in water. (Walchner.)

ParaTartrate *of protoxide* of Copper. $C_8H_4Cu_2O_{12} + 4\,Aq$ Permanent. Sparingly soluble in cold, more freely in hot water. Easily soluble in chlorhydric acid. (Fresenius.)

ParaTartrate *of protoxide* of Copper & of Potash. Sparingly soluble in boiling water. (Fresenius.)

ParaTartrate *of protoxide* of Copper & of Soda.

I.) *normal.* $C_8H_4NaCuO_{12} + Aq$ Very slowly soluble in cold, more readily soluble in hot water. (Werther.)

II.) *basic.* $C_8H_4NaCuO_{12};\ 2\,CuO + 8\,Aq$ Sparingly soluble in cold, more readily soluble in hot water. Insoluble in alcohol. (Werther.)

ParaTartrate *of protoxide* of Iron. Sparingly soluble in water. Readily soluble in paratartaric, acetic, and the mineral acids, in ammonia-water, and an aqueous solution of caustic potash.

ParaTartrate *of sesquioxide* of Iron. Very soluble in water, from which it is precipitated by alcohol, but not by alkaline solutions. (Fresenius.)

ParaTartrate *of sesquioxide* of Iron & of Potash. Deliquescent. Soluble in water, and in paratartaric acid. It is not precipitated by alkaline solutions.

ParaTartrate of Lead. $C_8H_4Pb_2O_{12}$ Soluble in warm paratartaric acid. More soluble in tartaric acid than tartrate of lead.

ParaTartrate of Lime. $C_8H_4Ca_2O_{12} + 8\,Aq$ Sparingly soluble in boiling, almost insoluble in cold water. Less soluble than sulphate of lime in water. Scarcely at all soluble in an aqueous solution of chloride of ammonium. (H. Rose.) Sparingly soluble in warm solutions of sulphate, and succinate, of ammonia and chloride of ammonium. (Wittstein.) Readily soluble in a cold solution of caustic potash, from which it is reprecipitated on the addition of water. Soluble in chlorhydric acid, from which it is precipitated by ammonia. Insoluble in acetic acid, or in paratartaric acid, after it has once become crystallized.

ParaTartrate of Magnesia. $C_8H_4Mg_2O_{12} + 10\,Aq$ Effloresces in dry air. Soluble in 120 pts. of water at 19°; and in less boiling water. Insoluble in alcohol. Soluble, without change, in paratartaric acid. Easily soluble in strong mineral acids. Insoluble in acetic acid. Soluble in potash-lye. (Fresenius.)

ParaTartrate of Manganese. $C_8H_4Mn_2O_{12} + 2\,Aq$ Permanent. Very sparingly soluble in cold, more readily soluble in hot water. Readily soluble in acids, and also in alkaline solutions; hence neither acids nor alkalies precipitate it one from the other. (Fresenius.)

ParaTartrate *of dinoxide* of Mercury. Insoluble in water or in paratartaric acid. Easily soluble in nitric acid. (Fresenius.)

ParaTartrate of Methyl. *Vid.* Methyl-ParaTartaric Acid.

ParaTartrate of Nickel. $C_8H_4Ni_2O_{12} + 10\,Aq$ Effloresces slowly in dry air. Sparingly soluble in hot water, more soluble in paratartaric acid, and still more soluble in chlorhydric acid. Soluble, also, in aqueous solutions of caustic potash, and of warm carbonate of soda. (Werther.)

ParaTartrate of Potash.

I.) *normal.* $C_8H_4K_2O_{12} + 4\,Aq$ Permanent. Soluble in 0.97 pt. of water at 25°. Almost insoluble in alcohol. (Fresenius.)

II.) *acid.* $C_8H_5KO_{12}$ Permanent. Soluble in 180 pts. of water at 19°; in 139 pts. of water at 25°, and in 14.3 pts. of boiling water. Less soluble in water than the corresponding tartrate. Insoluble in alcohol. Easily soluble in the mineral acids. (Fresenius.)

ParaTartrate of Potash & of Soda. $C_8H_4KNaO_{12} + 8\,Aq$ Efflorescent. Easily soluble in water. (Fresenius.) Consists of a mixture of the right and left tartrates of potash and soda. (Pasteur, *Ann. Ch. et Phys.*, (3.) **28.** 63.) Soluble in 1.32 pts. of water at 6°, and in all proportions in hot water.

ParaTartrate of Silver. $C_8H_4Ag_2O_{12}$ Sparingly soluble in water, being less soluble than the tartrate of silver. Soluble in ammonia-water. (Liebig & Redtenbacher.)

ParaTartrate of Soda.

I.) *normal.* $C_8H_4Na_2O_{12}$ Permanent. Soluble in 2.63 pts. of water at 25°. Insoluble in alcohol. (Walchner.)

II.) *acid.* $C_8H_5NaO_{12} + 2\,Aq$ Permanent. Soluble in 11.3 pts. of water at 19°; and in much less boiling water. Insoluble in alcohol. (Fresenius.)

ParaTartrate of Strontia. $C_8H_4Sr_2O_{12} + 8\,Aq$ Almost insoluble in cold, very sparingly soluble in boiling water. Easily soluble in chlorhydric acid. Insoluble in acetic acid. (Fresenius.) It forms clear solutions with hot aqueous solutions of nitrate and succinate of ammonia and chloride of ammonium; but these solutions become turbid on cooling. (Wittstein.)

ParaTartrate of StibEthylium. Very deliquescent. Soluble in water.

ParaTartrate of Tin. Soluble in water. (Walchner.)

ParaTartrate of Zinc. Scarcely at all soluble in water; more soluble in paratartaric acid, and still more soluble in chlorhydric acid. (Werther.)

ParaTartrelic Acid.
$C_8 H_4 O_{10}$

ParaTartrate of Baryta.

ParaTartrate of Lime.

ParaTartroMethylic Acid. *Vid.* MethylParaTartaric Acid.

ParaTartroVinic Acid. *Vid.* EthylParaTartaric Acid.

ParaThionic Acid. Not isolated.
(Beta Sulpho Vinic Acid.)

ParaThionate of Baryta. Soluble in water, the solution not undergoing decomposition when boiled.
$C_4 H_5 Ba S_2 O_8 + 2 Aq$

ParaThionate of Lime.
$C_4 H_5 Ca S_2 O_8 + 2 Aq$

Parellic Acid. Very sparingly soluble in cold water. Easily soluble in alcohol, and ether, from which water precipitates it. More soluble in acetic acid than in water. Slowly soluble in aqueous solutions of caustic potash, lime, and baryta, from which it is precipitated by acids; less soluble in ammonia-water.
(Parellin.)
$C_{18} H_6 O_8 = C_{18} H_5 O_7, H O \& + Aq$

Parellate of Baryta. Insoluble in water. Soluble in warm baryta-water.

Parellate of Copper. Ppt.

Parellate of Lead.
$C_{18} H_5 Pb O_8 (?)$

Paricin. Sparingly soluble in water. Easily soluble in alcohol, and ether. Soluble in dilute acids, forming salts which are readily soluble. (Winkler.)

Paridin (from *Paris quadrifolia*). 100 pts. of water dissolve 1.5 pts. of it; 100 pts. of alcohol of 94.5% dissolve 2 pts. of it, and 100 pts. of ordinary alcohol, 6 pts. of it. Insoluble in ether. Soluble in chlorhydric acid. Decomposed by sulphuric, phosphoric, and nitric acids; also by a warm solution of caustic potash.
$C_{12} H_{10} O_6 ?$ or $C_{16} H_{14} O_7 + 2 Aq (?)$

Parietic Acid. *Vid* Chrysophanic Acid.

Parietin. *Vid.* Usnic Acid.

Pariglin. *Vid.* Smilacin.

Parvolin. Soluble in coal-oil naphtha. (Gr. Williams.)
(Isomeric with Cumidin.)
$N \left\{ C_{18} H_{13}''' \right.$

Pearlash. *Vid.* Carbonate of Potash.

Pectase. Exists in vegetables in two states, —in one of which it is soluble, while in the other it is insoluble in water. The aqueous solution of the soluble modification soon undergoes decomposition when left to itself. The soluble form is converted into the insoluble by adding alcohol to the aqueous solution, the precipitate which forms being no longer soluble in water. Both modifications are insoluble in alcohol. (Fremy, *Ann. Ch. et Phys.*, (3.) **24.** 21.)

Pectic Acid. Insoluble in cold, scarcely at all soluble in boiling water. After standing for a long time with water it dissolves completely, with decomposition. It is also dissolved, with decomposition, by long-continued boiling with water. (Fremy, *Ann. Ch. et Phys.*, (3.) **24.** pp. 26, 36.) Soluble in water. (Schunck.) Slightly soluble in boiling water. The aqueous solution is coagulated by alcohol, and by a solution of sugar. Easily soluble in alkalies, from which it is precipitated by alcohol as well as by acids. (John Porter, *Am. J. Sci.*, (2.) **9.** 21.) Easily soluble in alkaline liquids, even when these are very dilute; it is quickly decomposed, however, by an excess of alkali. (Fremy, *loc. cit.*, p. 28.) When boiled with dilute acids it is converted into metapectic acid, which dissolves. (Fremy.) Insoluble in alcohol, ether, or the organic acids. (Braconnot.)
$C_{32} H_{20} O_{28}, 2 H O$

The aqueous solutions of many neutral salts, of almost all the organic salts of ammonia, and especially the soluble pectates, dissolve considerable quantities of pectic acid, forming with it ill-defined compounds which are soluble in water and precipitable therefrom by alcohol. (Fremy, *loc. cit.*, pp. 28, 32.)

The alkaline pectates are soluble in water, but insoluble in alcohol. The other pectates are insoluble. Insoluble pectic acid is precipitated when they are treated with acids.

Pectate of Ammonia. Soluble in water, from which solution it is precipitated by alcohol.

Pectate of Baryta. Ppt.

Pectate of Copper. Insoluble in boiling water. (Braconnot.)

Pectate of Lead. Ppt., decomposed by boiling water.
$C_{32} H_{20} O_{28}, 2 Pb O$

Pectate of Lime. Insoluble in boiling water, and ammonia-water.

Pectate of Potash. Soluble in water, less solnble in a solution of potash.

Pectate of Silver, Ppt.

Pectate of Soda. Soluble in water.

Pectin. Soluble in cold water, from which it is precipitated by alcohol. On boiling the aqueous solution it is transformed to parapectin. Decomposed by alkaline solutions, also by boiling dilute acids. (Fremy, *Ann. Ch. et Phys.*, (3.) **24.** pp. 12, 14, 36.) When its aqueous solution is allowed to stand, pectin changes into metapectic acid, the transformation being more rapid in case pectose is likewise present.
$C_{64} H_{40} O_{56}, 8 H O$

PectoLactic Acid. Deliquescent. Soluble in all proportions in water, and alcohol. Insoluble in ether. The pectolactates of the alkalies and alkaline earths are all easily soluble in water, excepting the lime salt; they are all insoluble in alcohol. (Bœdeker & Struckmann, *Ann. Ch. u. Pharm.*, **100.** 284.)
$C_{16} H_8 O_{12} = C_{16} H_6 O_{10}, 2 H O + 2 Aq \& 5 Aq$

PectoLactate of Baryta. Easily soluble in water. Insoluble in alcohol. (B. & S.)
$C_{16} H_6 Ba_2 O_{12} + 6 Aq \& 9 Aq$

PectoLactate of Cobalt. Insoluble in water. Easily soluble in an excess of pectolactic acid. (B. & S.)

PectoLactate of Copper. Insoluble in water. Easily soluble in an excess of pectolactic acid. Soluble in a solution of caustic soda. (B. & S.)

PectoLactate *of sesquioxide* **of Iron.** Insoluble in water, or pec-
$6 Fe_2 O_3, C_{16} H_6 O_{10} + 8 Aq$

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tolactic acid. Soluble in a solution of caustic soda. (B. & S.)

PectoLactate of Lead.

I.) Insoluble in water. Soluble in pectolactic acid and in an aqueous solution of acetate of lead. (B. & S.)

II.) *basic.* Insoluble in water, or an aqueous solution of acetate of lead. Soluble in pectolactic acid. (B. & S.)

PectoLactate of Mercury.

I.) *of the dinoxide.* } Insoluble in pectolactic
II.) *of the protoxide.* } acid. Difficultly soluble in dilute nitric acid. (B. & S.)

PectoLactate of Zinc. Insoluble in water. Easily soluble in pectolactic acid. (B. & S.)

Pectose. Insoluble in water, alcohol, or ether. By the action of warm acids, excepting acetic acid, it is converted into pectin. (Fremy, *Ann. Ch. et Phys.*, (3.) **24.** 7.)

Pectosic Acid. $C_{32}H_{20}O_{28}, 3\,HO$ Scarcely at all soluble in cold water, but is easily soluble in boiling water, the solution gelatinizing on cooling. Insoluble in water acidulated with chlorhydric acid, or other acids. Gradually decomposed by the action of boiling water, or alkaline liquors. (Fremy, *Ann. Ch. et Phys.*, (3.) **24.** 23.)

Pectosate of Baryta. $C_{32}H_{20}O_{28}, HO, 2\,BaO$ Ppt., soluble in dilute acids.

Pectosate of Lead. $C_{32}H_{20}O_{26}, HO, 2\,PbO$ Ppt., soluble in warm dilute acids.

Pelargonic Acid(Anhydrous). (*Pelargonic Pelargonate.*) $C_{36}H_{34}O_6 = \left.\begin{matrix}C_{18}H_{17}O_3\\C_{18}H_{17}O_3\end{matrix}\right\}$ Very slowly acidified by water. (Chiozza, *Ann. Ch. et Phys.*, (3.) **39.** 208.)

Pelargonic Acid. (*Identical with Œnanthic Acid, according to Dellfs.*) $C_{18}H_{18}O_4 = C_{18}H_{17}O_3, HO$ Scarcely at all soluble in water. (Gerhardt.) Very difficulty soluble in water. Readily soluble in alcohol, and ether. (Redtenbacher.)

Pelargonate of Ammonia. With water it forms a soapy solution. Very readily soluble in cold alcohol. (Gerhardt.)

Pelargonate of Baryta. $C_{18}H_{17}BaO_4$ Permanent. Slightly soluble in water. Soluble in boiling, less soluble in cold alcohol. (Cahours, *J. Ch. Soc.*, **3.** 241.) Difficultly soluble in water, and alcohol. (Redtenbacher.) Much less soluble in water or alcohol than the valerate, œnanthylate, or caprylate of baryta, but more soluble than the rutylate.

Pelargonate of Benzoyl. *Vid.* Benzo-Pelargonic Acid.

Pelargonate of Copper. $C_{18}H_{17}CuO_4 + 2\,Aq$ Soluble in boiling alcohol.

Pelargonate of Ethyl. $C_{18}H_{17}(C_4H_5)O_4$ Insoluble in water. Soluble in alcohol.

Pelargonate of Lime. $C_{18}H_{17}CaO_4$ Difficultly soluble in water. Soluble in boiling, less soluble in cold alcohol. (Cahours.)

Pelargonate of Phenyl.
$C_{18}H_{17}(C_{12}H_5)O_4$

Pelargonate of Potash. Readily soluble in water. (Cahours.)

Pelargonate of Silver. $C_{18}H_{17}AgO_4$ Very sparingly soluble in water, even when this is boiling.

Pelargonate of Soda. Readily soluble in water. Soluble in alcohol.

Pelargonate of Strontia. Slightly soluble in water. Soluble in boiling, less soluble in cold alcohol. (Cahours, *J. Ch. Soc.*, **3.** 241.)

Pelargonic Acid with *bin***Oxide of Nitrogen**(NO_2). *Vid.* NitrosoPelargonic Acid.

Pelargone. *Vid* Oxide of Capryl & of Pelargoyl.

Pelargonene. *Vid.* Nonylene.

Pellutein. $N\left\{C_{36}H_{19}O_6''\right.$ Soluble in hot, less soluble in cold alcohol. Insoluble in ether.

Pelosin. (*Cissampelin. Isomeric with Codein.*) $N\left\{C_{36}H_{21}O_6'''\right.$ Sparingly soluble in water. Easily soluble in alcohol, and ether. When the ethereal solution is mixed with water a hydrate, containing 3 equivs. of H O is formed, which is insoluble in water, alcohol, or ether.

The salts of pelosin are generally readily soluble in water. (Wiggers.)

Penta. See *penta*, as prefix, under the generic name of the substance sought for.

Pepsin. Soluble in water, from which it is precipitated on the addition of alcohol.

PerChloric Acid. ClO_7, HO Deliquescent. Very soluble in water. The most concentrated aqueous solution is of 1.65 sp. gr. and boils at 200°. (Serullas, *Ann. Ch. et Phys.*, (2.) **46.** 296.)

All of its salts are soluble in water, — the potash salt somewhat difficultly; they are all deliquescent, and soluble in alcohol, excepting those of ammonia, potash, lead, and dinoxide of mercury. (Sérullas, *loc. cit.*, p. 308.)

PerChlorate of Alumina. $Al_2O_3, 3\,ClO_7$ Deliquescent. Soluble in water, and alcohol. (Sérullas, *Ann. Ch. et Phys.*, 1831, (2.) **46.** 304.)

PerChlorate of Ammonia. NH_4O, ClO_7 Permanent. Soluble in 5 pts. of water, and slightly in alcohol. The aqueous solution loses ammonia when evaporated. The normal salt is precipitated when strong perchloric acid is added to its concentrated aqueous solution. (Sérullas, *Ann. Ch. et Phys.*, (2.) **46.** 304.)

PerChlorate of Baryta. BaO, ClO_7 Deliquescent. Very soluble in water, and alcohol. (Sérullas, *Ann. Ch. et Phys.*, (2.) **46.** 303.)

PerChlorate of Brucin. Sparingly soluble in cold water, more soluble in warm water and in alcohol.

PerChlorate of Cadmium. CdO, ClO_7 Deliquescent. Soluble in water, and alcohol. (Sérullas, *Ann. Ch. et Phys.*, (2.) **46.** 305.)

PerChlorate of Cinchonin. $C_{40}H_{24}N_2O_2, 2\,(ClO_7, HO) + 2\,Aq$ Permanent. Readily soluble in water, and alcohol. (Bœdecker.)

PerChlorate of Codein. Readily soluble in water, and alcohol. (Bœdecker.)

PerChlorate *of protoxide* **of Copper.** CuO, ClO_7 Deliquescent. Soluble in water, and alcohol. (Sérullas, *Ann. Ch. et Phys.*, (2.) **46.** 305.)

PerChlorate of Ethyl. C_4H_5O, ClO_7 Insoluble in water. Soluble in alcohol, but this solution eventually undergoes a partial decomposition. (Hare & Boyé.)

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PerChlorate of Furfurin. $C_{30}H_{13}N_2ClO_{14} + 2\,Aq = N_2\}(C_{10}H_4O_2'')_3, HO, ClO_7 + 2\,Aq$ Readily soluble in water, and alcohol. (Bœdeker.)

PerChlorate *of protoxide* of Iron. FeO, ClO_7 Tolerably permanent. Soluble in water. (Sérullas, p. 305.)

PerChlorate *of sesquioxide* of Iron. $Fe_2O_3, 3\,ClO_7$ Soluble in water. (Berzelius, *Lehrb.*)

PerChlorate of Lead. PbO, ClO_7 Permanent. Soluble in about 1 pt. of water. (Sérullas, *Ann. Ch. et Phys.*, (2.) **46.** 306.)

PerChlorate of Lime. CaO, ClO_7 Deliquescent. Soluble in water, and alcohol. (Sérullas, *Ann. Ch. et Phys.*, (2.) **46.** 304.)

PerChlorate of Lithia. LiO, ClO_7 Deliquescent. Soluble in water, and alcohol. (Sérullas, *Ann. Ch. et Phys.*, (2.) **46.** 304.) A solution of perchloric acid produces a slight precipitate in very concentrated solutions of lithia salts, but this precipitate readily dissolves on adding water. (H. Rose, *Tr.*)

PerChlorate of Magnesia. MgO, ClO_7 Deliquescent. Soluble in water, and alcohol. (Sérullas, *Ann. Ch. et Phys.*, (2.) **46.** 304.)

PerChlorate of Manganese. MnO, ClO_7 Very deliquescent. Soluble in water, and in the strongest alcohol. (Sérullas, *Ann. Ch. et Phys.*, (2.) **46.** 305.)

PerChlorate *of dinoxide* of Mercury. Hg_2O, ClO_7 Permanent. Soluble in water. (Sérullas, *Ann. Ch. et Phys.*, (2.) **46.** 306.)

PerChlorate *of protoxide* of Mercury. HgO, ClO_7 Exceedingly deliquescent. Soluble in water. Partially soluble, with decomposition, in alcohol. (Sérullas, *Ann. Ch. et Phys.*, (2.) **46.** 306.)

PerChlorate of Morphine. $C_{34}H_{19}NO_6, HO, ClO_7 + 4\,Aq$ Tolerably soluble in water, and alcohol.

PerChlorate of Potash. KO, ClO_7 Permanent. Is the least soluble of any of the metallic perchlorates.

Soluble in 65 pts. of water at 15°; more soluble in hot water. Insoluble in alcohol. (Sérullas, *Ann. Ch. et Phys.*, 1831, (2.) **46.** pp. 297 - 301, 302.) Soluble in 88 pts. of water at 10°, and in 5.52 pts. of water at 100°. (Hutstein, *Arch. Pharm.*, (2.) **65.** 159; in *Liebig & Kopp's Jahresbericht*, **4.** 331.) Soluble in 60 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) Soluble in 4.5 pts. of boiling water.

Insoluble in spirit of 38°. (Millon, *Ann. Ch. et Phys.*, (3.) **7.** 332.)

PerChlorate of Potash with PerManganate of Potash. The two salts crystallize together in all proportions. The compounds formed are soluble in water. (Wœhler.)

PerChlorate of Quinine. $C_{40}H_{24}N_2O_4, 2\,(ClO_7, HO) + 14\,Aq$ Slowly soluble in water. Readily soluble in alcohol.

PerChlorate of Silver. AgO, ClO_7 Deliquescent. Very soluble in water. Soluble in concentrated alcohol. (Sérullas, *Ann. Ch. et Phys.*, (2.) **46.** pp. 307, 299.)

PerChlorate of Soda. NaO, ClO_7 Very deliquescent. Very soluble in water, and in the strongest alcohol. (Sérullas, *Ann. Ch. et Phys.*, 1831, (2.) **46.** pp. 297 - 301, 303.)

PerChlorate of Strontia. SrO, ClO_7 Very deliquescent, and soluble in water. Readily soluble in alcohol. (Sérullas, *Ann. Ch. et Phys.*, (2.) **46.** 303.)

PerChlorate of Strychnine. $C_{42}H_{22}N_2O_4, HO, ClO_7 + 2\,Aq$ Sparingly soluble in cold water; much more soluble in alcohol. (Bœdeker.)

PerChlorate *of protoxide* of Uranium. UrO, ClO_7 Soluble in water.

PerChlorate of Zinc. ZnO, ClO_7 Deliquescent. Soluble in water, and alcohol. (Sérullas, *Ann. Ch. et Phys.*, (2.) **46.** 305.)

PerChromic Acid. Cr_2O_7 Soluble in water, and ether. Both solutions soon undergo decomposition, but the ethereal solution is much more stable than the aqueous. (Barreswil, *Ann. Ch. et Phys.*, (3.) **20.** 367.)

PerChromic Acid with Quinine. } Insoluble
" " **Strychnine.** } in ether.
(Barreswil.)

Pereirin (from *Pao Pereiro*). Only slightly soluble in water. Very easily soluble in alcohol, and ether. Also soluble in concentrated sulphuric and nitric acids. Most of its salts are soluble in water, and alcohol. (Goos.)

PerIodic Acid. (*HyperIodic Acid. OxIodic Acid.*) $IO_7, 5\,HO$ Deliquescent. Readily soluble in water. Tolerably soluble in alcohol, and ether. (Benckiser.) Sparingly soluble in concentrated alcohol, and less soluble in ether. (Langlois, *Ann. Ch. et Phys.*, (3.) **34.** 258.) Most of the salts of periodic acid are difficultly soluble or insoluble in water; all of them are insoluble, or very sparingly soluble in alcohol; but they all dissolve with tolerable facility in dilute nitric acid. (Benckiser.)

PerIodate of Ammonia. $NH_4O, IO_7 + 4\,Aq$ Easily soluble in water slightly acidulated with nitric acid. (Langlois, *Ann. Ch. et Phys.*, (3.) **34.** 265.)

PerIodate of Baryta.

I.) $5\,BaO, IO_7$ Insoluble in water. Soluble in nitric acid. (Rammelsberg.)

II.) $5\,BaO, 2\,IO_7 + 5\,Aq$ Insoluble in water. Easily soluble in weak nitric acid. (Benckiser.)

III.) $2\,BaO, IO_7 + 8\,Aq$

PerIodate of Brucin. Tolerably soluble in water, and alcohol. (Langlois, *Ann. Ch. et Phys.*, (3.) **34.** 278.)

PerIodate of Cinchonin. Alterable. Soluble in alcohol. (Langlois, *Ann. Ch. et Phys.*, (3.) **34.** 277.)

PerIodate of Copper. $4\,CuO, HO, IO_7$ Insoluble in water. Soluble in dilute nitric acid. (Benckiser.)

PerIodate of Lead.

I.) $3\,PbO, 2\,HO, IO_7$ Easily soluble in water slightly acidulated with nitric acid. (Langlois, *Ann. Ch. et Phys.*, (3.) **34.** 270.)

II.) *basic.* Insoluble in water, or an aqueous solution of periodic acid. Readily soluble in dilute nitric acid. (Benckiser, *Ann. Ch. u. Pharm.*, **17.** 254.)

PerIodate of Lime.

I.) $2\,CaO, 3\,HO, IO_7$

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II.) $5CaO, IO_7$ Insoluble in water. Soluble in nitric acid. (Berzelius's *Lehrb.*, **3.** 413.)

PerIodate of Lithia. Soluble in water. Decomposed by spirit. (Rammelsberg.)

PerIodate of Magnesia. $2MgO, 3HO, IO_7 + 9Aq$ Insoluble in water. Soluble in periodic acid. (Langlois, *Ann. Ch. et Phys.*, (3.) **34.** 268.)

PerIodate of Mercury.
I.) *of the dinoxide*(Hg_2O). } Easily soluble in
II.) *of the protoxide*(HgO). } dilute nitric acid.
(Benckiser.)

PerIodate of Potash.
I.) *normal.* Very sparingly soluble in water. KO, IO_7
II.) *basic.* Very sparingly soluble in water. $2KO, IO_7$

PerIodate of Quinine. $C_{40}H_{24}N_2O_4, HO, IO_7 + 22Aq$ Sparingly soluble in water. Easily soluble in water acidulated with nitric acid. Soluble in alcohol. (Langlois, *Ann. Ch. et Phys.*, (3.) **34.** 276.)

PerIodate of Silver.
I.) AgO, IO_7 Insoluble in water. By the action of hot water it is transformed into No. II. (Ammermuller & Magnus.)

II.) $2AgO, HO, IO_7$ Insoluble in hot water. Soluble in warm nitric acid. (A. & M.)

III.) $2AgO, 3HO, IO_7$ By the action of hot water it is decomposed to No. II. (A. & M.)

PerIodate of Soda.
I.) NaO, IO_7 Readily soluble in water. (Magnus.) Permanent. Soluble, without decomposition, in dilute nitric acid. (Benckiser.)

II.) $2NaO, 3HO, IO_7$ Insoluble in cold, sparingly soluble in hot water. (Magnus.)

PerIodate of Strontia. $2SrO, 3HO, IO_7$ Resembles the baryta salt.

PerIodate of Strychnine. Tolerably soluble in water, and alcohol. (Langlois, *Ann. Ch., et Phys.*, (3.) **34.** 278.)

PerIodate *of protoxide* **of Uranium.** Ppt., which soon becomes oxidized.

PerIodate *of sesquioxide* **of Uranium.** Somewhat soluble in hot water, and in an aqueous solution of protochloride of uranium. (Rammelsberg.)

PerIodate of Veratrin. Soluble in alcohol. (Langlois, *Ann. Ch. et Phys.*, (3.) **34.** 278.)

PerIodate of Zinc.
I.) $4ZnO, HO, IO_7$ Easily soluble in water slightly acidulated with nitric acid. (Langlois, *Ann. Ch. et Phys.*, (3.) **34.** 269.)
II.) $3ZnO, 7HO, 2IO_7$

" *Basic***PerIodite of Lead(?).**" (See Gmelin's *Handbook*, **5.** 143.)
I.) *Blue salt.* Insoluble in water, or in aqueous solutions of acetate of lead, or sugar. Decomposed by the weakest acids. (Durand.)

II.) *Violet salt.* Slowly decomposed by water. Not decomposed by alcohol. Soluble in an aqueous solution of caustic potash. (Jammes.)

PerManganic Acid. Mn_2O_7 Known only in aqueous solution, which is decomposed on evaporating.

Its salts are all soluble in water, excepting the silver salt, which is difficultly soluble.

PerManganate of Ammonia. NH_4O, Mn_2O_7 Soluble in water. (Mitscherlich.)

PerManganate of Baryta. BaO, Mn_2O_7 Permanent. Soluble in water.

PerManganate of Copper(CuO). CuO, Mn_2O_7 Deliquescent. (Mitscherlich.)

PerManganate of Lead. PbO, Mn_2O_7 Soluble in nitric acid. (Forchammer.)

PerManganate of Lime. Deliquescent. (Mitscherlich.)

PerManganate of Lithia. LiO, Mn_2O_7 Permanent. Soluble in water.

PerManganate of Magnesia. MgO, Mn_2O_7 Deliquescent. Soluble in water.

PerManganate of Potash. KO, Mn_2O_7 Soluble in 16 pts. of water at 15°. Immediately decomposed by alcohol. (Mitscherlich.) The aqueous solution saturated at 15° contains 0.06% of its weight of the salt. (Berzelius's *Lehrb.*)

PerManganate of Silver. AgO, Mn_2O_7 Soluble in 109 [190 ?] pts. of cold water, and in much less hot water. (Mitscherlich.)

PerManganate of Soda. NaO, Mn_2O_7 Deliquescent. Very soluble in water. (Mitscherlich.)

PerManganate of Strontia. Deliquescent. Soluble in water. (Mitscherlich.)

PerManganate of Zinc. ZnO, Mn_2O_7 Deliquescent. Soluble in water. (Mitscherlich.)

PerSpiroylic Acid. *Vid.* Salicylic Acid.

PerSulphate(&c.) of *X*. See under **Sulphate of** *X*, as *per*Sulphate of *X*, and the like.

PerSulfure EthylSulfocarbonique. *Vid.* *bi*Carbonate of *bi*Sulphide of Ethyl.

PerSulphoCyanogen. *Vid.* *per*SulphoCyanogen.

PerSulphoMolybdate of *X*. *Vid.* *per*SulphoMolybdate of *X*.

PerUric Acid. $C_{10}H_5N_4O_9$(?) Slowly soluble in water. Soluble in ammonia-water. Easily and abundantly soluble in aqueous solutions of the caustic and carbonated alkalies. (Unger.) Difficultly soluble in acids.

PerUrate of Silver. $C_{10}H_3Ag_2N_4O_9$(?) Insoluble in water.

Peruvin. *Vid.* Styrone.

Petasite(from the root of *Tussilago Petasites*).

Petinin. $C_8H_{11}N = N\left\{\begin{matrix}C_8H_9\\H_2\end{matrix}\right.$ *(Isomeric with Butylamin, Biethylamin, Bimethylethylamin, and Methylpropylamin.)* Soluble in all proportions in water, alcohol, ether, and oils. Its salts are soluble in water, and alcohol. Readily soluble in dilute, but insoluble in a strong, aqueous solution of caustic potash. It combines with the stronger acids, forming salts which are permanent, and are all soluble in water. (Anderson.)

Petrolene. *(Isomeric with Tekoretin.)* $C_{40}H_{32}''$ Sparingly soluble in alcohol. Easily soluble in ether. (Boussingault.)

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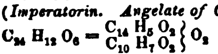
Petroleum. Soluble in 18 pts. of alcohol, of 0.85 sp. gr. (Parrish's *Pharm.*, p. 346.)

(*Oleum petræ.*)

Peucedanin. Insoluble in water. Very sparingly soluble in cold, readily soluble in boiling alcohol. Readily soluble in ether and in the fatty and volatile oils. Insoluble in dilute acids. Soluble in concentrated sulphuric acid, from which it is precipitated, unchanged, by water. (Wackenroder.) Soluble, with decomposition, in warm nitric acid. Also soluble in an aqueous solution of caustic potash; but only sparingly soluble in ammonia-water, or in chlorhydric or acetic acids.

(*Imperatorin. Angelate of Oreoselone.*)


$C_{24} H_{12} O_6 = \left.\begin{matrix} C_{14} H_5 O_2 \\ C_{10} H_7 O_2 \end{matrix}\right\} O_2$

Peucyl(of Blanchet & Sell). *Vid.* Terebilene.

Phæoretin. Exceedingly difficultly soluble in water, and ether. Easily soluble in alcohol, and in aqueous alkaline solutions. Soluble in acetic acid and in concentrated sulphuric acid. (Schlossberger & Dœpping.)

$C_{16} H_8 O_7$

*Di*Phanin. *Vid.* *di*Phenin.

Phaseomannite. Identical with Inosite, *q. v.*

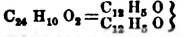
PhenAmyl. *Vid.* Phenate of Amyl.

PhenAmylol. *Vid.* Phenate of Amyl.

*Bi*PhenAnilin. *Vid.* *tri*Phenylamin.

Phenic Acid(Anhydrous). Insoluble in water. Scarcely at all soluble in alcohol. Easily soluble in ether.

(*Phenate of Phenyl. Phenyl Ether. Phenic Anhydride.*)


$C_{24} H_{10} O_2 = \left.\begin{matrix} C_{12} H_5 O \\ C_{12} H_5 O \end{matrix}\right\}$

Phenic Acid. Sparingly soluble in water. Soluble in all proportions in alcohol, ether, and acetic ether. Readily soluble in concentrated acetic acid. (Reichenbach; Runge; Laurent.) Soluble in 80 pts. of water at 20°, and in 22 pts. of water at 100° (Reichenbach); in 31 pts. of water at 20° (Runge). No more soluble in chlorhydric acid than in water; but much more soluble in dilute acetic acid than in water. (Laurent.) Soluble in 17 pts. of a cold mixture of equal parts of glacial acetic acid and water, and in 10 pts. of the same mixture when warm. Soluble in 30 pts. of hot, less soluble in cold phosphoric acid of 1.135 sp. gr. (Reichenbach.) Soluble in all proportions in bisulphide of carbon, and the volatile oils. (Reichenbach.)

(*Carbolic Acid. Phenol. Hydrate of Phenyl. Hydrated Oxide of Phenyl. Phenous Acid. Spirol. Phenylic Acid. Salicon. Phenyl Alcohol. Often confounded with Creosote.*)

$C_{12} H_6 O_2 = C_{12} H_5 O, H O$

Phenate of Ammonia. Soluble in water, and alcohol. (Laurent.)

$C_{12} H_5 (N H_4) O_2$(?)

Phenate of Amyl. Insoluble in water. Easily soluble in alcohol, and ether. Soluble, with combination, in concentrated sulphuric acid.

(*PhenAmylol. PhenAmyl. AmylPhenic Ether.*)

$C_{12} H_5 (C_{10} H_{11}) O_2$

Phenate of Baryta. Soluble in water. (Laurent.)

$C_{12} H_5 Ba O_2 + 8 Aq$

Phenate of BromEthyl, &c. *Vid.* BromoPhenate of Ethyl, &c.

Phenate of Ethyl. Insoluble in water. Easily soluble in alcohol, and ether. Unacted upon by an aqueous solution of caustic potash. Soluble in concentrated sulphuric acid, with combination: the baryta-salt of this conjugate acid is soluble in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **27.** 464.)

(*Phenetol. Salithol. EthylPhenic Ether.*)

$C_{12} H_5 (C_4 H_5) O_2$

Phenate of Ethyl*nitré*. *Vid.* NitroPhenate of Ethyl.

Phenate of Ethyl*trinitré*. *Vid.* Picrate of Ethyl.

Phenate of Lead.

I.) *normal?* Soluble in alcohol, from which it is partially precipitated on the addition of water.

II.) *basic.* Ppt. Soluble in anhydrous phenic acid. (Runge.)

$2 (C_{12} H_5 Pb O_2); Pb O, H O$

Phenate of Lime. Soluble in water, from which it is precipitated on adding much alcohol. (Runge.)

Phenate of Methyl. Insoluble in water. Soluble in alcohol, and ether. Insoluble in an aqueous solution of caustic potash. Soluble, with combination, in fuming sulphuric acid. (Cahours, *Ann. Ch. et Phys.*, (3.) **10.** 353.)

(*Anisol. Dracol. Methyl-Phenic Ether.*)

$C_{12} H_5 (C_2 H_3) O_2$

Phenate of Methyl*bromé*; **Methyl***chloré*, **Methyl***nitré*, &c. *Vid.* BromoPhenate, ChloroPhenate, NitroPhenate (&c.) of Methyl.

Phenate of Phenyl. *Vid.* Phenic Acid (Anhydrous).

Phenate of Potash. Deliquescent. Very soluble in water, alcohol, and ether. (Laurent.)

$C_{12} H_5 K O_2$(?)

Phenate of Soda. Very readily soluble in water and in phenic acid. Insoluble in soda lye. (Reichenbach.)

Phene. *Vid.* Hydride of Phenyl.

*Bi*PhenEthAnilin. *Vid.* Hydrate of Ethyl*tri*Phenylammonium.

Phenetidine nitrique. *Vid.* EthylNitroPhenidin.

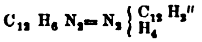
Phenetol. *Vid.* Phenate of Ethyl.

Phenic Alcohol. *Vid.* Phenic Acid.

Phenidamin. *Vid.* AzoPhenylamin.

Phenidin. *Vid.* Benzoate of Phenyl.

*Di*Phenin. Soluble in ether, and in chlorhydric, and nitric acids. (Laurent & Gerhardt.)


$C_{12} H_6 N_2 = N_2 \left\{\begin{matrix} C_{12} H_2'' \\ H_4 \end{matrix}\right.$

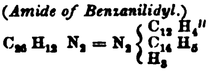
Phenol. *Vid.* Phenic Acid.

Phenic Amid. *Vid.* Anilin.

Phenous Acid. *Vid.* Phenic Acid.

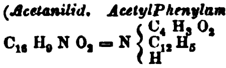
PhenoylBenzoicyl*bi***amin.** Insoluble, or very sparingly soluble, in water. Soluble in boiling, less soluble in cold alcohol. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **53.** 310.)

(*Amide of Benzanilidyl.*)


$C_{26} H_{12} N_2 = N_2 \left\{\begin{matrix} C_{12} H_4'' \\ C_{14} H_5 \\ H_3 \end{matrix}\right.$

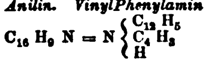
PhenylAcetamin. Sparingly soluble in cold, tolerably soluble in boiling water. Tolerably soluble in alcohol, and ether. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 329.)

(*Acetanilid. AcetylPhenylamid.*)


$C_{16} H_9 N O_2 = N \left\{\begin{matrix} C_4 H_3 O_2 \\ C_{12} H_5 \\ H \end{matrix}\right.$

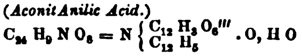
PhenylAcetosamin. Insoluble in water. Readily soluble in absolute alcohol. Insoluble in ether. (Natanson, *Ann. Ch. u. Pharm.*, **98.** 298.)

(*AcetylAnilin. AcetoylAnilin. VinylAnilin. VinylPhenylamin.*)


$C_{16} H_9 N = N \left\{\begin{matrix} C_{12} H_5 \\ C_4 H_3 \\ H \end{matrix}\right.$

PhenylAconitamic Acid. Sparingly soluble in water. Easily soluble in alcohol.

(*AconitAnilic Acid.*)


$C_{24} H_9 N O_8 = N \left\{\begin{matrix} C_{12} H_3 O_6''' \\ C_{12} H_5 \end{matrix}\right. . O, H O$

Very easily soluble in dilute ammonia-water. (Pebal.)

PhenylAconitamate of Silver. Insoluble, or very sparingly soluble in water.
$C_{24} H_8 Ag N O_8$

*Di***PhenylAconitimid.** Insoluble in water. Sparingly soluble in boiling alcohol. (Pebal, *Ann. Ch. u. Pharm.*, **98.** 80.)
(*AconitobiAnil.*)
$C_{36} H_{14} N_2 O_6 = N_2 \left\{ \begin{matrix} C_{12} H_3 O_6''' \\ (C_{12} H_5)_2 \\ H \end{matrix} \right.$

PhenylAllylUrea.
(*AllylAnilin Urea.*)
$C_{20} H_{12} N_2 O_2 = N_2 \left\{ \begin{matrix} C_2 O_2'' \\ C_6 H_5 \\ C_{12} H_5 \\ H_2 \end{matrix} \right.$

Phenylamate of Ammonia. Soluble in water.

Phenylamate of Baryta. Readily soluble in water. Insoluble in an aqueous solution of chloride of ammonium.

Phenylamate of Lead. Soluble in water.

Phenylamate of Silver. Soluble in water.
$C_{20} H_{10} Ag N O_6$

Phenamid. *Vid.* Anilin.

PhenylAmin. *Vid.* Anilin.

*Tri***PhenylAmin.** Difficultly soluble in water. Readily soluble in alcohol, and ether. Its salts are easily decomposed, especially when in solution. (Gœssmann, *Ann. Ch. u. Pharm.*, **100.** 57.)
(*BiCinnamylamin. BiPhenanilin.*)
$C_{36} H_{15} N = N \left\{ (C_{12} H_5)_3 \right.$

PhenylAmmelin. Soluble in warm, less soluble in cold dilute nitric acid. Insoluble in ammonia-water. (Laurent, *Ann. Ch. et Phys.*, (3.) **22.** 100.)
(*Ammeline anilique.*)
$C_{20} H_{13} N_5 O_2$

PhenylAmmonia. *Vid.* Anilin.

PhenylAngelamid.
(*Angelanilid.*)

PhenylAnisylamid. Insoluble in water. Soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **23.** 353.)
(*PhenylAnisamid. Anisanilid. ThianylAnisamid. Anilanisamid.*)
$C_{28} H_{13} N O_4 = N \left\{ \begin{matrix} C_{16} H_7 O_4 \\ C_{12} H_5 \\ H \end{matrix} \right.$

PhenylBenzolamin. Insoluble in water. Very easily soluble in alcohol, and ether. Soluble, without apparent decomposition, in warm concentrated chlorhydric acid. Soluble, with decomposition, in concentrated sulphuric and nitric acids. Not perceptibly soluble in acetic acid. (Laurent & Gerhardt.)
(*BenzoylAnilid. BenzoylAnilin. StilbylPhenylamin. StilbylAnilin.*)
$C_{26} H_{11} N = N \left\{ \begin{matrix} C_{14} H_6'' \\ C_{12} H_5 \end{matrix} \right.$

PhenylBenzoylamid. Insoluble in water. Soluble in alcohol, especially if this be warm. Unacted upon by weak acids, or by alkaline solutions, even boiling. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **15.** 96.) Easily soluble in alcohol, and ether.
(*PhenylBenzamid. Benzanilid. Anilobenzamid. BenzoylPhenylamid.*)
$C_{26} H_{11} N O_2 = N \left\{ \begin{matrix} C_{14} H_5 O_2 \\ C_{12} H_5 \\ H \end{matrix} \right.$

Phenyl*di***Benzoylamid.** Sparingly soluble in boiling, and still less soluble in cold water; somewhat more readily soluble in warm ammonia-water, separating out again on cooling. Tolerably easily soluble in absolute alcohol, and in ether. (Gerhardt & Chiozza, *Ann. Ch. et Phys.*, (3.) **46.** 138.) Only sparingly soluble in cold, more readily soluble in boiling alcohol.
(*PhenyldiBenzamid. BiBenzoylanilid. DiBenzanilid. DiBenzoylPhenylamid.*)
$C_{40} H_{15} N O_4 = N \left\{ \begin{matrix} (C_{14} H_5 O_2)_2 \\ C_{12} H_5 \end{matrix} \right.$

PhenylBromImesatin. Almost insoluble in water. Easily soluble in boiling, less soluble in cold alcohol.
$C_{28} H_9 Br N_2 O_2$

PhenylButyramid. Insoluble in water. Easily soluble in alcohol (spirit), and ether. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 330.)
(*ButyrylPhenylamid. Butyranilid.*)
$C_{20} H_{13} N O_2 = N \left\{ \begin{matrix} C_8 H_7 O_2 \\ C_{12} H_5 \\ H \end{matrix} \right.$

PhenylCamphoric Acid. Very sparingly soluble in boiling water. Readily soluble in alcohol, even when very dilute, and ether. Soluble in dilute ammonia-water. (Laurent & Gerhardt, *Ann. Ch. et Phys.*, (3.) **24.** 194.)
(*CamphorAnilic Acid. CamphorAnilidic Acid. AniloCamphoraminic Acid. PhenylCamphorylaminic Acid.*)
$C_{32} H_{21} N O_6 = N \left\{ \begin{matrix} C_{20} H_{14} O_4'' \\ C_{12} H_5 \\ H \end{matrix} \right. . O, H O$

PhenylCamphorate of
Ammonia.
Baryta.
Lime.
} Soluble in water.

PhenylCamphorate of Silver. Sparingly soluble in water. (L. & G.)
$C_{32} H_{20} Ag N O_6$

PhenylCamphorimid. Insoluble in cold, sparingly soluble in boiling water. Readily soluble in alcohol, and ether. Soluble in boiling, less soluble in cold dilute alcohol. Insoluble in ammonia-water. (Laurent & Gerhardt, *Ann. Ch. et Phys.*, (3.) **24.** 191.)
(*PhenylCamphorylamid. Camphoranil. AniloCamphorimid.*)
$C_{32} H_{19} N O_4 = N \left\{ \begin{matrix} C_{20} H_{14} O_4'' \\ C_{12} H_5 \end{matrix} \right.$

PhenylCamphorimid with Silver. Ppt.
$N \left\{ \begin{matrix} C_{20} H_{13} Ag O_4'' \\ C_{12} H_5 \end{matrix} \right.$

PhenylCarbamic Acid. Only slightly soluble in cold, much more soluble in boiling water. Readily soluble in alcohol, and ether. The alkaline phenylcarbamates are readily soluble in water, and alcohol. (Fritzsche.)
(*Carbanilic Acid. AmidoBenzoic Acid. CarbonylPhenylaminic Acid. Anthranilic Acid. Isomeric with Benzamic Acid.*)
$C_{14} H_7 N O_4 = N \left\{ \begin{matrix} C_2 O_2'' \\ C_{12} H_5 \\ H \end{matrix} \right. . O, H O$

PhenylCarbamate of Copper. Ppt.

"**PhenylCarbamate of Ethyl.**" *Vid.* Benzamate of Ethyl.

PhenylCarbamate of Lead. Ppt.

PhenylCarbamate of Lime. Slightly soluble in cold, tolerably readily soluble in hot water. (Liebig.)
$C_{14} H_6 Ca N O_4$

"**PhenylCarbamate of Methyl.**" *Vid.* Benzamate of Methyl.

PhenylCarbamate of Silver. Soluble in boiling, less soluble in cold water. (Liebig.) Tolerably soluble in hot, less soluble in cold water; more readily soluble in alcohol, and ether. (Chancel.)
$C_{14} H_6 Ag N O_4$

PhenylCarbamate of Zinc.

PhenylCarbamid. Sparingly soluble in cold, abundantly soluble in boiling water. Very soluble in alcohol and in ether. Soluble, without decomposition,
(*Carbanilamid. Anilin Urea. Carbamid Carbanilid. Abnormal Cyanate of Anilin.*)
$C_{14} H_8 N_2 O_2 = N_2 \left\{ \begin{matrix} C_2 O_2'' \\ C_{12} H_5 \\ H_3 \end{matrix} \right.$

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in monohydrated sulphuric acid, but the solution is decomposed by heating. Soluble, without alteration, in nitric acid, but scarcely more readily in dilute nitric or oxalic acid than in water. It is not decomposed by boiling with dilute acids or alkalies. (Hofmann, *J. Ch. Soc.*, **2.** 39.)

***Di*PhenylCarbamid.** (*Carbanilid. Anilo Carbamid.*) $C_{26}H_{12}N_2O_2 = N_2\left\{\begin{matrix}C_2O_2''\\(C_{12}H_5)_2\\H_2\end{matrix}\right.$ Very slightly soluble in water; more readily soluble in alcohol, and ether. (Hofmann, *J. Ch. Soc.*, **2.** 43.)

PhenylCarbimid. *Vid.* Cyanate of Phenyl.

PhenylCetylamin. *Vid.* CetylAnilin.

PhenylChlorImesatin. $C_{28}H_9ClN_2O_2$ Very difficultly soluble in water. Very easily soluble in boiling, and tolerably soluble in cold alcohol.

PhenylChloroCyanamid. (*ChloroCyanilide.*) $C_{30}H_{12}N_5Cl$ Insoluble in water. Sparingly soluble in boiling, and still less soluble in cold alcohol. (Laurent, *Ann. Ch. et Phys.*, (3.) **22.** 99.)

PhenylCinnamylamid. (*PhenylCinnamid. Cinnanilid. Anilo Cinnamid.*) $C_{30}H_{13}NO_2 = N\left\{\begin{matrix}C_{18}H_7O_2\\C_{12}H_5\\H\end{matrix}\right.$ Insoluble, or very sparingly soluble in water. Easily soluble in warm, much less soluble in cold alcohol. Scarcely at all acted upon by strong alkaline solutions. (Cahours, *Ann. Ch. et Phys.*, (3.) **23.** 344.)

PhenylCitraconamic Acid. (*CitraconAnilic Acid. Citraconanilidsaure. CitraconylPhenylamic Acid.*) $C_{22}H_{11}NO_6 = N\left\{\begin{matrix}C_{10}H_4O_4''\\C_{12}H_5\\H\end{matrix}\right..O,HO$ Very sparingly soluble in cold water, the aqueous solution undergoing decomposition when boiled. Soluble in a mixture of alcohol and ether.

PhenylCitraconamate of Ammonia. Soluble in water.

PhenylCitraconamate of Silver. Ppt. Decomposed by boiling water.

PhenylCitraconimid. (*Citraconanil. CitraconylPhenylamid.*) $C_{22}H_9NO_4 = N\left\{\begin{matrix}C_{10}H_4O_4''\\C_{12}H_5\end{matrix}\right.$ Sparingly soluble in water. Readily soluble in alcohol, and ether. Soluble, without decomposition, in cold concentrated sulphuric acid, from which it is precipitated on the addition of water.

PhenylCitramic Acid. (*CitrAnilic Acid. CitromonAnilic Acid. CitrAnilidic Acid. Phenyl Citrylamic Acid.*) $C_{24}H_{11}NO_{10} = N\left\{\begin{matrix}C_{12}H_5O_8'''\\C_{12}H_5\end{matrix}\right..O,HO$ Easily soluble in water, and alcohol. (Pebal.)

PhenylCitramate of Anilin. $C_{24}H_{10}\left(N\left\{\begin{matrix}C_{12}H_5\\H_2.H\end{matrix}\right.\right)O_{10}$ Very soluble in alcohol. (Pebal.)

PhenylCitramate of Silver.

I.) $C_{24}H_{10}AgNO_{10}$ Ppt., in alcohol.

II.) *basic.* $C_{24}H_{10}AgNO_{10};AgO,HO$ Insoluble, or very sparingly soluble, in water.

PhenylCitramid. (*Citranilide. triPhenylCitryltriamide.*) $C_{48}H_{23}N_3O_8 = N_3\left\{\begin{matrix}C_{12}H_5O_8'''\\(C_{12}H_5)_3\\H_3\end{matrix}\right.$ Scarcely at all soluble in water. Sparingly soluble in boiling, and still less soluble in cold alcohol. Insoluble in boiling aqueous solutions of caustic ammonia or potash.

PhenylCitrimid. (*CitrobiAnil. Citranilimid. DiPhenylCitryldiamid.*) $C_{36}H_{16}N_2O_8 = N_2\left\{\begin{matrix}C_{12}H_5O_8'''\\(C_{12}H_5)_2\\H\end{matrix}\right.$ Permanent. Very slightly soluble in water. Very readily soluble in boiling alcohol. (Pebal.)

PhenylCitro*bi*amic Acid. (*Citrobianilic Acid. Citrobianilidic Acid. diPhenylCitrylbiamic Acid.*) $C_{36}H_{18}N_2O_{10} = N_2\left\{\begin{matrix}C_{12}H_5O_8'''\\C_{12}H_5\\C_{12}H_5.H\\H\end{matrix}\right..O,HO$ Slightly soluble in water. Readily soluble in alcohol. Very easily soluble in spirit, and in ammonia-water. (Pebal, *Ann. Ch. u. Pharm.*, **98.** 90.)

PhenylCitro*bi*amate of Ammonia. Soluble in water.

PhenylCitro*bi*amate of Anilin. $C_{36}H_{17}\left(N\left\{\begin{matrix}C_{12}H_5\\H_2.H\end{matrix}\right.\right)N_2O_{10}$ Soluble in water.

PhenylCitro*bi*amate of Baryta. $C_{36}H_{17}BaN_2O_{10}$ Ppt. Insoluble, or nearly insoluble, in water.

PhenylCitro*bi*amate of Silver. $C_{36}H_{17}AgN_2O_{10}$ Insoluble in water.

PhenylCuminamid. (*Phenyl Cumylamid. CuminAnilid. Anilo Cuminamid. Cumanilid.*) $C_{32}H_{17}NO_2 = N\left\{\begin{matrix}C_{20}H_{11}O_2\\C_{12}H_5\\H\end{matrix}\right.$ Insoluble, or very sparingly soluble, in water. Sparingly soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **23.** 349.)

PhenylCaprylamid. (*CaprylAnilid. CaprylPhenylamid.*) $C_{28}H_{21}NO_2 = N\left\{\begin{matrix}C_{16}H_{15}O_2\\C_{12}H_5\\H\end{matrix}\right.$

PhenylCyanamid. *Vid.* CyanAnilid.

PhenylEthyl Compounds. *Vid.* EthylPhenyl Compounds.

PhenylFormylamid. (*PhenylFormiamid. Formanilid. AniloFormamid.*) $C_{14}H_7NO_2 = N\left\{\begin{matrix}C_{12}H_5\\C_2HO_2\\H\end{matrix}\right.$ Tolerably readily soluble in water, especially when this is warm; still more soluble in alcohol. Unacted upon by cold, but decomposed by boiling dilute aqueous solutions of caustic potash, and sulphuric acid. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **14.** 122, & (3.) **15.** 94.) Soluble in ether.

Phenylic Acid. *Vid.* Phenic Acid.

Phenylide of Benzoyl. *Vid.* BenzoPhenone.

Phenylide of SulphoPhenyl. *Vid.* SulphoBenzid.

PhenylImesatin. (*PhenylIsatoylbiamid.*) $C_{28}H_{10}N_2O_2 = N_2\left\{\begin{matrix}C_{16}H_2O_2''\\C_{12}H_5\\H_3\end{matrix}\right.$ Very slightly soluble in boiling water, from which it separates as the solution cools. Readily soluble in boiling, much less soluble in cold alcohol. Soluble in ether, and in concentrated sulphuric acid. (Engelhardt.)

PhenylItaconamic Acid. (*ItaconAnilic Acid. ItaconAnilidic Acid. ItaconylPhenylamic Acid.*) $C_{22}H_{11}NO_6 = N\left\{\begin{matrix}C_{10}H_4O_4''\\C_{12}H_5\\H\end{matrix}\right..O,HO$ Easily soluble in water; still more readily soluble in alcohol. (Gottlieb.)

PhenylItaconamate of Ammonia.

I.) *acid.* Sparingly soluble in hot water.

PhenylItaconamate of Baryta. $C_{22}H_{10}BaNO_6$ Very soluble in water.

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PhenylItaconamate of Copper. Ppt.
$C_{22}H_{10}CuNO_6$

PhenylItaconamate of Lead. Ppt.

PhenylItaconamate of Silver. Easily soluble, with partial decomposition, in boiling water.
$C_{22}H_{10}AgNO_6$

PhenylItaconamate of Soda. Very readily soluble in water. (Gottlieb.)

PhenylItaconamid. Almost insoluble in cold, very sparingly soluble in boiling water. Easily soluble in alcohol, and ether. Soluble, without decomposition, in concentrated sulphuric acid, from which solution it is precipitated on the addition of water. Unacted upon by dilute acids or alkaline solutions. (Gottlieb.)

(*ItaconylPhenylbiamid. Itaconanilid.*)

$$C_{34}H_{16}N_2O_4 = N_2\left\{\begin{matrix}C_{10}H_4O_4 \\ (C_{12}H_5)_2 \\ H_2\end{matrix}\right.$$

PhenylMalamic Acid. Readily soluble in water. Soluble in alcohol. Sparingly soluble in ether. Its salts are generally very readily soluble in water. (Arppe, *Ann. Ch. u. Pharm.*, **96.** 111.)

(*MalAnilic Acid. MalAnilidic Acid. MalylPhenamic Acid.*)

$$C_{20}H_{11}NO_8 = N\left\{\begin{matrix}C_8H_4O_6'' \\ C_{12}H_5 \\ H\end{matrix}\right. .O, HO$$

PhenylMalamate of Ammonia. Soluble in water.

PhenylMalamate of Baryta. Tolerably soluble in water. Insoluble in an aqueous solution of chloride of ammonium.

PhenylMalamate *of sesquioxide* **of Iron.** Ppt.

PhenylMalamate of Lead. Somewhat soluble in water.

PhenylMalamate of Lime. Soluble in water.

PhenylMalamate of Silver. Somewhat soluble in boiling, less soluble in cold water. (Arppe.)
$C_{20}H_{10}AgNO_8$

***Di*PhenylMalamid.** Nearly insoluble in water. Soluble in boiling, sparingly soluble in cold alcohol. Sparingly soluble in ether. Nearly insoluble in chlorhydric acid, ammonia-water, or a dilute solution of caustic potash; decomposed by a strong solution of potash. Soluble in warm concentrated sulphuric acid, and in cold nitric acid. (Arppe, *Ann. Ch. u. Pharm.*, **96.** 108.)

(*Malanilid. MalyldiPhenylbiamid.*)

$$C_{32}H_{16}N_2O_8 = N_2\left\{\begin{matrix}C_8H_4O_6'' \\ (C_{12}H_5)_2 \\ H_2\end{matrix}\right.$$

PhenylMalimid. Soluble in great quantity in boiling water. Also soluble in alcohol, and ether. Abundantly soluble, with combination, in nitric acid. (Arppe, *Ann. Ch. u. Pharm.*, **96.** 109.)

(*MalAnil. MalylPhenylamid.*)

$$C_{20}H_9NO_6 = N\left\{\begin{matrix}C_8H_4O_6'' \\ C_{12}H_5\end{matrix}\right.$$

PhenylNaphthylSulphoCarbamid. *Vid.* SulphoCyanide of PhenylNaphthylamin.

PhenylNitroBenzamid. *Vid.* NitroBenzanilid.

PhenylOxaluramid. Insoluble in boiling water. Almost insoluble in boiling alcohol. Easily soluble in concentrated sulphuric acid. (Laurent & Gerhardt, *Ann. Ch. et Phys.*, (3.) **24.** 178.)

(*Oxaluranilid. Aniloxuramid. Carbonyl OxalylPhenylteramid.*)

$$C_{18}H_9N_3O_6 = N_3\left\{\begin{matrix}C_2O_2'' \\ C_4O_4'' \\ C_{12}H_5 \\ H_4\end{matrix}\right.$$

PhenylOxamic Acid. Sparingly soluble in cold, readily soluble, without decomposition, in boiling water. Very soluble in alcohol. Decomposed by boiling with a dilute aqueous solution of caustic potash, or with dilute sulphuric or chlorhydric acid. (Laurent & Gerhardt, *Ann. Ch. et Phys.*, (3.) **24.** 168.)

(*Oxanilic Acid. Oxanilidic Acid. Aniloxamic Acid. OxalylPhenylamic Acid.*)

$$C_{16}H_7NO_6 = N\left\{\begin{matrix}C_4O_4'' \\ C_{12}H_5 \\ H\end{matrix}\right. .O, HO$$

Its salts are all sparingly soluble in cold, but easily soluble in hot water.

PhenylOxamate of Ammonia.

I.) *normal.* Sparingly soluble in cold, very soluble in boiling water. Very soluble in boiling, somewhat sparingly soluble in cold alcohol. (L. & G.)
$C_{16}H_6(NH_4)NO_6$

II.) *acid.* Sparingly soluble in cold water.
$C_{16}H_6(NH_4)NO_6, C_{16}H_7NO_6$ (L. & G.)

PhenylOxamate of Anilin.

I.) *acid.* Sparingly soluble in cold, readily soluble in hot water. Soluble, without decomposition, in chlorhydric acid. (L. & G.)
$$C_{16}H_6\left(N\left\{\begin{matrix}C_{12}H_5 \\ H_2.H\end{matrix}\right.\right)NO_6, C_{16}H_7NO_6$$

PhenylOxamate of Baryta. Sparingly soluble in hot, almost insoluble in cold water. (L. & G.)
$C_{16}H_6BaNO_6$

PhenylOxamate of Lime. Soluble in hot, rather sparingly soluble in cold water. (L. & G.)
$C_{16}H_6CaNO_6$

PhenylOxamate of Silver. Abundantly soluble in hot, almost insoluble in cold water. (L. & G.)
$C_{16}H_6NAgO_6$

PhenylOxamid. Almost insoluble in cold, easily soluble in boiling water. Soluble in boiling, somewhat less soluble in cold, concentrated alcohol. Less soluble in alcohol than in water. Soluble in ether. Soluble in concentrated aqueous solutions of the caustic alkalies, the solution undergoing decomposition after a time. (Hofmann, *J. Ch. Soc.*, **2.** 302.)

(*Oxanilamid. Oxamide Oxanilid. OxalylPhenylbiamid.*)

$$C_{16}H_8N_2O_4 = N_2\left\{\begin{matrix}C_4O_4'' \\ C_{12}H_5 \\ H_3\end{matrix}\right.$$

***Di*PhenylOxamid.** Insoluble in water, even when this is boiling. Insoluble in cold, very sparingly soluble in boiling alcohol. Insoluble in ether. Unacted upon by boiling dilute alkaline solutions, or dilute acids. Decomposed by boiling concentrated solutions of caustic potash, and of concentrated sulphuric acid. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **14.** 121, & (3.) **15.** 92.) Insoluble in water. Very difficultly soluble in alcohol; more readily, though still sparingly, soluble in benzin. (Hofmann, *J. Ch. Soc.*, **2.** 301.)

(*Oxanilid. Aniloxamid. OxalyldiPhenylbiamid.*)

$$C_{28}H_{12}N_2O_4 = N_2\left\{\begin{matrix}C_4O_4'' \\ (C_{12}H_5)_2 \\ H_2\end{matrix}\right.$$

***Tri*PhenylPhosphamid.** Insoluble in water. Soluble, with decomposition, in concentrated sulphuric acid.

(*Phosphanilid. PhosphoryltriPhenyltriamid.*)

$$C_{36}H_{18}N_3PO_2 = N_3\left\{\begin{matrix}PO_2''' \\ (C_{12}H_5)_3 \\ H_3\end{matrix}\right.$$

PhenylPhtalamic Acid. Very sparingly soluble in cold, more soluble in warm water. Easily soluble in al-

(*PhtalAnilic Acid. PhthalAnilidic Acid. AniloPhtalamic Acid.*)

$$C_{28}H_{11}NO_6 = N\left\{\begin{matrix}C_{16}H_4O_4'' \\ C_{12}H_5 \\ H\end{matrix}\right. .O, HO$$

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cohol, and ether. (Laurent & Gerhardt, *Ann. Ch. et Phys.*, (3.) **24.** 190.)

PhenylPhtalamate of Ammonia. Soluble in water.

PhenylPhtalamate of Baryta. Appears to be soluble in water.

PhenylPhtalamate of Lead. Ppt.

PhenylPhtalamate of Lime. Appears to be soluble in water.

PhenylPhtalamate of Silver. Ppt.

PhenylPhtalimid. (*PhtalAnil. PhtalPhenylimid.*) $C_{28}H_9NO_4 = N\left\{\begin{matrix}C_{16}H_4O_4''\\C_{12}H_5\end{matrix}\right.$ Insoluble in water. Soluble in boiling, less soluble in cold alcohol. Decomposed by boiling ammonia-water. (Laurent & Gerhardt, *Ann. Ch. et Phys.*, (3.) **24.** 189.)

PhenylPyroTartramic Acid. (*Pyrotartranilic Acid. Pyrotartranilidic Acid. Pyrotartanilic Acid. Pyrotartrylphenylamic Acid.*) $C_{22}H_{13}NO_8 = N\left\{\begin{matrix}C_{10}H_6O_4''\\C_{12}H_5\\H\end{matrix}\right. .O,HO$ Somewhat sparingly soluble in water, though more soluble than phenylpyrotartrimid. Easily soluble in alcohol, ether, and acids.

Its salts of the alkalies and alkaline earths are readily soluble in water; those of the metallic oxides are difficultly soluble. (Arppe, *Ann. Ch. u. Pharm.*, **90.** 142.)

PhenylPyroTartramate of Ammonia. Readily soluble in cold water. Decomposed by boiling water.

PhenylPyroTartramate of Baryta. Soluble in water.

PhenylPyroTartramate of Copper. Ppt.

PhenylPyroTartramate *of peroxide* **of Iron.** Ppt.

PhenylPyroTartramate of Lead. $C_{10}H_7Pb(C_{12}H_5)NO_6$ Soluble in boiling water and in a solution of acetate of lead.

PhenylPyroTartramate of Lime. Soluble in water.

PhenylPyroTartramate of Mercury(HgO). Ppt.

PhenylPyroTartramate of Potash. Very easily soluble in water.

PhenylPyroTartramate of Silver. $C_{22}H_{12}AgNO_6$ Soluble in boiling water.

PhenylPyroTartramate of Soda. Soluble in water.

PhenylPyroTartrimid. (*Pyrotartranil. Pyrotartranil. Pyrotartrylphenylamid.*) $C_{22}H_{11}NO_4 = \left\{\begin{matrix}C_{10}H_6O_4''\\C_{12}H_5\end{matrix}\right.$ Sparingly soluble in boiling water. Easily soluble in alcohol, even in weak spirit, and in ether. Easily soluble in acids. Soluble in cold alkaline solutions, with alteration, the solution being decomposed on heating. (Arppe, *Ann. Ch. u. Pharm.*, **90.** 139.) Sparingly soluble in cold water. Easily soluble in boiling alcohol. (Biffi.)

PhenylSalicoylamid (*Salicylanilid. Isomeric with PhenylBenzoylamid.*) $C_{26}H_{11}NO_2 = N\left\{\begin{matrix}C_{14}H_5O_2\\C_{12}H_5\\H\end{matrix}\right.$ Insoluble in water. Easily soluble in alcohol. Decomposed by warm acids and alkaline solutions. (Schischkoff.)

PhenylStearamid. (*StearAnilid.*) $C_{48}H_{41}NO_2 = N\left\{\begin{matrix}C_{36}H_{35}O_2\\C_{12}H_5\\H\end{matrix}\right.$

PhenylSuberamic Acid. (*SuberAnilic Acid. AniloSuberamic Acid.*) $C_{28}H_{19}NO_8 = N\left\{\begin{matrix}C_{16}H_{12}O_4''\\C_{12}H_5\\H\end{matrix}\right. .O,HO$ Insoluble in cold, sparingly soluble in warm water. Easily soluble in alcohol, and ether. (Laurent & Gerhardt, *Ann. Ch. et Phys.*, (3.) **24.** 186.)

PhenylSuberamate of Ammonia. Tolerably soluble in water. (L. & G.)

PhenylSuberamate of Baryta. Soluble in boiling, but sparingly soluble in cold water. (L. & G.)

PhenylSuberamate of Copper. Insoluble in water. (L. & G.)

PhenylSuberamate *of protoxide* **of Iron.** Ppt.

PhenylSuberamate of Lead. Insoluble in water. (L. & G.)

PhenylSuberamate of Lime. Soluble in warm, less soluble in cold water. (L. & G.)

PhenylSuberamate of Silver. $C_{28}H_{18}AgNO_6$ Insoluble in water. (L. & G.)

***Di*PhenylSuberamid.** (*SuberAnilid. DiPhenylSuberylbiamid.*) $C_{40}H_{24}N_2O_4 = N_2\left\{\begin{matrix}C_{16}H_{12}O_4''\\(C_{12}H_5)_2\\H_2\end{matrix}\right.$ Entirely insoluble in water. Very sparingly soluble in cold, easily soluble in hot alcohol. Easily soluble in hot ether. Insoluble in boiling ammonia-water. (Laurent & Gerhardt, *Ann. Ch. et Phys.*, (3.) **24.** 184.)

PhenylSuberimid(?). (*SuberAnil*(?).) Sparingly soluble in boiling, less soluble in cold alcohol, and ether. Insoluble in boiling aqueous solutions of caustic potash or ammonia. (Laurent & Gerhardt, *Ann. Ch. et Phys.*, (3.) **24.** 187.)

PhenylSuccinamic Acid. (*SuccinAnilic Acid. SuccinAnilidic Acid. AniloSuccinamic Acid. SuccinylPhenylamic Acid.*) $C_{20}H_{11}NO_6 = N\left\{\begin{matrix}C_8H_4O_4''\\C_{12}H_5\\H\end{matrix}\right. .O,HO$ Very sparingly soluble in cold, more soluble in warm water. Very readily soluble in alcohol, and ether. Soluble in alkaline solutions. (Laurent & Gerhardt, *Ann. Ch. et Phys.*, (3.) **24.** 181.)

PhenylSuccinamate of Ammonia. Tolerably readily soluble in water.

PhenylSuccinamate of Baryta. Easily soluble in warm water. (L. & G.)

PhenylSuccinamate of Copper. Insoluble in water.

PhenylSuccinamate *of protoxide* **of Iron.** Sparingly soluble in water.

PhenylSuccinamate of Lime. Appears to be soluble in water.

PhenylSuccinamate of Silver. $C_{20}H_{10}AgNO_6$ Insoluble in water. (L. & G.)

***Di*PhenylSuccinamid.** (*SuccinAnilid. AniloSuccinamid. SuccinyldiPhenylbiamid.*) $C_{32}H_{16}N_2O_4 = N_2\left\{\begin{matrix}C_8H_4O_4''\\(C_{12}H_5)_2\\H_2\end{matrix}\right.$ Insoluble in water. Easily soluble in boiling, less soluble in cold alcohol. Easily soluble in ether. (Laurent & Gerhardt, *Ann. Ch. et Phys.*, (3.) **24.** 182.)

PhenylSuccinimid. (*SuccinAnil. AniloSuccinimid. SuccinylPhenylamid.*) $C_{20}H_9NO_4 = N\left\{\begin{matrix}C_8H_4O_4''\\C_{12}H_5\end{matrix}\right.$ Insoluble in cold, somewhat soluble in boiling water. Easily soluble in alcohol and ether, and in nitric, and chlorhydric acids. Soluble, with decompo-

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sition, in boiling ammonia-water. Unacted on by an aqueous solution of caustic potash. (Laurent & Gerhardt, *Ann. Ch. et Phys.*, (3.) **24.** 180.)

PhenylSulphamic Acid. *Vid.* SulphAnilic Acid.

PhenylSulphuric Acid. Soluble in water. (*SulphoPhenic Acid. SulphoCarbolic Acid. Sulphate of Phenyl.*)
$C_{12}H_6S_2O_8 = C_{12}H_5O, HO, 2SO_3$

PhenylSulphate of Ammonia.
$C_{12}H_5(NH_4)S_2O_8 + Aq$

PhenylSulphate of Baryta. Soluble in water, and in boiling alcohol.
$C_{12}H_5BaS_2O_8 + 3Aq$

PhenylSulphurous Acid. Easily soluble in water. Its salts are soluble in water. (*SulphoBenzolic Acid. Sulphophenylic Acid. Sulphobenzidic Acid. Benzosulphuric Acid.*)
$C_{12}H_6S_2O_6 = C_{12}H_5O, HO, S_2O_4$

PhenylSulphite of Ammonium. Soluble in water.

PhenylSulphite of Anilin. Easily soluble in water, and alcohol. Scarcely at all soluble in ether. (Gericke, *Ann. Ch. u. Pharm.*, **100.** 217.)
$C_{12}H_5\left(N\left\{\begin{matrix}C_{12}H_5\\H_3\end{matrix}\right.\right)S_2O_6$

PhenylSulphite of Baryta. Easily soluble in water, and alcohol. (Gericke.)
$C_{12}H_5BaS_2O_6$

PhenylSulphite of Copper. Easily soluble in water, and alcohol. (Gericke.)
$C_{12}H_5CuS_2O_6$

PhenylSulphite of Ethyl. Easily soluble in water; less soluble in spirit. When quickly evaporated, the aqueous solution undergoes decomposition. (Gericke.)
$C_{12}H_5(C_4H_5)S_2O_6$

PhenylSulphite of Lead. Easily soluble in water, and alcohol. (Gericke.)

PhenylSulphite of Lime. Easily soluble in water, and alcohol. (Gericke.)

PhenylSulphite of Potash. Soluble in water.

PhenylSulphite of Silver. Soluble in water. (Laurent, *Method*, p. 250.)

PhenylSulphite of Soda. Easily soluble in water, and alcohol. (Gericke.)

PhenylSulphite of Zinc. Easily soluble in water, and alcohol. (Gericke.)

***Di*PhenylSulphoBenzoylbiamid.** Difficultly soluble in hot, and almost insoluble in cold water. Easily soluble in hot alcohol, and ether. Unacted upon by cold, but decomposed by boiling potash-lye. (Limpricht & v. Uslar, *Ann. Ch. u. Pharm.*, **102.** 258.) (*SulphoBenzanilid.*)
$C_{38}H_{16}N_2S_2O_6 = N_2\left\{\begin{matrix}C_{14}H_4S_2O_6''\\(C_{12}H_5)_2\\H_2\end{matrix}\right.$

PhenylSulphoCarbamid. Soluble in water. (*SulphoCarbonylPhenylbiamid.*)
$C_{14}H_8N_2S_2 = N_2\left\{\begin{matrix}C_2S_2''\\C_{12}H_5\\H_3\end{matrix}\right.$

***Di*PhenylSulphoCarbamid.** Only slightly soluble in water; more readily soluble in alcohol, and ether, especially when these are warm. Soluble in cold concentrated sulphuric acid. (Hofmann, *J. Ch. Soc.*, **2.** 50.) (*SulphoCarbanilid. SulphoCarbonyldiPhenylbiamid.*)
$C_{26}H_{12}N_2S_2 = N_2\left\{\begin{matrix}C_2S_2''\\(C_{12}H_5)_2\\H_2\end{matrix}\right.$

Phenyl*di*Sulpho*di*amic Acid. *Vid. bi*ThioBenzolic Acid.

PhenylSulphoPhenylamid. *Vid.* SulphoPhenAnilid.

PhenylSulphurousPhenylid. *Vid.* SulphoBenzid.

PhenylTartrylamic Acid. Easily soluble in water, and alcohol; much less readily soluble in ether. (Arppe, *Ann. Ch. u. Pharm.*, **93.** 355.) (*Phenyl Tartramic Acid. Tartranilic Acid. Tartanilic Acid. Tartranilidic Acid.*)
$C_{20}H_{11}NO_{10} = N\left\{\begin{matrix}C_8H_4O_8''\\C_{12}H_5\\H\end{matrix}\right. .O, HO$

PhenylTartrylamate of Ammonia. Efflorescent. Very easily soluble in water. (Arppe, *loc. cit.*)

PhenylTartrylamate of Baryta. Tolerably soluble in boiling, less soluble in cold water. (Arppe, *loc. cit.*)
$C_{20}H_{10}BaO_{10}$

PhenylTartrylamate of Silver. Somewhat soluble in water. (Arppe, *loc. cit.*)
$C_{20}H_{10}AgO_{10}$

PhenylTartrylamid. Very easily soluble in water, and alcohol. (Arppe, *Ann. Ch. u. Pharm.*, **93.** 354.) (*Tartranil. Tartanil.*)
$C_{20}H_9NO_8 = N\left\{\begin{matrix}C_8H_4O_8''\\C_{12}H_5\end{matrix}\right.$

***Di*PhenylTartryl*bi*amin.** Insoluble in water. Somewhat sparingly soluble in boiling alcohol. Difficultly soluble in ether. Easily soluble in concentrated sulphuric acid, from which it is precipitated on the addition of water. Difficultly soluble in hot chlorhydric acid. Partially decomposed by hot nitric acid. Soluble in aqueous solutions of the caustic alkalies. (Arppe, *Ann. Ch. u. Pharm.*, **93.** 353.) (*Tartranilid. Tartanilid.*)
$C_{32}H_{16}N_2O_8 = N_2\left\{\begin{matrix}C_8H_4O_8''\\(C_{12}H_5)_2\\H_2\end{matrix}\right.$

PhenylThiosinamin. Insoluble in water. Readily soluble in alcohol, and ether, even in the cold. Soluble, without decomposition, in concentrated chlorhydric acid, from which it is precipitated on the addition of water; also soluble in alcoholic solutions of chlorhydric and sulphuric acids, from which it may be recrystallized unchanged. (*AllylSulpho Carbanilide. AllylPhenylSulpho Carbamid. Sulpho CarbonylAllylPhenylbiamid.*)
$C_{20}H_{12}N_2S_2 = N_2\left\{\begin{matrix}C_2S_2''\\C_{12}H_5\\C_6H_5\\H_2\end{matrix}\right.$

PhenylUrea. Soluble in water, alcohol, and ether. (Chancel.) The alcoholic and ethereal solutions soon undergo decomposition; but the aqueous solution may be preserved unaltered. (*Anilic Urea. CarbAnilamid. BasicCarbonylPhenylbiamid.*)
$C_{14}H_8N_2O_2 + 2Aq = N_2\left\{\begin{matrix}C_2O_2''\\C_{12}H_5\\H_3\end{matrix}\right. + 2Aq$

***Di*PhenylUrea.** Almost insoluble in water. Soluble in alcohol, and ether. (Laurent & Chancel.) (*Flavin. Basic CarbonyldiPhenylamid.*)
$C_{26}H_{12}N_2O_2 = N_2\left\{\begin{matrix}C_2O_2''\\(C_{12}H_5)_2\\H_2\end{matrix}\right.$

PhenylValeramid. Sparingly soluble in boiling water. Readily soluble in alcohol, even weak, and in ether. (Chiozza, *Ann. Ch. et Phys.*, (3.) **39.** 201.) (*ValerylPhenylamid. Valeranilid.*)
$C_{22}H_{15}NO_2 = N\left\{\begin{matrix}C_{12}H_5\\C_{10}H_9O_2\\H\end{matrix}\right.$

Phillyrin. Sparingly soluble in cold, tol-

$C_{84}H_{57}O_{26} = \left.\begin{matrix} C_{42}H_{23}O_{10} \\ C_{12}H_{11}O_{10} \end{matrix}\right\} O_2 + 3\,Aq$

erably easily soluble in boiling water. Easily soluble in alcohol. Very sparingly soluble in ether. No more soluble in dilute acid or alkaline solutions than in pure water. Soluble in concentrated sulphuric acid; decomposed by boiling chlorhydric and nitric acids. Soluble in hydrate of anisyl. (Bertagnini, *Ann. Ch. u. Pharm.*, **92.** 110.) Insoluble in volatile or fatty oils. (Carbonieri.)

Phillygenin. Insoluble in cold, very sparingly soluble in boiling water. Easily soluble in alcohol, and ether. (Bertagnini, *Ann. Ch. u. Pharm.*, **92.** 111.)

$C_{42}H_{24}O_{12}$

Phlobaphene. Permanent. Insoluble in water. When recently prepared, it is soluble in alcohol, but after having become dry it is insoluble in alcohol. Slightly soluble in acetic acid, but is insoluble in other dilute acids. Readily soluble in aqueous alkaline solutions.

$C_{20}H_8O_8$

Phloramin. Permanent in dry air. Sparingly soluble in cold water. Readily soluble in alcohol. Insoluble in ether. Soluble in acids, with combination.

$C_{12}H_7NO_4$

Phloretic Acid (of Stass). *Vid.* NitroPhloretin.

Phloretic Acid. Permanent. Soluble in water, though somewhat less soluble therein than in alcohol. Easily soluble in ether, even when this is cold. Insoluble in cold, decomposed by boiling chlorhydric acid. Soluble in concentrated sulphuric, and nitric acids. (Hlasiwetz.)

(*Phloretylic Acid.*)

$C_{18}H_{10}O_6 = C_{18}H_8O_4,\ 2\,HO$

Phloretate of Amyl. *Vid.* AmylPhloretic Acid.

Phloretate of Baryta.

I.) *normal.* Sparingly soluble in cold, somewhat more soluble in hot water. (Hlasiwetz.)

$C_{18}H_8Ba_2O_6 + 5\,Aq$

II.) *acid.* Soluble in water.

$C_{18}H_9BaO_6$

Phloretate of Copper.

I.) *normal.* Sparingly soluble in boiling water. Almost entirely insoluble in alcohol, or ether. (Hlasiwetz.)

$C_{18}H_8Cu_2O_6 + x\,Aq$

II.) *acid.* Difficultly soluble in boiling water, or alcohol. Easily soluble in ether. (Hlasiwetz.)

$C_{18}H_9CuO_6 + 2\,Aq$

Phloretate of Ethyl. *Vid.* EthylPhloretic Acid.

Phloretate of Lead.

I.) *normal.* Ppt. Partially decomposed when washed with water.

$C_{18}H_8Pb_2O_6 + x\,Aq$

II.) *basic.* Ppt.

$C_{18}H_8Pb_2O_6;\ PbO,\ HO + Aq$

Phloretate of Lime.

I.) *normal.* Soluble in water.

Phloretate of Magnesia.

Phloretate *of dinoxide* **of Mercury.**
Phloretate *of protoxide* **of Mercury.** } Ppts.

Phloretate of Potash.

I.) *acid.* Efflorescent. Soluble in water, and alcohol. Insoluble in ether. (Hlasiwetz.)

$C_{18}H_9KO_6 + x\,Aq$

Phloretate of Silver. Sparingly soluble in cold water. Easily soluble in acetic acid, and in ammonia-water.

$C_{18}H_9AgO_6$

Phloretate of Soda.

I.) *acid.* Efflorescent. Soluble in water.

$C_{18}H_9NaO_6 + x\,Aq$

Phloretate of Urea. Soluble in water.

$C_{28}H_{24}N_2O_{14} = C_{18}H_9\left(N_2\left\{\begin{matrix} C_2O_2'' \\ H_3 \end{matrix}\right.\right)O_6;\ C_{18}H_{10}O_6$

Phloretate of Zinc.

I.) *normal.* Insoluble in water.

II.) *acid.* Permanent. Very sparingly soluble in water. (Hlasiwetz.)

$C_{18}H_9ZnO_6$

Phloretin. Almost insoluble in cold, very sparingly soluble in boiling water. Soluble in all proportions in boiling, less soluble in cold alcohol, wood-spirit, and concentrated acetic acid. Very sparingly soluble in anhydrous ether. Soluble in concentrated acids, without alteration. Decomposed by dilute nitric acid. (Stass.)

(*Phloretate of Phloro Glucin.*)

$C_{30}H_{14}O_{10} = \left.\begin{matrix} C_{18}H_8O_2'' \\ H\,.\,C_{12}H_5O_4 \end{matrix}\right\} O_4$

Phloretol. Very sparingly soluble in water. Miscible in all proportions with alcohol, and ether. Soluble in concentrated sulphuric acid, with subsequent decomposition. (Hlasiwetz, *Ann. Ch. u. Pharm.*, **102.** 166.)

(*Hydrate of Phloryl. Xylenyl Alcohol. Isomeric with Phenate of Ethyl.*)

$C_{16}H_9O,\ HO$

Phloretylamic Acid. Very sparingly soluble in cold, tolerably soluble in hot water. Soluble in alcohol, and ether. (Hlasiwetz.)

$C_{18}H_{11}NO_4 = N\left\{\begin{matrix} C_{18}H_8O_2'' \\ H_2 \end{matrix}\right.\,.\,O,\ HO$

Phloridzein. Easily soluble in boiling water. Scarcely at all soluble in alcohol, wood-spirit, or ether. (Stass.)

(*Phlorizeine.*)

$C_{42}H_{30}N_2O_{26} = N_2\left\{\begin{matrix} C_{18}H_8O_2'' \\ C_{12}H_{11}O_{10} \\ C_{12}H_5O_4 \\ H_2 \end{matrix}\right.\,.\,O_6 + 4\,Aq$

Phloridzein with Ammonia. Very soluble in water.

$C_{42}H_{29}(NH_4)N_2O_{26} + Aq$

Phloridzin. Scarcely at all soluble in cold, soluble in all proportions in boiling water. Soluble in 1000 pts. of cold water. Very easily soluble in alcohol, and wood-spirit. Boiling ether only dissolves traces of it. Soluble in cold, weak acids, even in oxalic acid, but these solutions are decomposed when heated to 80° @ 90°. Soluble in alkaline solutions.

(*Phlorizin. Phloridzic Acid.*)

$C_{42}H_{24}O_{20} + 4\,Aq =$

$C_{12}H_{11}O_{10}\,.\,\left.\begin{matrix} C_{18}H_8O_2'' \\ C_{12}H_5O_4 \end{matrix}\right\} O_4 + 4\,Aq$

Phloridzate of Baryta. Ppt.

$C_{42}H_{24}O_{20},\ 2\,BaO$

Phloridzate of Lead.

$O_{42}H_{24}O_{20},\ 6\,PbO$

Phloridzate of Lime. Soluble in water.

$C_{42}H_{24}O_{20},\ 3\,CaO + 3\,Aq$

PhloroGlucin. When anhydrous it is permanent, but the hydrate effloresces in warm air. Readily soluble in water, and alcohol, and still more soluble in ether. From the ethereal solution it crystallizes in the anhydrous state. In presence of carbonate of potash it is insoluble in alcohol or ether. Unacted upon by cold chlorhydric acid. Soluble in nitric acid, with decomposition.

(*Isomeric with Frangulin and Pyrogallic Acid.*)

$C_{12}H_6O_6 + 4\,Aq = \left.\begin{matrix} C_{12}H_5O_4 \\ H \end{matrix}\right\} O_2 + 4\,Aq$

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PhloroGlucin with Oxide of Lead. Ppt.
$C_{12}\,H_6\,O_6,\,4\,Pb\,O$

Phocenic Acid. *Vid.* Valeric Acid.

Phocenin. *Vid.* Valerin; also Delphinin.

Phoenicin. *Vid.* SulphoPhenicic Acid.

Phorone. Insoluble in water. Soluble in alcohol, and with peculiar facility, in ether. It does not combine with acids or alkalies (Laurent); but is soluble in concentrated sulphuric acid, from which the greater part of it is reprecipitated on the addition of water. (Gerhardt & Lies Bodart.)
(*Camphoryl.*)
$C_{36}\,H_{28}\,O_4 = \begin{matrix} C_{20}\,H_{14}\,O_4'' \\ C_{16}\,H_{14}'' \end{matrix}$

Phorylamin.
$C_{18}\,H_{15}\,N = N \left\{ \begin{matrix} C_{18}\,H_{13} \\ H_2 \end{matrix} \right.$

Phosgene, or Phosgene Gas. *Vid.* Chloro-Carbonic Acid.

PhosphAcetic Acid. Very soluble in water. (Zeise, *Ann. Ch. et Phys.*, (3.) **6.** 504.)

PhosphAcetate of Baryta. Readily soluble in water. Sparingly soluble in alcohol. (Gm.)

PhosphAcetate of Lead. Insoluble in water. (Zeise, *Ibid.*, pp. 503, 504.)

PhosphAcetate of Lime. Soluble in water; the aqueous solution is liable to undergo decomposition when evaporated.

PhosphAcetate of Silver. Ppt.

PhosphAcetate of Soda. Soluble in water. (Zeise, *Ibid.*, p. 504.)

Phospham. Insoluble in water, alcohol, ether, dilute nitric acid, or aqueous solutions of the caustic alkalies. (Berzelius's *Lehrb.*, **1.** 212.) Unacted upon by dilute chlorhydric, sulphuric, or nitric acids, or by boiling aqueous solutions of the caustic alkalies. (H. Rose.) Insoluble in water, or in fuming nitric acid. (Pauli, *Ann. Ch. u. Pharm.*, **101.** 41.) Decomposed by concentrated alkaline solutions, and by lime and baryta-water.
(*Phosphorstickstoff*, $P\,N_2$, of Liebig & Wœhler and H. Rose.)
$P\,N_2\,H$

Phosphamic Acid. Easily soluble in water, and alcohol. The alkaline phosphamates and those of the metal ammoniums are soluble; but the metallic salts are precipitates insoluble in water, and but sparingly soluble in acid liquors.
$\left. \begin{matrix} N\,H\,.\,P\,O_2 \\ H \end{matrix} \right\} O_2$

Phosphamate of Ammonia. Soluble in water..

Phosphamate of Baryta. Ppt. Insoluble in ammonia-water.
$N\,H\,Ba\,P\,O_4$

Phosphamate of Cadmium.
$N\,H\,Cd\,P\,O_4 + 2\,Aq$

Phosphamate of Chromium. Ppt. Soluble in ammonia-water.

Phosphamate of Cobalt. Ppt. Soluble in ammonia-water.

Phosphamate *of protoxide* **of Copper.** Ppt. Soluble in ammonia water.

Phosphamate of Ferammonium. Soluble in water.
$N\,H\,(N\,H_3\,Fe)\,P\,O_4$

Phosphamate of Iron. Ppt. Soluble in ammonia-water. Insoluble in acids, being scarcely at all acted upon by concentrated sulphuric acid.
$N\,H\,Fe\,P\,O_4 + 2\,Aq$

Phosphamate of Lead. Ppt. Insoluble in ammonia-water.

Phosphamate of Lime. Ppt. Insoluble in ammonia-water.
$N\,H\,Ca\,P\,O_4$

Phosphamate of Magnesia. Ppt. Insoluble in ammonia-water.

Phosphamate of Manganese. Ppt. Insoluble in ammonia-water.

Phosphamate *of protoxide* **of Mercury.** Ppt. Soluble in ammonia-water.

Phosphamate of Nickel. Ppt. Soluble in ammonia-water.
$N\,H\,Ni\,P\,O_4 + 2\,Aq$

Phosphamate of Silver. Ppt. Soluble in ammonia-water.

Phosphamate of Strontia. Ppt. Insoluble in ammonia-water.

Phosphamate of Zinc. Ppt. Soluble in ammonia-water. (H. Schiff, *Ann. Ch. u. Pharm.*, **103.** 168.)

*Mono***Phosphamid**(of Schiff, 1857). Insoluble in all ordinary menstrua; but is partially decomposed when heated with water.
(*Phosphamid*(of Gladstone, 1850). *BiPhosphamid* (of Gerhardt).)
$N \left\{ P\,O_2''' \right.$

Insoluble like biphosphamid ($N_2\,P\,O_2\,H_3$). (Gerhardt, *Ann. Ch. et Phys.*, (3.) **18.** 195.)

*Bi***Phosphamid**(of Schiff, 1857). Insoluble in water, but is decomposed by long-continued boiling therewith. Insoluble in alcohol, or oil of turpentine, and in all ordinary menstrua. Difficultly decomposed by boiling concentrated sulphuric acid. (Gladstone.) Insoluble in boiling water, in a boiling dilute solution of caustic potash or of dilute nitric acid. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **18.** 191.)
(*Phosphamid*(of Gerhardt). *BiHydrate of Phosphide of Nitrogen*(of Liebig & Wœhler).)
$N_2 \left\{ \begin{matrix} P\,O_2''' \\ H_3 \end{matrix} \right.$

*Tri***Phosphamid.** Insoluble in water. Scarcely at all acted upon by long boiling with water, dilute acids, or an aqueous solution of caustic potash. Slowly decomposed by boiling concentrated nitric or chlorhydric acid, and more readily by aqua-regia. Tolerably readily soluble in concentrated sulphuric acid, or a mixture of concentrated sulphuric and nitric acids, with decomposition. (Schiff, *Ann. Ch. u. Pharm.*, **101.** 302.)
$N_3\,H_6\,P\,O_2 = N_3 \left\{ \begin{matrix} P\,O_2''' \\ H_3 \\ H_3 \end{matrix} \right.$

Phosphoric Acid. Three principal isomeric modifications of phosphoric acid are universally admitted by chemists, viz., *a*(*meta*), *b*(*pyro* or "*para*"), and *c*(*ordinary* or "*di*,") phosphoric acid. There are, moreover, several sub-varieties of *meta*phosphoric acid, Fleitmann (*Pogg. Ann.*, 1849, **78.** pp. 239, 362) having enumerated as many as five distinct polymeric modifications of metaphosphoric acid. Besides these, Fleitmann & Henneberg (*Ann. Ch. u. Pharm.*, 1848, **65.** 324), maintain the existence of two other varieties of phosphoric acid intermediate between meta- and pyrophosphoric acids; one [*d*] having the formula $6\,H\,O,\,4\,PO_5$, and the other [*e*] the formula $6\,H\,O,\,5\,PO_5$; but these have not been generally accepted by chemists. Laurent & Gerhardt have suggested that the salts which have been described as belonging to these acids [*d* and *e*] are nothing more than pyrophosphates, intermediate between the normal and acid salts already known. (See *Gmelin's Handbook*, **3.** 96.)
PO_5

a = *meta* (*uni-basic*).

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I.) *Monometaphosphoric acid.*
(Acid of the insoluble alkaline metaphosphates.)
$HO, a^{\prime}PO_5$

Not isolated. It is formed, in combination with potash, soda, and ammonia, when these bases are heated with phosphoric acid under certain circumstances. These salts are all insoluble. (Fleitmann, *Pogg. Ann.*, 1849, **78.** pp. 362, 360.)

II.) *Dimetaphosphoric acid.*
(First acid of Fleitmann. Acid in several of Maddrell's salts.)
$2 HO, 2 a^{\prime\prime}PO_5$

Not isolated. It is formed, when phosphoric acid is heated with the oxides of copper, zinc, or manganese. (Fleitmann, *Pogg.*, *Ann.*, 1849, **78.** pp. 363, 240.) The simple alkaline salts of dimetaphosphoric acid, and some of the double salts which contain an alkaline base, are soluble in water; the others are difficultly soluble, or insoluble in water.

III.) *Trimetaphosphoric Acid.*
(Acid of Fleitmann & Henneberg.)
$3 HO, 3 a^{\prime\prime\prime}PO_5$

Formed by heating somewhat strongly, but not melting monopyrophosphate of soda, or by allowing melted hexametaphosphate of soda to cool very slowly. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 304, 306, 316; Fleitmann, *Pogg. Ann.*, 1849, **78.** 363; Graham, see under *trimeta*PHOSPHATE OF SODA.)

Soluble in water, and the solution is tolerably permanent in the cold, but on evaporation the acid is quickly changed to ordinary *c* phosphoric acid. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 241.) With all strong bases, the alkaline earths, and metallic oxides, it forms simple salts, and double soda salts, all of which are soluble in water. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 309.)

IV.) *Tetrametaphosphoric Acid.*
(Second acid of Fleitmann.)
$4 HO, 4 a^{iv}PO_5$

Not isolated. It is formed. when phosphoric acid is heated with the oxides of lead, bismuth, and cadmium, or a mixture of equal equivalents of oxide of copper and soda. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 363.) Its alkaline salts are soluble in water, but insoluble in alcohol. Those of the metals and alkaline earths are insoluble in water. (Fleitmann, *loc. cit.*, p. 353, *et seq.*)

V.) *Hexametaphosphoric Acid.*
(Ordinary modification. Glacial Phosphoric Acid. Acid of the deliquescent metaphosphate of soda, of Graham.)
$6 HO, 6 a^{vi}PO_5$

Formed, when hydrated phosphoric acid is ignited; by the sudden cooling of melted metaphosphate of soda, and when oxide of silver and phosphoric acid are heated together. (Fleitmann, *Pogg. Ann.*, 1849, **78.** pp. 363, 359; Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, pp. 316, 305.) Glacial phosphoric acid is deliquescent when pure; and easily soluble in water, with evolution of heat and transformation to ordinary *c* phosphoric acid. But when contaminated with earthy impurities it is often very slowly and difficultly soluble in water, and not deliquescent; phosphate of magnesia especially, even when in small quantity, tends to destroy its solubility (Ot. Gr.), and if much lime, alumina, or silica be present, the acid is scarcely at all soluble in water. (Berzelius's *Lehrb.*, **1.** 553.) For Gregory's observations on the separation of metaphosphate of magnesia, when solutions of impure glacial phosphoric acid are evaporated, see *Ann. Ch. u. Pharm.*, 1845, **54.** 95.)

The aqueous solution undergoes change when exposed to the air, ordinary *c* phosphoric acid being formed. When the acid is boiled with water, or heated with sulphuric, chlorhydric, acetic, or phosphoric acids, the same change occurs. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, pp. 112, 113; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** pp. 131, 132.) Easily soluble in alcohol, and ether.

The hexametaphosphates of the alkalies are soluble in water, but those of the alkaline earths and metallic oxides are, for the most part, precipitates; these precipitates are, however, usually soluble in an aqueous solution of hexametaphosphate of soda. (H. Rose, *Pogg. Ann.*, 1849, **76.** 2.) Many of the precipitates have a remarkable peculiarity of being converted into heavy, oily, viscid masses of the consistence of pitch, on being agitated or heated, the acid probably passing into another modification, though this is a point still undetermined. (See H. Rose, *Pogg. Ann.*, 1849, **76.** p. 2, *et seq.*; Berzelius, *Ibid.*, **19.** 333.)

Another point still undetermined is the question to which modification should be referred the variety of metaphosphoric acid which is obtained by burning phosphorus in oxygen. The experiments of H. Rose (*Pogg. Ann.*, 1849, **76.** pp. 5, 11, *et seq.*), indicating merely that it differs from the acid prepared from hexametaphosphate of soda. This anhydrous acid, obtained by combustion, deliquesces rapidly in the air. It has a very strong affinity for water, in which it dissolves with evolution of heat; but is, nevertheless, only slowly soluble in water.

b = *pyro* [or "*para*"] (*bi-basic*).
$2 HO, bPO_5$

Soluble in water. The concentrated aqueous solution may be preserved without change for a long time at the ordinary temperature; but when heated the acid passes into the ordinary *c* modification.

When the aqueous solution is contaminated with even a trace of sulphuric acid, the greater part of it will change to the ordinary (*c*) acid in the course of 24 hours. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 133.)

The alkaline salts of pyrophosphoric acid are soluble in water, but most of the other salts are precipitates; these precipitates are, however, for the most part, readily soluble in aqueous solutions of the alkaline pyrophosphates,—soluble double salts being formed. (Stromeyer; Schwarzenberg; Persoz; H. Rose, *loc. inf. cit.*) In those solutions of pyrophosphoric acid, where it is saturated or supersaturated with a strong base it may be preserved unchanged; no transformation of *b* into *c* phosphoric acid occurring, either on boiling or long standing. A solution of pyrophosphate of soda may be kept without alteration for years; and when a solution of the acid is evaporated with an excess of alkali it is changed to *c* phosphoric acid only when the dry residue has been completely melted. (H. Rose, *Pogg. Ann*, 1849, **76.** 20.) In presence of acids, however, the conversion of *b* into *c* phosphoric acid is easy, especially when the solutions are heated; and the change is the more complete in proportion as the acid is stronger. According to Weber, this change is best effected by means of concentrated sulphuric acid. (H. Rose, *Ibid.*, p. 21.)

For Rose's remarks upon the probability of the existence of two modifications of pyrophosphoric acid, see *Pogg. Ann.*, 1849, **76.** 13. For Gregory's, see *Ann. Ch. u. Pharm.*, 1845, **54.** 98, *note.*

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c = ordinary, or *di*.(*terbasic*).

$3 HO, cPO_5$ Extremely deliquescent. Soluble in water, and alcohol.

An aqueous solution of sp. gr. at (15°)	Contains (by experiment) per cent of $3 HO, PO_5$
1.0333	6
1.0688	12
1.1065	18
1.1463	24
1.2338	36
1.3840	54

From these results Schiff deduces the formula: — $D = 1 + 0.005378p + 0.00002886\,p^2 + 0.00000006\,p^3$; in which D = the sp. gr. of the solution, and the p the percentage of acid contained in the solution, by means of which Ott has calculated the following table.

Sp. gr. (at 15°)	Per cent of $3 HO, PO_5$.	Per cent of anhyd. PO_5.
1.0054	1	0.726
1.0109	2	1.452
1.0164	3	2.178
1.0220	4	2.904
1.0276	5	3.630
1.0333	6	4.356
1.0390	7	5.082
1.0449	8	5.808
1.0508	9	6.534
1.0567	10	7.260
1.0627	11	7.986
1.0688	12	8.712
1.0749	13	9.438
1.0811	14	10.164
1.0874	15	10.890
1.0937	16	11.616
1.1001	17	12.342
1.1065	18	13.068
1.1130	19	13.794
1.1196	20	14.520
1.1262	21	15.246
1.1329	22	15.972
1.1397	23	16.698
1.1465	24	17.424
1.1534	25	18.150
1.1604	26	18.876
1.1674	27	17.602
1.1745	28	20.328
1.1817	29	21.054
1.1889	30	21.780
1.1962	31	22.506
1.2036	32	23.232
1.2111	33	23.958
1.2186	34	24.684
1.2262	35	25.410
1.2338	36	26.136
1.2415	37	26.862
1.2493	38	27.588
1.2572	39	28.314
1.2651	40	29.040
1.2731	41	29.766
1.2812	42	30.492
1.2894	43	31.218
1.2976	44	31.944
1.3059	45	32.670
1.3143	46	33.496
1.3227	47	34.222
1.3313	48	34.948
1.3399	49	35.674
1.3486	50	36.400
1.3573	51	37.126
1.3661	52	37.852
1.3750	53	38.578
1.3840	54	39.304
1.3931	55	40.030
1.4022	56	40.756
1.4114	57	41.482
1.4207	58	42.208
1.4301	59	42.934
1.4395	60	43.660

(H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 192.)

In publishing the following table, Dalton (in his *New System*, Pt. **2.** p. 413) remarks that he "thinks it will be found nearly correct; at all events, it may have its use till a better can be formed."

An aqueous solution of sp. gr.	Contains per cent of "real acid."
1.85	50
1.60	40
1.39	30
1.23	20
1.10	10

Miscible with strong acetic acid. Soluble in 30 pts. of warm creosote. (Reichenbach.)

The *c* phosphates of potash, soda, and lithia are soluble in water, no matter in what proportion the acid may be united with these bases; all the others, excepting some acid salts, are nearly insoluble in water, but all are soluble in an excess of phosphoric acid.

The salts of ordinary *c* phosphoric acid, with the exception of those noted below, are all soluble in dilute nitric acid; less easily soluble in acetic acid, excepting the phosphates of lead, and of sesquioxide of iron, which are insoluble; and also slightly soluble in aqueous solutions of ammoniacal salts, especially of chloride of ammonium, from which solutions they are usually precipitated on the addition of caustic ammonia.

The salts of *c* phosphoric acid which are insoluble in water, are also insoluble in an excess of aqueous solutions of the alkaline *c* phosphates; while, on the other hand, the pyrophosphates are almost all soluble in an excess of a solution of an alkaline pyrophosphate — those of baryta, lime, and silver being the least soluble. (Persoz, *Ann. Ch. et Phys.*, (3.) **20.** 318.) Very many of the *c* phosphates, which are insoluble in water dissolve in an excess of the aqueous saline solutions, from which they were originally precipitated; from the solutions thus obtained the phosphate is usually precipitated again when heat is applied, but the precipitate disappears again as the mixture cools. (H. Rose, *Pogg. Ann.*, 1849, **76.** 23.)

Any insoluble *c* phosphate of a protoxide is completely decomposed by any soluble salt of a sesquioxide, as an alum, for example, either in the cold or at the boiling temperature, an insoluble phosphate of the sesquioxide being formed. (Guignet, *C. R.*, **49.** 454.) All phosphates, excepting the phosphate of binoxide of tin [and of bismuth] are soluble in nitric acid. (Reynoso, *Ann. Ch. et Phys.*, (3.) **34.** 321.) All phosphates are either insoluble, or but very sparingly soluble in alcohol. (Gmelin's *Handbook*, **8.** 265.)

d = First acid of Fleitmann and Henneberg. Not isolated. Is said to exist in a soda-salt obtained by fusing together various mixtures of the soda-salts of the *a*, *b*, and *c* modifications of phosphoric acid. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 324, 332; compare Laurent & Gerhardt, *Gmelin's Handbook*, **3.** 96.)

(*SesquiPhosphoric Acid.*)
"$6 HO, 4 PO_5$."

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e = *Second acid of Fleitmann and Henneberg.* "$6\,HO, 5\,PO_5$." Not isolated. Is said to exist in a soda-salt obtained by fusing together certain proportions of pyrophosphate of soda, and hexametaphosphate of soda. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 324, 333; compare Laurent & Gerhardt, *Gmelin's Handbook*, **3.** 96.)

Phosphate of Aconitin. Soluble in water.

Phosphate of Agrostemmin. Ppt.

***Meta*Phosphate of Alumina.**

I.) $Al_2O_3, 3\,aPO_5$ Insoluble in water, and concentrated acids. (Maddrell, *Ann. Ch. u. Pharm.*, 1847, **61.** 59.)

***Pyro*Phosphate of Alumina.** $2\,(Al_2O_3''')$, $3\,bPO_5 + 10\,Aq$ Soluble in mineral acids, and in an aqueous solution of pyrophosphate of soda. Insoluble in acetic acid. (Wittstein.) Soluble in sulphurous acid, from which it is reprecipitated on boiling. Soluble in aqueous solutions of caustic ammonia and potash. A basic salt, insoluble in ammonia-water, is formed when the chlorhydric acid solution is treated with ammonia. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 148.) Soluble in aqueous solutions of pyrophosphate of soda, and of alum. (H. Rose, *Pogg. Ann.*, 1849, **76.** 19.)

Phosphate of Alumina.
(DiPhosphate of Alumina. SesquiPhosphate of Alumina. Ordinary precipitated Phosphate.)

I.) $Al_2O_3, cPO_5 + 6$ @ $9\,Aq$ Insoluble in water, or in an aqueous solution of chloride of ammonium. Soluble in acids, even in acetic acid. (Wittstein.) Soluble in cold, insoluble in warm acetic acid. (Ot. Gr.) Soluble in phosphoric, and in weak chlorhydric, and nitric acids. Soluble in an aqueous solution of caustic potash, from which it is reprecipitated by chloride of ammonium. (Berzelius's *Lehrb.*) Vauquelin has stated that it is decomposed by a solution of carbonate of potash, with separation of pure alumina; but this decomposition is only partial, a basic phosphate, apparently No. III., being formed. (Rammelsberg, *Pogg. Ann.*, 1845, **64.** 492.) Slightly soluble in an aqueous solution of alum. On heating the solution thus obtained an abundant precipitate is formed which disappears again for the most part on cooling. (H. Rose, *Pogg. Ann.*, 1849, **76.** 26.) It is not precipitated by ammonia-water from solutions which contain citrate of soda. (Spiller.)

II.) *acid.* Deliquescent. (Fourcroy.)

III.) *basic.* $4\,Al_2O_3, 3\,cPO + 15\,Aq$ & $18\,Aq$ Insoluble in water. (Rammelsberg, *Pogg. Ann.*, **64.** 409.)

Phosphate of Alumina & Lead.
$6\,(Al_2O_3, 3\,HO); 3\,PbO, PO_5$

Phosphate of Alumina & of Lithia. $2\,(3\,LiO, PO_5); 6\,Al_2O_3, PO_5 + 30\,Aq$ Insoluble in water. Easily soluble in acids. (Rammelsberg, *Pogg. Ann.*, 1845, **64.** 270.)

Phosphate of Alumina & of Magnesia. *(Lazulite.)* Unacted upon by acids, until it has been ignited.

***Pyro*Phosphate of Alumina & of Soda.** Very soluble in water. (Persoz, *Ann. Ch. et Phys.*, (3.) **20.** 322.)

***Meta*Phosphate of Ammonia.**

I.) *Mono*METAPHOSPHATE. Completely insoluble in water, and resembles the potash and soda-salts in its other physical properties. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 252.)

II.) *Di*METAPHOSPHATE. $2\,NH_4O, 2\,a''PO_5$ Soluble in 1.15 pts. of water, either hot or cold. Its solubility in dilute spirit is much more considerable than that of the potash or soda salt. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 251.)

III.) *Hexa*METAPHOSPHATE? Known only in aqueous solution. When the aqueous solution is allowed to evaporate spontaneously, the salt is decomposed. (Graham; compare Wach, *Schweigger's Journ. für Ch. u. Phys.*, 1830, **59.** 302.)

***Pyro*Phosphate of Ammonia.**

I.) *normal.* $2\,NH_4O, bPO_5$ The aqueous solution is perfectly stable at the ordinary temperature, and when allowed to evaporate spontaneously appears to crystallize, but in the act of becoming solid it passes into the ordinary *c* monophosphate ($NH_4O, 2\,HO, cPO_5$). (Graham, *Elements.*) Easily soluble in water, the solution losing ammonia when boiled. Alcohol precipitates it from the aqueous solution. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 141.)

II.) *acid.* NH_4O, HO, bPO_5 Easily soluble in water. Only sparingly soluble, or insoluble in alcohol. Alcohol precipitates it as a syrupy, aqueous solution from an acetic acid solution of the normal *b* salt (No. I.) (Schwarzenberg, *loc. cit.*, p. 142.)

Phosphate of Ammonia.
(Neutral Phosphate of Ammonia.)

I.) *di.* $2\,NH_4O, HO, cPO_5$ The crystals undergo decomposition when exposed to the air (Mitscherlich, *loc. inf. cit.*); effloresce superficially, with loss of ammonia. (H. Rose.) Very soluble in water. (Berzelius, *Gilbert's Ann. Phys.*, 1816, **53.** 415.) More soluble in water than the mono-salt. (Mitscherlich, *Ann. Ch. et Phys.*, 1821, (2.) **19.** 383.) Soluble in 4 pts. of cold, and in less hot water; when heated, the solution loses ammonia. Insoluble in alcohol.

100 pts. of water at	15.5°	dissolve 50 pts.	of it.
"	15.5°	" 25	"
"	100°	" more than 25	"

(Ure's *Dict.*)

II.) *mono.* $NH_4O, 2\,HO, cPO_5$ Permanent. Very easily soluble in water. (Mitscherlich, *Ann. Ch. et Phys.*, 1821, (2.) **19.** 373.) Less soluble in water than the diphosphate. (*Ib.*, p. 383.) Soluble in 5 pts. of cold water; more easily soluble in hot water. (Mitscherlich[?].)

III.) *tris.* $3\,NH_4O, cPO_5$ Decomposes at once when exposed to the air. (Mitscherlich, *Ann. Ch. et Phys.*, 1821, (2.) **19.** 383.) Less soluble in water than the di-salt. The aqueous solution is decomposed by evaporation. (Berzelius, *Gilbert's Ann. Phys.*, 1816, **53.** 415.) Insoluble in aqueous alkaline solutions. (Berzelius's *Lehrb.*, **2.** 334.)

***DiMeta*Phosphate of Ammonia & of Cadmium.** $NH_4O, CdO, 2\,a''PO_5 + 3\,Aq$ Efflorescent. (Fleitmann, *Pogg. Ann.*, **78.** 347.)

***Meta*Phosphate of Ammonia & of Cobalt.** Extremely soluble in water, and in ammonia-water. (Persoz, *J. pr. Ch.*, 1834, **3.** 215; and *Ann. Ch. et Phys.*, (3.) **20.** 316.)

***DiMeta*Phosphate of Ammonia & of Copper.** $NH_4O, CuO, 2\,a''PO_5 + 2\,Aq$ & $4\,Aq$ The 2 Aq salt is

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permanent, but the 4 Aq salt loses part of its water when exposed to the air. Very difficultly soluble in water. Insoluble in alcohol. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 345.)

Phosphate of Ammonia & *of protoxide* of Iron. $N\,H_4\,O, 2\,Fe\,O, c PO_5 + 2\,Aq$ Permanent. Insoluble in water, even when this is hot, or in alcohol. While yet moist it dissolves very easily in dilute acids, but after having become dry, tolerably concentrated acids are required for its solution, and these in much larger quantity than is the case with the analogous salts of magnesia and of manganese. Decomposed by ammonia-water and solutions of the fixed caustic alkalies. (Otto, *J. pr. Ch.*, 1834, **2.** 412.)

Phosphate of Ammonia & *of sesquioxide* of Iron. Soluble in ammonia-water. (Dœbereiner.)

*DiMeta*Phosphate of Ammonia & of Lead. $N\,H_4\,O, Pb\,O, 2\,a'' PO_5$ Very difficultly soluble in water. Only difficultly attacked by acids. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 344.)

Persoz, also, (*J. pr. Ch.*, 1834, **3.** 216) mentions an insoluble compound.

*DiMeta*Phosphate of Ammonia & of Lime. $N\,H_4\,O, Ca\,O, 2\,a'' PO_5 + 2\,Aq$ Very difficultly soluble in water. Towards acids it behaves like the lime-salt. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 344.)

*HexaMeta*Phosphate of Ammonia & of Lime. $N\,H_4\,O, 5\,Ca\,O, 6\,a^{vi} PO_5$ Insoluble in water. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 362.)

Phosphate of Ammonia & of Lithia. $N\,H_4\,O, 2\,Li\,O, c PO_5$ Difficultly soluble in water. (Berzelius.)

*DiMeta*Phosphate of Ammonia & of Magnesia. $N\,H_4\,O, Mg\,O, 2\,a'' PO_5 + 6\,Aq$ Efflorescent. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 347.)

*HexaMeta*Phosphate of Ammonia & of Magnesia? $4\,Mg\,O, N\,H_4\,O, 4\,PO_5 + 17\,Aq$ Soluble to a considerable extent in cold water, from which it is precipitated on the addition of alcohol. When boiled in water it appears to dissolve but slightly, and when the cold aqueous solution is heated nearly to boiling, a precipitate forms in it, which slowly dissolves again as the solution cools. It dissolves readily in chlorhydric, nitric, and probably other acids. Somewhat soluble in an aqueous solution of sulphate of magnesia, from which it is precipitated on the addition of alcohol; also soluble, though less abundantly in solutions of the nitrate, chloride, and acetate of magnesium. Less soluble in a solution of hexametaphosphate of magnesia. (Wach, *Schweigger's Journ. für Ch. u. Phys.*, 1830, **59.** pp. 303, 302, 308.)

Phosphate of Ammonia & of Magnesia.

I.) $2\,Mg\,O, N\,H_4\,O, c PO_5 + 12\,Aq$ The anhydrous salt is soluble in 15293 pts. of water at the ordinary temperature; and is much less soluble in water containing ammonia, from 42780 to 45880 pts. (in the mean 44330 pts.) of such a solution having been required to dissolve 1 pt. of the anhydrous salt at 14°. In a more recent experiment [in reply to Weber], Fresenius found that 44600 pts. of water containing ammonia dissolved 1 pt. of the anhydrous phosphate. It is a little more soluble in water which contains chloride of ammonium than in pure water, only 7548 pts. of a solution containing 1 pt. of $N\,H_4\,Cl$ to 5 pts. of water being required to dissolve it; but of a solution of 1 pt. of $N\,H_4\,Cl$ in 7 pts. of water containing ammonia 15627 pts. were required. (Fresenius, *Quant.*, pp. 130, 756.)

When recently precipitated it is soluble in a hot aqueous solution of chloride of ammonium, and is not reprecipitated therefrom on the addition of an excess of ammonia. Less easily soluble in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 96, 334.) Insoluble in cold aqueous solutions of chloride of ammonium or other ammoniacal salts. (H. Rose, *Tr.*) No more soluble in solutions of the alkaline phosphates than in water. Easily soluble in acids, even acetic and carbonic acids (Pfaff), with partial decomposition.

Completely insoluble in water which contains phosphate of ammonia, or phosphate of ammonia and soda, in solution. But its solubility in water is not lessened by any other salts besides the phosphates. (Berzelius, *Lehrb.*, **3.** 441.) When in presence of iron or alumina it is soluble to a considerable extent in tartaric acid.

A mixture of 3 pts. water and 1 pt. ammonia-water of 0.96 sp. gr., is best suited for washing it; a mixture of 4 pts. of water with 1 pt. of ammonia-water, as well as strong ammonia-water, dissolves magnesia from it. (Kremers, from *Pogg. Ann.*, in *J. pr. Ch.*, 1852, **55.** 190.) In a series of experiments made for the purpose of testing the above statement of Kremers, Ebermayer (*J. pr. Ch.*, 1853, **60.** 41), found that 1 pt. of the anhydrous salt is soluble in 13497 pts. of water at 23°; in 31048 pts. of a mixture of 4 pts. of water and 1 pt. ammonia-water, of 0.961 sp. gr., at 21.25°; in 36764 pts. of a mixture of 3 pts. of water and 1 pt of ammonia-water, at 20.6°; in 43089 pts. of a mixture of equal pts. of water and ammonia-water; in 45206 pts. of a mixture of 1 pt. of water and 2 pts. of ammonia-water, at 22.5°; in 52412 pts. of a mixture of 1 pt. of water and 3 pts. of ammonia-water, at 22.5°; and in 60883 pts. of pure ammonia-water, at 21.25°.

II.) $Mg\,O, N\,H_4\,O, H\,O, c PO_5 + 8\,Aq$ (Graham.)

*DiMeta*Phosphate of Ammonia & of Manganese. $N\,H_4\,O, Mn\,O, 2\,a'' PO_5 + 6\,Aq$ Efflorescent. (Fleitmann, *Pogg. Ann.*, **78.** 347.)

Phosphate of Ammonia & of Manganese. $N\,H_4\,O, 2\,Mn\,O, c PO_5 + 12\,Aq$ Insoluble in boiling water, or alcohol. Soluble in dilute acids. (Otto.)

*Pyro*Phosphate of Ammonia, of Manganese, & of Soda. $N\,H_4\,O, Mn\,O, b PO_5 ; Na\,O, Mn\,O, b PO_5 + 6\,Aq$ Permanent. Insoluble in water or alcohol. Readily soluble in acids, even when these are very dilute. (Otto, *J. pr. Ch.*, 1834, **2.** 418.)

*Meta*Phosphate of Ammonia & of Mercury (Hg O). Soluble in water, or at least, in ammonia-water. (Persoz, *J. pr. Ch.*, 1834, **3.** 216.)

*Meta*Phosphate of Ammonia & of Nickel. Insoluble in water. Soluble in ammonia-water, from which it is redeposited when the ammonia is allowed to exhale. (Persoz, *J. pr. Ch.*, 1834, **3.** 215.) [Compare the remarks of Persoz, in *Ann. Ch. et Phys.*, (3.) **20.** 316.]

Phosphate of Ammonia & of Nickel. Insoluble in water or alcohol. (Compare Tupputi, *Ann. de Chim.*, 1811, **78.** 169.)

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***DiMeta*Phosphate of Ammonia & of Potash.**

a.) $NH_4O, 3KO, 4a''PO_5 + 4Aq$ Difficultly soluble in water. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 341.)

b.) $5NH_4O, 2KO, 7a''PO_5$ Somewhat more soluble in water than the preceding salt. (Fleitmann, *loc. cit.*)

***Pyro*Phosphate of Ammonia & of Potash.** $2KO, bPO_5; NH_4O, HO, bPO_5 + Aq$ Deliquescent. Soluble in water; the solution losing ammonia when boiled. (Schwarzenberg, *Ann. Ch. u. Pharm.*, **65.** 137.)

***DiMeta*Phosphate of Ammonia & of Soda.** $NH_4O, NaO, 2a''PO_5$ More soluble in water than the soda salt, but somewhat less soluble than the ammonia salt. Less soluble in alcohol than in water. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 340.)

***HexaMeta*Phosphate of Ammonia & of Soda.** (*Of varying composition.*) Soluble in water, from which it is precipitated on the addition of spirit. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 361.)

***Pyro*Phosphate of Ammonia & of Soda.** $NH_4O, NaO, bPO_5 + 5Aq$ Readily soluble in water, but ammonia is evolved when the solution is heated. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 142.)

Phosphate of Ammonia & of Soda. (*Microcosmic Salt. Phosphorsalt.*) $NH_4O, NaO, HO, cPO_5 + 8Aq$ Efflorescent. Readily soluble in water. The aqueous solution gradually evolves ammonia, especially if it be heated. (Mitscherlich, *Ann. Ch. et Phys.*, 1821, (2.) **19.** 400.) Soluble in 6 pts. of cold, and in 1 pt. of boiling water. Insoluble in alcohol.

Soluble in 6 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.)

Phosphate of Ammonia & of Uranium. $NH_4O, 2Ur_2O_3, cPO_5$ Insoluble in water, or in an aqueous solution of acetate of ammonia. Completely insoluble in acetic acid. (Knop.)

***DiMeta*Phosphate of Ammonia & of Zinc.** $NH_4O, ZnO, 2a''PO + 6Aq$ Efflorescent. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 347.)

***Pyro*Phosphate of Ammonia & of Zinc.** *Vid. b*Phosphate of Zinc & of Zincammonium.

Phosphate of Ammonia & of Zinc. $NH_4O, 2ZnO, cPO_5 + 2Aq$ Insoluble in water. Soluble in acids, and in aqueous solutions of caustic potash, soda, and ammonia. (Bette.)

Phosphate of AmmonioRhodium. Soluble in water. (Claus, *Beiträge*, p. 90.)

Phosphate of AmmoniumChlorPlatin(*ous*)Ammonium. (*Phosphate of Gros's Base.*) Much less soluble in water than the nitrate. (Gros, *Ann. der Pharm.*, 1838, **27.** 256.)

Phosphate of AmmoniumChlorPlatin(*ous*)Ammonium & of AmmoniumOxyPlatin(*ous*)Ammonium. (*Raewsky's Phosphate. Sesquichlorhydrophosphate de diplatinamine* (of Gerhardt).)

$$H_{12}ClPt_2N_4PO_9 = \left(N\left\{\begin{matrix}H_2\\NH_4\\PtCl\end{matrix}\right. .O,\quad N\left\{\begin{matrix}H_2\\PtO\\NH_4\end{matrix}\right. .O, HO\right)cPO$$

Nearly insoluble in cold, slightly soluble in hot water. (Raewsky.)

Phosphate of Amyl. *Vid.* AmylPhosphoric Acid.

***Meta*Phosphate of Anilin.** $N\left\{\begin{matrix}C_{12}H_5\\H_2.H\end{matrix}\right. .O, aPO_5$ Soluble in water, the solution undergoing decomposition when boiled. Entirely insoluble in alcohol, or ether. (Nicholson.)

***Pyro*Phosphate of Anilin.** $2N\left\{\begin{matrix}C_{12}H_5\\H_2.H\end{matrix}\right. .O, bPO_5; 2HO, bPO_5$ Soluble in water. Entirely insoluble in alcohol or ether. (Nicholson.)

Phosphate of Anilin.

I.) *di.* Very soluble in water, and alcohol. $2N\left\{\begin{matrix}C_{12}H_5\\H_2.H\end{matrix}\right. .O, HO, cPO_5 + 2Aq$ (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 155.) Readily soluble in water, and ether; less soluble in alcohol. Sparingly soluble in cold alcohol, but so abundantly soluble in hot alcohol that the solution solidifies on cooling. (Nicholson.)

II.) *mono.* Readily soluble, with partial decomposition, in water. $N\left\{\begin{matrix}C_{12}H_5\\H_2.H\end{matrix}\right. .O, 2HO, cPO_5 + Aq$ Readily soluble, without decomposition, in alcohol, and ether. (Nicholson.)

***Pyro*Phosphate of Antimony.** On boiling oxide of antimony with an aqueous solution of monopyrophosphate of soda a liquid is obtained which contains in solution much oxide of antimony; but on evaporating to dryness and adding water, most of the oxide of antimony remains undissolved. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 160.)

Phosphate *of teroxide* of Antimony.

I.) $2SbO_3, PO_5$ Insoluble in cold, slowly decomposed by boiling water. (Brandes.)

II.) $2SbO_3, 3cPO_5 + 2Aq$ Decomposed by cold water. (Brandes.)

III.) $4SbO_3, PO_5$ Insoluble in boiling water. (Brandes.)

Phosphate of AzoNaphthylamin. Sparingly soluble in water, and alcohol. (Zinin.)

***Meta*Phosphate of Baryta.**

I.) *Monometaphosphate?* (*Anhydrous.*) BaO, aPO_5 Insoluble in water, and dilute acids. Decomposed by warm concentrated sulphuric acid. (Maddrell, *Ann. Ch. u. Pharm.*, 1847, **61.** 61.) Insoluble in acids. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 313.) Completely insoluble in water. Scarcely at all attacked by acids. Not decomposed when digested with carbonate of soda. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 255.) Not decomposed by digestion in solutions of the alkaline carbonates. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 352.)

II.) *Dimetaphosphate.* $2BaO, 2a''PO_5 + 4Aq$ Very difficultly soluble in water. Somewhat less soluble in water than the trimetaphosphate. Scarcely attacked by boiling acids, even by concentrated nitric, or chlorhydric acid. Easily decomposed by concentrated sulphuric acid. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 254.)

III.) *Trimetaphosphate.* $3BaO, 3a'''PO_5$ & $+ 2Aq$ & $6Aq$ Somewhat soluble in water. When heated to redness, it melts, and is then insoluble in acids. (Fleitmann &

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Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 313, 314.) See also above, under No. II.

IV.) *Hexametaphosphate?* Insoluble in water. Soluble in an aqueous solution of metaphosphate of soda. Like the metaphosphates in general, it is precipitated with considerable difficulty from very dilute solutions, although when once precipitated it is like them, highly insoluble. It may be boiled in water for two hours without sensible change, but it then begins to dissolve, and the solution proceeds at an accelerated rate, till eventually the whole disappears, having been changed to a soluble c phosphate. After having been ignited it is difficultly soluble in nitric acid. (Graham, *Phil. Trans.*, 1833, **123.** pp. 278, 279.) Completely soluble in an aqueous solution of hexametaphosphate of soda. The salt obtained from the acid prepared by burning phosphorus in oxygen is exceedingly difficultly soluble in an excess of this acid. (H. Rose, *Pogg. Ann.*, 1849, **76.** 3; compare also *Ibid.*, pp. 5, 6.) Insoluble in an aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 316.)

*Pyro*PHOSPHATE OF BARYTA. Ppt. Somewhat soluble in water. Insoluble in acetic acid, or in an aqueous solution of pyrophosphate of soda. Soluble in nitric, chlorhydric, and sulphurous acids, and sparingly in pyrophosphoric acid. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 143.) Insoluble in an aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 316.) Insoluble, or as good as insoluble, in an aqueous solution of pyrophosphate of soda. (H. Rose, *Pogg. Ann.*, 1849, **76.** 16.) Insoluble in an aqueous solution of pyrophosphate of soda, or rather, only very slightly soluble therein when recently precipitated. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111; also, in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130.)

$2\,Ba\,O, bPO_5 + Aq$

PHOSPHATE OF BARYTA.

I.) *ordinary, di.* Permanent. Very sparingly soluble in water.

$2\,Ba\,O, H\,O, cPO_5$

Soluble in 20570 pts. of water at 18.75° @ 22.5°. (G. Bischof, *Schweigger's Journ. für Ch. u. Phys.*, 1833, **67.** pp. 44, 40.) The solubility of bibasic phosphate of baryta is $\frac{1}{10000}$. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 346.) Soluble in a boiling aqueous solution of chloride of ammonium, with evolution of ammonia. (Fuchs; Demarçay, *Ann. der Pharm.*, 1836, **11.** 251.) Soluble in an aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 315.) When recently precipitated it is soluble in a cold aqueous solution of chloride of ammonium, and in the solution thus obtained an excess of ammonia produces no precipitate. Less soluble in a solution of nitrate of ammonia than in a solution of chloride of ammonium. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 96, 334; compare p. 99.) Easily soluble in aqueous solutions of chloride of ammonium, nitrate of ammonia, and succinate of ammonia. (H. Rose, Wittstein.) Only slightly soluble in pure water, but is abundantly soluble in an aqueous solution of chloride of ammonium. Also more soluble in aqueous solutions of the chlorides of barium and sodium than in water, 1 pt. of it dissolving in 4362 pts. of a solution containing 1.2% of Na Cl, and 0.8% of Ba Cl. (Ludwig.) Soluble in an aqueous solution of normal citrate of soda. (Spiller.) It is partially decomposed when boiled with an aqueous solution of carbonate of potash or of carbonate of soda. (Dulong, *Ann. de Chim.*, **82.** 279.) Insoluble in an aqueous solution of phosphate of soda or of chloride of barium. (H. Rose, *Pogg. Ann.*, 1849, **76.** 23.)

When one equivalent of $2\,Ba\,O, H\,O, P\,O_5$ is boiled with 1 equivalent of $K\,O, 2\,C\,O_2$ in aqueous solution $\frac{46.82}{100}$ of it may be decomposed; when boiled with an equivalent of $Na\,O, 2\,C\,O_2$ $\frac{25.44}{100}$ of it may be decomposed. While, on the other hand, when an equivalent of $Ba\,O, 2\,C\,O_2$ is boiled with one of $2\,K\,O, H\,O, P\,O_5$ $\frac{27.77}{100}$ of it may be decomposed, and when boiled with an equivalent of $2\,Na\,O, H\,O, P\,O_5$ $\frac{50}{100}$ of it may be decomposed. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 348.) When an equivalent of $2Ba\,O, H\,O, P\,O_5$ is boiled with an equivalent of $K\,O, S\,O_3$, in aqueous solution, $\frac{85}{100}$ of it may be decomposed. (Malaguti, *Ann. Ch. et Phys*, (3.) **51.** 335.)

Soluble in 367 @ 403 pts. of acetic acid, of 1.032 sp. gr., at 22.5°. (G. Bischof, *Schweigger's Journ. für Ch. u. Phys.*, 1833, **67.** 40.) Readily soluble in dilute phosphoric, chlorhydric, and nitric acids with formation of the soluble mono (No. II.) salt. It should be observed, that, speaking in general terms, up to a certain limit, this solution occurs more readily in proportion as the acids are more dilute, for, as a rule, the barium salts are precipitated from their aqueous solutions on the addition of free acid.

Much more soluble in dilute than in concentrated nitric acid at the ordinary temperature. In the experiments tabulated below an excess of the phosphate was digested during 24 hours with nitric acid of the indicated strengths.

1 pt. of phosphate of baryta dissolves at 18.75° @ 22.5° in	of a mixture of 1 pt. of nitric acid of 1.275 sp. gr. at 21.25° and pts. of water.	100 pts. of nitric acid of 1.275 sp. gr., mixed with the amounts of water given in column 2, dissolve pts. of phosphate of baryta.
1563 pts. . . .	0	0.062
318	0.792	0.56
155	1.584	1.67
107	2.375	3.16
69	3.168	6.03
57	3.960	8.74
45	4.752	12.88
52	7.	15.53
48	8.	18.68
30	9.	33.02
22	10.	49.91
45	11.	26.78
66	17.	27.30
63	23.	38.03
74	29. . . .	39.16

From these figures it appears that the solvent power of the nitric acid increases with its dilution up to a certain point, and then decreases as the dilution is increased, though these changes are not regular. The maximum solvent power of the nitric acid of 1.275 sp. gr. occurs when it is diluted with 10 pts. of water, or that of the most concentrated nitric acid, when it is diluted with about 29 pts. of water. In attempting to reconcile the irregularity in experiments 13 and 14, by repeating these, it was inexplicably made greater, as follows: —

1 pt. of phosphate of baryta dissolves at 18.75° @ 22.5° in	of a mixture of 1 pt. of nitric acid of 1.275 sp. gr. at 21.25° and pts. of water.	100 pts. of nitric acid of 1.275 sp. gr., mixed with the amounts of water given in column 2, dissolve pts. of phosphate of baryta.
28 pts.	17	64.39
65	23	36.85

In order to ascertain whether or no these irregularities might be due to differences of temperature the following series of experiments was made at the constant temperature of 15.63° : —

1 pt. of phosphate of baryta dissolves at 15.63° in	of a mixture of 1 pt. of nitric acid of 1.275 sp. gr. at 21.25° and pts. of water.	100 pts. of nitric acid of 1.275 sp. gr., mixed with the amounts of water given in col. 2, dissolve pts. of phosphate of baryta.
392 pts. . . .	1	0.51
94.5	4	5.29
43	7	18.71
27	10	40.19
34	13	41.49
26.5	16	64.19
61	19	32.63

On attempting to reconcile the discrepancies between Nos. 5 and 6 the following discordant results were obtained. (At the temperature of 16.87°.)

24	13	57.45
48	16	35.83

A series of experiments with more dilute acids than the foregoing gave the following results. (Temperature 16.25° @ 17.5°.)

1 pt. of phosphate of baryta dissolves at 16.25° @ 17.5° in	of a mixture of 1 pt. of nitric acid of 1.275 sp. gr. at 21.25° and pts of water.	100 pts. of nitric acid of 1.275 sp. gr., mixed with the amounts of water given in col. 2, dissolve pts. of phosphate of baryta.
27 pts. . . .	19	74.22
32	29	93.49
45	39	89.76
48	49	104.70
68	79	117.37
72	99	139.73

and (temperature = 11.25°)

571	500 *	87.69
817	1000 *	123.00
8595 . . .	10000 * . . .	116.41

The solvent power of the acid is consequently decreased very much by strong dilution; but in the last experiment the 10000 times diluted acid still dissolves more than twice as much of the phosphate as pure water, and the 1000 times diluted acid almost twice as much as the standard acid of 1.275 sp. gr.

Bischof confesses himself unable to explain the great discrepancies which his results exhibit; for his discussion of this question, see p. 47 of his memoir. By direct experiment he found that, while 1 pt. of the phosphate dissolved in 32 pts. of dilute acid, with which it had been violently shaken, the same quantity was dissolved in 31 pts. of similar acid, in which it had been allowed to lie quietly, and from which it was decanted, without disturbing the undissolved phosphate. (G. Bischof, *Schweigger's Journ. für Ch. u. Phys.*, 1833, **67.** pp. 41 - 50.) In citing the first table of Bischof, Gmelin (*Handbook*, **3.** 144) remarks: "The solution is doubtless effected by the conversion of the diphosphate of baryta into nitrate and soluble monophosphate of baryta. The more concentrated the solution the less easily is the nitrate of baryta taken up. A certain degree of dilution is therefore necessary; but when it is too great, the decomposing influence of the nitric acid is probably interfered with." In confirmation of which compare Bischof's first two experiments, p. 41 of his memoir.

II.) *mono.* $BaO, 2HO, cPO_5$ Permanent. Decomposed by [illegible] especially on boiling, [illegible] position of the disalt [illegible] tion of free phosporic acid and a little [illegible] of baryta. Soluble in phosphoric acid and [illegible] other acids. (Berzelius, *Gilbert's Ann. Phys.*, 1816, **53.** pp. 398, 399.) Soluble in water. (Mitscherlich, *Ann. Ch. et Phys.*, 1821, (2.) **19.** 360.)

III.) *tri.* $3BaO, cPO_5$ Very slightly soluble, or insoluble, in water. Easily soluble in acids.

IV.) *Compound of Nos. I. and III.* $2BaO, HO, PO_5; 3BaO, PO_5$ Ppt. Decomposed by water. Insoluble in alcohol. (Berzelius, *Gilbert's Ann. Phys.*, 1816, **53.** 400; also in his *Lehrb.*, **3.** 366.)

V.) *Salt of Fleitmann & Henneberg's* 1st *acid.* "$6BaO, 4PO_5 + x Aq.$" Insoluble precipitate. On heating the salt more strongly than is necessary to expel its water it becomes insoluble in acids. (F. & H., *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 331, 332, 329.)

*TriMeta*PHOSPHATE OF BARYTA & OF SODA. $2BaO, NaO, 3a'''PO_5 + 8Aq \& 8Aq$ Much more soluble in water than the simple baryta-salt. When melted it is easily soluble in acids, but if only gently ignited, and not melted, it is insoluble in acids. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 314.)

*Pyro*PHOSPHATE OF BARYTA & OF SODA. $6(2BaO, bPO_5); 2NaO, bPO_5 + 6Aq$ Completely insoluble in an aqueous solution of pyrophosphate of soda, but not insoluble in water or ammonia-water. Easily soluble in nitric and chlorhydric acids. Insoluble in alcohol. (Baer, *Pogg. Ann.*, 1848, **75.** pp. 164, 165.)

PHOSPHATE OF BEBIRIN? Ppt. Easily soluble in chlorhydric acid. (v. Planta, *Phil. Mag.*, 1851, (4.) **1.** 116.)

PHOSPHATE OF BENZIDIN. Almost insoluble in boiling water, or alcohol.

*TetraMeta*PHOSPHATE OF BISMUTH. Insoluble in water. Easily decomposed by an aqueous solution of sulphide of sodium. (Fleitmann, *Pogg. Ann.*, 1849, **78.** pp. 358, 363.)

*HexaMeta*PHOSPHATE OF BISMUTH. Ppt. Insoluble in water acidulated with nitric acid. Soluble in an aqueous solution of hexametaphosphate of soda. (H. Rose, *Pogg. Ann*, 1849, **76.** 5.) Insoluble in ammonia-water. (Persoz, *J. pr. Ch.*, 1843, **3.** 215.)

*Pyro*PHOSPHATE OF BISMUTH. Ppt. Soluble in an aqueous solution of pyrophosphate of soda, with combination. (Stromeyer, *Gött. gelehrte*

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* Or, starting with the most concentrated nitric acid, 1 pt. of it is diluted with 1358 pts. of water in the first experiment, with 2704 pts. in the second, and with 27029 pts. in the third.

Anz., 1st vol. of the year 1830, p. 111; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130.) Ppt. Insoluble in water acidulated with nitric acid. Soluble in an aqueous solution of pyrophosphate of soda. (H. Rose, *Pogg. Ann.*, 1849, **76.** 20.) A boiling aqueous solution of monopyrophosphate of soda dissolves no inconsiderable quantity of oxide of bismuth. (Schwarzenberg, *Ann. Ch. u. Phys.*, 1848, **65.** 160.)

PHOSPHATE OF BISMUTH.

I.) $\mathrm{Bi\,O_3'''}, c\mathrm{PO_5} + 3\,\mathrm{Aq}$ Insoluble in water or in dilute nitric acid. (Thomson's *System of Chem.*, London, 1831, **2.** 684.) Completely insoluble in water or in hot nitric acid, unless this be present in large excess. Sensibly soluble in aqueous solutions of the ammoniacal salts. (Chancel.)

Phosphate of bismuth is only difficultly precipitated from solutions which contain a salt of sesquioxide of iron; but from solutions containing a salt of protoxide of iron, it is easily precipitated. (Chancel, *C. R.*, 1860, **51.** 882.) When solutions of phosphate of soda and nitrate of bismuth (in dilute nitric acid) are mixed in presence of nitrate of sesquioxide of iron, nitrate of alumina, nitrate of sesquioxide of chromium, or nitrate of sesquioxide of uranium, phosphate of bismuth is not precipitated, or is only partially precipitated. Precipitated phosphate of bismuth may even be redissolved when digested with a large quantity of nitrate of uranium, and but little of this is needed to prevent the precipitation of the phosphate. On the other hand, solutions of the nitrates of ammonia, potash, baryta, strontia, lime, and magnesia do not appear to exercise any solvent action upon the phosphate. (McCurdy, *Am. J. Sci.*, (2.) **31.** 282.) More easily soluble in chlorhydric than in nitric acid. (H. Rose, *Tr.*) Insoluble in solutions of bismuth salts. (H. Rose, *Pogg. Ann.*, 1849, **76.** 26.)

II.) There are two salts; one permanent and soluble, the other insoluble in water. (Wenzel.)

Phosphate of bismuth is readily soluble in an aqueous solution of chloride of ammonium, but insoluble in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 98.)

PHOSPHATE OF BRUCIN.

I.) $2(\mathrm{N_2}\left\{\mathrm{C_{46}\,H_{26}\,O_8^{vi}.\,H\,O}\right), \mathrm{H\,O, P\,O_5} + \mathrm{Aq}$ Efflorescent. Tolerably soluble in cold, and soluble in all proportions in hot water. (Anderson, *J. Ch. Soc.*, **1.** 58.)

II.) *acid*. Efflorescent. Very soluble in water.

PHOSPHATE OF BRUCIN & OF SODA.

$\mathrm{N_2}\left\{\mathrm{C_{46}\,H_{26}\,O_8^{vi}}\right.\mathrm{.\,H\,O, Na\,O, H\,O, PO_5} + \mathrm{Aq}$

PHOSPHATE OF CACODYL.

*Meta*PHOSPHATE OF CADMIUM. Very soluble in ammonia-water. (Persoz, *J. pr. Ch.*, 1834, **2.** 215.)

*TetraMeta*PHOSPHATE OF CADMIUM. Insoluble in water. Easily decomposed by an aqueous solution of sulphide of sodium. (Fleitmann, *Pogg. Ann.*, 1849, **78.** pp. 358, 363.)

*Pyro*PHOSPHATE OF CADMIUM. $2\,\mathrm{Cd\,O}, b\mathrm{PO_5} + 2\,\mathrm{Aq}$ Soluble in ammonia-water, in acids, and in an aqueous solution of pyrophosphate of soda. Soluble in sulphurous acid, from which it is precipitated when the solution is boiled. Insoluble in a solution of caustic potash. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 153.) Soluble in an aqueous solution of pyrophosphate of soda; but on heating this solution a precipitate forms and does not disappear again on cooling. (H. Rose, *Pogg. Ann.*, 1849, **76.** 19.)

PHOSPHATE OF CADMIUM. Insoluble in water. $3\,\mathrm{Cd\,O}, c\mathrm{PO_5}$ Soluble in a cold aqueous solution of chloride of ammonium; less completely soluble in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 99, 334.) Easily soluble in aqueous solutions of the salts of cadmium; on heating the solution thus obtained a precipitate is formed, which disappears again on cooling. (H. Rose, *Pogg. Ann.*, **76.** 25.) Readily soluble in aqueous solutions of the sulphate, nitrate, and succinate of ammonia, and of chloride of ammonium. (Wittstein.)

PHOSPHATE *of protoxide* OF CERIUM.

I.) *di.* $2\,\mathrm{Ce\,O, H\,O}, c\mathrm{PO_5}$ Insoluble in water, or in a solution of phosphoric acid. Slightly soluble in chlorhydric and nitric acids. (Hisinger & Berzelius.)

II.) *tri.* $3\,\mathrm{Ce\,O, PO_5}$ Occurs native as the mineral *Cryptolite*, which is insoluble in dilute nitric acid, but dissolves in concentrated sulphuric acid. (Wœhler.)

PHOSPHATE OF CHELIDONIN. Readily soluble in water, spirit, and absolute alcohol. Insoluble in ether. (Probst, *Ann. der Pharm.*, 1839, **29.** 127.)

PHOSPHATE OF CHLORANILIN. Tolerably soluble in water, and alcohol.

PHOSPHATE *of protoxide* OF CHROMIUM. Insoluble in water. Readily soluble in acids. (Moberg.)

*Meta*PHOSPHATE *of sesquioxide* OF CHROMIUM.

I.) Insoluble in water, and concentrated acids. $\mathrm{Cr_2\,O_3'''}, 3\,a\mathrm{PO_5}$ (Maddrell, *Ann. Ch. u. Pharm.*, 1847, **61.** 60.)

*Pyro*PHOSPHATE *of sesquioxide* OF CHROMIUM. $2\,\mathrm{Cr_2\,O_3'''}, 3\,b\mathrm{PO_5} + 7\,\mathrm{Aq}$ Soluble in the strong mineral acids, in water acidulated with sulphurous acid, from which it is reprecipitated on boiling, and in aqueous solutions of pyrophosphate of soda, and caustic potash. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 149.) Insoluble in an aqueous solution of pyrophosphate of soda. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111; also, in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130.)

PHOSPHATE *of sesquioxide* OF CHROMIUM.

I.) *ordinary precipitated.* Insoluble in water. $\mathrm{Cr_2\,O_3'''}; c\mathrm{PO_5} + 12\,\mathrm{Aq}$, & $10\,\mathrm{Aq}$, & $6\,\mathrm{Aq}$(Rammelsberg). Soluble in phosphoric acid, and is not precipitated from the acid solution on the addition of carbonate of ammonia. (T. Thomson, *Phil. Trans.*, 1827, Part I., pp. 210, 203.) Insoluble in water. Easily soluble in acids. It is not precipitated by ammonia from its acid solution when this contains at the same time citrate of soda. (Spiller.)

II.) "*acid.*" Soluble in water. (Vauquelin.)

*Pyro*PHOSPHATE *of sesquioxide* OF CHROMIUM & OF POTASH. Known only in solution. (Persoz, *Ann. Ch. et Phys.*, (3.) **20.** 322.)

*c*PHOSPHATE OF CINCHONIDIN (of Pasteur). Difficultly soluble in cold water. (Winckler, from *Buchn. Rep.*, (2.) **49.** 1, in *Pharm. Central B.*, 1848, **19.** 311.)

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Phosphate of Cinchonin. Readily soluble in water.

***Meta*Phosphate of Cobalt.**

I.) ***Di*MetaPhosphate** ? $2\,\mathrm{Co\,O}, 2\,a''\mathrm{PO}_5$ Insoluble in water, and dilute acids. Soluble in concentrated sulphuric acid. (Maddrell, *Ann. Ch. u. Pharm.*, 1847, **61.** 58.) Scarcely at all attacked by a boiling aqueous solution of sulphide of sodium. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 352.)

II.) ***Tri*MetaPhosphate.** Appears to be soluble in water. (Fleitmann, cited by H. Rose, *Pogg. Ann.*, 1849, **76.** 9.)

III.) ***Hexa*MetaPhosphate.** Ppt. Soluble in an aqueous solution of hexametaphosphate of soda. (H. Rose, *Pogg. Ann.*, 1849, **76.** 4.)

Persoz (*J. pr. Ch.*, 1834, **3.** 215) speaks of a meta (hexa ?) phosphate of cobalt soluble in ammonia-water.

***Pyro*Phosphate of Cobalt.** Soluble in ammonia-water [at least when in presence of pyrophosphate of nickel], from which solution alcohol precipitates it. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 158.) Soluble in an aqueous solution of pyrophosphate of soda, with combination. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111 ; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130.) Easily soluble in an aqueous solution of pyrophosphate of soda ; this red solution becomes blue when heated, but remains clear, and regains its red color on cooling. (H. Rose, *Pogg. Ann.*, 1849, **76.** 19.)

Phosphate of Cobalt.

I.) *di.* $2\,\mathrm{Co\,O}, \mathrm{H\,O}, c\mathrm{PO}_5 + 5\,\mathrm{Aq}$ Insoluble in water. Soluble in phosphoric acid. (Berzelius, *Lehrb.*)

II.) *tri.* $3\,\mathrm{Co\,O}, c\mathrm{PO}_5$ Soluble in phosphoric acid, and ammonia-water. Soluble in aqueous solutions of the salts of cobalt ; on boiling the solution thus obtained, a precipitate is formed, which redissolves completely on cooling. (H. Rose, *Pogg. Ann.*, 1849, **76.** 25.) Imperfectly soluble in aqueous solutions of chloride of ammonium and nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 98.) Decomposed by an aqueous solution of any salt of a sesquioxide, with formation of an insoluble phosphate of the sesquioxide employed; when boiled with a solution of potash-alum it is completely decomposed in less than an hour ; with chrome alum the decomposition is more rapid, and with iron alum the decomposition is complete after a few minutes, even in the cold. Instead of the alums, any other salt of a sesquioxide may be employed, for example, nitrate of iron, tartrate of iron and of potash, &c. (Guignet, *C. R.*, **49.** 454.)

Phosphate *of sesquioxide* of Cobalt. Ppt.

***Meta*Phosphate of Cobalt & of Soda.**

I.) *Dimetaphosphate ?* $6\,(\mathrm{Co\,O}, a\mathrm{PO}_5); \mathrm{Na\,O}, a\mathrm{PO}_5$ Insoluble in water, and dilute acids. Soluble in concentrated sulphuric acid. (Maddrell, *Ann. Ch. u. Pharm.*, 1847, **61.** pp. 57, 56.)

II.) *Trimetaphosphate.* Soluble in water. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 315, 309.)

***Pyro*Phosphate of Cobalt & of Soda.** Soluble in water. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111 ; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130.)

Phosphate of Cobalt & of Zinc.

I.) $\mathrm{Co\,O}, 2\,\mathrm{Zn\,O}, c\mathrm{PO}_5 + 6\,\mathrm{Aq}$ Insoluble in water. (Domente.)

II.) $4\,\mathrm{Co\,O}, 5\,\mathrm{Zn\,O}, 9\,\mathrm{H\,O}, 6\,c\mathrm{PO}_5 + 9\,\mathrm{Aq}$ Ppt.

Phosphate of Codein. $\mathrm{N}\left\{\begin{matrix}\mathrm{C}_{36}\,\mathrm{H}_{20}\,\mathrm{O}_6''\\ \mathrm{H}\end{matrix}\right. .\,\mathrm{H\,O}, 2\,\mathrm{H\,O}, c\mathrm{PO}_5 + 3\,\mathrm{Aq}$ Very soluble in water; from this solution it is precipitated on the addition of strong alcohol.

Phosphate of Coniin. Soluble in water.

***Meta*Phosphate of Copper.**

I.) *Dimetaphosphate.*

a = *anhydrous.* $2\,\mathrm{Cu\,O}, 2\,a''\mathrm{PO}_5$ Insoluble in water, and dilute acids. Soluble in concentrated sulphuric acid. (Maddrell, *Ann. Ch. u. Pharm.*, 1847, **61.** 60.) Completely insoluble in water, and almost as insoluble in most acids, even when these are concentrated, and alkalies, being tolerably easily soluble only in ammonia-water, and hot concentrated sulphuric acid. It is not in the least decomposed by sulphuretted hydrogen water, but is decomposed by solutions of the alkaline sulphides; best by sulphide of ammonium, less easily by the sulphides of sodium and potassium. (Fleitmann, *Pogg. Ann.*, 1849, **78.** pp. 246, 241.)

b = *hydrated.* $2\,\mathrm{Cu\,O}, 2a''\mathrm{PO}_5 + 8\,\mathrm{Aq}$ A concentrated aqueous solution of dimetaphosphate of soda being mixed with a solution of sulphate of copper occasions no precipitate, even after the mixture has stood for days. But on the addition of spirit, or on evaporating the solution, the precipitate separates out, and when once separated is completely insoluble in water. If a solution of chloride of copper be taken, instead of the sulphate, the metaphosphate of copper is much more readily formed, separating as hydrated crystals. Like the anhydrous salt, this is completely insoluble in water. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 256.)

II.) *Hexametaphosphate.* Ppt. Soluble in an excess of hexametaphosphate of soda, or of chloride of copper. (H. Rose, *Pogg. Ann.*, 1849, **76.** 4.)

***Pyro*Phosphate of Copper.** $2\,\mathrm{Cu\,O}, b\mathrm{PO}_5 + 2\,\mathrm{Aq}$ Soluble in mineral acids, ammonia-water, and an aqueous solution of pyrophosphate of soda. Soluble, without decomposition, in an aqueous solution of sulphurous acid, from which it crystallizes out unaltered on boiling. Decomposed by a boiling aqueous solution of caustic potash. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 156.) Soluble, with combination, in an aqueous solution of pyrophosphate of soda. It is not decomposed in the least by a boiling solution of pyrophosphate of soda, but boiling ordinary (*c*) phosphate of soda decomposes it at once, *c* phosphate of copper being precipitated. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, pp. 110, 111 ; also, in *Schweigger's Journ. für Ch. u. Phys.*, **58.** pp. 129, 130.) Easily soluble in an aqueous solution of pyrophosphate of soda. Also soluble in a very large excess of a solution of sulphate of copper ; on heating this solution a precipitate is produced which does not disappear on cooling. (H. Rose, *Pogg. Ann.*, 1849, **76.** 18.)

The anhydrous salt, obtained by gently igniting a mixture of oxide of copper and an excess of phosphoric acid, is completely insoluble in water, and very difficultly soluble in acids, even when these are concentrated. (Fleitmann, *Pogg. Ann.*,

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1849, **78.** 244.) Equally insoluble with the insoluble metaphosphate of copper of Maddrell, but is easily decomposed by sulphuretted hydrogen-water. (H. Rose, *Pogg. Ann.*, **76.** 14; for Rose's remarks upon the probability of the acid of this salt being different from common pyrophosphoric acid, see *Ibid.*, p. 13.) Rather easily decomposed by sulphuretted hydrogen-water. (Fleitmann, *loc. cit.*, p. 241.)

PHOSPHATE OF COPPER.

I.) *mono* or "*acid.*"

II.) *di.* Insoluble in water. Soluble in phosphoric acid. Insoluble in aqueous solutions of chloride of ammonium or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 98.)
$2 Cu O, H O, cPO_5 + 8 Aq$

III.) *tri.* Insoluble in water. Easily soluble in acids, even in phosphoric, acetic, and sulphurous acids. Slightly soluble in aqueous solutions of the ammoniacal salts.
$3 Cu O, cPO_5 + 8 Aq$

Sparingly soluble in solutions of the salts of protoxide of copper; on heating the solution thus obtained, a precipitate falls, but disappears again as the solution cools. (H. Rose, *Pogg. Ann.*, 1849, **76.** 25.) Soluble in ammonia-water. (H. Rose, *Tr.*) Decomposed by an aqueous solution of any salt of a sesquioxide, with formation of an insoluble phosphate of the sesquioxide; these decompositions occur, however, less readily with phosphate of copper than with the phosphates of cobalt, nickel, and silver. (Guignet, *C. R.*, **49.** 455.)

IV.) *basic.*
$4 Cu O, P O_5 + 2 Aq$

V.) *basic.*
$3 (Cu O, cPO_5) ; 2 Cu O, H O$

VI.) $5 Cu O, PO_5 + 3 Aq$ Easily soluble in ammonia-water, and in nitric acid.

VII.) $6 Cu O, PO_5 + 8 Aq$

*Pyro*PHOSPHATE OF COPPER & OF POTASH. Extremely soluble in water. (Persoz, *Ann. Ch. et Phys.*, (3.) **20.** 324.)
$2 Cu O, bPO_5 ; 2 K O, bPO_5 + x Aq$

*TetraMeta*PHOSPHATE OF COPPER & OF SODA. As completely insoluble in water as dimetaphosphate of copper, and cannot be separated from its mixture with the latter. Completely, though difficultly, decomposed by digestion in an aqueous solution of sulphide of sodium. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 356.)
$2 Cu O, 2 Na O, 4 a^{IV}PO_5$

*Pyro*PHOSPHATE OF COPPER & OF SODA.

I.) $2 Cu O, bPO_5 ; 2 Na O, bPO_5 + 12 Aq$
II.) $2 Cu O, bPO_5 ; 3 (2 Na O, bPO_5) + 4 Aq \ \& \ 24 Aq$

Soluble in water. (Persoz, *Ann. Ch. et Phys.*, (3.) **20.** pp. 323, 325; compare Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111; or *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130.) Very efflorescent. No. I. is less soluble than No. II., which is more soluble in water than pyrophosphate of soda. Insoluble in alcohol. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm*, 1848, **65.** 387.)

III.) $3 (2 Cu O, bPO_5) ; 2 Na O, bPO_5 + 7 Aq$ Completely insoluble in water, or alcohol. Soluble in chlorhydric acid. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 387.)

PHOSPHATE OF COPPER & *of sesquioxide* OF URANIUM. Easily soluble in acids.
$Cu O, 2 Ur_2 O_3, PO_5 + 8 Aq$

PHOSPHATE OF CRESYL.

PHOSPHATE OF CUMIDIN.

PHOSPHATE OF CYSTIN.

PHOSPHATE OF DIDYMIUM. Insoluble in water. Very sparingly soluble in weak acids. Easily soluble in strong acids. (Marignac, *Ann. Ch. et Phys.*, (3.) **38.** 163.)
$3 Di O, cPO_5 + 2 Aq$

*Pyro*PHOSPHATE OF ETHYL. Soluble in water, alcohol, and ether. (De Clermont, *Ann. Ch. et Phys.*, (3.) **44.** 332.)
$2 C_4 H_5 O, bPO_5$

PHOSPHATE OF ETHYL.

I.) *mono.* *Vid.* EthylPhosphoric Acid.
$C_4 H_5 O, 2 H O, cPO_5$

II.) *di.* *Vid. di*EthylPhosphoric Acid.
$2 C_4 H_5 O, H O, cPO_5$

III.) *tri.* Miscible with water, by which it is soon decomposed however. (De Clermont.) Soon decomposed by cold, and at once by hot water. (Schiff.) Miscible with alcohol, ether, and even with water. (Vœgeli.)
(*EthylPhosphate of Ethyl.*)
$3 C_4 H_5 O, cPO_5$

PHOSPHATE OF ETHYLAMIN & OF MAGNESIA. Much more soluble in water than the corresponding ammonia-salt. (E. Meyer.)
$2 Mg O, \left(N \left\{ \begin{matrix} C_4 H_5 \\ H_2 \end{matrix} \right. . H O \right) cPO_5 + 10 Aq$

PHOSPHATE OF *tetr*ETHYLAMMONIUM.

*Pyro*PHOSPHATE OF FURFURIN.

I.) = *anhydrous.*
$2 \left(N_2 \left\{ (C_{10} H_4 O_2'')_3 . H O \right. \right) bPO_5$

II.) = *hydrated.* Readily soluble in water, and alcohol.
$2 \left(N_2 \left\{ (C_{10} H_4 O_2'')_3 . H O \right. \right) bPO_5 + 2 Aq$

PHOSPHATE OF FURFURIN.

I.) *mono* or "*acid.*" Sparingly soluble in cold, readily soluble in hot water. Readily soluble in hot alcohol. Apparently insoluble in ether. (Svanberg & Bergstrand.)
$N_2 \left\{ (C_{10} H_4 O_2'')_3 . H O, 2 H O, cPO_5 \right.$

II.) *di* or "*normal.*" Readily soluble in boiling water, and alcohol. Nearly insoluble in ether. (Svanberg & Bergstrand.)
$2 \left(N_2 \left\{ (C_{10} H_4 O_2'')_3 . H O \right. \right), H O, cPO_5$

III.) *tri.* Readily soluble in water, and alcohol. Sparingly soluble in ether. (Svanverg & Bergstrand.)
$3 \left(N_2 \left\{ (C_{10} H_4 O_2'')_3 . H O \right. \right) cPO_5$

PHOSPHATE OF GLAUCIN.

PHOSPHATE OF GLAUCOPICRIN.

*Pyro*PHOSPHATE OF GLUCINA. Soluble in an aqueous solution of pyrophosphate of soda, with combination. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130.)

PHOSPHATE OF GLUCINA. Permanent. Insoluble in water. Soluble in dilute acids, including phosphoric acid. (Berzelius's *Lehrb.*)
$2 Gl_2 O_3, 3 PO_5$

*Pyro*PHOSPHATE OF GLUCINA & OF SODA. Soluble in water. (Stromeyer, *Gött. gelehrte Anz.*,

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1st vol. of the year 1830, p. 111; in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130.)

*Pyro*PHOSPHATE OF GOLD & OF SODA. Soluble in water. (Persoz, *Ann. Ch. et Phys.*, (3.) **20.** 326.)

PHOSPHATE OF GUANIN.

PHOSPHATE OF HARMALIN.

PHOSPHATE OF HYDRARGETHYL. *Vid.* Phosphate of MercurEthyl.

*Meta*PHOSPHATE *of protoxide* OF IRON.

I.) *Trimetaphosphate.* Appears to be soluble in water. (Fleitmann, cited by H. Rose, *Pogg. Ann.*, 1849, **76.** 9.)

II.) *Hexametaphosphate.* Appears to be soluble in water. (H. Rose, *Pogg. Ann.*, 1849, **76.** 4.)

*Pyro*PHOSPHATE *of protoxide* OF IRON. Ppt. Soluble in aqueous solutions of pyrophosphate of soda, and sulphate of protoxide of iron. (H. Rose, *Pogg. Ann.*, 1849, **76.** 18.)

PHOSPHATE *of protoxide* OF IRON.

I.) *mono* or "*acid.*" Soluble in ammonia-water.
$FeO, 2\,HO, cPO_5$

II.) *di.* Insoluble in water, or in aqueous solutions of the ammoniacal salts. Does not appear to be soluble in aqueous solutions of chloride of ammonium or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.) Soluble in ammonia-water and in dilute acids, including phosphoric and acetic acids. When no more than 1000 pts. of water are present diphosphate of soda precipitates it from solutions containing protoxide of iron. (Pfaff.) It is not precipitated from solutions which contain citrate of soda. (Spiller.)
$2\,FeO, HO, cPO_5$

Soluble in about 1000 pts. of a saturated aqueous solution of carbonic acid. This solubility is increased by adding dilute acetic acid to the carbonic-acid-water, so that 1 pt. of the phosphate dissolves in about 560 pts. of carbonic-acid-water containing less than $\frac{1}{500}$ pt. of commercial acetic acid. 1 pt. of it dissolves in 1666 pts. of carbonic-acid-water, which contains $\frac{1}{11}$ of its weight of acetate of ammonia. (Pierre, *Ann. Ch. et Phys.*, (3.) **36.** 78.)

Soluble in a boiling aqueous solution of sulphate of protoxide of iron. (Berzelius, *Lehrb.*) Easily soluble in aqueous solutions of the salts of protoxide of iron. On heating the solution thus obtained it deposits a voluminous precipitate which does not dissolve completely on cooling. (H. Rose, *Pogg. Ann.*, **76.** 25.)

III.) *tri.* Insoluble in water. (Rammelsberg.) Easily soluble in chlorhydric and nitric acids. Decomposed by a hot solution of caustic potash.
(*Vivianite.*)
$3\,FeO, cPO_5 + 8\,Aq$

IV.) *Compound of Nos II. and III.* Ppt. (Berzelius.)
$2\,FeO, HO, PO_5;\ 2\,(3\,FeO, PO_5)$

*Meta*PHOSPHATE *of sesquioxide* OF IRON. Insoluble in water, or in dilute acids. Soluble in concentrated sulphuric acid. (Maddrell, *Ann. Ch. u. Pharm.*, 1847, **61.** 59.)
$Fe_2O_3''', 3aPO_5$

*Pyro*PHOSPHATE *of sesquioxide* OF IRON. Easily soluble in an aqueous solution of pyrophosphate of soda, the solution being partially decomposed on boiling. 16 pts. of the gelatinous precipitate (= 3 pts. of the salt dried at 100°) are dissolved by 3 pts. of pyrophosphate of soda. Also soluble in a solution of citrate of ammonia. (Parrish's *Pharm.*, p. 490.) Soluble in acids, in an aqueous solution of pyrophosphate of soda, in ammonia-water, and an aqueous solution of carbonate of ammonia. Insoluble in acetic acid, sulphurous acid, or a solution of chloride of ammonium; but when precipitated by ammonia from its chlorhydric-acid solution it may be redissolved by adding an excess of ammonia-water. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 154.) Easily soluble in an aqueous solution of pyrophosphate of soda. (H. Rose, *Pogg. Ann.*, 1849, **76.** 18.)
$2\,Fe_2O_3''', 3\,bPO_5 + 9\,Aq$

PHOSPHATE *of sesquioxide* OF IRON.

I.) *acid.* Insoluble in water. Soluble in ammonia-water, and very easily in chlorhydric acid. (Winckler.)
$Fe_2O_3''', 3\,HO, 2\,cPO_5 + 5\,Aq$

II.) *di.* Insoluble in water. Soluble in acids. Soluble in 1500 pts. of boiling water; easily soluble in dilute acids. (Bergmann.) Soluble in about 12500 pts. of carbonic-acid-water. (Pierre, *Ann. Ch. et Phys.* (3.) **36.** 78.) Easily soluble in aqueous solutions of the salts of sesquioxide of iron. (H. Rose, *Pogg. Ann.*, 1849, **76.** 25.) Soluble in phosphoric, and citric acids.
(*Ordinary precipitated. Sesqui.*)
$2\,Fe_2O_3''', 3\,HO, 3\,cPO_5$

Easily soluble in chlorhydric acid, in which solution a precipitate is produced on the addition of phosphoric acid, but not by sesquichloride of iron. (Gladstone.) When moist it dissolves in warm sulphurous acid, and in a solution of sulphite of ammonia, though slowly and difficultly. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 79.) Insoluble in acetic acid. (Gay-Lussac, *Ann. Ch. et Phys.*, (2.) **49.** 324; Otto, *J. pr. Ch.*, **2.** 410, *note.*) Insoluble in acetic acid, or in aqueous solutions of ammoniacal salts. (Wittstein.) Does not appear to be soluble in aqueous solutions of chloride of ammonium or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.) Partially soluble in a large excess of a solution of carbonate of soda. (H. Rose, *Tr.*) Soluble in ammonia-water, when in presence of diphosphate of soda; also soluble in a solution of carbonate of ammonia.

It is not precipitated by ammonia when in presence of citrate of soda. (Spiller.) Decomposed by potash-lye, which abstracts a great part, but not the whole of its phosphoric acid. (H. Rose, *Tr.*) Diphosphate of soda precipitates sesquioxide of iron from solutions of its salts, even when these are diluted with 1500 pts. of water. (Pfaff.)

III.) *tri.* Insoluble in water. Easily soluble in the stronger acids. (Rammelsberg.) Soluble in an aqueous solution of carbonate of ammonia, and in a mixture of caustic ammonia and phosphate of ammonia. Partially dissolved, with decomposition, in aqueous solutions of the caustic alkalies. (Berzelius's *Lehrb.*) Decomposed, with formation of No. IV., by a boiling dilute aqueous solution of caustic potash. (Rammelsberg, *Pogg. Ann.*, 1845, **64.** 419.)
$Fe_2O_3''', cPO_5 + 4\,Aq$

Insoluble in water. Readily soluble in chlorhydric, and nitric acids. Slightly soluble in citric and tartaric acids. Insoluble in phosphoric acid or a hot aqueous solution of diphosphate of soda. Slightly soluble in a solution of tartrate of ammonia, but the solution is decomposed when heated. Soluble, in considerable quantity, with combination, in a solution of citrate of soda. (Heydenreich, *Amer. J. Pharm.*, (3.) **33.** 295.)

IV.) *basic.* Insoluble in acetic acid. Soluble in an aqueous solution of acetate of iron.
$2\,(Fe_2O_3''', cPO_5)$; $Fe_2O_3 + 16\,Aq$

Decomposed, with formation of No. IV., by a boiling dilute aqueous solution of caustic potash. (Rammelsberg, *Pogg. Ann.*, 1845, **64.** 419.)

V.) *basic.* Easily soluble in dilute chlorhydric acid.
Fe_2O_3''', cPO_5 ; $Fe_2O_3 + 3\,Aq$ & $20\,Aq$

VI.) *basic.* Unacted upon by a boiling dilute aqueous solution of caustic potash. (Rammelsberg, *Pogg. Ann.*, 1845, **64.** 419.) Insoluble, or rather very difficultly soluble in water, or in caustic ammonia. (H. Rose.)
Fe_2O_3, cPO_5 ; $14\,Fe_2O_3$

Phosphate *of protoxide* & *of sesquioxide* of Iron. Ppt. Soluble in chlorhydric acid. (Rammelsberg, *Pogg. Ann.*, **64.** 415.)
$2\,(3\,FeO, cPO_5)$; $3\,Fe_2O_3, 2\,cPO_5 + 24\,Aq$

Phosphate *of protoxide* of Iron & of Manganese. Easily soluble in chlorhydric acid. (Berzelius.)
(*Triplite.*)
$3\,FeO, cPO_5$; $3\,MnO, cPO_5$

Phosphate of Iron, of Manganese, & of Soda.
Fe_2O_3''', cPO_5 ; $3\,(NaO, MnO), cPO_5 + Aq$

*Pyro*Phosphate *of protoxide* of Iron & of Soda. Known only in solution. (Persoz, *Ann. Ch. et Phys.*, (3.) **20.** 323.)

*Pyro*Phosphate *of sesquioxide* of Iron & of Soda. Very soluble in water. (Persoz, *Ann. Ch. et Phys.*, (3.) **20.** 322.) On the addition of spirit it is precipitated from the aqueous solution. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 390.)
$2\,Fe_2O_3''', 3\,bPO_5$; $2\,(2\,NaO, bPO_5) + 7\,Aq$

Phosphate of Lanthanum. Insoluble in water. Soluble in acids.

*Meta*Phosphate of Lead.

I.) *Dimetaphosphate.* Almost insoluble in water. Soluble in nitric acid. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 253.)
$2\,PbO, 2\,a''PO_5$

II.) *Trimetaphosphate.* Somewhat less soluble in water than the corresponding silver salt. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 312.)
$3\,PbO, 3\,a'''PO_5 + 3\,Aq$

III.) *Tetrametaphosphate.* Completely insoluble in water. Much more easily decomposed and dissolved by acids than the metallic salts of dimetaphosphoric acid. Decomposed with the greatest facility by solutions of the alkaline sulphides, even in the cold. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 353.)
$4\,PbO, 4\,a^{iv}PO_5$

IV.) *Hexametaphosphate.* Ppt. Decomposed by sulphuretted-hydrogen-water. (Graham, *Elements.*) Insoluble in ammonia-water. (Persoz, *J. pr. Ch.*, 1834, **3.** 216.) Ppt. Soluble in an aqueous solution of hexametaphosphate of soda. (H. Rose, *Pogg. Ann.*, 1849, **76.** 4.)

*Pyro*Phosphate of Lead. Ppt. Easily soluble, with combination, in an aqueous solution of pyrophosphate of soda. It is not decomposed in the least by a boiling solution of pyrophosphate of soda, but is decomposed at once by boiling with ordinary (*c*) phosphate of soda, *c* phosphate of lead being precipitated. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, pp. 110, 111 ; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** pp. 129, 130.) Soluble in nitric acid, and in aqueous solutions of caustic potash and of pyrophosphate of soda. Insoluble in ammonia-water, or in acetic or sulphurous acids. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 155.) Soluble, at first, in warm aqueous solutions of the alkaline pyrophosphates. On boiling the solution in pyrophosphate of soda, an insoluble precipitate is obtained. (Gerhardt, *Ann. Ch. et Phys.*, 1848, (3.) **22.** 506.) Easily soluble in an aqueous solution of pyrophosphate of soda. (H. Rose, *Pogg. Ann.*, 1849, **76.** 18.)
$2\,PbO, bPO_5 + Aq$

Phosphate of Lead.

I.) *di.* Insoluble in water or acetic acid. (Mitscherlich, *Ann. Ch. et Phys.*, 1821, (2.) **19.** 368.) Soluble in nitric acid, and in aqueous solutions of caustic potash and soda. [*Gm.*]
$2\,PbO, HO, cPO_5$

When recently precipitated, it is soluble in a cold aqueous solution of chloride of ammonium, but the lead may be precipitated from this solution by adding an excess of caustic ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 96, 99.) More soluble in an aqueous solution of acetate of ammonia at 18.8° @ 25° than in pure water. (Weppen, from *Arch. d. Pharm.*, (2.) **9.** 236 ; in *J. pr. Ch.*, 1837, **11.** 182.) Phosphate of lead is soluble in a saturated aqueous solution of chloride of sodium, though to a smaller extent than sulphate of lead ; from the solution thus obtained a double salt of chloride of lead and phosphate of lead crystallizes out. (Becquerel, *C. R.*, 1845, **20.** pp. 1524, 1523.) Insoluble in aqueous solutions of the salts of lead. (H. Rose, *Tr.*) Soluble in dilute nitric acid. Insoluble in acetic acid. (Persoz, *Chim. Moléc.*, p. 353.) Decomposed by chlorhydric and sulphuric acids. Not precipitated when in presence of citrate of soda. (Spiller.) Decomposed by sulphuretted-hydrogen-water. (Graham, *Elements.*)

When an equivalent of $2\,PbO, HO, PO_5$ is boiled with an equivalent of KO, SO_3, in aqueous solution, $\frac{12{\cdot}18}{100}$ of it may be decomposed. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 335.)

II.) *tri.* Insoluble in water, acetic acid, or ammonia-water. Soluble in nitric acid. (Fresenius, *Quant.*, p. 159.) Easily decomposed by sulphuretted-hydrogen-water. (Graham, *Elements.*)
$3\,PbO, cPO_5$

When an equivalent of $3\,PbO, PO_5$ is boiled with an equivalent of $NaO, 3\,CO_2$, in aqueous solution, $\frac{7{\cdot}37}{100}$ of it may be decomposed. While, on the other hand, $PbO, 3\,CO_2$ boiled with $3\,NaO, PO_5$ may be decomposed to the extent of $\frac{64{\cdot}7}{100}$. An equivalent of $3\,PbO, PO_5$ boiled with an equivalent of teroxalate of potash may be decomposed to the extent of $\frac{85{\cdot}27}{100}$; while, on the other hand, an equivalent of $PbO, 3\,\overline{Ox}$ when boiled with $3\,KO, PO_5$ may be decomposed to the extent of $\frac{58}{100}$. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** pp. 351, 354.)

*DiMeta*Phosphate of Lead & of Soda. Easily decomposed.

*Pyro*Phosphate of Lead & of Soda.

a.) Soluble in water. (Stromeyer, *loc. inf. cit.*)

b = PbO, NaO, bPO_5 Obtained by boiling *a*, i. e. the solution of pyrophosphate of lead in pyrophosphate of soda. It is insoluble in boiling water. (Gerhardt, *Ann. Ch. u. Phys.*, 1848, (3.) **22.** 506.)

*Meta*Phosphate of Lime.

I.) *anhydrous.* *Dimetaphosphate?* Insoluble in

CaO, aPO_5 water, and dilute acids. Decomposed by warm concentrated sulphuric acid. (Muddrell, *Ann. Ch. u. Pharm.*, 1847, **61.** 61.) Not decomposed by digestion in solutions of the alkaline carbonates. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 352.)

II.) *Dimetaphosphate.* Insoluble in water. Not perceptibly attacked by concentrated nitric and chlorhydric acids. Decomposed by warm concentrated sulphuric acid. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 256.)

$2\,CaO, 2\,a''PO_5 + 4\,Aq$

III.) *Trimetaphosphate.* Appears to be soluble in water. (Fleitmann, cited by H. Rose, *Pogg. Ann.*, 1849, **76.** 9.)

IV.) *Hexametaphosphate.* The hydrated salt is insoluble in water. (Graham, *Phil. Trans.*, 1833, **123.** 280.) Completely soluble in an aqueous solution of hexametaphosphate of soda. Soluble in chlorhydric acid. (H. Rose, *Pogg. Ann.*, 1849, **76.** 3; compare also, *ibid.*, pp. 5, 6.)

*Pyro*Phosphate of Lime. Somewhat soluble in water. Completely soluble in nitric and chlorhydric acids; also soluble in saturated sulphurous acid. Insoluble in acetic acid, or in an aqueous solution of pyrophosphate of soda. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 145.) Insoluble in an aqueous solution of pyrophosphate of soda, or, rather only very slightly soluble therein when recently precipitated. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111; also, in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130.)

$2\,CaO, bPO_5 + Aq$ & $4\,Aq$

The precipitate produced by chloride of calcium in a solution of pyrophosphate of soda is soluble in a very large excess of the latter, but the clear solution thus obtained becomes cloudy on standing, and after 24 hours contains in solution only a very small quantity of the lime salt. (H. Rose, *Pogg. Ann.*, 1849, **76.** 16.) Insoluble in water, or an aqueous solution of pyrophosphate of soda. When recently precipitated it dissolves in acetic acid, though considerably more difficultly than the ordinary (*c*) triphosphate; but after a time it separates out again in crystals, which dissolve still more difficultly than the original ppt, when more acetic acid is added. Less soluble in *warm* than in cold acetic acid. Even after drying, it is soluble to no inconsiderable extent in acetic acid. Soluble in nitric and chlorhydric acids. On heating the acid solution the pyrophosphoric acid is gradually, though incompletely, changed to the ordinary c modification. (Baer, *Pogg. Ann.*, 1848, **75.** pp. 155–159.) Insoluble in an aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 316.)

Phosphate of Lime.

I.) *mono* or "*acid.*" Hygroscopic. Soluble in water. Precipitated, with decomposition, by alcohol.

$CaO, 2\,HO, cPO_5$

Glacial acetic acid precipitates it completely from the aqueous solution, even when this is mixed with nitric acid. (Persoz, *Chim. Moléc.*, p. 347; compare *Ann. Ch. et Phys.*, 1836, (2.) **63.** 444.)

The common notion that triphosphate of lime can be decomposed only so far as is necessary for the formation of the mono-salt, is erroneous, the degree of decomposition being only dependent upon the concentration and quantity of the acid. If a somewhat concentrated solution of monophosphate of lime be mixed with concentrated sulphuric acid, an abundant precipitate of sulphate of lime will be produced and an almost complete decomposition of the salt ensue, so that if enough sulphuric acid has been added the lime will be almost entirely removed from the solution, and the filtrate, after having been neutralized with ammonia, will no longer afford a precipitate on the addition of oxalate of ammonia, although a trace of lime is still contained in it. (Berzelius, *Lehrb.*, **3.** 409.)

II.) *di.* Insoluble, or extremely sparingly soluble in water.

$2\,CaO, HO, PO_5 + 4\,Aq$

"The solubility of bibasic phosphate of lime is $\frac{1}{1.000.000}$" (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 346.) Not completely insoluble, but only difficultly soluble, in water, and acetic acid. Easily soluble in nitric and chlorhydric acids. (Baer. *Pogg. Ann.*, 1848, **75.** pp. 153, 154, 156 *note.*) When boiled with water it is decomposed to the soluble acid-salt (No. I.) and the insoluble tri-salt (No. V.). (Bœdeker.)

Insoluble in alcohol. Very readily soluble in acids, even in carbonic-acid-water; but is especially soluble in strong acids, and those which form soluble salts with lime.

Difficultly soluble in acetic acid; easily soluble in chlorhydric acid. It is soluble in aqueous solutions of various salts, — especially chloride of ammonium, and of many organic matters: this is of interest, since it is probable that this salt is left in the soil by the decay of vegetables. (Otto.) Insoluble in an aqueous solution of diphosphate of soda; but traces of it are dissolved by a solution of chloride of calcium. (H. Rose, *Pogg. Ann.*, 1849, **76.** 24.)

When one equivalent of $2\,CaO, HO, PO_5$ is boiled with an equivalent of $KO, 2\,CO_2$, in aqueous solution, $\frac{88 \cdot 28}{100}$ of it may be decomposed; when boiled with an equivalent of $NaO, 2\,CO_2$ $\frac{25 \cdot 86}{100}$ it may be decomposed. While, on the other hand, when an equivalent of $CaO, 2\,CO_2$ is boiled with one of $2\,KO, HO, PO_5$ $\frac{41}{100}$ of it may be decomposed, or with an equivalent of $2\,NaO, HO, PO_5$ $\frac{89}{100}$ of it may be decomposed. (Malaguti, *Ann. Ch. et Phys.*, (3) **51.** pp. 348–354.)

III.) *Compound of Nos.* I. & II. Decomposed by water, which dissolves out the mono-salt (No. I.). Insoluble in alcohol. (Berzelius, *Lehrb.*, **3.** 408.)

$2\,(CaO, 2\,HO, PO_5); 2\,CaO, HO, PO_5$

IV.) $3\,CaO, 3\,HO, 2\,cPO_5 + Aq$ Insoluble in alcohol. (Raewsky.)

V.) *tri.* Insoluble in water.

$3\,CaO, cPO_5$ & $+ 2\,Aq$ (*Exists in bones.*)

When recently precipitated, it is soluble to a very slight extent in pure water, so that the liquid becomes cloudy on the addition of nitrate of lead. (R. Phillips.) It dissolves more readily in water containing starch or glue. (Vauquelin.) Soluble in no inconsiderable quantity in liquids which contain various organic, non-acid substances in solution. (Berzelius, *Lehrb.*, **3.** 407.) Bone-dust is dissolved, to a certain extent, when in contact with water, even that which contains no carbonic acid. This is probably, for the most part, owing to the solvent power of the products of putrefaction of the gelatine of the bone. (Wœhler, *Ann. Ch. u. Pharm.*, 1856, **98.** 143.) Somewhat soluble in aqueous solutions of many organic substances. (Ot. Gr.) Slightly soluble in aqueous solutions of the ammoniacal salts.

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When recently precipitated, it is dissolved in small quantity by a cold solution of chloride of ammonium (Wœhler); also by solutions of succinate or nitrate of ammonia. (Wittstein.) As good as insoluble in water, but somewhat soluble in liquors containing ammoniacal salts; in a single experiment where a weighed portion of it was dissolved in chlorhydric acid and reprecipitated by ammonia-water, nearly 5% of it remained dissolved in the fluid. (Rammelsberg, *Pogg. Ann.*, 1845, **64.** 421.) Even the anhydrous salt is dissolved by long-continued boiling with chloride of ammonium, or nitrate or succinate of ammonia. (Huenefeld; Wittstein.) Readily soluble, when recently precipitated, in cold aqueous solutions of chloride of ammonium, and nitrate of ammonia; from the solution in chloride of ammonium it may be nearly, if not entirely precipitated by adding an excess of caustic ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 95, 99, 334.) Completely soluble in a boiling aqueous solution of chloride of ammonium, with evolution of ammonia. (Fuchs; Demarçay, *Ann. der Pharm.*, 1834, **11.** 251.) Soluble, when recently precipitated, in an aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 315.) When boiled for several hours with a solution of sulphate of ammonia, it is decomposed, soluble monophosphate being dissolved while sulphate of lime separates. (Delkeskamp; Morveau.) Partially decomposed when boiled with aqueous solutions of carbonate of potash or of soda. (Dulong, *Ann. de Chim.*, **82.** 278.) Sparingly soluble in an aqueous solution of common salt. (Thomson.) Soluble in an aqueous solution of normal citrate of soda. (Spiller.) Soluble to a certain extent, at the ordinary temperature, in a moderately concentrated aqueous solution of sucrate of lime. Although the phosphate dissolves to a notable extent in the sucrate, even after having been ignited, it is, nevertheless, more readily soluble when recently precipitated and in the gelatinous state. (Bobierre, *C. R.*, 1851, **32.** 859.) Insoluble in pure water, but is easily soluble in water which contains chloride of sodium or an ammonia salt. In water which contains sulphate of ammonia it is as easily soluble as gypsum. Easily soluble also in carbonic-acid-water; 1 litre of water saturated with carbonic acid dissolves 0.6626 grm. of bone-earth, of which 0.5 grm. separates out at the temperature of boiling, while 0.1626 grm. remains dissolved after the solution has become cold. (Liebig, *Ann. Ch u. Pharm.*, **61.** 128.)

Water saturated with carbonic acid at 10° and the ordinary atmospheric pressure dissolves $\frac{75}{100000}$ of its weight (i. e. $\frac{1}{1333}$ of bone phosphate of lime. This solution is decomposed on heating, also when the carbonic acid is neutralized with potash or soda. The phosphate is also dissolved, though in lesser quantity, by carbonic acid water which is charged with carbonate of lime. (Lassaigne, *Ann. Ch. et Phys.*, (3.) **25.** 348.) Partially decomposed when boiled with aqueous solutions of the chlorides of cobalt, nickel, zinc, manganese, or copper, with formation of insoluble phosphates of these metals. (Demarçay, *Ann. der Pharm.*, 1834, **11.** 250.)

When an equivalent of $3\,CaO, PO_5$ is boiled with an equivalent of $NaO, 3\,CO_2$, in aqueous solution, $\frac{7.62}{100}$ of it may be decomposed. While, on the other hand, when $CaO, 3\,CO_2$ is boiled with $3\,NaO, PO_5$ $\frac{89.21}{100}$ of it may be decomposed. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 351.)

It is soluble in acids, but the readiness with which this solution is accomplished varies greatly according to the state of aggregation of the phosphate; this last is of special moment as regards weak acids: thus, the mineral apatite is dissolved only with extreme difficulty in carbonic-acid-water, in which bone-earth dissolves more readily, and the freshly precipitated salt very much more easily.

Soluble, with decomposition, in sulphuric, chlorhydric, nitric, and phosphoric acids. Sparingly soluble in strong acetic acid. (Wenzel.) When recently precipitated, terbasic phosphate of lime is very easily soluble in acetic acid, being very much more soluble therein than the diphosphate, but after having become dry it is only very difficultly soluble in acetic acid. (Baer, *Pogg. Ann.*, 1848, **75.** pp. 156 *note*, 153.) From the nitric-acid solution, glacial acetic acid precipitates the monophosphate (No. I.). (Persoz, *Chim. Molée.*, p. 347.) Soluble in lactic acid, even when this is dilute. (Cap & Henry.) The solvent power which lactic acid exerts over basic phosphate of lime, far exceeds that of acetic acid, and is indeed very considerable, — a fact long ago asserted by Berzelius (in his *Lehrbuch*), and directly proved by the experiments of Gay-Lussac (*Pogg. Ann.*, **31.** 399), although its accuracy has been called in question by Liebig. (Lehmann, in his *Phys. Chem.*, London, 1851, **1.** 104.) On the other hand, Baer (*Pogg. Ann.*, **75.** 156 *note*), remarks that Liebig's statement (in *Geiger's Handbuch der Pharm.*, **1.** 815) "that the property of dissolving recently precipitated phosphate of lime, in large quantity is possessed only by lactic, and not by acetic acid," should be corrected. Soluble in many of the vegetable acids, as tartaric, malic, lactic, &c. (Crum.)

More readily soluble in concentrated than in dilute nitric acid. Very much more soluble in concentrated nitric acid than phosphate of baryta.

In the experiments tabulated below an excess of precipitated phosphate was digested during 24 hours with acid of the indicated strength.

1 pt. of phosphate of lime dissolves, at 16.25 @ 17.5°, in	of a mixture of 1 pt. of nitric acid of 1.28 sp. gr. at 17.5° and pts. of water.	100 pts. of nitric acid, of 1 23 sp. gr., mixed with the amts. of water in col. 2, dissolve pts. of phosphate of lime.
2.72 pts. . . .	0	36.785
4.23	0.827	43.226
10.25	3.309	42.050
15.45	5.791	43.954
20.34	8.273	45.589
20.82	10.	52.831
30.64	10.754	56 939
26.48	13.	52.857
32.14	13 236	44.299
36.06	15.718	46.368
127.81 . . .	40.	32.078

As is indicated in the 3d column of the table, a somewhat diluted acid dissolves a larger amount of phosphate in proportion to the real acid contained in it than is the case with a more concentrated acid. (G. Bischof, *Schweigger's Journ. für Ch. u. Phys.*, 1833, **67.** pp. 50 - 54.)

The solvent power of chlorhydric acid for phosphate of lime is increased, up to a certain point, as this is diluted with water in a more decided manner than is the case with nitric acid, as may be seen by the following table: —

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1 pt. of phosphate of lime dissolves, at 16.25 @ 17.5°, in	of a mixture of 1 pt. of chlorhydric acid of 1.155 sp. gr. at 15.63° and pts. of water.	100 pts. of chlorhydric acid of 1.155 sp. gr., mixed with amts. of water given in col. 2 dissolve pts. of phosphate of lime.
3.95 pts.	0	25.320
4.44	1	45.010
8 02	4	62.311
12.35	7	64.753
15.97	10	68.899
19.47	13	71.907
24.44	16	69.545
28.68	19	69.719

(Bischof, *loc. cit.*, pp. 55 – 56.) In citing these experiments, Gmelin (*Handbook*, **3.** 194) remarks that theoretically "72.8 pts. (2 At.) of anhydrous H Cl should decompose and dissolve 155.4 pts. (1 At.) of the lime salt: —

"$3\,CaO, PO_5 + 2\,HCl = CaO, PO_5 + 2\,(CaO, HCl)$; 100 pts. of aqueous chlorhydric acid of sp. gr. 1.153 contain 30.9 pts. of anhydrous acid; $72.8 : 155.4 = 30.9 : 66$; 100 pts. of the aqueous acid of sp. gr. 1.153 should, therefore, when diluted to any extent, dissolve 66 pts. of the lime salt. With this the 3d column accords upon the whole; but why the acid when moderately diluted should dissolve more, and when not diluted so much less than 66 pts., remains to be explained. Similar results are obtained with nitric acid: 108 pts. (2 Ats.) of anhydrous NO_5 should decompose 155.4 pts. of the salt; 100 pts. of acid of sp. gr. 1.23 contain 31 pts. of the real acid; and $108 : 155.4 = 31 : 44.5$."

Decomposed, with partial solution (see under No. I.), by sulphuric acid. Completely decomposed to sulphate of lime and free phosphoric acid when treated with a mixture of sulphuric acid and alcohol. (Berzelius, *Lehrb.*, **3.** 409.)

VI.) *Compound of Nos.* II. *&* IV.) Ppt. Soluble in nitric and chlorhydric acids either concentrated or dilute, though most readily in acid which has been diluted to a certain extent, and in general resembles, in solubility, the tri-salt (No. V.). (Berzelius, *Lehrb.*, **3.** 406.)

$2\,CaO, HO, PO_5; 2\,(3\,CaO, PO_5)$

VII.) *Salt of Fleitmann & Henneberg's* 1*st acid.* Insoluble precipitate. On heating the salt more strongly than is necessary to expel its water it becomes insoluble in acids. (F. & H., *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 331, 332, 329.)

"$6\,CaO, 4\,PO_5 + x\,Aq$."

PHOSPHATE OF LIME & OF POTASH. Soluble in water. (Saussure; Berthollet.)

$2\,KO, CaO, cPO_5$

*TriMeta*PHOSPHATE OF LIME & OF SODA. Soluble in water. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 315, 309.)

$2\,CaO, NaO, 3\,a'''PO_5 + x\,Aq$

*Pyro*PHOSPHATE OF LIME & OF SODA. Insoluble in water, or an aqueous solution of pyrophosphate of soda; but is not insoluble in acetic acid. Easily soluble in nitric and chlorhydric acids. (Baer, *Pogg. Ann.*, 1848, **75.** 160.)

$CaO, NaO, bPO_5 + 4\,Aq$

PHOSPHATE OF LIME & *of sesquioxide* OF URANIUM. Soluble in nitric acid. (Berzelius.)

$CaO, 2\,Ur_2O_3, cPO_5 + 8\,Aq$

PHOSPHATE OF LITHIA.

I.) *mono.* Deliquescent. Readily soluble in water. (Gmelin; Rammelsberg.)

$LiO, 2\,HO, cPO_5$

II.) *di.* Nearly insoluble in water. (C. Gmelin.) Soluble in 833 pts. of water at 12°. (Rammelsberg.)

$2\,LiO, HO, cPO_5$

III.) $5\,LiO, HO, 2\,cPO_5 + 2\,Aq$ Soluble in 200 pts. of water. (Rammelsberg.)

IV.) *tri.* Soluble in 2539 pts. of pure water at the ordinary temperature, and in 3920 pts. of water containing caustic ammonia. Readily soluble in aqueous solutions of ammoniacal salts. (W. Mayer, *Ann. Ch. u. Pharm.*, **98.** 201.) Very soluble in carbonic-acid-water, and in acids even when these are very dilute. (Troost)

$3\,LiO, cPO_5$

(This is the only phosphate of lithia, the existence of which has been well proved.)

This salt is liable to retain portions of phosphate or carbonate of potash, soda, and ammonia, with considerable tenacity, though by thorough washing the foreign salt may be entirely removed. This fact led Berzelius and Rammelsberg to describe as double salts several such mixtures, for example, NaO, LiO, PO_5 (Berzelius); $3\,NaO, 3\,LiO, PO_5$; and $3\,LiO, PO_5$; $2\,LiO, HO, PO_5 + 2\,Aq$ (Rammelsberg), which should henceforth not be admitted as salts. (W. Mayer, *Ann. Ch. u. Pharm.*, **98.** 193.) [It may not be uninteresting, however, to cite what is known of the solubility of these mixtures, thus: the] Phosphate of Lithia and of Soda (of Berzelius) "NaO, LiO, PO_5" (which Rammelsberg, like Mayer, long ago found to be of very variable composition), is scarcely at all soluble in cold, but more soluble in hot water. It is nearly insoluble in water containing diphosphate of soda. (Berzelius.)

Soluble in	1396	pts. of water at	15°.
"	1233	"	60°.
"	951	"	100°.

(Brandes.)

And the compound $3\,(Na\,Li\,O)\,cPO_5$ is very difficultly soluble in water. Soluble in 1396 pts. of water at 15°; but more soluble in hot water. (Brandes.) Soluble in chlorhydric acid.

*Meta*PHOSPHATE OF MAGNESIA.

I.) *Dimetaphosphate.*

a.) *anhydrous.* Almost insoluble in water, and dilute acids. Soluble in concentrated sulphuric acid. (Maddrell, *Ann. Ch. u. Pharm.*, 1847, **61.** pp. 62, 54.) It is not decomposed in the least when digested for days in aqueous solutions of the alkaline carbonates or *c* phosphates. (Fleitmann, *Pogg. Ann.*, 1849, **78.** pp. 352, 260.)

$2\,MgO, 2\,a''PO_5$

Wach (*Schweigger's Journ. für Ch. u. Phys.*, 1830, **59.** 304) also appears to have encountered this salt. He describes it as being rather difficultly soluble in cold water, and rather difficultly soluble in acids, even when these are boiling; dissolving best in a considerable excess of hot sulphuric acid. But an aqueous solution of phosphoric acid does not dissolve it, not even when the mixture is boiled to dryness and then ignited.

Gregory (*Ann. Ch. u. Pharm.*, **54.** 97) has described as phosphate of magnesia a compound which has since been shown by Maddrell to contain soda. See METAPHOSPHATE OF MAGNESIA & OF SODA.

b.) *crystallized.* Insoluble in water. Somewhat more easily decomposed by acids than the zinc and manganesian salts. (Fleitmann, *loc. cit.*, p. 259.)

$2\,MgO, 2\,a''PO_5 + 9\,Aq$

II.) *Trimetaphosphate.* Appears to be soluble in water. (Fleitmann, cited by H. Rose, *Pogg. Ann.*, 1849, **76.** 9.)

III.) *Hexametaphosphate.* Appears to be soluble in water. (H. Rose, *Pogg. Ann.*, 1849, **76.** pp. 3, 56; compare Wach, *Schweigger's Journ. für Ch. u. Phys.*, 1830, **59.** pp. 302, 304.)

*Pyro*PHOSPHATE OF MAGNESIA. Permanent. $2\,Mg\,O, bPO_5 + 3\,Aq$ Somewhat soluble in water. Completely soluble in nitric, and chlorhydric acid, in sulphurous acid, and in an aqueous solution of pyrophosphate of soda. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 146.) Soluble in aqueous solutions of pyrophosphate of soda, and sulphate of magnesia and in an excess of carbonate of ammonia. (Wach, *Schweigger's Journ. für Ch. u. Phys.*, 1830, **59.** 300.) Easily soluble in aqueous solutions of pyrophosphate of soda, and sulphate of magnesia, but on boiling these solutions precipitates are formed which do not disappear on cooling. (H. Rose, *Pogg. Ann.*, 1849, **76.** 17.) The anhydrous salt is scarcely at all soluble in water. (Fresenius, *Quant.*, p. 130.) The anhydrous salt obtained by igniting mono *c* phosphate of magnesia is insoluble in acids. (Graham, cited by Gregory, *Ann. Ch. u. Pharm.*, 1845, **54.** 98 *note.*) But when prepared by igniting phosphate of ammonia and of magnesia ($2\,Mg\,O, N\,H_4\,O, P\,O_5$) it is readily soluble in chlorhydric and nitric acids. (Fresenius, *Quant.*)

PHOSPHATE OF MAGNESIA.

I.) *mono.* $Mg\,O, 2\,H\,O, cPO_5$ Soluble in water. Tolerably soluble in spirit. (Gregory, *Ann. Ch. u. Pharm.*, 1845, **54.** 94.)

II.) *di.*

a = gelatinous ppt. $2\,Mg\,O, H\,O, cPO_5 + 6\,Aq$ Decomposed by boiling water to an insoluble basic, and a soluble acid salt. (Riffault; Rammelsberg, *Pogg. Ann.*, 1845, **64.** 259.)

b = crystals. Efflorescent. Soluble in 322 pts. $2\,Mg\,O, H\,O, cPO_5 + 14\,Aq$ of water at 7.2°, but on heating the solution to 48.8° or less, it becomes turbid, and at 100° a cloudy precipitate subsides, the solution containing only 1 pt. of the crystallized phosphate in 498 pts. of water at 100°. This precipitation also occurs when the solution contains an excess of phosphate of soda or sulphate of magnesia. Much more soluble in acids than in water, dissolving with facility even in very dilute acetic, oxalic, phosphoric, chlorhydric, nitric or sulphuric acid. The addition of the smallest quantity of any of these acids to the aqueous solution prevents the appearance of the usual precipitate when the solution is heated. When an aqueous solution, from which a precipitate has been deposited at 100°, is heated to a higher temperature in a close vessel, a new precipitate will form. When a solution which has been heated to 100° is allowed to cool upon the precipitate which has been produced, a portion of the latter will redissolve. Thus, while 2.3 grains of precipitated phosphate were obtained by filtering at 100°, only 2 grains were obtained from an equal quantity of the same solution which had been allowed to become cold, with occasional agitation, before filtration. In appearance the precipitate had suffered a very great reduction. (Graham, *Phil. Mag.*, 1827, (2.) **2.** 20 *et seq.*) 100 pts. of water at 15.5° dissolve 1.1 pts. of it, and at 15.5° 6.6 pts. (Ure's *Dict.*) Soluble in 15 pts. of cold water, and in much less hot water. (Dumas, *Tr.*, **6.** 288; also Schubarth, *Tech.*)

Insoluble in alcohol. (Berzelius's *Lehrb.*) Soluble in aqueous solutions of magnesia salts, but insoluble in a solution of phosphate of soda. On boiling the clear solution, obtained by means of sulphate of magnesia, a copious precipitate is produced, which at first disappears again completely on cooling, and is again produced on the application of heat; but after the experiment has been repeated a number of times, the precipitate formed by heat does not disappear again completely on cooling. (H. Rose, *Pogg. Ann.*, 1849, **76.** 24.) It is not precipitated from solutions containing citrate of soda. (Spiller.) When recently precipitated, it is soluble in a hot aqueous solution of chloride of ammonium, and an excess of caustic ammonia does not reprecipitate it completely from this solution; less readily soluble in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 96, 99.)

III.) *tri.* $3\,Mg\,O, cPO_5 + 5\,Aq$ Insoluble in water, or in aqueous solutions of the alkaline salts. Readily soluble in dilute acids, excepting acetic acid, in which it is but difficultly soluble. (Berzelius's *Lehrb.*) Easily soluble in acids, even after having been melted. (Gregory, *Ann. Ch. u. Pharm.*, 1845, **54.** 98 *note.*)

IV.) *Salt of Fleitmann & Henneberg's 1st acid.* "$6\,Mg\,O, 4\,P\,O_5 + x\,Aq$" Insoluble precipitate. On heating the salt more strongly than is necessary to expel its water it becomes insoluble in acids. (F. & H., *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 331, 332, 329.)

PHOSPHATE OF MAGNESIA & OF NICKEL. Insoluble in ammonia-water.

*Meta*PHOSPHATE OF MAGNESIA & OF SODA.

I.) *Mono?* or *Di? metaphosphate.* $3\,(Mg\,O, aPO_5)\,;\ Na\,O, aPO_5$ Almost insoluble in water, chlorhydric acid, and aqua-regia. Soluble in concentrated sulphuric acid, and this solution may be diluted with water. (Maddrell, *Ann. Ch. u. Pharm.*, 1847, **61.** 54.) Completely insoluble in cold water, and cold phosphoric acid. Almost completely insoluble in chlorhydric acid or aqua-regia, even when these are hot. Insoluble in an aqueous solution of carbonate of ammonia. (Gregory, *Ann. Ch. u. Pharm.*, 1845, **54.** pp. 97, 95.)

II.) *Trimetaphosphate.* Soluble in water. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 315, 309.)

*Pyro*PHOSPHATE OF MAGNESIA & OF SODA.

a.) Soluble in water, but the solution soon decomposes when left to itself. (Persoz, *Ann. Ch. et Phys.*, (3.) **20.** 322.)

b = basic? Ppt. Slightly soluble in water, and ammonia-water. Insoluble in alcohol. Easily soluble in an aqueous solution of pyrophosphate of soda, and in chlorhydric and nitric acids. (Baer, *Pogg. Ann.*, 1848, **75.** pp. 168, 164.)

*Meta*PHOSPHATE OF MANGANESE.

I.) *Dimetaphosphate.*

a.) *anhydrous.* $2\,Mn\,O, 2\,a''PO_5$ Insoluble in water, and dilute acids. Soluble in concentrated sulphuric acid. (Maddrell, *Ann. Ch. u. Pharm.*, 1847, **61.** 58.) Like the copper salt, it is insoluble in almost all reagents. Much less easily decomposed by alkaline solutions than the copper salt. Scarcely attacked by a warm solution of sulphide of sodium, and not much more easily by sulphide of ammonium. A solution of

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carbonate of soda decomposes it more readily. (Fleitmann, *Pogg. Ann.*, **78**. 349.)

b = hydrated. Resembles the copper salt, *q. v.* (Fleitmann, *loc. cit.*, p. 257.)
$2\,MnO, 2\,a''PO_5$ & $+ 8\,Aq$

II.) *Trimetaphosphate.* Appears to be soluble in water. (Fleitmann, cited by H. Rose, *Pogg. Ann.*, 1849, **76**. 9.)

III.) *Hexametaphosphate.* Ppt. Soluble in an aqueous solution of hexametaphosphate of soda. (II Rose, *Pogg. Ann.*, 1849, **76**. 4.)

*Pyro*PHOSPHATE OF MANGANESE. Soluble in sulphurous acid, in an aqueous solution of pyrophosphate of soda, and in the strong mineral acids. (Schwarzenberg, *Ann. Ch. u. Pharm.*, **65**. 150.) Soluble in an aqueous solution of pyrophosphate of soda, with combination. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111; also in *Schweigger's Journ. für Ch. u. Phys.*, **58**. 130.) Soluble in an aqueous solution of pyrophosphate of soda, but insoluble in a solution of sulphate of manganese. (H. Rose, *Pogg. Ann.*, 1849, **76**. 18.)
$2\,MnO, bPO_5 + 8\,Aq$

PHOSPHATE OF MANGANESE.

I.) *mono* or "*acid.*" Readily soluble in water. Decomposed by alcohol, which abstracts phosphoric acid. (Heintz.)
$MnO, 2\,HO, cPO_5 + 2\,Aq$

II.) *di.* Permanent. When boiled with water it is decomposed to a soluble acid and an insoluble basic salt. (Bœdeker.) Difficultly soluble in water, or acetic acid. Insoluble in alcohol. Readily soluble in strong mineral acids. (Heintz.) Slightly soluble in an aqueous solution of carbonate of ammonia, from which it is reprecipitated on boiling. Decomposed, with oxidation, by a boiling solution of caustic potash. (Berzelius, *Lehrb.*)
$2\,MnO, HO, cPO_5 + 6\,Aq$

III.) *tri.* Sparingly soluble in water. Insoluble in alcohol. Soluble in an aqueous solution of carbonate of ammonia, from which it is deposited when the solution is boiled. Soluble in a cold aqueous solution of chloride of ammonium; also partially soluble in a cold solution of nitrate of ammonia, but a portion of it is reprecipitated in either case on boiling. (Brett, *Phil. Mag.*, 1837, (3.) **10**. pp. 98, 335.) Also soluble in solutions of sulphate and succinate of ammonia.
$3\,MnO, cPO_5 + 7\,Aq$

Soluble in acetic and phosphoric acids, and with greater facility in the strong mineral acids. (Heintz.) Slightly soluble in aqueous solutions of the salts of protoxide of manganese, the solution depositing a precipitate on boiling which disappears again as the solution cools. (H. Rose, *Pogg. Ann.*, 1849, **76**. 25.)

PHOSPHATE *of sesquioxide* OF MANGANESE. Insoluble in acids, excepting chlorhydric acid. Decomposed by warm potash-lye. (Hermann.)
$Mn_2O_3, 2\,HO, 3\,cPO_5$

*TriMeta*PHOSPHATE OF MANGANESE & OF SODA. Soluble in water. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65**. pp. 315, 309.)

*Pyro*PHOSPHATE *of protoxide* OF MANGANESE & OF SODA. Soluble in water. (Stromeyer, *Gött. gelehrte Anz.*, 1st. vol. of the year 1830, p. 111; also in *Schweigger's Journ. für Ch. u. Phys.*, **58**. 130.)

PHOSPHATE OF MELAMIN. Very soluble in boiling water.

PHOSPHATE OF MELANIL. Very easily soluble in water. (Hofmann, *J. Ch. Soc.*, I. 293.)

PHOSPHATE OF MENAPHTHALAMIN. Very soluble in alcohol, and ether.

PHOSPHATE OF MERCURETHYL. Readily soluble in water. (Duenhaupt.)
(*Phosphate of HydrargEthyl.*)

*Meta*PHOSPHATE *of dinoride* OF MERCURY.

I.) *Trimetaphosphate.* Ppt. Does not appear to be very insoluble. (Fleitmann, cited by H. Rose, *Pogg. Ann.*, **76**. 9.)

II.) *Hexametaphosphate.* Ppt. Soluble in an excess of an aqueous solution of hexametaphosphate of soda. (H. Rose, *Pogg. Ann.*, 1849, **76**. 4.)

*Meta*PHOSPHATE *of protoxide* OF MERCURY.

I.) *Trimetaphosphate.* Ppt. Does not appear to be very insoluble. (Fleitmann, cited by H. Rose, *Pogg. Ann.*, 1849, **76**. 9.)

II.) *Hexametaphosphate.* Ppt. (H. Rose, *Pogg. Ann.*, **76**. 4.) Insoluble in water. (Fleitmann, *Pogg. Ann.*, 1849, **78**. 359.)

*Pyro*PHOSPHATE *of dinoxide* OF MERCURY. Ppt. Soluble in an aqueous solution of pyrophosphate of soda, with combination. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111; also, in *Schweigger's Journ. fur Ch. u. Phys.*, **58**. 130; H. Rose, *Pogg. Ann.*, **76**. 17.) When recently precipitated it is soluble in an aqueous solution of pyrophosphate of soda, the solution undergoing decomposition when boiled; but is insoluble therein after having been dried at 100°. Soluble in nitric acid. Decomposed by chlorhydric acid. (Schwarzenberg, *Ann. Ch. u. Pharm.*, **65**. 159.)
$2\,Hg_2O, bPO_5 + Aq$

*Pyro*PHOSPHATE *of protoxide* OF MERCURY. Insoluble in water or alcohol. Soluble in phosphoric, chlorhydric, and nitric acids.
$2\,HgO, bPO_5$

Soluble in 6 pts. of an aqueous solution of chloride of ammonium (Trommsdorff); also soluble in solutions of the nitrate, sulphate, and carbonate of ammonia (Wittstein); and of iodide of potassium. (Melsens, *Ann. Ch. et Phys.*, (3.) **26**. 221.) It is precipitated in presence of 500 pts. of water. (Pfaff.) Insoluble in water acidulated with nitric acid. When treated with an aqueous solution of pyrophosphate of soda it is rendered basic. (H. Rose, *Pogg. Ann.*, 1849, **76**. 17.) Insoluble in an aqueous solution of pyrophosphate of soda. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111; also, in *Schweigger's Journ. für Ch. u. Phys.*, **58**. 130; Schwarzenberg, *loc. inf. cit.*) Soluble in acids. Decomposed by caustic potash, and by a boiling aqueous solution of ordinary phosphate of soda. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65**. 160.)

PHOSPHATE *of dinoxide* OF MERCURY.

I.) *di.* Insoluble in water, in phosphoric or tartaric acids, or in aqueous solutions of the salts of dinoxide of mercury. When recently precipitated, it dissolves in an aqueous solution of chloride of ammonium, though less completely than the phosphate of the protoxide. Nitrate of ammonia dissolves it less readily than chloride of ammonium. (Brett, *Phil. Mag.*, 1837, (3.) **10**. 97.) Decomposed by cold aqueous solutions of caustic potash and ammonia and of carbonate of ammonia. Soluble in nitric acid.
$2\,Hg_2O, HO, cPO_5$

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II.) *tri.* Ppt.
$3\ Hg_2\ O, cPO_5$

Phosphate *of protoxide* **of Mercury.** Insoluble in water, or alcohol. Soluble in phosphoric, nitric, and chlorhydric acids, and in many ammonia salts.
$3\ Hg\ O, cPO_5$

When recently precipitated, it dissolves in cold aqueous solutions of chloride of ammonium or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.)

*Pyro***Phosphate** *of dinoxide* **of Mercury & of Soda.** Soluble in water. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130.)

Phosphate *of protoxide* **of Molybdenum.**
I.) *acid.* Deliquescent. Soluble in water, and in an aqueous solution of caustic ammonia. (Berzelius.)

II.) *di.* Insoluble in water. Soluble in an aqueous solution of protochloride of molybdenum.
$2\ Mo\ O, H\ O, PO_5$

Phosphate *of binoxide* **of Molybdenum.**
I.) *acid.* Soluble in water, and in ammonia-water. (Bucholz.)

II.) *mono.* Sparingly soluble in an aqueous solution of diphosphate of ammonia.
$Mo\ O_2, H\ O, P\ O_5$

"**Phosphate of Molybdenum,**" *i. e. the yellow precipitate produced by molybdate of ammonia in the solution of a phosphate.* See Molybdic Acid with Phosphate of Ammonia.

Phosphate of Molybdic Acid.
I.) "*basic.*" Insoluble in water.

II.) "*acid.*" Readily soluble in water, and alcohol. (Berzelius.)

Phosphate of Morphine.
I.) *normal.* Readily soluble in chlorhydric acid.

II.) *acid.*

*Meta***Phosphate of Naphtylamin.** Sparingly soluble in water, and alcohol.

*c***Phosphate of Naphtylamin.** Readily soluble in water, and in boiling alcohol.

*Meta***Phosphate of Nickel.**
I.) *Dimetaphosphate?* Insoluble in water, and dilute acids. Soluble in concentrated sulphuric acid. (Maddrell, *Ann. Ch. u. Pharm.*, 1847, **61.** 58.) Is not decomposed in the least by boiling aqueous solutions of the alkaline carbonates or sulphides. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 352.)
$2\ Ni\ O, 2\ a''PO_5$

II.) *Trimetaphosphate.* Appears to be soluble in water. (Fleitmann, cited by H. Rose, *Pogg. Ann.*, 1849, **76.** 9.)

III.) *Hexametaphosphate.* Ppt. Soluble in an aqueous solution of hexametaphosphate of soda. (H. Rose, *Pogg. Ann.*, 1849, **76.** 4.)

*Pyro***Phosphate of Nickel.** Ppt. Soluble in an aqueous solution of pyrophosphate of soda, with combination. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130.) Easily soluble in an aqueous solution of pyrophosphate of soda, and the solution remains clear on being heated, unless the precipitate has been formed from chloride of nickel, in which case the above-mentioned solution becomes cloudy when heated. (H. Rose, *Pogg. Ann.*, 1849, **76.** 19.) Soluble in ammonia-water, sulphurous acid, in an aqueous solution of pyrophosphate of soda, and in the mineral acids. Alcohol does not precipitate it from the ammoniacal solution. (Schwarzenberg, *Ann. Ch. u. Pharm.*, **65.** 158.)
$2\ Ni\ O, bPO_5 + 6\ Aq$

Phosphate of Nickel.
I.) *acid.* Soluble in dilute phosphoric acid.

II.) *tri.* Insoluble in water. Soluble in sulphuric, nitric, chlorhydric, and phosphoric acids. (Tupputi, *Ann. de Chim.*, 1811, **78.** 158.)
$3\ Ni\ O, cPO_5 + 7\ Aq$

Soluble in aqueous solutions of the salts of nickel; on heating the solution thus obtained a precipitate is formed which disappears again on cooling. (H. Rose, *Pogg. Ann.*, 1849, **76.** 25.) When boiled with an aqueous solution of diphosphate of ammonia only a faint trace of it dissolves; the phosphates of potash and soda, under similar circumstances, have no action upon it. (Tupputi, *loc. cit.*, p. 170.)

Decomposed by an aqueous solution of any salt of a sesquioxide, with formation of an insoluble phosphate of the sesquioxide. (Guignet, *C. R.*, **49.** 455.)

*Meta***Phosphate of Nickel & of Soda.**
I.) *Dimetaphosphate?* Insoluble in water, and dilute acids. Soluble in concentrated sulphuric acid. (Maddrell, *Ann. Ch. u. Pharm.*, 1847, **61.** 56.)
$6\ (Ni\ O, aPO_5); Na\ O, aPO_5$

*Pyro***Phosphate of Nickel & of Soda.** Soluble in water. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130.)

Phosphate of Nicotin. Soluble in water.

Phosphate of *ter***NitroMesidin.** Insoluble in water. Soluble in dilute phosphoric acid. Water does not decompose it. (Maule, *J. Ch. Soc.*, **2.** 120.)
$3\left(N\left\{\begin{matrix}C_{18}\ H_{10}\ (N\ O_4)\\ H_2\end{matrix}\right.\ .\ H\ O\right), cPO_5$

Phosphate *of protoxide* **of Osmium.**
I.) *di.* Difficultly soluble in water. (Berzelius.)
$2\ Os\ O, H\ O, PO_5$

II.) ? Soluble in nitric acid.

Phosphate of Palladium. Ppt.

Phosphate of Phenyl. Insoluble in water. Soluble in alcohol, and ether. Insoluble in an aqueous solution of caustic potash, unless this is boiling. (Scrugham, *J. Ch. Soc.*, 7. 240.)
$3\ C_{12}\ H_5\ O, cPO_5$

Phosphate of Phosphoric Oxide. When recently precipitated it is completely soluble in water; but after standing for a few hours at the ordinary temperature, or immediately at a temperature of 80°, the solution deposits phosphoric oxide. It is also soluble in alcohol when recently prepared; but is insoluble in ether. (Leverrier.)
(*Phosphoric Phosphate.*)
$4\ P_2\ O, 3\ P\ O_5$

Phosphate of Picolin. By boiling with water it is converted into an acid salt. (Unverdorben.)

Phosphate of Platinum & Ammonia (Raewsky's). Nearly insoluble in cold, slightly soluble in hot water. (Raewsky.)
$4\ N\ H_3, Pt_2\ Cl, H\ O, P\ O_5$

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_Meta_Phosphate of Potash.

I.) *Monometaphosphate.* $KO, a'PO_5$ Almost completely insoluble in water. Soluble, however, in dilute and concentrated acids, even in acetic acid. (Maddrell, *Ann. Ch. u. Pharm.*, 1847, **61.** 62.) Almost absolutely insoluble in water. (Graham, *Phil. Trans.*, 1833, **123.** 275.) Fleitmann (*Pogg. Ann.*, **78.** 250), speaks of it as being completely insoluble in water, and weak acids.

II.) *Dimetaphosphate.* $2KO, 2a''PO_5 \& + 2Aq$ The crystallized salt is soluble in 1.2 pts. of water, either hot or cold. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 250.)

III.) *Hexametaphosphate.* Soluble in water. (Graham.)

_Pyro_Phosphate of Potash.

I.) $2KO, bPO_5 + 3Aq$ Very deliquescent. Soluble in water, from which solution it is precipitated on the addition of alcohol. The aqueous solution may be boiled without the salt being converted into ordinary phosphate. (Schwarzenberg, *Ann. Ch. u. Pharm.*, **65.** pp. 134, 135.)

II.) KO, HO, bPO_5 Quickly deliquesces. Very soluble in water. A syrupy aqueous solution of this salt is precipitated when alcohol is added to the acetic-acid solution of No. I. (Schwarzenberg, *Ann. Ch. u. Pharm.*, **65.** 136.)

Phosphate of Potash.

I.) *mono.* $KO, 2HO, cPO_5$ Deliquescent. Easily soluble in water. Insoluble in alcohol.

II.) *di.* $2KO, HO, cPO_5$ Deliquescent. Easily soluble in water, and alcohol. (Schubarth's *Tech.*)

III.) *tri.*

a = crystallized. Permanent. Exceedingly soluble in water. (Graham, *Phil. Trans.*, 1833, **123.** 263.) Insoluble in alcohol.

_DiMeta_Phosphate of Potash & of Soda. $KO, NaO, 2a''PO_5 + 2Aq$ Soluble in 24 pts. of water. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 339.)

_Pyro_Phosphate of Potash & of Soda. $KO, NaO, bPO_5 + 12Aq$ Soluble in water. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 140.)

Phosphate of Potash & of Soda. $KO, NaO, HO, cPO_5 + 16Aq$ Soluble in water. (Mitscherlich, *Ann. Ch. et Phys.*, 1821, (2.) **19.** 396.)

Phosphate of Potash with _bi_Sulphate of Potash. $KO, 2HO, cPO_5; KO, HO, 2SO_3$ Decomposed by water, and alcohol. (Jacquelain.)

Phosphate of Quinine.

I.) $3\left(\left.N_2\right\}C_{40}H_{24}O_4{}^{vi}.HO\right), 3HO, 2cPO_5 + 9Aq$ Difficultly soluble in cold water. (Winckler, from *Buchn. Rep.*, (2.) **49.** 1, in *Pharm. Central B.*, 1848, **19.** 311.) Soluble in water. Very readily soluble in water acidulated with phosphoric acid. (Anderson, *J. Ch. Soc.*, **1.** 58.)

II.) *acid.* Easily soluble in water. (Winckler.)

Phosphate of Rhodium.

Phosphate of Ruthenium.

Phosphate of Sanguinarin (or of *Chelerythrin*). Permanent. Easily soluble in water, and dilute spirit; more difficultly soluble in absolute alcohol. Insoluble in ether. The aqueous solution may be kept for a long time without decomposing. (Probst, *Ann. der Pharm.*, 1839, **29.** 121.)

_Meta_Phosphate of Silver.

I.) *Dimetaphosphate.* $2AgO, 2a''PO_5$ Much less soluble than trimetaphosphate of silver. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 252.)

II.) *Trimetaphosphate.* $3AgO, 3a'''PO_5 + 2Aq$ Soluble in 60 pts. of cold water. The permanence of this salt in cold solutions is remarkable; it can even be crystallized from liquors strongly acidulated with nitric acid. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 310, 312.)

III.) *Hexametaphosphate.*
(*Ordinary metaphosphate.*)

a = normal. $6AgO, 6a^{vi}PO_5$ Completely insoluble in water. (Fleitmann, *Pogg. Ann.*, 1849, **78.** pp. 253, 359.) Very easily soluble in an aqueous solution of hexametaphosphate of soda. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 329, 320, 305.) Exceedingly easily decomposed by an aqueous solution of sulphide of sodium. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 359.) Soluble in ammonia-water, and in nitric acid. Also soluble in a large excess of an aqueous solution of hexametaphosphate of soda. (H. Rose, *Pogg. Ann.*, 1849, **76.** pp. 3, 5, 6, 7.) Cold water very slowly abstracts a portion of its acid, and if it be immersed in boiling water, while recently precipitated and still moist, it is decomposed, with formation of the salt *b*. (Berzelius, *Pogg. Ann.*, 1830, **19. 332**; H. Rose, *Ibid.*, 1849, **76.** 6.)

b = basic. "$3AgO, 2aPO_5 + Aq$" Insoluble in cold, gradually decomposed by the continued action of boiling water. (Berzelius, *Pogg. Ann.*, **19.** 332.) Soluble in nitric acid. (H. Rose, *Ibid.*, **76.** 7.) Fleitmann & Henneberg, (*Ann. Ch. u. Pharm.*, 1848, **65.** 332) suggest that this salt may be the same as the silver salt of their first acid. *Vid. inf. Anomalous* Phosphate of Silver, after the salt of the ordinary *c* acid.

Metaphosphate of silver is soluble in cold metaphosphate of anilin, the solution being partially decomposed on boiling. (Nicholson.)

_Pyro_Phosphate of Silver.

I.) *di.* $2AgO, bPO_5$ Permanent. Insoluble in water. Is not altered by boiling with water, nor attacked by acetic acid. Easily soluble in nitric and sulphuric acids; on heating these acid solutions it is converted into ordinary (*c*) phosphate of silver. Decomposed by chlorhydric acid. Tolerably easily soluble in ammonia-water. Soluble in an aqueous solution of pyrophosphate of soda(?) with combination. It is not decomposed in the least when boiled with an aqueous solution of pyrophosphate of soda, but is almost instantaneously decomposed when boiled with ordinary (*c*) phosphate of soda, *c* phosphate of silver being formed. When the solution of a silver salt is added to a mixed solution of the *b* and *c* phosphates of soda the ordinary *c* phosphate of silver is precipitated first, i. e. before any pyrophosphate of silver falls. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, pp. 109–111; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** pp, 128–130.) Soluble in ammonia-water, and nitric acid. Insoluble in aqueous solutions of the pyrophosphates. Very slightly soluble in an aqueous solution of nitrate of silver. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 161.) Not completely insoluble in a very large excess of an aque-

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ous solution of pyrophosphate of soda. (H. Rose, *Pogg. Ann.*, 1849, **76.** 17.)

Phosphate of Silver.

I.) *di.* $2\,\mathrm{Ag\,O, H\,O}, c\mathrm{PO_5}$ Permanent. Instantly decomposed by water. (Berzelius; Schwarzenberg.) Insoluble in absolute alcohol, or in ether. Soluble in phosphoric acid. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 162.)

II.) *tri.* $3\,\mathrm{Ag\,O}, c\mathrm{PO_5}$ Insoluble, or very sparingly soluble in water. Soluble in nitric acid and in phosphoric acid. (Berzelius, *Gilbert's Ann. Phys.*, 1816, **53.** 409.) Readily soluble in phosphoric, acetic, and nitric acids; also, in ammonia-water, and in an aqueous solution of carbonate of ammonia; less easily soluble in solutions of nitrate, and succinate of ammonia; imperfectly soluble in a solution of sulphate of ammonia.

Soluble in an aqueous solution of chloride of ammonium, and also very imperfectly in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 97, 98.) Readily soluble, with decomposition, in aqueous solutions of the soluble hyposulphites. (Herschel, *Edin. Phil. Journ.*. 1819, **1.** 397.) Soluble in ammonia-water and in nitric acid. (H. Rose, *Tr.*) Insoluble in an aqueous solution of *c* phosphate of soda. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, pp. 110, 111.) Insoluble in aqueous solutions of *c* diphosphate of soda or of the silver salts. (H. Rose, *Pogg. Ann.*, 1849, **76.** 24.) Insoluble in neutral liquors; it may be conveniently and completely precipitated from the nitric-acid solution by adding to this a slight excess of carbonate of silver, in order to neutralize it. (Chancel, *C. R.*, **49.** 997.)

When an equivalent of $3\,\mathrm{Ag\,O, PO_5}$ is boiled with an equivalent of $\mathrm{Na\,O, 3\,C\,O_2}$, in aqueous solution, $\frac{11}{1000}$ of it may be decomposed. While, on the other hand, when an equivalent of $\mathrm{Ag\,O, 3\,C\,O_2}$ is boiled with one of $3\,\mathrm{Na\,O, PO_5}$, $\frac{9269}{10000}$ of it may be decomposed. (Malaguti, *Ann. Ch. et Phys.*, (3) **51.** 351.) Decomposed by an aqueous solution of any salt of a sesquioxide, with formation of an insoluble phosphate of the sesquioxide. (Guignet, *C. R.*, **49.** 455.) It is not precipitated from solutions which contain citrate of soda. (Spiller.) It is precipitated even in presence of 10000 pts. of water. (Pfaff.)

*Anomalous*Phosphate of Silver.

I.) *Salt of Fleitmann & Henneberg's 1st acid.* "$6\,\mathrm{Ag\,O}, 4\,\mathrm{PO_5}$" Ppt. Insoluble in water, but is partially decomposed by long-continued washing with water. Soluble in a very large excess of an aqueous solution of the corresponding soda salt. (F. & H., *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 329, 330, 332.) Fleitmann & Henneberg suggest that this salt may be the same as the basic metaphosphate of silver of Berzelius.

II.) *Salt of Fleitmann & Henneberg's 2d Acid.* "$6\,\mathrm{Ag\,O}, 5\,\mathrm{PO_5}$." Ppt. Very easily soluble in an aqueous solution of the corresponding soda salt. (F. & H., *loc. cit.*, p. 333.)

*TriMeta*Phosphate of Silver & of Soda.

$3\,\mathrm{Ag\,O}, 3\,a'''\mathrm{PO_5}; 3\,\mathrm{Na\,O}, 3\,a'''\mathrm{PO_5}$ Soluble in water. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 310, 311.)

*Pyro*Phosphate of Silver & of Soda.

a.) Easily soluble in water. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130.)

$b = 6(2\,\mathrm{Ag\,O}, b\mathrm{PO_5}); 2\,\mathrm{Na\,O}, b\mathrm{PO_5} + 4\,\mathrm{Aq}$ Not completely insoluble in an aqueous solution of pyrophosphate of soda. Easily soluble in nitric acid. (Baer, *Pogg. Ann.*, 1848, **75.** 171.)

*Meta*Phosphate of Soda.

I.) *Monometaphosphate.* Even when reduced to an impalpable powder, it is only very slowly acted upon by continued digestion in a large quantity of boiling water.

(Strongly heated salt of Graham. Insoluble metaphosphate.)
$\mathrm{Na\,O}, a'\mathrm{PO_5}$

When it does dissolve, it appears to pass into No. III. (the trimetaphosphate). (Graham, *Phil. Trans.*, 1833, **123.** pp. 273–275.) Dilute acids have no action upon it, but alkalies, by long digestion, withdraw a portion of the phosphoric acid. (Graham, *Ibid.*, p. 276.) Almost completely insoluble in water. Soluble, however, in dilute and concentrated acids, even in acetic acid. (Maddrell, *Ann. Ch. u. Pharm.*, 1847, **61.** 63.)

II.) *Dimetaphosphate.* $2\,\mathrm{Na\,O}, 2\,a''\mathrm{PO_5}\ \&\ + 4\,\mathrm{Aq}$ The crystallized salt is soluble in 7.2 pts. of water, either hot or cold. Completely insoluble in strong alcohol, and even very dilute spirit only dissolves traces of it. The anhydrous salt greedily absorbs water from the air. It evolves considerable heat when moistened with water. The aqueous solution may be preserved, in the cold, for months without decomposition, and even on boiling it is transformed but slowly to ordinary *c* phosphate. Very easily soluble in concentrated chlorhydric acid, from which it crystallizes again completely as neutral salt, on the addition of spirit. It may also be recovered, as neutral salt, from its solution in caustic soda, when this is evaporated. It is most permanent in alkaline solutions; but on boiling with acids it is rapidly converted to the ordinary *c* phosphate, sulphuric acid acting most quickly and completely. (Fleitmann, *Pogg. Ann.*, 1849, **78.** pp. 247–249.)

III.) *Trimetaphosphate.* Readily soluble in water. (Graham, *Phil. Trans.*, 1833, **123.** pp. 273, 274.)

(Slightly heated salt of Graham.)
$3\,\mathrm{Na\,O}, 3\,a'''\mathrm{PO_5} + \frac{1}{2}\,\mathrm{Aq}\ \&\ 11\frac{1}{2}\,\mathrm{Aq}$

Soluble in 4.5 pts. of cold water. The aqueous solution may be preserved in the cold for a long time, but on boiling it acquires an acid reaction after a time, and when this has once occurred, further decomposition goes on more rapidly. Insoluble in alcohol, and difficultly soluble even in very dilute spirit. Decomposed to ordinary *c* phosphate by boiling chlorhydric acid. Does not melt in its water of crystallization. It forms with the other trimetaphosphates many double salts, all of which are soluble in water. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 304–309, 316.) Easily soluble in water. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 356.)

IV.) *Tetrametaphosphate.* $4\,\mathrm{Na\,O}, 4\,a^{\mathrm{iv}}\mathrm{PO_5} + 8\,\mathrm{Aq}$ Permanent. Soluble in water to a slimy solution; less soluble in spirit. (Fleitmann, *Pogg. Ann.*, 1849, **78.** pp. 354, 355.)

V.) *Hexametaphosphate.* Deliquescent. Soluble in water. (Proust.) Deliquesces in damp air. Highly soluble in water.

(Glassy metaphosphate. Graham's metaphosphate. Ordinary metaphosphate. Deliquescent metaphosphate.)
$6\,\mathrm{Na\,O}, 6\,a^{\mathrm{vi}}\mathrm{PO_5}$

The aqueous solution undergoes no alteration when kept for several months. Insoluble in alcohol. (Graham, *Phil. Trans.*, 1833, **123.** pp. 276–278.) Spirit precipitates it from

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the aqueous solution, as a concentrated solution. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 359.)

Compare Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 305, 316.)

*Pyro*PHOSPHATE OF SODA.

I.) *mono* or "*acid.*" Very soluble in water. $Na O, H O, bPO_5$ (Graham, *Phil. Trans.*, 1833, **123.** 272.) Easily soluble in water. Only slightly soluble in alcohol. It is precipitated from an acetic acid solution of the normal salt (No. II.) on the addition of alcohol. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 139.) Much more soluble in water than mono (*c*) phosphate of soda ($Na O, 2 H O, cPO_5$). (Berzelius's *Lehrb.*, **3.** 230.)

II.) $2 Na O, bPO_5 + 10 Aq$ Permanent. Soluble in water. More difficultly soluble in water than ordinary *c* diphosphate of soda. (Clarke.) The aqueous solution is not changed by boiling, or when kept for a long time. The salt is, however, converted into the ordinary *c* phosphate when heated with sulphuric, chlorhydric, acetic, or even phosphoric acid. The aqueous solution dissolves most of the metallic pyrophosphates, with formation of easily soluble double salts. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, pp. 111, 113; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** pp. 130, 132.) For the stability of aqueous solutions of this salt, see also under pyrophosphoric acid, or H. Rose, *Pogg. Ann.*, 1849, **76.** 20. Pyrophosphate of soda is not sensibly soluble in alcohol. (Persoz, *Ann. Ch. et Phys.*, (3.) **20.** 325.)

PHOSPHATE OF SODA.

I.) *mono.* Very easily soluble in water; not $Na O, 2 H O, cPO_5 + 2 Aq$ easily soluble in alcohol. (Graham.) Insoluble in alcohol. (Berzelius's *Lehrb.*) This salt is precipitated when alcohol is added to a solution of ordinary phosphate of soda in nitric acid. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1818, **65.** 140.)

II.) *di.*

a.) *Containing no water of crystallization.* Soluble in water. $2 Na O, H O, cPO_5$

In a solution containing for 100 pts. of water, pts. of dry $2 Na O, H O, PO_5$	The boiling-point is elevated.	Difference.
0.0	0.0	
11.0	0 5	11.0
21.0	1.0	10.0
31.0	1.5	10.0
40.8	2.0	9.8
50.3	2.5	9.5
59.4	3.0	9.1
68.1	3.5	8.7
76.4	4.0	8 3
84 2	4.5	7.8
91.5	5 0	7.3
98.4	5.5	6.9
105 0	6.0	6.6
111 4	6.5	6.4
11[2 ?]6	6.6	

The point of ebullition of pure water, observed in a glass-tube containing bits of metallic zinc, having been 99.9°. (Legrand, *Ann. Ch. et Phys.*, 1835, (2.) **59.** 433.)

$b = 2 Na O, H O, cPO_5 + 14 Aq$ Nonefflorescent. This salt is contained in hot solutions of common phosphate of soda, and may be obtained when these are evaporated at temperatures superior to 33°; at lower temperatures the compound *c* crystallizes out. (Clark.)

$c = 2 Na O, H O, cPO_5 + 24 Aq$ Effloresces rapidly. (*Common Phosphate of Soda. Neutral Phosphate of Soda. Pearl Salt.*) Soluble in 8.48 pts. of water at 17°; or 100 pts. of water at 17° dissolve 11.8 pts. of it; or the aqueous solution saturated at 17° contains 10.6% of it, or 4.2% of the anhydrous salt, and is of 1.0442 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.) Soluble in 4 pts. of cold and in 2 pts. of boiling water; the saturated cold solution containing 20% of it, and the boiling saturated solution 33.33%. (Pagenstecker.) This salt is much less soluble in water than has been stated by Pagenstecker; the erroneous results of this chemist were probably due to the formation of supersaturated solutions, a phenomenon to which phosphate of soda is peculiarly liable. (H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 331.) Soluble in 4 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht*, *für* 1854, p. 76.) The aqueous solution saturated at 15° is of 1.046912 sp. gr., and contains dissolved in every 100 pts. of water at least 12.735 pts. of it. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.) 100 pts. of water at 18.3° dissolve 26.77 pts. of it. [T.] Very soluble in water, but much more soluble in hot than in cold water. (Mitscherlich, *Ann. Ch. et Phys.*, 1821, (2.) **19.** pp. 388, 407.) It melts in its water of crystallization, at a temperature below 100°; and is very liable to form supersaturated solutions like sulphate of soda. (Gay-Lussac.) The saturated aqueous solution boils at 105.5°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90; at 106.6° (Legrand.) Insoluble in alcohol.

An aqueous solution of sp. gr. (at 19°)	Contains (by experiment) $2 Na O, H O, PO_5 + 24 Aq$ (per cent).
1.0442	10.588
1.0292	6.988
1.0220	5.294
1.0198	4.659
1.0160	3 495
1.0114	2.330
1.0067	1.165

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 331.)

From these results Schiff calculates the following table by means of the formula:—
$D = 1 + 0.00415\,p + 0.00000355\,p^2$, — in which D = the sp. gr. of the solution and p the percentage of substance contained in the solution.

An aqueous solution of sp. gr. (at 19°)	Contains Per cent of $2 Na O, H O, PO_5 + 24 Aq.$	Per cent of anhydrous $2 Na O, H O, PO_5$.
1.0041	1	0.397
1.0083	2	0.794
1.0125	3	1.191
1.0166	4	1.588
1.0208	5	1.985
1.0250	6	2.382
1.0292	7	2.779
1.0332	8	3.176
1.0376	9	3.573
1.0418	10	3.970
1.0460	11	4.367
1.0503	12	4 764

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 70.)

III.) *tri.*

a = *anhydrous*
$3 Na O, cPO_5$

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b = crystallized. Permanent. 100 pts. of water at 15.56° dissolve 19.6 pts. of it; or 1 pt. of it is soluble in 5.1 pts. of water at 15.56°. It melts in its water of crystallization at 76.67°. (Graham, *Phil. Trans.*, 1833, **123.** pp. 254, 255.) Soluble in 3.94 pts. of water at 15°; or 100 pts. of water at 15° dissolve 28.3 pts. of it; or, the aqueous solution saturated at 15° contains 22.03% of it, or 9.5% of the anhydrous salt, and is of 1.1035 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 350.)

$3\,Na\,O, c PO_5 + 24\,Aq$

An aqueous solution of sp. gr. (at 15°)	Contains (by experiment) per cent of $3\,Na\,O, PO_5 + 24\,Aq.$
1.0193	4.40
1.0393	8.80
1.0495	11.00
1.0812	17.60
1.1035	22.03

From these results Schiff deduces the formula: $D = 1 + 0.004279\,p + 0.00001742\,p^2$, in which D = sp. gr. of the solution and p the percentage of substance in the solution, by means of which Ott has calculated the following table.

An aqueous solution of sp. gr. (at 15°)	Contains	
	Per cent of $3\,Na\,O, PO_5 + 24\,Aq.$	Per cent of $3\,Na\,O, PO_5.$
1.0043	1	0.432
1.0086	2	0.864
1.0130	3	1.297
1.0174	4	1.729
1.0218	5	2.161
1.0263	6	2.593
1.0308	7	3.025
1.0353	8	3.458
1.0399	9	3.890
1.0445	10	4.322
1 0492	11	4.754
1.0539	12	5.186
1.0586	13	5.619
1.0633	14	6.051
1.0681	15	6.483
1 0729	16	6.915
1.0778	17	7.347
1.0827	18	7.780
1.0876	19	8.212
1.0925	20	8.644
1.0975	21	9 076
1.1025	22	9.508
1.1076	23	9.941
1.1127	24	10.373

(H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 196.)

*Anomalous*PHOSPHATE OF SODA.

I.) *Salt of Fleitmann & Henneberg's 1st acid.*

a = normal. Soluble in about 2 pts. of cold water. The aqueous solution is exceedingly easily decomposed. Although abundantly soluble in water, as stated above, it dissolves very difficultly and with extreme slowness. Very easily decomposed by acetic acid. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 324 – 328; compare Laurent & Gerhardt, *Gmelin's Handbook*, **3.** 96.)

"$6\,Na\,O, 4\,P\,O_5 + x\,Aq$"

b = acid. *Salt of Fleitmann and Henneberg's 1st acid?* (Fleitmann & Henneberg, *loc. cit.*, p. 328.)

"$4\,Na\,O, 2\,H\,O, 4\,PO_5$"

II.) *Salt of Fleitmann and Henneberg's 2d acid.* Soluble in water. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 333.)

"$6\,Na\,O, 5\,PO_5$."

*TriMeta*PHOSPHATE OF SODA & OF STRONTIA. Soluble in water. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 315, 309.)

*Pyro*PHOSPHATE OF SODA & OF STRONTIA. Somewhat soluble in water, and ammonia-water. Insoluble in an aqueous solution of pyrophosphate of soda or in alcohol. Easily soluble in chlorhydric and nitric acids. (Baer, *Pogg. Ann.*, 1848, **75.** pp. 166, 164.)

$9\,(2\,Sr\,O, b PO_5)\,;\,2\,Na\,O, b PO_5 + 18\,Aq(?)$

*Pyro*PHOSPHATE OF SODA & *of sesquioxide* OF URANIUM. Soluble in water. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130.) Extremely soluble in water. (Persoz, *Ann. Ch. u. Phys.*, (3.) **20.** 322.)

PHOSPHATE OF SODA & OF URANIUM. Ppt.

$Na\,O, 5\,Ur_2O_3, 2\,c PO_5$

PHOSPHATE OF SODA & OF VANADIC ACID. Very slowly soluble in water.

*Pyro*PHOSPHATE OF SODA & OF YTTRIA. Soluble in water. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130.)

*TriMeta*PHOSPHATE OF SODA & OF ZINC. Soluble in water. (Fleitmann & Henneberg, *Ann. Ch. u. Pharm.*, 1848, **65.** pp. 315, 309.)

$Na\,O, 2\,Zn\,O, 3\,a''' PO_5 + x\,Aq$

PHOSPHATE OF SOLANIN.

PHOSPHATE OF STANNETHYL. Insoluble in water.

*Meta*PHOSPHATE OF STRONTIA.

I.) *Dimetaphosphate?* Insoluble in water, and dilute acids. Decomposed by warm concentrated sulphuric acid. (Maddrell, *Ann. Ch. u. Pharm.*, 1847, **61.** 61.) Not decomposed by digestion in solutions of the alkaline carbonates. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 352.)

$Sr\,O, a PO_5$

II.) *Trimetaphosphate.* Appears to be soluble in water. (Fleitmann, cited by H. Rose, *Pogg. Ann.*, 1849, **76.** 9.)

*Pyro*PHOSPHATE OF STRONTIA. Somewhat soluble in water. Easily soluble in nitric or chlorhydric acid. Insoluble in acetic acid, or in an aqueous solution of pyrophosphate of soda. (Schwarzenberg, *Ann. Ch. u. Pharm.*, **65.** 144.) Insoluble in an aqueous solution of pyrophosphate of soda, or rather only very slightly soluble therein when recently precipitated. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130.)

$2\,Sr\,O, b PO_5 + Aq$

PHOSPHATE OF STRONTIA.

I.) *di.* Permanent. Insoluble in water. Easily soluble in phosphoric, chlorhydric, and nitric acids. (Vauquelin.)

$2\,Sr\,O, H\,O, c PO_5$

Soluble in a boiling aqueous solution of chloride of ammonium, with evolution of ammonia (Fuchs; Demarçay, *Ann. der Pharm.*, 1834, **11.** 251.) Easily soluble, when recently precipitated, in cold aqueous solutions of chloride of ammonium and nitrate of ammonia, and cannot be completely precipitated therefrom by an excess of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 96, 99, compare p. 334.)

When an equivalent of $2\,Sr\,O, H\,O, P\,O_5$ is boiled with an equivalent of $Na\,O, 2\,C\,O_2$, in aqueous solution, $\frac{24.61}{100}$ of it may be decomposed.

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While, on the other hand, when an equivalent of $Sr\,O, 2\,C\,O_2$ is boiled with an equivalent of $2\,Na\,O, H\,O, P\,O_5$ $\frac{45}{100}$ of it may be decomposed. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 351.) Soluble in aqueous solutions of chloride of ammonium, and of nitrate and succinate of ammonia (Wittstein), and of normal citrate of soda. (Spiller.) Partially decomposed when boiled with an aqueous solution of carbonate of potash or carbonate of soda. (Dulong, *Ann. de Chim.*, **82.** 279.)

Phosphate of Strychnine.

I.) *mono.* Soluble in 5 @ 6 pts. of cold water, $N_2\left\{C_{42}H_{22}O_4^{vi}\,.\,H\,O, 2\,H\,O, cPO_5 + 4\,Aq\right.$ and in a much smaller quantity of hot water. (Anderson, *J. Ch. Soc.*, **1.** 56.)

II.) *di.* Less soluble in water than the monobasic salt. $2\left(N_2\left\{C_{42}H_{22}O_4^{vi}\,.\,H\,O\right.\right), H\,O, PO_5 + 18\,Aq$ (Anderson, *loc. cit.*)

Phosphate of Sulphate of Potash. $K\,O, S\,O_3\,;\,3\,H\,O, PO_5$ Decomposed by water, and alcohol. (Jacquelin.)

Phosphate of Tellurium. Insoluble in water. (Berzelius.)

Phosphate of Thoria. $2\,Th\,O, H\,O, cPO_5$ Insoluble in water, or in phosphoric acid. (Berzelius, *Pogg. Ann.*, 1829, **16.** 411.)

Phosphate ***of protoxide*** **of Tin.** $3\,Sn\,O, cPO_5$ Insoluble in water.

Insoluble in aqueous solutions of chloride of ammonium or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 98.) Soluble in chlorhydric acid and in an aqueous solution of caustic potash.

Phosphate ***of binoxide*** **of Tin.** $2\,Sn\,O_2, PO_5 + 10\,Aq$ Insoluble in nitric acid. (Reynoso, *Ann. Ch. et Phys.*, (3.) **34.** 323.) In general it has the same solubility as hydrated metastannic acid. [See *per*Oxide of Tin.] (Fresenius, *Quant.*, p. 161.)

Phosphate ***of binoxide*** **of Titanium.** Insoluble in water. Soluble in phosphoric acid, and in an aqueous solution of chloride of titanium. (Rose.)

Phosphate of Toluidin.

Phosphate ***of protoxide*** **of Uranium.** $2\,Ur\,O, H\,O, cPO_5 + 2\,Aq$ Completely insoluble in water, and is insoluble while yet moist in dilute chlorhydric acid. Very sparingly soluble in concentrated chlorhydric acid, and is reprecipitated therefrom on the addition of water. Decomposed by a solution of caustic potash. (Rammelsberg.)

Pyro**Phosphate** ***of sesquioxide*** **of Uranium.** $2\,Ur_2\,O_3, bPO_5 + 5\,Aq$ Efflorescent. Insoluble in water, alcohol, or ether. Soluble in nitric acid, from which it is reprecipitated on the addition of an alkali. (A. Girard, *C. R.*, 1852, **34.** 24.) Soluble in an aqueous solution of pyrophosphate of soda. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130; A. Girard, *loc. cit.*)

Phosphate ***of sesquioxide*** **of Uranium.**

I.) $Ur_2\,O_3, cPO_5 + 5\,Aq$ Hygroscopic. Partially soluble in water, with separation of a basic salt. (Werther.)

II.) $2\,Ur_2\,O_3, P\,O_5, \&c. + 4\,Aq\ \&\ 9\,Aq$ Insoluble in water or acetic acid. Easily soluble in the mineral acids. (Arendt & W. Knop.) Insoluble in water. Soluble in a solution of carbonate of ammonia. (Werther.) Is not precipitated from solutions containing citrate of soda. (Spiller.) Soluble in an aqueous solution of carbonate of potash. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** 220.)

III.) *acid.* Soluble in water. (Berzelius's *Lehrb.*)

Phosphate ***of binoxide*** **of Vanadium.**

I.) *normal.* Quickly deliquescent. Soluble in $V\,O_2, H\,O, cPO_5$ water. Insoluble in alcohol. After having been ignited it is insoluble in water. (Berzelius's *Lehrb.*, **3.** 1053.)

II.) "*basic.*" Not entirely soluble in water. Insoluble in alcohol.

Phosphate ***of teroxide*** **of Vanadium** (Vanadic Acid.)

I.) *normal.* Very slowly soluble in water. $2\,V\,O_3, 3\,H\,O, 3\,cPO_5$

II.) *acid.* Deliquescent. Soluble in water. (Berzelius's *Lehrb.*)

"**Phosphate of Vanadic Acid & of Silicic Acid.**" $2\,Si\,O_3, P\,O_5\,;\,2\,V\,O_3, P\,O_5 + 6\,Aq$ Tolerably soluble in water. (Berzelius.)

Pyro**Phosphate of Yttria.** Soluble in an aqueous solution of pyrophosphate of soda, with combination. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 111; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 130.)

Phosphate of Yttria.

I.) *acid.* Soluble in phosphoric acid. (Gadolin.)

II.) *di.* $2\,Y\,O, PO_5$ Insoluble in water. Soluble, with combination, in phosphoric acid. Soluble in chlorhydric, and nitric acids, from which solutions, when saturated, the tri-salt is deposited on boiling. (Berzelius.)

III.) *tri.* $3\,Y\,O, P\,O_5$ Insoluble in water, or in acids after it has been ignited. Before ignition it is soluble in acids.

Meta**Phosphate of Zinc.**

I.) *Dimetaphosphate.*

a = *anhydrous.* $2\,Zn\,O, 2\,a''PO_5$ Unacted upon by acid or alkaline solvents, with the exception of boiling concentrated sulphuric acid. It is not decomposed to any perceptible extent by boiling aqueous solutions of the sulphides of sodium or ammonium; but solutions of the alkaline carbonates abstract its acid. (Fleitmann, *Pogg. Ann.*, 1849, **78.** 350.)

b.) *crystallized.* $2\,Zn\,O, 2\,a''PO_5 + 8\,Aq$ Insoluble in water. Only difficultly decomposed by boiling acids. (Fleitmann, *loc. cit.*, p. 258.)

II.) *Trimetaphosphate.* Appears to be soluble in water. (Fleitmann, cited by H. Rose, *Pogg. Ann.*, 1849, **76.** 9.)

III.) *Hexametaphosphate.* Appears to be soluble in water. (H. Rose, *Pogg. Ann.*, 1849, **76.** 4.)

IV.) ? As prepared by burning hyposulphophosphate of zinc, metaphosphate of zinc is soluble in water. (Berzelius.)

Pyro**Phosphate of Zinc.** $2\,(2\,Zn\,O, bPO_5) + 8\,Aq$ Soluble in acids, even in sulphurous acid. Also soluble in aqueous

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solutions of caustic potash, and ammonia. From the solution in ammonia-water alcohol precipitates a syrupy mass. (Schwarzenberg, *Ann. Ch. u. Pharm.*, 1848, **65.** 151.) It is not decomposed in the least by a boiling aqueous solution of pyrophosphate of soda, but is immediately decomposed by a boiling solution of ordinary *c* phosphate of soda, *c* phosphate of zinc being precipitated. (Stromeyer, *Gött. gelehrte Anz.*, 1st vol. of the year 1830, p. 110; also in *Schweigger's Journ. für Ch. u. Phys.*, **58.** 129.) Soluble in an aqueous solution of pyrophosphate of soda, and the solution remains clear when boiled. Also soluble in an aqueous solution of sulphate of zinc, but this solution becomes cloudy on being heated, and the precipitate formed does not disappear again on cooling. (H. Rose, *Pogg. Ann.*, 1849, **76.** 19.)

PHOSPHATE OF ZINC.

I.) *peracid.* Soluble in water. (Wenzel.)

II.) *mono.* Nearly insoluble in water. (Parrish's *Pharm.*, p. 491.) Soluble in water. (Ure's *Dict.*)
$Zn\,O, 2\,H\,O, c PO_5 + 2\,Aq$

III.) *di.* Insoluble in water. Soluble in phosphoric acid. (Berzelius's *Lehrb.*)
$2\,Zn\,O, H\,O, c PO_5 + 2\,Aq$

IV.) *tri.* Insoluble in water. Soluble in acids, in ammonia-water, and in aqueous solutions of carbonate, sulphate, and nitrate of ammonia, of chloride of ammonium, and of caustic potash.
$3\,Zn\,O, c PO_5$

Soluble in a boiling aqueous solution of chloride of ammonium, with evolution of ammonia. (Fuchs; Demarçay, *Ann. der Pharm.*, 1834, **11.** 251.) When recently precipitated it is soluble in a hot aqueous solution of chloride of ammonium. Somewhat less easily in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.) Easily soluble in aqueous solutions of the salts of zinc. Solutions thus obtained become slightly turbid on heating and not entirely clear again on cooling. (H. Rose, *Pogg. Ann.*, 1849, **76.** 25.)

***Pyro*PHOSPHATE OF ZINC & OF ZINCAMMONIUM.** Insoluble in water. (Bette.)
$4\,Zn\,O, 2\left(N\left\{H_3\,Zn\right.\right)O, 3\,b PO_5 + 9\,Aq$

PHOSPHATE OF ZIRCONIA. Insoluble in water.
$2\,Zr_2\,O_3, 3\,PO_5$

PHOSPHETHYLIC ACID. *Vid.* EthylPhosphoric Acid.

PHOSPHIDES. All the metallic phosphides are either insoluble in water or immediately decomposed by it. (Persoz, *Chim. Moléc.*, p. 463.)

PHOSPHIDE OF ALUMINUM. Decomposed by water. (Deville.)

PHOSPHIDE OF ANTIMONY.

PHOSPHIDE OF BARIUM. Decomposed by water. (Dulong.)

PHOSPHIDE OF BISMUTH.

PHOSPHIDE OF CADMIUM. Soluble, with decomposition, in chlorhydric acid.

PHOSPHIDE OF CALCIUM. Permanent in dry air. Decomposed by water and by acids. Unacted upon by concentrated nitric acid, but decomposed by dilute acid. (P. Thénard, *Ann. Ch. et Phys.*, (3.) **14.** 14.)
$Ca_2\,P$

PHOSPHIDE OF CERIUM. Unacted upon by strong acids.

PHOSPHIDE OF *ter*CHLORACETYL. *Vid. ter*ChlorAcetylPhosphin.

***Di*PHOSPHIDE OF CHROMIUM.** Insoluble in chlorhydric acid; difficultly soluble in nitric acid, and in aqua-regia (H. Rose); insoluble in everything else, even in fluorhydric acid. (Berzelius.)
$Cr_2\,P$

***Tri*PHOSPHIDE OF COBALT.** Insoluble in chlorhydric acid. Easily soluble in nitric acid.
$Co_3\,P$

PHOSPHIDE OF COPPER.

I.) *di.*
$Cu_2\,P$

II.) *tri.* Soluble in hot concentrated sulphuric, nitric, and chlorhydric acids.
$Cu_3\,P$

III.) *hexa.* Insoluble in chlorhydric acid; but soluble in nitric acid, and in aqua-regia, with formation of phosphoric acid. (H. Rose.)
$Cu_6\,P$

IV.) $Cu_3\,P_2$

α

β Insoluble in chlorhydric acid. Soluble in nitric and in hot concentrated sulphuric acids. (Berzelius's *Lehrb.*)

V.) $Cu_4\,P$; $Cu_6\,P$

PHOSPHIDE OF COPPER & OF ZINC.
$Cu_6\,P$; $Zn_6\,P$

PHOSPHIDE OF GLUCINUM. Decomposed by water.

PHOSPHIDE OF GOLD.

PHOSPHIDE OF HYDROGEN. *Vid.* Phosphuretted Hydrogen. [No. I. (solid.)]

PHOSPHIDE OF IRIDIUM.

PHOSPHIDE OF IRON.

I.) Unacted upon by chlorhydric or nitric acid. (Hooslef.)
$Fe_2\,P$

II.) $Fe_3\,P_2$ Soluble only in strong nitric acid, or in aqua-regia. (H. Rose.)

III.) $Fe_4\,P$ Same solubility as No. II. (H. Rose.)

IV.) $Fe_6\,P$ Unacted upon by chlorhydric or nitric acid. (Hooslef.)

PHOSPHIDE OF LEAD. Insoluble in water.

PHOSPHIDE OF MANGANESE. Insoluble in chlorhydric acid.

PHOSPHIDE OF MERCURY.
$Hg\,P$

PHOSPHIDE OF MERCURY with SULPHATE OF MERCURY. Insoluble in cold water. Soluble in aqua-regia. (H. Rose.)
$P\left\{Hg_3\right.; 2\,(3\,Hg\,O, 2\,S\,O_3) + 4\,Aq$

PHOSPHIDE OF NICKEL. Insoluble in chlorhydric, soluble in nitric acid.
$Ni_3\,P$

PHOSPHIDE OF NITROGEN (of Liebig & Wœhler, and of H. Rose). *Vid.* Phospham.

PHOSPHIDE OF OSMIUM.

PHOSPHIDE OF PALLADIUM.

PHOSPHIDE OF PLATINUM.

PHOSPHIDE OF POTASSIUM. Decomposed by water. Unacted upon by petroleum.

PHOSPHIDE OF SELENIUM. Phosphorus and selenium may be melted together in all proportions. The compounds $S\,P_2$ and $S\,P_3$ are partially decomposed by water. They are soluble in aqueous solutions of the caustic alkalies, with decomposition. (Berzelius.)

PHOSPHIDE OF SILVER.

PHOSPHIDE OF SODIUM. Decomposed by water. (Dumas, *Tr.*)

PHOSPHIDE OF STRONTIUM. Decomposed by water. (Dumas, *Tr.*)

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Phosphide of Thorium. Unacted upon by water.

Phosphide of Tin.

Phosphide of Titanium.

Phosphide of Yttrium. Decomposed by water. (Wœhler.)

Phosphide of Zinc.

I.) PZn Unacted upon by hot chlorhydric acid. (Hooslef.)

II.) Zn_3P Decomposed by chlorhydric acid. (Hooslef.)

Phosphide of zinc is totally insoluble in water. (H. Rose.)

Phosphorous Acid.

a = *anhydrous.* Easily soluble in water.
PO_3

b = *hydrated.* Very deliquescent. Soluble in
$3HO, PO_3$ water. The alkaline phosphites are easily soluble in water; most of the other salts are insoluble in water, but soluble in phosphorous acid. All the phosphites are insoluble in alcohol.

Phosphite of Alumina. Sparingly soluble
$2Al_2O_3, 3PO_3$ in water. (Berzelius's *Lehrb.*, **3.** 478.)

Phosphite of Ammonia. Deliquescent.
$2NH_4O, HO, PO_3$ Soluble in water. Insoluble in alcohol. (Fourcroy.) 100 pts. of water at 15.5° dissolve 50 pts. of it; more soluble in hot water. (Ure's *Dict.*) Soluble in 2 pts. of cold, and in less hot water. (Berzelius's *Lehrb.*)

Deliquescent. Very soluble in water. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **16.** 210.)

Phosphite of Ammonia & of Magnesia. Only slightly soluble in water. (Fourcroy & Vauquelin.)

Phosphite of Ammonia & of Potash. Difficultly soluble in water. (H. Rose.)

Phosphite of Amyl.

I.) *mono.* *Vid.* AmylPhosphorous Acid.
$C_{10}H_{11}O, 2HO, PO_3$

II.) *di.* Insoluble in water, or in a weak aqueous solution of carbonate of soda. Soluble in a strong solution of carbonate of soda, and in ether. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **16.** pp. 223, 227.)
(*AmylPhosphorous Ether.*)
$2C_{10}H_{11}O, HO, PO_3$

III.) *tri.* Insoluble in water. Soluble in al-
$3C_{10}H_{11}O, PO_3$ cohol, and ether. (Railton, *J. Ch. Soc.*, **7.** 219.) Sparingly soluble in water. Soluble in alcohol, and ether. (Williamson & Railton.)

Phosphite of Antimony. Soluble in an
$2SbO_3, 3HO, 3PO_3$ excess of chlorhydric acid. (H. Rose.)

Phosphite of Baryta.

I.) *mono.* Easily soluble in water. (H. Rose.)
$BaO, 2HO, PO_3 + Aq$ Decomposed by boiling water to an insoluble basic and an insoluble acid salt. Insoluble in alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **16.** 211.)

II.) *di.* Efflorescent. Very slightly soluble in
$2BaO, HO, PO_3 + Aq$ water. Soluble in an aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 315.) 100 pts. of water at 15.5° dissolve 0.25 pt. of it. (Ure's *Dict.*) Soluble in phosphorous acid, with combination. (Berzelius's *Lehrb.*) Soluble in dilute chlorhydric acid. (Railton.)

Phosphite of Baryta & of Ethyl.

I.) $2BaO, C_4H_5O, PO_3$ Soluble in water, but the solution is decomposed by boiling. (Railton.)

II.) $BaO, 2C_4H_5O, PO_3$ Very deliquescent. Extremely soluble in water. Soluble in dilute, but only slightly soluble in absolute alcohol. (Railton.)

Phosphite of Bismuth. Insoluble in water.
$2BiO_3, 3PO_3$

Phosphite of Cadmium. Ppt.
$2CdO, HO, PO_3$

Phosphite *of sesquioxide* of Chromium. Al-
$2Cr_2O_3, 3HO, 3PO_3$ most insoluble in water. (H. Rose.)

Phosphite of Cobalt. Difficultly soluble
$2CoO, HO, PO_3$ in water. (H. Rose.)

Phosphite of Copper. Insoluble in water.
$2CuO, HO, PO_3 + 4Aq$ (H. Rose.)

Phosphite of Ethyl.

I.) *mono.* *Vid.* EthylPhosphorous Acid.

II.) *di.* *Vid.* *di*EthylPhosphorous Acid.

III.) *tri.* Soluble in water, alcohol, and ether.
(*EthylPhosphite of Ethyl.*) (Railton, *J. Ch. Soc.*, **7.** 218.)
$3C_4H_5O, PO_3$

Phosphite of Glucina. Insoluble in water.
$2Gl_2O_3, 3PO_3$ (H. Rose.)

Phosphite *of protoxide* of Iron. Almost in-
$2FeO, HO, PO_3$ soluble in water.

Phosphite *of sesquioxide* of Iron. Sparingly
$2Fe_2O_3, 3HO, 3PO_3$ soluble in cold water. Soluble in a cold aqueous solution of iron-alum. (H. Rose.)

Phosphite of Lead.

I.) *di.* Insoluble in water. (H. Rose.) Very
$2PbO, HO, PO_3$ sparingly soluble in warm phosphoric acid. (A. Wurtz.) Soluble in cold nitric acid, without oxidation. (Berzelius, *Lehrb.*)

II.) *tri*, "*tetra.*" Insoluble in water. Soluble
$3PbO, PO_3 + Aq$ in a warm dilute aqueous solution of hypophosphorous acid, from which it is precipitated on neutralizing with ammonia. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **7.** pp. 36, 44.)

Phosphite of Lime.

I.) *mono,* "*acid.*" Soluble in water. The aque-
$CaO, 2HO, PO_3 + Aq$ ous solution is decomposed by alcohol, which precipitates normal hypophosphite of lime, while an acid salt remains in solution. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **16.** 212.)

II.) *di,* "*normal.*" Soluble in water. The
$2CaO, HO, PO_3 + Aq$ aqueous solution is decomposed by boiling to a difficultly soluble basic, and a soluble acid salt. Insoluble in alcohol. (Wurtz, *Ann. Ch. et Phys.*, (3.) **16.** 212.) Difficultly soluble in water, the aqueous solution being decomposed by boiling, to an insoluble basic and a soluble acid salt. (Berzelius's *Lehrb.*) Soluble in an aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 315.) Soluble in 1 pt. of water at 15.6°. [Y.]

Phosphite of Magnesia.

I.) *di.* Difficultly soluble in water. (H. Rose.)
$2MgO, HO, PO_3 + 2Aq$ Requiring 400 pts. of water to dissolve it. (Berzelius, *Lehrb.*, **3.** 443.)

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Phosphite of Manganese.

I.) *di.* $2 MnO, HO, PO_3 + Aq$ Sparingly soluble in water. Soluble in aqueous solutions of chloride of manganese and sulphate of manganese. (H. Rose.)

Phosphite of Nickel. $2 NiO, HO, PO_3$ Sparingly soluble in water. (H. Rose.)

Phosphite of Potash.

I.) *di,* "*normal.*" $2 KO, HO, PO_3$ Very deliquescent. Very soluble in water. Insoluble in alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **16.** 207.) Deliquescent. Soluble in water. Insoluble in alcohol. (Dulong.)

II.) "*acid.*" $2 KO, 3 PO_3 + 7 HO$ Somewhat less soluble in water than the preceding salt. (Wurtz, *loc. cit.*, p. 208.) Soluble in 3 pts. of cold, and in a smaller quantity of hot water. (Fourcroy & Vauquelin.)

Phosphite of Silver. Insoluble in water. [Y.]

Phosphite of Soda.

I.) *di* or "*normal.*" $2 NaO, HO, PO_3 + 10 Aq$ Deliquescent. Very soluble in water. (A. Wurtz.) Very soluble in water. Also soluble in absolute alcohol. (H. Rose.)

II.) *acid.* $2 NaO, 3 PO_3 + 8 Aq$ Very deliquescent. Soluble in water. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **16.** 209.) Soluble in 2 pts. of cold, and in about the same quantity of hot water. Sparingly soluble in spirit. (Fourcroy & Vauquelin.)

Phosphite of Strontia. $2 SrO, HO, PO_3 + Aq$ Difficultly soluble in water. On heating the aqueous solution it is decomposed to a difficultly soluble basic, and an easily soluble acid salt.

Phosphite *of protoxide* of Tin. $2 SnO, HO, PO_3$ Insoluble in water. Soluble in chlorhydric acid; and the solution thus obtained is one of the most powerful reducing agents known.

Phosphite *of binoxide* of Tin. SnO_2, HO, PO_3 Insoluble in water.

Phosphite of Titanium. Insoluble in water.

Phosphite of Zinc. $2 ZnO, HO, PO_3 + 5 Aq$ Difficultly soluble in water. (H. Rose.)

PhosphoGlyceric Acid. $C_6 H_9 PO_{12} = C_6 H_7 O_5, 2 HO, PO_5$ Very soluble in water, and alcohol. (Gobley.) Solutions containing more than 1 pt. of the acid in 10 pts. of water are decomposed by boiling; solutions weaker than this are not thus decomposed. (Gobley.)

Most of the salts of phosphoglyceric acid are readily soluble in water, but insoluble, or only sparingly soluble, in alcohol. (Pelouze.)

PhosphoGlycerate of Baryta. $C_6 H_7 O_5, (BaO)_2, PO_5$ Soluble in water, from which it is precipitated on the addition of alcohol. (Pelouze.)

PhosphoGlycerate of Lead. $C_6 H_7 O_5, 2 PbO, PO_5$ Insoluble in water. (Pelouze.)

PhosphoGlycerate of Lime. $C_6 H_7 O_5, 2 CaO, PO_5$ Very soluble in *cold*, but very sparingly soluble in *boiling* water. Alcohol precipitates it from the aqueous solution. (Pelouze; Gobley.)

PhosphoMolybdate of *X*. *Vid.* Molybdate of *X*, with Phosphate of *X*.

PhosphoNitrate of *X*. *Vid.* Nitrate of *X* with Phosphate of *X*.

PhosphorDiMethyl. Insoluble in water.
(PhosphorCacodyl.
diMethylPhosphorus.)
$\left.\begin{matrix}(C_2 H_3)_2 \\ (C_2 H_3)_2\end{matrix}\right\} P_2$

Phosphorus. P There are two allotropic modifications.

I.) *Modif. α.* *(Ordinary white Phosphorus.)* Insoluble in water, but is very slowly decomposed thereby.

Soluble in 320 pts. of cold alcohol of 0.799 sp. gr., and in 240 pts. of the same alcohol when it is warm; from this hot solution ¼ of the phosphorus is deposited on cooling. On the addition of water it is precipitated from the alcoholic solution. (Buchner.) Soluble in 20 pts. of absolute ether at 20°; in 240 pts. of ordinary ether at 20°. (Bucholz.) Soluble in 80 pts. of absolute ether at 15.5°, and in 240 pts. of ordinary ether at 15.5°. The ethereal solution undergoes decomposition in the course of time. (Brugnatelli, *Ann. de Chim.*, **24.** 73. [T.].) Soluble in 0.05 pt. of bisulphide of carbon (Bœttger); in 0.125 pt. (Trommsdorff.) Sulphide of carbon is the best solvent known of ordinary phosphorus. (Pelouze & Fremy.)

When a solution of ordinary phosphorus in bisulphide of carbon is exposed to sunlight it is partially decomposed, and some red phosphorus (modif. *β*) is deposited. (Corenwinder, *Ann. Ch. et Phys.*, (3.) **30.** 248.) Alcohol precipitates it from the bisulphide of carbon solution. (Berzelius.) Sparingly soluble in cold, more soluble in hot benzin. (Mansfield.) Soluble in 14 pts. of hot, less soluble in cold rock-oil (naphtha) from Amiano. (Saussure.) Sparingly soluble in warm essential oils, as oil of turpentine, and in the fatty oils. Soluble in warm oil of turpentine, the solution solidifying on cooling. (Jonas.) Soluble in hot oil of copaiba, separating out again in part as the solution cools. (Gerber.) Soluble in hot oil of caraway. Soluble in oil of mandarin. (Luca.) Slightly soluble in cold, more soluble in hot caoutchin; from the hot solution the greater part of it is deposited on cooling. Abundantly soluble, with evolution of heat, in bichloride of sulphur ($Cl S_2$); as the solution cools, much of the phosphorus is deposited; but if one continues to heat the solution, it is decomposed. (Wœhler, *Ann. Ch. u. Pharm.*, **93.** 276.) It is also soluble in protochloride of sulphur. (Thompson.) Soluble in disulphide of phosphorus ($P_2 S$) at 50°; from which it crystallizes out when the solution is cooled to + 30°. Largely soluble in terchloride of phosphorus ($P Cl_3$). Soluble to an almost unlimited extent in hot, less readily soluble in cold sulphoperchloride of phosphorus, of Gladstone ($P Cl_5 S_4$), and pentachloride of phosphorus. Tolerably readily soluble in warm, less soluble in cold styrol.

Soluble in anilin, though less so than sulphur; also soluble in leukol (quinolein). (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** pp. 143, 169.) Sparingly soluble in cold creosote. (Reichenbach.) Somewhat soluble in boiling fusel-oil (hydrate of amyl), and does not separate out on cooling. (Pelletan.) Readily soluble in valerianic acid, and in valerate of amyl. Tolerably soluble in hydride of valeryl. (Trautwein.)

Very readily soluble in caprylic alcohol (hydrate of capryl) (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 103); in warm chloride of ethylene (Vogel); in warm sulphocyanide of allyl (essence of mustard = $C_8H_5NS_2$) (Fontanelle); and in mercur(*ic*) methyl. Soluble in chloroform (Liebig), in bromal (Lœwig), in warm chloral (Liebig), in acetic ether (O. Henry), in aldehyde (Liebig), in hot protosulphide of cacodyl, and in alkarsine (oxide of cacodyl). Strong vinegar, of 9° @ 10° B., when boiling, dissolves a considerable quantity of it. (Beudet.) Soluble in chloride of ethyl, in warm chloride of benzoyl ($C_{14}H_5O_2Cl$), and in bichloride of tin; also, in the course of a few days, in liquid (by pressure) cyanogen. (Kemp.) Sparingly soluble in nitrite of ethyl. (Favre.) Sparingly soluble in wood-spirit (Zeise); in lignone, from which it is precipitated on the addition of water (L. Gmelin); and in bromoform. (Lœwig).

Sparingly soluble in acetone, the solution undergoing decomposition gradually at the ordinary temperature, but much more rapidly at temperatures nearly equal to that of the boiling-point of the liquid. (Zeise, *Ann. Ch. et Phys.*, (3.) **6.** 502.) A little more soluble than sulphur in acetone. (Chenevix, *Ann. de Chim.*, 1809, **69.** 50.) Insoluble in nicotin. (Barral.) Appears to be insoluble in coniin. (Blyth.) Soluble, with decomposition, in hot concentrated nitric acid. Also decomposed by boiling aqueous solutions of the caustic alkalies.

II.) *Modif. β.* Permanent. (Schrœtter.) The statement that red phosphorus is permanent is an error, since it absorbs oxygen from the air, and gradually runs down to an acid liquid. (G. Wilson; Personne, *C. R.*, 1857, **45.** 114.) Insoluble in water, alcohol, ether, bisulphide of carbon, perchloride of phosphorus, naphtha, or an aqueous solution of caustic potash. Oil of turpentine and other liquids of high boiling-points dissolve small quantities when heated; but as these solutions cool ordinary phosphorus is deposited. Concentrated sulphuric acid has no action upon it in the cold, but when hot it dissolves it easily, with decomposition. Insoluble in dilute, readily soluble, with decomposition, in concentrated nitric acid.

(*Red Phosphorus. Amorphous Phosphorus.*)

Marvellously easily soluble in nitric acid, either hot or cold, with formation of PO_3 and PO_5, being very much more easily soluble than the ordinary modification of phosphorus. (Personne, *C. R.*, 1857, **45.** 115.)

PhosphoVinic Acid. *Vid.* EthylPhosphoric Acid.

Phosphuretted Hydrogen.

I.) *solid.* Insoluble in water, or alcohol. (Leverrier.) The only liquid which dissolves, without decomposing it, is liquid phosphuretted hydrogen. (P. Thénard, *Ann. Ch. et Phys.*, (3.) **14.** 28.) Soluble, with decomposition, in dilute nitric acid at a temperature of 30° @ 40°. (Leverrier.) Instantly decomposed by nitric and sulphuric acids. Also soluble, with decomposition, in an alcoholic solution of caustic potash. It is not acted upon by protochloride of phosphorus, bichloride of tin, or chloride of titanium. (P. Thénard, *Ann. Ch. et Phys.*, (3.) **14.** 8.)

(*Hydride of Phosphorus.*)
P_2H

II.) *liquid.* Entirely insoluble in water. Alcohol, and oil of turpentine appear to dissolve it, but the solution quickly decomposes. (P. Thénard, *Ann. Ch. et Phys.*, (3.) **14.** 23.)

PH_2

III.) *gaseous.* Boiled water absorbs of the more inflammable gas 0.0179 ($\frac{1}{56}$) of its own volume (Gengembre); 0.0250 ($\frac{1}{40}$) of its volume. (H. Davy.)

PH_3

"The absorption of this gas by water has been stated variously. In 1799, Raymond found that water absorbs rather less than $\frac{1}{4}$ [= 0.25] of its vol. of this gas; in 1802, Henry rates its absorption at $\frac{1}{47}$ [= 0.1213] only; in 1810, I [Dalton] found it $\frac{1}{27}$ [= 0.037]; in 1812, Davy found it $\frac{1}{8}$ [= 0.125]; in 1816, Thompson found it to be $\frac{1}{47}$ [= 0.0213]; I [Dalton] now estimate it at $\frac{1}{8}$ [= 0.125]. These enormous differences may be partly accounted for by varieties in the gas; and partly from the theory of the absorption not being understood." (Dalton, in his *New System*, **2.** 173.) Water absorbs of the less inflammable gas 0.1250 ($\frac{1}{8}$) of a vol. (H. Davy.)

1 volume of alcohol, of 0.85 sp. gr. absorbs 0.5 vol. of it. (Graham.) 1 vol. of ether absorbs 2 vols. of it. (Graham.) Also soluble in volatile oils. 1 vol. of oil of turpentine absorbs 3.25 vols. of it. (Graham.) Slowly absorbed by an aqueous solution of sulphate of copper and by bromine. (Berthelot.) Concentrated sulphuric acid absorbs it without any immediate decomposition; but the solution kept out of contact with the air decomposes in the course of 24 hours. (Buff.)

Phtalamic Acid. Soluble in water, and in dilute chlorhydric acid. (Perkin, *Ann. Ch. u. Pharm.*, **98.** 237.)

(*Phtalamid. Naphthalamid. Isomeric with Isatinic Acid.*)
$C_{16}H_7NO_6 = N\left\{\begin{matrix}C_{16}H_4O_4'' \\ H_2\end{matrix}\right. \cdot O, HO$

Phtalamate of Ammonia. Very soluble in water; the aqueous solution being decomposed by long-continued boiling. Easily soluble in alcohol. (Laurent.)

$C_{16}H_6(NH_4)NO_6$

Phtalamate of Lead. Ppt.

Phtalamate of Silver. Insoluble in cold, soluble, with decomposition, in hot water. Somewhat soluble in alcohol. (Laurent, *Ann. Ch. et Phys.*, (3.) **23.** 117.)

$C_{16}H_6AgNO_6$

Phtalic Acid(Anhydrous). Sparingly soluble in cold water. Soluble in boiling water, with formation of the hydrated acid. Very soluble in alcohol, and ether.

(*PhtalicAnhydride. Pyro-Alizaric Acid. Phtalid.*)
$C_{16}H_4O_6$

Phtalic Acid. Sparingly soluble in cold water. Very soluble in alcohol, and ether. Also soluble, without decomposition, in sulphuric, chlorhydric, and nitric acids.

(*Naphthalic Acid. Alizaric Acid.*)
$C_{16}H_6O_8 = C_{16}H_4O_6, 2HO$

Alizaric acid is very sparingly soluble in cold, but soluble in boiling water, being more readily soluble in water than benzoic acid. Easily soluble in alcohol and in aqueous solutions of the alkalies. Soluble in cold concentrated sulphuric acid. Most of its salts are soluble in water. (Schunk, *Rep. Br. Assoc.*, 1847, p. 140; & 1848, p. 64.)

The alkaline phtalates are readily soluble in water; less soluble in alcohol. The other salts are sparingly soluble, or insoluble.

Phtalate of Ammonia.

I.) *acid.* Very soluble in water. Sparingly soluble in alcohol. (Laurent.)

$C_{16}H_5(NH_4)O_8$

Phtalate of Baryta. Somewhat sparingly soluble in water. (Laurent.)

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Phtalate of Ethyl.
$C_{16} H_4 (C_4 H_5)_2 O_8$

Phtalate of Lead. Insoluble in water, or acetic acid. (Schunk, *loc. cit.*)
$C_{16} H_4 Pb_2 O_8$

Phtalate of Lime. Soluble in water. (Schunk, *loc. cit.*)

Phtalate of Magnesia. Soluble in water.

Phtalate of Potash.

I.) *normal.* Deliquescent. Soluble in water. (Schunk, *loc. cit.*) Very soluble in water. (Laurent.)

Phtalate of Silver. Tolerably soluble in water. (Marignac.) Soluble in boiling, less soluble in cold water. (Schunk, *loc. cit.*)
$C_{16} H_4 Ag_2 O_8$

Phtalate of Soda.

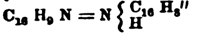
I.) *normal.* Very readily soluble in water. Soluble in hot, less soluble in cold alcohol.

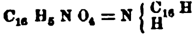
Phtalate of Zinc. Scarcely at all soluble in cold water.

Phtalamid. *Vid.* Phtalamic Acid.

PhtalAnil. *Vid* PhenylPhtalimid.

PhtalAnilic Acid. *Vid.* PhenylPhtalamic Acid.

Phtalidin. Tolerably easily soluble in cold water, from which solution it is deposited again after several days. Soluble in all proportions in hot alcohol, and ether. (Dusart, *Ann. Ch. et Phys.*, (3.) **45.** 335.) The salts of phtalidin are soluble in water, and alcohol.
(*Phtalenamin.*)

$C_{16} H_9 N = N \left\{ \begin{matrix} C_{16} H_8'' \\ H \end{matrix} \right.$

Phtalimid. Almost insoluble in cold, sparingly soluble in boiling water. Largely soluble in boiling alcohol, and ether. Soluble, with decomposition, in hot concentrated sulphuric acid.
(*Naphthalimid. Phtalylamid. Isomeric with Isatin and CyanoSalicyl.*)

$C_{16} H_5 N O_4 = N \left\{ \begin{matrix} C_{16} H_4 O_4'' \\ H \end{matrix} \right.$

Phtalimid with **Oxide of Silver.** Soluble in hot water. Abundantly soluble in boiling alcohol, and ether. Soluble in hot ammonia-water, separating out unchanged as the solution cools.
(*SilverPhtalimid*)
$C_{16} H_4 Ag N O_4$

Phtaline *nitrè.* *Vid.* NitroPhtalene.

Phycic Acid(from *Protococcus vulgaris*). Utterly insoluble in water. Easily soluble in alcohol, especially if it is hot; also soluble in ether, acetone, and the fatty and essential oils. Soluble in 15 pts. of boiling absolute alcohol; in concentrated sulphuric acid, from which it is precipitated on the addition of water, and in aqueous solutions of caustic potash and soda, but not ammonia. (Lamy, *Ann. Ch. et Phys.*, (3.) **35.** 131.)

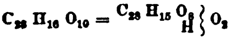
The alkaline salts of phycic acid are soluble in water, and alcohol, especially when these are hot; most of the other salts are insoluble precipitates.

Phycite. *Vid.* ErythroMannite.

Phycoerythrin(Red coloring matter of various *algæ*).

Phycohematin(coloring matter of *Rytiplaea tinctoria*). Easily soluble in water, and in ammonia-water. Insoluble in alcohol, ether, or oils. (Kuetzing.)

Phylloretin. Insoluble in water. Readily soluble in boiling alcohol, and in ether. (Forchammer.)
$C_{40} H_{24}''$

Physalin. Very sparingly soluble in cold, somewhat more soluble in boiling water. Easily soluble in alcohol, and chloroform. Very sparingly soluble in cold ether. Tolerably soluble in ammonia-water. Very sparingly soluble in dilute acids.

$C_{28} H_{16} O_{10} = \left. \begin{matrix} C_{28} H_{15} O_8 \\ H \end{matrix} \right\} O_2$

PhysetOleic Acid.
$C_{32} H_{30} O_4 = C_{32} H_{29} O_3, H O$

PhysetOleate of Baryta. Soluble in boiling alcohol.
$C_{32} H_{29} Ba O_4$

PhysetOleate of Lead. Soluble in ether.

Physodein.
$C_{20} H_9 O_{13}$

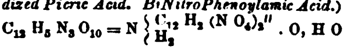
Physodin. Insoluble in water, and alcohol of 80%, but is soluble in boiling absolute alcohol. Insoluble in ether or acetic acid. Unacted upon by dilute acids. Soluble in concentrated sulphuric acid, and with decomposition in nitric acid. Readily soluble in warm aqueous solutions of caustic ammonia, potash, and carbonate of ammonia. (Gerding.)
$C_{20} H_{10} O_{14}$

Picamar. Very sparingly soluble in water. Very easily soluble in alcohol, ether, acetate of ethyl, wood-spirit, bisulphide of carbon, naphtha, and creosote. Insoluble in eupion. Soluble in aqueous alkaline solutions, with combination. (Reichenbach.) Easily soluble in acetic acid. Soluble in concentrated sulphuric acid. (Reichenbach.)

Picolin. Miscible with water in all proportions, but is separated when the water is saturated with caustic potash or with many alkaline salts. (Anderson.) Readily soluble in alcohol, ether (Unverdorben), and wood-spirit. (Anderson.) It mixes readily with volatile oils (Unverdorben), and with fixed oils (Anderson).
(*Odorin*(of Unverdorben).)
(*Isomeric with Anilin*).
$C_{12} H_7 N = N \{ C_{12} H_7'''$

The salts of picolin are readily soluble in water, being, as a rule, somewhat more soluble than those of anilin; several of them are deliquescent. (Anderson.) They are also easily soluble in cold alcohol. (Unverdorben.)

PicrAcetate of *X*. *Vid.* Acetate of *X* with Picrate of *X*.

Picramic Acid. Almost insoluble in boiling water. (A. Girard.) Difficultly soluble in water. (Wœhler.) Easily soluble in alcohol, and ether (Girard); also soluble, without alteration, in dilute sulphuric and chlorhydric acids. Decomposed by concentrated sulphuric and nitric acids.
(*NitroHæmatic Acid. BiNitroPhenidamic Acid. AmibiNitroPhenylic Acid. Deoxidized Picric Acid. BiNitroPhenoylamic Acid.*)

$C_{12} H_5 N_3 O_{10} = N \left\{ \begin{matrix} C_{12} H_2 (N O_4)_2'' \\ H_2 \end{matrix} \right. . O, H O$

Picramate of Ammonia. Soluble in water, and alcohol. Insoluble in ether. (Girard.)
$C_{12} H_4 (N H_4) (N O_4)_2 N O_2$

Picramate of Baryta. Sparingly soluble in water, and alcohol. (Girard.)
$C_{12} H_4 Ba (N O_4)_2 N O_2$

Picramate of Copper. Insoluble in water, or alcohol. Soluble in ammonia-water, and in acids. (Girard.)
$C_{12} H_4 Cu (N O_4)_2 N O_2$

Picramate of Lead. Soluble in water. Insoluble in alcohol. Soluble in ammonia-water, and in acids. (Girard.)

Picramate *of protoxide* **of Mercury.** Ppt. Soluble in acids. (Girard.)

Picramate of Potash. Tolerably soluble in water. Sparingly soluble in alcohol. (Girard.)
$C_{12} H_4 K (N O_4)_2 N O_2$

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Picramate of Silver. Insoluble in cold, decomposed by boiling water. Insoluble in alcohol. (Girard.)
$C_{12} H_4 Ag (N O_4)_2 N O_2$

Picramid. *Vid. ter*NitrAnilin.

Picranisic Acid. *Vid.* Picric Acid.

Picric Acid.
(*TerNitroPhenic Acid. TerNitroCarbolic Acid. NitroPhenisic Acid. NitroPicric Acid. Crysolepic Acid. CarbAzotic Acid. Welter's Bitter. Picranisic Acid.*)
$C_{12} H_3 N_3 O_{14} = C_{12} H_2 (N O_4)_3 O, H O$

Soluble in	160	pts. of water at	5°
"	86	"	15°
"	81	"	20°
"	77	"	22.5°
"	73	"	26°
"	26	"	77°

(Marchand.)

Easily soluble in alcohol, and ether. (Liebig; Schunk; Cahours.) Soluble, with combination, in hot benzin: at the ordinary temperature pure benzin dissolves 8 @ 10 % of it. (Fritzsche.) Insoluble in cold concentrated sulphuric acid, and but sparingly soluble in cold dilute sulphuric acid. Soluble in warm concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water. (Marchand.) When a saturated cold aqueous solution is mixed with an equal volume of sulphuric acid, the greater part of the picric acid is precipitated.

Readily soluble in concentrated nitric acid, not being decomposed even by boiling fuming acid. (Cahours.) Soluble, without decomposition, in hot nitric and chlorhydric acids, and even in aqua-regia, but appears to be slightly changed after long-continued boiling with the latter or with nitric acid. (Kolbe's *Lehrb.*, **1.** pp. 420, 422.) Sparingly soluble in cold, very abundantly soluble in hot creosote. (Reichenbach.)

There has been a question, whether picranisic acid is identical or only isomeric with picric acid. Quite recently Carey Lea has shown (*Am. J. Sci.*, 1858, (2.) **26.** 380), that these acids are really identical. Cahours, who believed this acid to be isomeric, and not identical with picric acid, says that it is sparingly soluble in cold, very easily soluble in boiling water. Easily soluble in alcohol, and ether. Easily soluble in cold fuming nitric acid, but is decomposed when the solution is boiled. (Cahours, *Ann. Ch. et Phys.*, (3.) **25.** 26.)

Most of the picrates are soluble in water.

Picrate of Aconitin. Insoluble in ammonia-water.

Picrate of Alumina. Permanent. Soluble in water. (Carey Lea, *Am. J. Sci.*, (2.) **26.** 383.)

Picrate of Ammonia. Tolerably readily soluble in water. Sparingly soluble in alcohol. (Liebig.) Sparingly soluble in water. (Cahours, *loc. cit.*) Very difficultly soluble in cold alkaline solutions. (Carey Lea, *Am. J. Sci.*, (2.) **31.** 75.)
$C_{12} H_2 (N H_4) (N O_4)_3 O_2$

Picrate of Anilin. Nearly insoluble in cold, and very difficultly soluble in boiling water. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 163.) Soluble in boiling, less soluble in cold alcohol.

Picrate of Argent*bi*amin. Readily soluble in hot, sparingly soluble in cold water containing ammonia. (Carey Lea, *Am. J. Sci.*, (2.) **31.** 80.)
(*AmmonioPicrate of Silver.*)
$C_{12} H_2 \left(N_2 \left\} H_6 . Ag \right) \right. N_3 O_{14}$

Picrate of Atropin.

Picrate of Baryta.

I.) $C_{12} H_2 Ba (N O_4)_3 O_2 + 5 Aq$ Easily soluble in water. (Liebig.) The "picranisate of baryta" is sparingly soluble in cold water. (Cahours, *loc. cit.*)

II.) *basic.* Almost insoluble in water. (Kolbe's *Lehrb.*, **1.** 424.)
$C_{12} H Ba_2 (N O_4)_3 O_2 + 4 Aq$?

Picrate of Beberin. Ppt.

Picrate of Benzin. Immediately decomposes when exposed to the air, but may be preserved in an atmosphere of benzin. Decomposed by water. Soluble, without decomposition, in alcohol, and ether. Soluble in hot, less soluble in cold benzin. (Fritzsche.)
$C_{12} H_2 (C_{12} H_6) (N O_4)_3 O_2$

Picrate of Cadmium. Efflorescent. Extremely soluble in water. By long-continued boiling the aqueous solution is partially decomposed. (Lea, *Am. J. Sci.*, (2.) **26.** 385.)

Picrate of Cadmium*bi*amin & of Cadmium-ammonium. Decomposed by pure water. Soluble, without decomposition, in a warm solution of mixed ammonia and chloride of ammonium. (Lea, *Am. J. Sci.*, (2.) **31.** 83.)
(*AmmoniaPicrate of Cadmium.*)
$C_{12} H_2 \left(N_2 \left\} H_6 . Cd \right) \right. N_3 O_{14} ; C_{12} H_2 \left(N \begin{cases} H_3 \\ Cd \end{cases} \right) N_3 O_{14}$

Picrate *of protoxide* **of Chromium.** Soluble in water. (Lea.)

Picrate *of sesquioxide* **of Chromium.** Soluble in water. (Lea.)

Picrate of Chromiumamin. Decomposed when heated with a considerable quantity of water, even when this contains much ammonia. (Lea, *Am. J. Sci.*, (2.) **31.** 84.)
(*AmmonioPicrate of Chromium.*)

Picrate of Cinchonin.

Picrate of Cobalt. Soluble in warm, less soluble in cold water. (Lea.) Soluble in water and in boiling absolute alcohol. (Marchand.)
$C_{12} H_2 Co (N O_4)_3 O_2 + 5 Aq$

Picrate of Cobalt*bi*amin. Nearly insoluble in water, by which it is decomposed, however. It is even difficult to wash it, without decomposition, with solutions of carbonated or caustic ammonia. (Lea, *Am. J. Sci.*, (2.) **31.** pp. 79, 82.)
(*Ammonia-Picrate of Cobalt.*)
$C_{12} H_2 \left(N_2 \left\{ H_6 . Co \right) \right. N_3 O_{14} + Aq$

Picrate *of protoxide* **of Copper.**

I.) *normal.* Efflorescent. Easily soluble in water; also soluble in boiling absolute alcohol.
$C_{12} H_2 Cu (N O_4)_3 O_2 + 5 Aq$

II.) *basic.* Soluble in water. Insoluble in boiling absolute alcohol.

Picrate of Cupr(*ic*)*bi*amin. Insoluble, or nearly insoluble in water, but is decomposed thereby. May be washed with a strong aqueous solution of carbonate of ammonia, and with dilute ammonia-water. (Lea, *Am. J. Sci.*, (2.) **26.** 385, & **31.** pp. 79, 81.)
(*AmmoniaPicrate of Copper.*)
$C_{12} H_2 \left(N_2 \left\{ H_6 . Cu \right) \right. N_3 O_{14}$

Picrate of Ethyl. Insoluble in water. Sparingly soluble in cold, more easily soluble in boiling alcohol. (Mitscherlich.)
(*Picric Ether. Phenate of Ethyl-trinitré. TriNitroPhenetol.*)
$C_{16} H_7 N_3 O_{14} = C_{12} H_2 (C_4 H_5) (N O_4)_3 O_2$

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Picrate of Ferrousamin? Ppt. Does not appear to dissolve when heated with aqueous solutions of chloride of ammonium or of caustic ammonia, but is decomposed by them. (Lea, *Am. J. Sci.*, (2.) **31.** 86.)

(*AmmoniaPicrate of Protoxide of Iron.*)

Picrate of Glucina. Soluble in water. (Lea, *loc. cit.*, vol. **26.**)

Picrate *of protoxide* **of Iron.** Soluble in water. (Lea.)

Picrate *of sesquioxide* **of Iron.** Soluble in water. (Lea, *loc. cit.*, vol. **26.**)

Picrate of Lead.

I.) *normal.* Tolerably soluble in water (E. Kopp, *Ann. Ch. et Phys.*, (3.) **13.** 235), and in dilute alcohol.

$C_{12}\,H_2\,Pb\,(N\,O_4)_3\,O_2 + Aq$ & $5\,Aq$

II.) *di.* Ppt.

$C_{12}\,H_2\,Pb\,(N\,O_4)_3\,O_2,\ Pb\,O,\ H\,O$

III.) *tri.* Nearly insoluble in boiling water. (Marchand.)

$C_{12}\,H_2\,Pb\,(N\,O_4)_3\,O_2,\ 2\,(Pb\,O,\ H\,O) + Aq$

IV.) *penta.* Ppt.

$C_{12}\,H_2\,Pb\,(N\,O_4)_3\,O_2,\ 4\,Pb\,O$

Picrate of Lime. Easily soluble in water. (Liebig.) More soluble in water than the baryta or strontia salt. (Marchand.)

$C_{12}\,H_2\,Ca\,(N\,O_4)_3\,O_2 + 5\,Aq$

Picrate of Lutidin. Less soluble in water than the other salts of lutidin.

Picrate of Magnesia. Very soluble in water, being more soluble than the lime salt. Scarcely at all soluble in boiling alcohol.

$C_{12}\,H_2\,Mg\,(N\,O_4)_3\,O_2 + (5\,Aq\,?)$

Very difficultly soluble in cold alkaline solutions. (Carey Lea, *Am. J. Sci.*, (2.) **31.** 75.)

Picrate of Manganese. Very difficultly soluble in water. (Lea.)

$C_{12}\,H_2\,Mn\,(N\,O_{43})\,O_2 + 8\,Aq$

Picrate of Manganammonium. Very unstable. (Lea, *Am. J. Sci.*, (2.) **31.** 85.)

(*AmmoniaPicrate of Manganese.*)

$C_{12}\,H_2\left(N\left\{\begin{matrix}H_3\\Mn\end{matrix}\right.\right)N_3\,O_{14}$

Picrate *of dinoxide* **of Mercury.** Very difficultly soluble in cold water, requiring more than 1200 pts. (Liebig.)

$C_{12}\,H_2\,Hg_2\,(N\,O_4)_3\,O_2$

Picrate *of protoxide* **of Mercury.** Efflorescent. Easily soluble in water. (Lea.)

Picrate of Methyl. Completely insoluble in water. Tolerably easily soluble in warm, very sparingly soluble in cold alcohol; much more readily soluble in a mixture of equal parts alcohol and ether. Readily soluble in cold ether. Soluble, without alteration, in warm concentrated nitric and sulphuric acids. It separates out from the nitric-acid solution on cooling. Completely insoluble in caustic ammonia, also insoluble in very dilute solutions of potash, though decomposed by stronger solutions. (Cahours, *Ann. Ch. et Phys.*, (3.) **27.** 455.)

(*TerNitrAnisol. Phenate of terNitroMethyl. Isomeric with Chysanisic Acid.*)

$C_{12}\,H_2\,(C_2\,H_3)\,(N\,O_4)_3\,O_2$

Picrate of "Naphthalin." Superficially decomposed by cold water, which removes picric acid, and more freely by boiling water. Warm dilute ammonia-water removes all the picric acid. Soluble in alcohol, ether, and benzin. (Fritzsche.)

$C_{12}\,H_2\,(C_{20}\,H_9)\,(N\,O_4)_3\,O_2$

Picrate of Nickel. Efflorescent. Readily soluble in water, and alcohol. (Marchand.)

$C_{12}\,H_2\,Ni\,(N\,O_4)_3\,O_2 + 5\,Aq$ & $8\,Aq$

Picrate of Nickelamin. Insoluble in water, but is decomposed by a large quantity of water, even in the cold. (Carey Lea, *Am. J. Sci.*, (2.) **26.** 384.)

(*AmmoniaPicrate of Nickel.*)

Picrate of Nicotin. Ppt.

Picrate of Potash. Soluble in not less than 260 pts. of water at 15° (Liebig); in 14 pts. of boiling water (Chevreul). Sparingly soluble in cold, more readily soluble in hot water. (Cahours.) Insoluble in alcohol. (Liebig.)

$C_{12}\,H_2\,K\,(N\,O_4)_3\,O_2$

Picrate of Quinine. Very sparingly soluble in water. Readily soluble in alcohol.

Picrate of Quinolein. Resembles in all respects the picrate of anilin. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 174.)

Picrate of Silver. Readily soluble in water. (Liebig.) Only slightly soluble in water. (Lea, *Am. J. Sci.*, (2.) **26.** 386.)

$C_{12}\,H_2\,Ag\,(N\,O_4)_3\,O_2 + Aq$

Picrate of Soda. Soluble in 10 @ 14 pts. of water at 15°. (Liebig.) Much more soluble in water than the potash salt. (Cahours.) Picrate of soda is the most soluble of all the alkaline picrates, but is nevertheless nearly insoluble in cold, though somewhat soluble in warm aqueous or alcoholic alkaline solutions. (Carey Lea, *Am. J. Sci.*, (2.) **31.** 75.)

$C_{12}\,H_2\,Na\,(N\,O_4)_3\,O_2$

Picrate of Spartein. Permanent. Very sparingly soluble in cold, somewhat more readily, though still very sparingly soluble in boiling water, and alcohol.

$C_{12}\,H_2\left(N\left\{C_{14}\,H_{13}{}''' \,.\, H\right.\right)(N\,O_4)_3\,O_2$

Picrate of Strontia. Easily soluble in cold, and very easily soluble in hot water. Very slowly soluble in boiling absolute alcohol. (Marchand.) The "picranisate" is sparingly soluble in water. (Cahours.)

$C_{12}\,H_2\,Sr\,(N\,O_4)_3\,O_2 + 5\,Aq$

Picrate of Urea. Permanent. Soluble in water. (Lea.)

Picrate of Zinc. Efflorescent. Readily soluble in water, and alcohol. (Marchand.)

$C_{12}\,H_2\,Zn\,(N\,O_4)_3\,O_2 + 7\,Aq$

Picrate of Zinc*bi*amin & of Zincammonium. Decomposed by water, but is nearly insoluble therein. It is even difficult to wash it, without decomposition, in solutions of carbonate of ammonia or dilute ammonia-water. Soluble, without decomposition, in a warm aqueous solution of mixed ammonia and chloride of ammonium. (Carey Lea, *Am. J. Sci.*, (2.) **31.** pp. 79, 82, 83.)

(*AmmoniaPicrate of Zinc.*)

$C_{12}\,H_2\left(N_2\left\{H_6\,.\,Zn\right.\right)N_3\,O_{14}$; $C_{12}\,H_2\left(N\left\{\begin{matrix}H_3\\Zn\end{matrix}\right.\right)N_3\,O_{14}$

Picril. Insoluble in water. Very readily soluble in ether, much less readily soluble in alcohol. (Laurent.)

(*Kripin.*)

$C_{42}\,H_{15}\,N\,O_4 = N\left\{\begin{matrix}C_{28}\,H_9\,O_2\\C_{14}\,H_5\,O_2\\H\end{matrix}\right.$ or $N\left\{\begin{matrix}(C_{14}\,H_5\,O_2)_2\\C_{14}\,H_5\end{matrix}\right.$

PicroErythrin. Sparingly soluble in cold,

$C_{20}H_{20}O_{16} = \left.\begin{matrix}C_{20}H_{19}O_{14}\\ H\end{matrix}\right\} O_2$

readily soluble in boiling water. Soluble in alcohol, and ether; in cold aqueous solutions of the caustic alkalies, and in cold concentrated sulphuric acid, the solution undergoing decomposition when heated.

PicroGlaucin(from the root of *Glaucium luteum*). Soluble in water, alcohol, and ether. (Parrish's *Pharm.*, p. 399.)

PicroLichenin(from *Variolaria amara*). Permanent. Insoluble in cold, sparingly soluble in boiling water. Readily soluble in alcohol, ether, essential oils, bisulphide of carbon, and in hot, fatty oils. Soluble in concentrated sulphuric acid, and in aqueous solutions of caustic ammonia and potash, and very sparingly in a solution of carbonate of potash.

$C_{24}H_{20}O_{12}$

Picromel. *Vid.* Cholate of Soda.

Picrotoxin(from the seeds of *Menispermum Cocculus*). Permanent.
(*Picrotoxic Acid. Menispermin* (of Courbe). *Cocculin.*)

$C_{10}H_6O_4 = \left.\begin{matrix}C_{10}H_5O_2\\ H\end{matrix}\right\} O_2$

Soluble in 150 pts. of water at 14°.
" 25 " boiling water. (Pelletier & Courbe; Boullay.)
" 180 " boiling water. (Merck.)
" 162 " cold " "
" 54 " boiling " (Duflos.)
" 160 " water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.)

Soluble in 3 pts. of hot alcohol of 0.81 sp. gr., the solution solidifying on cooling. It is precipitated from the alcoholic solution on the addition of a small quantity of water. (Boullay.) Soluble in 10 pts. of cold, and in 1 pt. of boiling alcohol. (Wittstein's *Handw.*) Difficultly soluble in cold ether. (Merck.) Soluble in 250 pts. of ether of 0.7 sp. gr. (Boullay); in 2.5 pts. of ether. (Wittstein's *Handw.*) It is not extracted from the aqueous solution by ether, nor from the alcoholic solution mixed with caustic potash, but ether abstracts it from the alcoholic solution mixed with chlorhydric acid. (G. Guenkel.) Insoluble in oils, either fixed or volatile. (Boullay.)

Completely soluble in concentrated acetic acid, but requires 2400 pts. of distilled vinegar to dissolve it, and does not dissolve perceptibly in a mixture of equal parts of distilled vinegar and water. (Merck.) Acetic acid facilitates the solution of picrotoxin in water. (Pelletier & Courbe.) Soluble in acetic acid, and in dilute acids generally. (Boullay.) No more soluble in dilute acids than in pure water, excepting acetic acid. (Pelletier & Courbe.) Abundantly soluble in aqueous solutions of caustic potash, soda, and ammonia. (Boullay; Pelletier & Courbe.) Soluble in warm iodic acid, without neutralizing it, and crystallizes out unchanged when the solution is evaporated. (Sérullas, *Ann. Ch. et Phys.*, 1830, (2.) **45.** 276.)

Picrotoxin with **Oxide of Lead.** Very soluble in water. (Pelletier & Courbe.)

Picryl. *Vid.* Picril.

Pimaric Acid. *Vid.* Resins(of Turpentine).

Pimelic Acid. Soluble in 35 pts. of water at 18°, and very soluble in boiling water. (Laurent.) 100 pts. of water at 18° dissolve 2.56 pts. of it. [= 1 pt. soluble in 39.063 pts. of water.] It is extremely soluble in boiling water, and the solution deposits crystals on cooling; but a solution thus prepared by cooling still contains, at 18°, in 100 pts. 4.32 pts. of the acid. (Wirz, *Ann. Ch. u. Pharm.*, 1857, **104.** 272.) More soluble in water than suberic acid. (Bromeis.) Easily soluble in warm alcohol, and ether; also, without decomposition, in warm concentrated sulphuric acid. (Laurent.)
(*Pimelenic Acid.*)
$C_{14}H_{12}O_8 = C_{14}H_{10}O_6, 2\,H\,O \;\&+ Aq$

Pimelate of Ammonia. Soluble in water, the solution undergoing decomposition after a time when left to itself, or more rapidly when boiled. (Marsh.)

Pimelate of Amyl. Insoluble in water. Soluble in alcohol, and ether. (Marsh.)
$C_{14}H_{10}(C_{10}H_{11})_2O_8$

Pimelate of Baryta. Soluble in water.
$C_{14}H_{10}Ba_2O_8$

Pimelate of Copper. Insoluble in water, or alcohol. (Marsh.)
$C_{14}H_{10}Cu_2O_8$

Pimelate of Ethyl.
I.) *normal.* Insoluble in water.
$C_{14}H_{10}(C_4H_5)_2O_8$
II.) *acid.*
$C_{14}H_{11}(C_4H_5)O_8$.

Pimelate *of sesquioxide* **of Iron.** Ppt.

Pimelate of Lead. Ppt. Apparently insoluble in water or alcohol. (Marsh.)

Pimelate of Lime. Soluble in water.

Pimelate of Magnesia. Soluble in water.

Pimelate of Manganese. Soluble in water.

Pimelate *of protoxide* **of Mercury.** Ppt.

Pimelate of Methyl.
$C_{14}H_{10}(C_2H_3)_2O_8$

Pimelate of Silver. Insoluble in water.
$C_{14}H_{10}Ag_2O_8$

Pimelate of Strontia. Soluble in water.

Pimelate of Zinc. Ppt.

Pimelenic Acid. *Vid.* Pimelic Acid.

Pimelin. *Vid.* Hydride of Acryl(Acrolein).

Pinacone.
$a = C_{12}H_{12}O_2$
$b =$ *hydrated.* Readily soluble in water, and still more readily in alcohol, ether, and acetone. Soluble in cold concentrated sulphuric acid. (Stædeler.)
$C_{12}H_{12}O_2 + 2\,Aq \;\&\; 4\,Aq \;\&\; 14\,Aq$

Pinic Acid. *Vid.* *a*Resin of Turpentine.

PinicorTannic Acid. After having been dried it dissolves very slowly in water. (Kawalier.)
$C_{32}H_{19}O_{22}$

PiniPicrin. Soluble in water, and alcohol, also in a mixture of alcohol and ether, but is insoluble in pure ether. Decomposed by hot concentrated sulphuric and chlorhydric acids.
$C_{44}H_{36}O_{22} + 4\,Aq$

PiniTannic Acid. Readily soluble in water, alcohol, and ether. (Kawalier.)
$C_{14}H_8O_8$

PiniTannate of Lead. Ppt., easily soluble in acetic acid.

Pinite(*Sugar from Pinus Lambertiana*). Extremely soluble in water. Almost insoluble in absolute alcohol; somewhat more soluble in boiling ordinary spirit. Insoluble in chloroform. (Berthelot, *Ann. Ch. et Phys.*, (3.) **46.** 78.) Soluble in water. Very slowly soluble in boiling alcohol. Insoluble in ether. (S. W. Johnson, *Am. J. Sci.*, (2.) **22.** 8.) Abundantly
(*Isomeric with Mannitan and Quercite.*)

$C_{12}H_{12}O_{10} = \left.\begin{matrix}C_{12}H_8O_8^{iv}\\ H_4\end{matrix}\right\} O_8$

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soluble in fuming chlorhydric acid, and crystallizes somewhat colored on cooling.

Pinite with Oxide of Lead. $C_{12}H_8\left.\begin{matrix}O_2{}^{\text{IV}}\\ Pb_4\end{matrix}\right\}O_8+4\,Aq$ At the moment of its formation it is soluble in an excess of cold water; but after having once been formed it is only partially soluble, with decomposition, in boiling water.

Piperic Acid. $C_{24}H_{10}O_8=C_{24}H_9O_7, HO$ Almost insoluble in water. Soluble in 275 pts. of absolute alcohol at the ordinary temperature; more soluble in hot alcohol. Sparingly soluble in ether. Scarcely at all soluble in bisulphide of carbon or naphtha; somewhat more easily soluble in benzin. (Babo & E. Keller.)

Piperate of Alumina. Ppt.

Piperate of Ammonia. $C_{24}H_9(NH_4)O_8$

Piperate of Baryta. $C_{24}H_9BaO_8$ Scarcely soluble in 5000 pts. of cold water, more soluble in hot water.

Piperate of Cadmium.

Piperate of Cobalt. Ppt.

Piperate of Copper(Cu O). Ppt.

Piperate of Ethyl. $C_{28}H_{14}O_8=C_{24}H_9(C_4H_5)O_8$ Insoluble, or but sparingly soluble in water. Soluble in ether.

Piperate of Iron(Fe O). Insoluble in water.

Piperate of Lead. Ppt.

Piperate of Lime. Somewhat more soluble in water than the baryta salt.

Piperate of Magnesia.

Piperate of Manganese.

Piperate of Mercury. Ppt.

Piperate of Piperidin. Soluble in water. $C_{34}H_{21}NO_8=C_{24}H_9\left(N\left\{\begin{matrix}C_{10}H_{10}{}''\\ H\end{matrix}\right.\cdot H\right)O_8$

Piperate of Potash. $C_{24}H_9KO_8$ Difficultly soluble in cold, easily soluble in boiling water. Sparingly soluble in alcohol. Almost insoluble in ether.

Piperate of Silver. $C_{24}H_9AgO_8$ Insoluble in water, or alcohol.

Piperate of Soda. Sparingly soluble in cold, easily soluble in hot water. Alcohol precipitates it from the aqueous solution.

Piperate of Strontia. Ppt.

Piperate of Zinc. Ppt.

Piperidic Urea. *Vid.* Cyanate of Piperidin.

Piperidin. (*Piperylamin.*) $C_{10}H_{11}N=N\left\{\begin{matrix}C_{10}H_{10}{}''\\ H\end{matrix}\right.$ Soluble in all proportions in water. Soluble in alcohol, and, with combination, in acids. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 78.)

Piperin. (*PiperylPipericylamid.*) $C_{34}H_{19}NO_6=N\left\{\begin{matrix}C_{10}H_{10}{}''\\ C_{24}H_9O_6\end{matrix}\right.$ Permanent. Extremely sparingly soluble in the neutral solvents. Soluble, with combination, in alcohol acidulated with chlorhydric acid. (Bouchardat, *Ann. Ch. et Phys.*, (3.) **9.** 227.) Insoluble, or very sparingly soluble in cold water, but is slightly soluble in hot water, from which it separates out on cooling. (Pelletier; Oersted.) Soluble in 30 pts. of cold, and in 1 pt. of hot alcohol. (Wittstein's *Handw.*) More readily soluble in hot than in cold alcohol, a precipitate being produced in this solution on the addition of water. (Pelletier.) Soluble in 60 pts. of ether (Merck); in 100 pts. of ether. (Wittstein's *Handw.*) Soluble in the essential oils. (Pelletier.) Readily soluble in acetic acid, from which it is precipitated on the addition of water. (Pelletier; Merck.) Abundantly soluble in warm creosote, and remains dissolved when the solution has become cold. (Reichenbach.) Not perceptibly soluble in dilute mineral acids. (Pelletier; Dulong; Regnault.)

Soluble, in the fatty and essential oils. Insoluble in alkaline solutions. Soluble in concentrated sulphuric acid, from which it is precipitated on the addition of water; also soluble in warm concentrated chlorhydric acid, and, without decomposition, in chloric acid.

Insoluble in water. Easily soluble in hot spirit. Tolerably soluble in ether. (Stenhouse.)

PiperylBenzoylamid. (*PiperylBenzamid. BenzoPiperid.*) $C_{24}H_{15}NO_2=N\left\{\begin{matrix}C_{10}H_{10}{}''\\ C_{14}H_5O_2\end{matrix}\right.$ Easily soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 87.)

PiperylCumylamid. (*PiperylCuminamid.*) $C_{30}H_{21}NO_2=N\left\{\begin{matrix}C_{10}H_{10}{}''\\ C_{20}H_{11}O_2\end{matrix}\right.$ Soluble in alcohol.

PiperylSulphoCarbamate of Piperidin. (*Piperidin with Sulphide of Carbon. SulphoCarbonyldiPiperylbiamic Acid.*) $C_{22}H_{22}N_2S_4=N_2\left\{\begin{matrix}C_2S_2{}''\\ (C_{10}H_{10}{}'')_2\\ H_2\end{matrix}\right.\cdot S_2$ Easily soluble in alcohol, especially when this is warm. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 89.)

PiperylUrea. *Vid.* Cyanate of Piperidin.

Pipitzahoic Acid. $C_{30}H_{20}O_6=C_{30}H_{19}O_5, HO$ Permanent. Almost insoluble in water. Easily soluble in absolute alcohol, and ether; also soluble in spirit, but water precipitates it from its alcoholic solution.

The alkaline pipitzahoates are easily soluble in water, alcohol, and ether. (Weld, *Ann. Ch. u. Pharm.*, **95.** 188.)

Pipitzahoate of Baryta. Very sparingly soluble in water. Soluble in alcohol. (Weld, *loc. cit.*)

Pipitzahoate of Copper. $C_{30}H_{19}CuO_6$ Insoluble in water. Soluble in alcohol, and ether. (Weld, *loc. cit.*)

Pipitzahoate of Lead. $C_{30}H_{18}Pb_2O_6$ Soluble in alcohol.

Pipitzahoate of Potash. Soluble in alcohol.

Pipitzahoate of Silver. $C_{30}H_{19}AgO_6$ Insoluble in water. Soluble in alcohol, and ether. (Weld, *loc. cit.*)

Pipitzahoate of Soda. Soluble in alcohol.

Pitayin(from *China pitaya* or *pitoya*). (*Pitoyin.*) Soluble in water, and alcohol. Insoluble in ether.

Pittacal. Permanent. Insoluble in water, alcohol, ether, eupion, or aqueous alkaline solutions. Soluble in dilute sulphuric, and chlorhydric acids. Abundantly soluble in acetic acid. Decomposed by nitric acid. (Reichenbach.)

Pityxylonic Acid. $C_{25}H_{20}O_8$ Difficultly soluble in cold, easily soluble in boiling water. Easily soluble in alcohol, ether, and aqueous alkaline solutions. (Wittstein.)

Pityxylonate of Lead. $C_{25}H_{20}O_8, PbO$ Somewhat soluble in water.

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"**PLATINAMIN**" (of Gerhardt). *Vid.* Oxide of Platin(*ic*)ammonium.

PLATINIC ACID. *Vid. bin*Oxide of Platinum.

PLATINATE OF BARYTA. Ppt.

PLATINATE OF POTASH. There are two compounds, one of which is soluble in water, while the other is insoluble in water and difficultly soluble in strong chlorhydric acid. (Tennant; Berzelius.)

PLATINATE OF SODA. Soluble in oxalic acid, and in dilute nitric acid. Dilute oxygen acids dissolve out the soda. (Weiss & Dœbereiner.)
$NaO, 3PtO_2 + 6Aq$

PLATINATE OF STRONTIA.

PLATINICUM. Platinum as it exists in the platin*ic* compounds.
$pt = Pt''$

PLATINOUS ACID. *Vid. prot*Oxide of Platinum.

PLATINITE OF POTASH.

PLATINITE OF SODA. Before drying it is soluble in nitric acid. (Vauquelin.)

PLATINOCYANHYDRIC ACID. Deliquescent. Very soluble in water, absolute alcohol, and ether. (Dœbereiner.)
$HCy\,PtCy + 5Aq$

PLATINOCYANIDE OF *X*. } *Vid.* Cyanide of *X*,
PLATINICYANIDE OF *X*. } with *proto*Cyanide of Platinum.

PLATINO*sesqui*CYANHYDRIC ACID. The platinosesquicyanhydrates are all soluble in water, and alcohol.

PLATINO*sesqui*CYANIDE OF AMMONIUM. More soluble than the potassium salt in water. (Weselsky.)
$(NH_4)_2\,Pt_2\,Cy_5 + 5Aq$

PLATINO*sesqui*CYANIDE OF LITHIUM. More soluble than the ammonium salt in water, and alcohol. (Weselsky.)
$Li_2\,Pt_2\,Cy_5 + 6Aq$

PLATINO*sesqui*CYANIDE OF MAGNESIUM. Soluble in water. (Weselsky.)
$Mg_2\,Pt_2\,Cy_5 + 14Aq$

PLATINO*sesqui*CYANIDE OF POTASSIUM. Easily soluble in water. (Weselsky.) Easily soluble in water. Insoluble in alcohol. (Knop, in *Berzelius's Lehrb.*)
(Same as Knop's "$2KCy, Pt_2Cy_3$."
$K_2\,Pt_2\,Cy_5 + 6Aq$

PLATINOPLATINICYANIDE OF ALUMINUM. Deliquescent. Soluble in water, and alcohol.

PLATINOPLATINICYANIDE OF AMMONIUM. Very soluble in water. Soluble in alcohol.
$C_{22}N_{11}(NH_4)_6Pt_5 = NH_4Cy, 5(NH_4, PtCy_2)$

PLATINOPLATINICYANIDE OF BARIUM. Soluble in 33 pts. of water at 16°, and more readily in hot water. (Quadrat.)
$C_{22}N_{11}Ba_6Pt_5 = BaCy, 5(Ba, PtCy_2)$

PLATINOPLATINICYANIDE OF CALCIUM. Easily soluble in water.
$C_{22}N_{11}Ca_6Pt_5$

PLATINOPLATINICYANIDE OF COPPER. Insoluble in water, or in concentrated chlorhydric or dilute nitric acid. Soluble in ammonia-water. (Quadrat.)
$C_{22}N_{11}Cu_6Pt_5$

PLATINOPLATINICYANIDE OF IRON. Ppt.
$C_{22}N_{11}Fe_6Pt_5$

PLATINOPLATINICYANIDE OF LEAD. Somewhat soluble in boiling water. (Quadrat.)
$C_{22}N_{11}Pb_6Pt_5$

PLATINOPLATINICYANIDE OF MAGNESIUM. Soluble in 3.4 pts. of water at 16°. Soluble in alcohol, and ether. (Quadrat.)
$C_{22}N_{11}Mg_6Pt_5$

PLATINOPLATINICYANIDE OF POTASSIUM. Efflorescent. Soluble in 3 pts. of water at 16°, and in much less boiling water; less soluble in alcohol, and ether. (Quadrat.)
$C_{22}N_{11}K_6Pt_5 + 21Aq$

PLATINOPLATINICYANIDE OF SODIUM. Soluble in water. (Quadrat.)
$C_{22}N_{11}Na_6Pt_5$

PLATINOPLATINICYANIDE OF STRONTIUM. Soluble in water. (Quadrat.)

PLATINOPYRIDIN.
$N\left\{\begin{matrix}C_{10}H_8'''\\ Pt\end{matrix}\right.$ or $N\}C_{10}H_8pt_2'''$

PLATINO*bi*SULPHOCYANHYDRIC ACID. Soluble in water. By evaporation, the solution is quickly decomposed. (Buckton, *J. Ch. Soc.*, 7. 35.)
(*Hydro Platinobi Sulpho Cyanic Acid.*)

PLATINO*bi*SULPHOCYANIDE OF *di*PLATOSAMMONIUM. Insoluble in water or alcohol. Rather freely soluble in dilute chlorhydric acid. (Buckton, *J. Ch. Soc.*, 7. 39.)
$N_2\left\{\begin{matrix}Pt\\ H_5\end{matrix}\right. . H, Pt\,2\,CyS_2$

PLATINO*bi*SULPHOCYANIDE OF COPPER. Ppt.

PLATINO*bi*SULPHOCYANIDE OF LEAD.

I.) *basic.* Ppt. Readily soluble in acetic and other acids.

PLATINO*bi*SULPHOCYANIDE OF POTASSIUM. Permanent. Readily soluble in 2.5 pts. of water at 15.5°, and still more readily soluble at higher temperatures. Soluble to any extent in warm alcohol. (Buckton, *loc. cit.*, p. 32.)
$K\,Pt\,2(CyS_2)$

PLATINO*bi*SULPHOCYANIDE OF SILVER. Soluble in an aqueous solution of sulphocyanide of potassium; this solution undergoes decomposition when diluted with water. Partially soluble, with decomposition, in ammonia-water. (Buckton, *loc. cit.*)
$Ag, Pt\,2(CyS_2)$

PLATINO*ter*SULPHOCYANHYDRIC ACID. Soluble in alcohol, and water. The solution is decomposed when evaporated upon a water-bath. (Buckton, *J. Ch. Soc.*, 7. 30.)
(*Hydro Platino ter Sulpho Cyanic Acid.*)

PLATINO*ter*SULPHOCYANIDE OF AMMONIUM. Soluble in water, and alcohol. (Buckton, *loc. cit.*)
$NH_4, Pt\,3(CyS_2)$

PLATINO*ter*SULPHOCYANIDE OF BARIUM. Soluble in water, and in hot alcohol. (Buckton, *loc. cit.*)

PLATINO*ter*SULPHOCYANIDE OF COPPER. Insoluble in water. Soluble in ammonia-water. (Buckton, *loc. cit.*)

PLATINO*ter*SULPHOCYANIDE OF IRON. Insoluble in water, or alcohol. (Buckton, *loc. cit.*) Unacted upon by dilute sulphuric, chlorhydric, or nitric acids. Decomposed by strong nitric acid.
$Fe, Pt\,3(CyS_2)$

PLATINO*ter*SULPHOCYANIDE OF LEAD.

I.) *normal.* Soluble in alcohol, less soluble in cold water. Decomposed by hot water.

II.) *basic.* Insoluble in water or alcohol. Readily soluble in acetic and nitric acids. (Buckton, *loc. cit.*, p. 30.)
$Pb, Pt\,3(CyS_2); PbO$

PLATINO*ter*SULPHOCYANIDE OF MERCURY $(\mathrm{Ḫg}_2)$. Insoluble, or nearly insoluble in water. (Buckton, *loc. cit.*)
$Hg_2, Pt\,3(CyS_2)$

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Platino*ter*SulphoCyanide of Potassium. $K, Pt\,3\,(Cy\,S_2)$ Permanent. Soluble in 12 pts. of water at 15.5°; far more soluble in boiling water; and still more soluble in hot alcohol. (Buckton, *loc. cit.*, p. 23.)

Platino*ter*SulphoCyanide of Silver. $Ag, Pt\,3\,(Cy\,S_2)$ Insoluble in water, or in an aqueous solution of platinotersulphocyanide of potassium. Soluble in cold ammonia-water, but decomposes when the solution is heated. (Buckton, *loc. cit.*, p. 28.) Soluble in sulphocyanide of potassium.

Platino*ter*SulphoCyanide of Sodium. $Na, Pt\,3\,(Cy\,S_2)$ Soluble in water, and alcohol.

Platinosum. $Pt = Pt'$ Platinum as it exists in platin*ous* compounds.

PlatinResin(of Zeise). Mixture of several compounds; for its behavior with solvents, see *Ann. Ch. u. Pharm.*, 1840, **33.** 66 *et seq.*

Platinum. Pt Unacted upon by water, or by sulphuric, chlorhydric, or other simple acids, even when these are concentrated and boiling. When pure it is not attacked by nitric acid, but when alloyed with metals it is generally somewhat soluble therein. Much less readily soluble than gold in aqua-regia. Soluble in chlorine-water.

A mixture of chlorhydric and nitric acids, so long as these acids are not sufficiently concentrated, or the temperature is so low that they cannot react upon each other, has no action upon platinum, nor does the addition of chlorine to the mixture occasion any action upon the metal, but if a few drops of a solution of nitrite of potash, or some nitrous acid be added, the action begins. (Millon, *Ann. Ch. et Phys.*, (3.) **6.** 102.) Completely, though difficultly, soluble in aqua-regia. (Claus, *Beiträge*, p. 37.) Platinum dissolves in the course of time in iodhydric acid, but no sensible quantity of hydrogen is disengaged. (H. Deville, *C. R.*, 1856, **42.** 896.)

Platinum & Silver(alloy). Hot sulphuric acid dissolves out the silver without acting upon the platinum. Nitric acid dissolves some platinum with the silver. (D'Arcet.)

Platosamin compounds. *Vid.* Compounds of Platin(*ous*)ammonium.
(Base of the 2d series of Reiset's salts.)
$N\left\{\begin{matrix}H_3\\Pt'\end{matrix}\right.$

***Di*Platosamin** compounds. *Vid.* Compounds of Platin(*ous*)*di*amin.
(Base of the 1st series of Reiset's salts.)
$N_2\left\{\begin{matrix}H_5\\Pt'\end{matrix}\right.$

PlatosoPyridin.
$N\left\{C_{10}\,H_4\,Pt'''\right.$

Plumbagin(from *Plumbago Europœa*). Scarcely at all soluble in cold, much more soluble in boiling water. Readily soluble in alcohol, and ether. Soluble in cold concentrated sulphuric and nitric acids, from which solutions it is precipitated on the addition of water.

Plumbic Acid. *Vid. per*Oxide of Lead(PbO_2).

Plumbate of Baryta. Insoluble in water. (Fremy, *loc. cit.*)

Plumbate of Lead. *Vid. Sesqui*Oxide of Lead.
(Red Lead. Minium.)

Plumbate of Lime. Insoluble in water. (Fremy, *loc. cit.*) Permanent. Insoluble in water. When treated with nitric acid the lime is dissolved out. (Crum.)

Plumbate of Potash. $K\,O, Pb\,O_2 + 8\,Aq$ Very deliquescent. Decomposed by pure water, but is soluble, without decomposition, in alkaline liquors. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 490.) When the clear solution is diluted with much water it suffers decomposition, $Pb\,O_2$ being precipitated. (Berzelius's *Lehrb.*)

Plumbate of Soda. Decomposed by pure water; sparingly soluble in alkaline liquors. (Fremy, *loc. cit.*)

Plumb*di*Ethyl. $C_8\,H_{10}\,Pb = Pb\,(C_4\,H_5)_2$ Insoluble in water. Soluble in ether. (Buckton.) Soluble in alcohol.

***Di*Plumb*tri*Ethyl.** $C_{12}\,H_{15}\,Pb_2 = Pb_2\,(C_4\,H_5)_3$ Insoluble in water. Very easily soluble in alcohol, and ether.

Plumbide of Ethyl. *Vid.* PlumbEthyl.

Plumbide of Iron.

Plumbide of Sodium. Slowly decomposed by water.

Plumbous Acid. *Vid. prot*Oxide of Lead.

Plumbite of Ammonia.

Plumbite of Baryta. Almost insoluble in water. (Dumas, *Tr.*)

Plumbite of Lime. Slightly soluble in water. (Karsten.)

Plumbite of Nickel? Exceedingly difficultly soluble in nitric acid. Readily soluble in chlorhydric acid. (Tupputi, *Ann. de Chim.*, 1811, **78.** 143.)

Plumbite of Potash. Soluble in water. (Dumas, *Tr.*)

Plumbite of Soda. Soluble in water. (Dumas, *Tr.*)

Plumbite of Strontia. Almost insoluble in water. (Dumas, *Tr.*)

Pneumic Acid. Identical with Taurin, *q. v.*

Polein. *Vid.* Melam.

Polychroit. *Vid.* Safranin.

Polychrest Salt. *Vid.* Sulphate of Potash.

Polychromatic Acid. *Vid.* Chrysammic Acid.

Polygalic Acid. *Vid.* Saponin.

Populin. *(BenzoylSalicin.)* $C_{40}\,H_{22}\,O_{16} + 4\,Aq$ Soluble in 1896 pts. of water at 9°; more readily soluble in hot water, and in alcohol. Scarcely at all soluble in ether. Unacted on by cold, decomposed by boiling nitric acid. Soluble in cold dilute chlorhydric acid, but the solution is decomposed by boiling. Soluble, with decomposition, in aqueous solutions of the caustic alkalies and alkaline earths. (Piria, *Ann. Ch. u. Pharm.*, **96.** 375.) Soluble in about 2000 pts. of cold, and in 70 pts. of boiling water. (Braconnot.) Less soluble in a cold saturated solution of chloride of sodium than in pure water.

Soluble in 100 pts. of absolute alcohol at 14° @ 15°. (Biot & Pasteur.) Much more abundantly soluble in boiling alcohol than in boiling water. Scarcely at all soluble in ether. Easily soluble in cold concentrated acetic acid, from which it is partially reprecipitated on the addition of water, and completely by alkalies. (Braconnot.) Easily soluble, without decomposition, in cold acids, not too concentrated, being partially precipitated therefrom by water, and completely by alkalies. (Braconnot; Koninck.) Soluble in aqueous alkaline solutions. (Koninck.)

Populin with Oxide of Lead. Insoluble in water. (Koninck.)

Porphyric Acid. Sparingly soluble in pure water; insoluble in acidulated water. Insoluble in cold, somewhat soluble in boiling alcohol.
$C_{20}H_4N_2O_{14} = C_{20}H_2(NO_4)_2O_5, HO$

Porphyrate of Ammonia.

I.) *normal.* Very sparingly soluble in pure water. Insoluble in an aqueous solution of carbonate of ammonia.
$C_{20}H_2(NH_4)(NO_4)_2O_6$

II.) *acid.* Somewhat soluble in boiling, less soluble in cold water.

Porphyrate of Baryta. Sparingly soluble in water.

Porphyrate of Copper. Ppt.

Porphyrate of Lead. Sparingly soluble in water.

Porphyrate of Lime. Sparingly soluble in water.

Porphyrate of Silver.

Porphyroxin(from *Bengal Opium*). Easily soluble in spirit, ether, and dilute acids. (Merck, *Ann. der Pharm.*, 1837, **21.** 204.)

Potash. } *Vid. prot*Oxide of Potassium.
Potassa. }

Potassamid. Gradually deliquesces, with decomposition. Decomposed by water, with evolution of heat, also decomposed by alcohol. Insoluble in and unacted upon by dry petroleum.
$N\left\{\begin{matrix}H_2\\K\end{matrix}\right.$

*Tri***Potassamid.** *Vid.* Nitride of Potassium.

Potassium. Decomposes water, alcohol, ether, and as a rule, all liquids which contain oxygen. Insoluble in and unacted upon by dry naphtha, petroleum, and similar hydrocarbons.
K

As a rule, the compounds of potassium are less soluble than those of ammonium (Dumas); but all of its salts are soluble in water, and most of them are readily soluble.

Pourprit(of Batilliat). (Blackish red coloring matter in the sediment of old wines). Insoluble in water. Soluble in concentrated sulphuric acid, and is precipitated therefrom on the addition of water. Soluble in 150 pts. of alcohol, of 80%; less soluble in stronger alcohol. Quite insoluble in ether. (Batilliat, *Traité sur les Vins de la France.*)

Primulin(from *Primula veris*). Easily soluble in water. Also soluble in alcohol, but the less readily in proportion as this is stronger. Insoluble in ether. (Huenefeld.)

Propionamid.
(*Metacetamid. Nitride of Propianyl.*)
$C_6H_7NO_2 = N\left\{\begin{matrix}C_6H_5O_2\\H_2\end{matrix}\right.$

Propionamic Acid. Identical with Alanin, *q. v.*

Propione. Insoluble in water. Soluble in all proportions in alcohol, and ether. (Morley, *J. Ch. Soc.*, **4.** 5.)
(*Ethylide of Propianyl.*)
$C_{10}H_{10}O_2 = \left.\begin{matrix}C_6H_5O_2\\C_4H_5\end{matrix}\right\}$

Propionic Acid(Anhydrous). Insoluble in water. (Limpricht & v. Uslar, *Ann. Ch. u. Pharm.*, **94.** 322.)
(*Propionic Anhydride.*)
$C_{12}H_{10}O_6 = \left.\begin{matrix}C_6H_5O_2\\C_6H_5O_2\end{matrix}\right\}$

Propionic Acid. Soluble in all proportions in water. (Redtenbacher.) Soluble in alcohol, and ether. (Nicklès.)
(*MetAcetonic Acid. MetAcetic Acid.*)
$C_6H_6O_4 = C_6H_5O_3, HO$

Most of the salts of propionic acid are soluble in water.

Propionate of Ammonia.

Propionate of Amyl. Sparingly soluble in water. Soluble in alcohol, in all proportions, and in ether. (Wrightson, *Phil. Mag.*, (4.) **6.** 98.)
$C_6H_5(C_{10}H_{11})O_4$

Propionate of Baryta. Very easily soluble in water, especially when this is hot. (Bœhme.) Soluble in 1.3 pts. of water at 16°. Almost insoluble in absolute alcohol. (Strecker, *Ann. Ch. u. Pharm.*, **92.** 87.)
$C_6H_5BaO_4 + Aq$

Propionate of BromAllyl. Insoluble in water. Soluble in ether. (Berthelot & De Luca, *Ann. Ch. et Phys.*, (3.) **48.** 304.)
(*Hemibromhydrin.*)
$C_{12}H_9BrO_4 = C_6H_5(C_6H_4Br)O_4$

Propionate of Copper. Easily soluble in water. (Wrightson, *Phil. Mag.*, (4.) **6.** 98.)
$C_6H_5CuO_4 + Aq$

Propionate of Ethyl. Insoluble in water.
$C_6H_5(C_4H_5)O_4$

Propionate of Lead.

I.) *normal.* Deliquesces in damp air. Soluble in water. (Strecker, *Ann. Ch. u. Pharm.*, **92.** 89.)
$C_6H_5PbO_4$

II.) *basic.* Soluble in water, and alcohol. (Frankland & Kolbe.) Somewhat soluble in water. (Strecker, *loc. cit.*)
$C_6H_5PbO_4;\ PbO$

Propionate of Lime. Apparently efflorescent. (Strecker.) Permanent. (Wrightson, *Ann. Ch. u. Pharm.*, **90.** 44.) Readily soluble in water. Sparingly soluble in alcohol. (Strecker, *Ann. Ch. u. Pharm.*, **92.** 88.)
$C_6H_5CaO_4 + Aq$

Propionate of Magnesia. Soluble in water. (Strecker.)

Propionate of Potash. Deliquescent. Soluble in water. Less soluble in absolute alcohol, and still less soluble in ether. (Strecker, *Ann. Ch. u. Pharm.*, **92.** 86.)
$C_6H_5KO_4$

Propionate of Silver. Soluble in boiling water, but less soluble in water than the acetate of silver. (Frankland & Kolbe.)
$C_6H_5AgO_4$

Propionate of Soda. Deliquescent. Very soluble in water. (Dumas.)
$C_6H_5NaO_4 + 2\,Aq$

Propionic Alcohol. *Vid.* Hydrate of Propyl.

Propionic Aldehyde. *Vid.* Hydride of Propionyl.

PropionSulphuric **Acid.** *Vid.* SulphoPropionic Acid.

Propyl.
(*Trityl*(of Gerhardt).)
$C_6H_7 \text{ or } \left.\begin{matrix}C_6H_7\\C_6H_7\end{matrix}\right\}$

Propylal. Miscible with water, alcohol, and ether. (Limpricht, *Ann. Ch. u. Pharm.*, **94.** 326.)
(*Isomeric with Acetone, Propylic Aldehyde, and Allylalcohol.*)
$C_6H_6O_2$

PropylAlcohol. *Vid.* Hydrate of Propyl.

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Propylamin. (*Tritylamin. MetAcetamin. Oenylamin. TritylAmmonium. Secalin.*) $C_6H_9N = NH_2(C_6H_7)$ Readily soluble in water. (Berthelot & De Luca.) Soluble in water. Most of its salts are soluble in water, and alcohol. (Parrish's *Pharm.*, p. 418.)

Propylene. (*Metacene. Tritylene. Isomeric with Hydride of Allyl.*) C_6H_6''

Nature of the Gas experimented upon.

Name of solvent used.	Pure propylene prepared from IodoPropylene (C_6H_5I).	Containing 2 % of air, from IodoPropylene.	Containing 7 % of air, prepared from Glycerin.	Containing 55 % of air, prepared from Glycerin.	Observations.
	1 vol. of the solvent absorbs gas.	1 vol. of the solvent absorbs gas.	1 vol. of the solvent absorbs gas.	1 vol. of the solvent absorbs gas.	
Water		$\frac{1}{16}$ to $\frac{1}{10}$ vol.			If a saturated aqueous solution of sulphate of soda be added to this solution, nothing is disengaged except on boiling, when the gas is evolved.
Ordinary alcohol		6 vols.			
Absolute alcohol	12 to 13 vols.		7 vols.		On the addition of water, $\frac{2}{3}$ of the gas is disengaged.
Amyl alcohol		8 vols.			Disengaged by ebullition.
Oleine		8 to 10 vols.			Disengaged on heating.
Acetic acid (glacial)		about 6 vols.			When 1 vol. water is added, $\frac{1}{3}$ of the gas is disengaged.
Oil of turpentine	18 vols.	15 vols.	16 vols.	4 vols.	
*Di*chloride of copper, dissolved in chlorhydric acid		about 3 vols.	2 vols.	1 vol.	Disengaged by ebullition. Less soluble than ethylene in this menstruum.
Ether	17 vols.	16 vols.	13 to 14 vols.	5 vols.	Partially disengaged when the solution is mixed with much water.
Sulphide of carbon	more than 13 vols.	8 to 12 vols.	about 10 vols.		
Chloroform (of commerce)		17 vols.	18 vols.		
Benzin (crystallizable)		more than 13 vols.			

Very little is absorbed by syrupy phosphoric acid. It is entirely absorbed by concentrated sulphuric acid, also by fuming sulphuric acid. At ordinary temperatures it is slowly absorbed by fuming chlorhydric acid, with combination; this absorption is rapid at 100° Very soluble in alcohol and in most inflammable liquids. Much more soluble in the neutral solvents than most other gases, even than olefiant gas. (Berthelot & De Luca, *Ann. Ch. et Phys.*, (3.) **43.** pp. 276, 404.) Almost as soluble in monohydrated sulphuric acid as carbonic acid is in potash: — 35 grammes of this acid can absorb nearly 4 litres of the gas (200 vols. = $\frac{1}{4}$ of an equivalent). When this solution is diluted with water, no gas is evolved, but the solution becomes somewhat cloudy. (Berthelot, *Ibid.*, (3.) **43.** 399.) By ebullition it is disengaged from its solutions. (Berthelot, *Ibid.*, (3.) **51.** 69.)

Propylic Alcohol. *Vid.* Hydrate of Propyl.

Propylic Aldehyde. *Vid.* Hydride of Propionyl.

PropylGlycol. $C_6H_8O_4 = \left.\begin{matrix}C_6H_6''\\H_2\end{matrix}\right\}O_4$ Soluble in all proportions in water, and alcohol.

"**PropylOxySulphoCarbonate of** *X*." *Vid.* OxySulphoCarbonate of *X* & of Propyl.

Propyl*bi*SulphoCarbonate of *X*." *Vid.* OxySulphoCarbonate of *X* & of Propyl.

PropylSulphuric Acid. *Vid.* SulphoPropylic Acid.

Prussic Acid. *Vid.* Cyanhydric Acid.

PseudErythrin. *Vid.* Orsellate of Ethyl.

PseudoAcetic Acid. *Vid.* ButyroAcetic Acid; compare Propionic Acid, with which it is almost, if not quite identical.

PseudoMorphine. (*Phormia.*) $C_{37}H_{18}NO_{14}$ Soluble in 800 @ 900 pts. of cold, and in 12.5 pts. of hot water. Still less soluble in alcohol, and ether. No more soluble in ammonia-water than in cold water, but easily soluble in aqueous solutions of potash and soda. Almost insoluble in absolute alcohol, though somewhat soluble in spirit of 0.833 sp. gr. Almost insoluble in weak acids. (Pelletier.)

PseudOrcin. *Vid.* ErythroMannite.

PseudoSulphoCyanogen. $C_6HN_3S_6$ *Vid.* PerSulphoCyanogen.

Pseudotoxin (from the leaves of *Atropa belladonna*). Soluble in water, and spirit. Insoluble in absolute alcohol or in ether. (Brandes.)

PseudoVeratrin (from *Veratrum sabadilla*). (*Hellonin. Veratrin resin.*) $C_{14}H_9NO_3$ Insoluble in water, ether, or aqueous alkaline solutions. Soluble in alcohol.

Pteleic Acid. C_6H_4O All of its salts are soluble in water. (Kane.)

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Pteritannic Acid. Insoluble in water. Easily soluble in strong alcohol, and ether; less soluble in weak alcohol. Insoluble in naphtha, or in fatty or essential oils. (Luck.)

$C_{24} H_{14} O_7, H O$

Pteritannate of Ethyl. Insoluble in water. Easily soluble in alcohol, with subsequent decomposition. Easily soluble in ether. Soluble in concentrated sulphuric acid, from which it is reprecipitated on the addition of water. Soluble in alkaline solutions. (Luck.)

(*Ethyl Pteritannic Acid.*)
$C_4 H_5 O, H O, 2 C_{24} H_{14} O_7$

Pteritannate of Ethyl & of Lead. Ppt.

Pteritannate of Lead.

I.) *mono.* Ppt.
$C_{24} H_{14} Pb O_8$

II.) *sesquibasic.* Ppt.
$2 C_{24} H_{14} Pb O_8 ; Pb O, H O$

III.) *acid.* Ppt.
$C_{24} H_{14} Pb O_8 ; C_{24} H_{15} O_8$

Punicin (from *Punica granatum*). Soluble in acids. (Righini.)

Purple of Cassius. See Stannate of Gold.

Purpuric Acid. Unknown.
$C_{16} H_5 N_5 O_{12}$

Purpurate of Ammonia. Soluble in 1500 pts. of water. (Prout); in 3000 pts. of water at 15°, and in a much smaller quantity of hot water. (Vauquelin.) 100 pts. of water at 15.5° dissolve 0.066 pts. of it. (Ure's *Dict.*) Insoluble in alcohol, or ether. (Prout; Kodweiss.) Soluble in an aqueous solution of caustic potash. Not perceptibly soluble in a saturated aqueous solution of carbonate of ammonia. (Liebig & Wœhler.) Easily soluble, without decomposition, in strong acetic acid. (Kodweiss.) Insoluble in glacial acetic acid. (Gm.) Decomposed by mineral acids.

(*Murexid.*)
$C_{16} H_4 (N H_4) N_5 O_{12} + 2 Aq$

Purpurate of Baryta. Very sparingly soluble in water. (Prout.)

Purpurate of Lead. Ppt.

Purpurate of Lime. Scarcely at all soluble in water, being less soluble in cold water than the baryta or strontia salt, but more soluble in hot water. (Prout.)

Purpurate of Magnesia. Very soluble in water. (Prout.)

Purpurate of Nicotin. Insoluble, or but sparingly soluble in water. Decomposed by alcohol. Soluble in cold, moderately dilute potash-lye. (Schwarzenbach.)

Purpurate of Potash. Sparingly soluble in an aqueous solution of caustic potash, and still less soluble in solutions of nitrate of potash and of other salts. (Fritzsche.)

Purpurate of Silver.

I.) *normal.* Sparingly soluble in water.
$C_{16} H_4 Ag N_5 O_{12} + 3 Aq$

II.) *di.* Sparingly soluble in water.
$C_{16} H_3 Ag_2 N_5 O_{12}$

III.) *tetra.* Ppt.
$C_{16} H_3 Ag_2 N_5 O_{12} ; 2 Ag O$

Purpurate of Soda. Soluble in 3000 pts. of water at 15°. (Prout.)

Purpurate of Strontia. Sparingly soluble in water. (Prout.)

PurpureoCobalt. The salts of purpureocobalt are generally less soluble than those of roseocobalt. Their neutral solutions are readily decomposed by heat.

$5 N H_3 . Co_2$

Purpurin. Scarcely at all soluble in water. (Gaultier & Persoz.) Sparingly soluble in cold water. (Runge; Debus.) Sparingly soluble in cold, more readily soluble in hot water. (Schiel; Debus.) From the hot aqueous solution it does not separate out again on cooling. (Runge.) More easily soluble than alizarin in warm water. (Strecker, *J. Ch. Soc.*, **3.** 254.) After having been moistened with alcohol it dissolves more readily in water. (Schiel.) Soluble in absolute alcohol. (Runge.) Soluble in cold, and more abundantly in hot alcohol. (Wolff & Strecker.) Soluble both in strong alcohol and weak spirit. (Strecker, *J. Ch. Soc.*, **3.** 254.) Very readily soluble in ether. (Gaultier & Persoz; Runge.) Soluble in ether. (Strecker, *loc. cit.*) Readily soluble in an aqueous solution of alum (Colin & Robiquet), when this is hot and concentrated (Strecker, *loc. cit.*), and in solutions of the salts of alumina, and of aluminate of potash (Gaultier & Persoz), of cold sulphide of ammonium (G. & P.), and of caustic ammonia (Runge), of the caustic alkalies (G. & P.; Runge; Schiel; Wolff & Strecker; Strecker, *loc. cit.*), and in all proportions in a solution of protoxide of tin in caustic potash. (G. & P.) Insoluble in cold aqueous solutions of the alkaline carbonates (Wolff & Strecker), but is dissolved by hot solutions, from which it separates again on cooling. (G. & P.) Insoluble in the cold, but soluble in a boiling concentrated solution of carbonate of soda. (Strecker, *loc. cit.*) Insoluble in a solution of chloride of tin. Soluble in concentrated sulphuric acid (Strecker, *loc. cit.*), from which it is precipitated on the addition of a quantity of water equal to ¼ @ ⅓ of the sulphuric-acid solution. (Schiel.) Even when the latter is heated to 110° the purpurin is not changed, but is again separated when the hot solution is slowly poured into cold water. (Schiel.) It dissolves unchanged in hot fuming sulphuric acid, and is not decomposed until the temperature has reached 200°. (Debus.) When boiled with dilute acids, a yellow solution is formed, from which it separates on cooling. (Runge.)

(*Madder Purple. Oxylizaric Acid.*)
$C_{18} H_6 O_6 = C_{18} H_4 O_4, 2 H O \& + Aq$

The compounds of purpurin with metallic oxides, excepting those of potash, soda, and ammonia, are insoluble in water or alcohol. (Debus.) Its compounds with the alkalies are insoluble in the aqueous solutions of many salts, and in a cold strong solution of carbonate of soda. (Strecker, *J. Ch. Soc.*, **3.** 255.)

Purpurin with Oxide of Lead. Insoluble in water, or alcohol. Soluble in an aqueous solution of caustic potash, and in acetic acid. (Debus.)

$5 C_{18} H_5 O_5, 6 Pb O$

Pyrene. *Vid.* ParaNaphthalin.

Pyridin. Soluble in all proportions in water. Readily soluble in the fixed and volatile oils. Readily soluble in acids, with combination, forming salts which are for the most part easily soluble in water. (Anderson.)

$N \{ C_{10} H_5'''$

PyroAcetic Ether. }
PyroAcetic Spirit. } *Vid.* Acetone.

PyroAcetic Oil. *Vid.* Dumasin.

PyroAconitic Acid. *Vid.* Itaconic Acid.

PyroAlizaric Acid. *Vid.* Pthalic Acid (Anhydrous).

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PyroBenzolin. *Vid.* Lophin.

PyroCatechin. } *Vid.* OxyPhenic
PyroCatechusic Acid. } Acid.

PyroCitramid.
$C_{10} H_8 N_2 O_4$

PyroCitric Acid(of Robiquet). *Vid.* Citraconic Acid.

PyroCitric Acid(of Lassaigne). *Vid.* Itaconic Acid

PyroCitric Chloride. *Vid.* ChloroPyroCitryl.
$C_{10} H_4 O_4, Cl_2$

PyroCitrimid. *Vid.* Citraconimid.

PyroComenic Acid. *Vid.* ParaComenic Acid.

PyroConiin. Soluble, with combination, in acetic acid. (J. D. Morries.)

PyroDextrin. Permanent. Very readily soluble in water. Alcohol of 22% dissolves traces of it; but it is insoluble in concentrated alcohol or ether. (Gélis, *Ann. Ch. et Phys.*, (3.) **52.** —.)
(*PyroGlucic Acid.*)
$C_{48} H_{37} O_{37}$

PyroDextrin with Baryta. Sparingly soluble in water. Insoluble in alcohol, even when this is very dilute; it is completely precipitated from the aqueous solution when 10% of ordinary alcohol is added to the latter. (Gélis, *loc. cit.*)
$C_{48} H_{36} O_{36}, 2\,Ba\,O$

PyroDextrin with Oxide of Lead. Very soluble in water. Insoluble in alcohol. (Gélis, *loc. cit.*)
$C_{48} H_{36} O_{36}, Pb\,O$

PyroGallic Acid. Permanent. Soluble in 2.25 pts. of water at 13°. (Braconnot.) Soluble in alcohol, and ether. (Braconnot; Pelouze.) Less soluble in alcohol than in water. (Stenhouse.) Soluble in cold concentrated sulphuric acid, apparently without decomposition. (Gmelin.) Decomposed by dilute sulphuric acid.
(*Isomeric with Frangulin and Phoro Glucin.*)
$C_{12} H_6 O_6 = C_{12} H_5 O_5, H\,O$

The salts of pyrogallic acid are more soluble in water than the corresponding gallates.

PyroGallate of Alumina. Soluble in water. (Braconnot.)

PyroGallate of Ammonia.

PyroGallate of Antimony. Insoluble in water and the other neutral solvents. Easily soluble in dilute chlorhydric acid. (Rosing.)
$Sb\,O_3, C_{12} H_5 O_5$

PyroGallate of Bismuth. Ppt.

PyroGallate of Copper. Sparingly soluble in water. (Stenhouse.)

PyroGallate of Lead.
I.) $C_{12} H_5 Pb\,O_6 ; Pb\,O, H\,O$
II.) $C_{12} H_5 Pb\,O_6 ; Pb\,O, H\,O ; 5\,Pb\,O$ Insoluble in water. (Berzelius.)
III.) $2\,C_{12} H_5 Pb\,O_6 ; Pb\,O, H\,O + 4\,Aq$

PyroGallate of Potash. Very soluble in water. (Pelouze.)

PyroGallate of Soda. Very readily soluble in water. (Pelouze.)

PyroGallate of Tin.

PyroGallate of Uranium. Ppt.

PyroGlucic Acid. *Vid.* PyroDextrin.

PyroGuaiacic Acid. Permanent. Sparingly soluble in water. Soluble in all proportions in alcohol, and ether. Readily soluble in acetic acid, even when this is tolerably dilute, and in other dilute acids. Easily soluble in dilute aqueous solutions of caustic potash, soda, and ammonia, and in concentrated sulphuric acid, from which it is partially precipitated on the addition of water. (Vœlckel, *Ann. Ch. u. Pharm.*, **89.** 354.) Soluble in a solution of caustic potash, but insoluble in ammonia-water, or in aqueous solutions of the carbonated alkalies. (Sobrero.) The compounds of pyroguaiacic acid with the alkaline earths are sparingly soluble in water, those of the oxides of the metals proper insoluble, or but sparingly soluble. (Unverdorben.)
(*Guajacol. Hydride of Guaiacyl. Isomeric with Orcin and Saligenin.*)
$C_{14} H_8 O_4 = C_{14} H_7 O_3, H\,O$

PyroGuaiacate of Ammonia.

PyroGuaiacate of Lead.
I.) *basic.* Insoluble in water. Soluble in strong alcohol. (Sobrero.)
$C_{14} H_7 Pb\,O_4 ; Pb\,O, H\,O$

PyroGuaiacate of Potash. Soluble in water. Sparingly soluble in absolute alcohol, and still less soluble in ether. (Unverdorben.)
$C_{14} H_7 K\,O_4 + 4\,Aq$

PyroGuaiacin. Insoluble in water. Soluble in alcohol, and ether, and in a hot aqueous solution of caustic potash.
$C_{38} H_{22} O_6$

PyrOleic Acid. *Vid.* Sebacic Acid.

PyroLithofellic Acid.
(*Isomeric with Asclepion.*)
$C_{40} H_{34} O_6 = C_{40} H_{33} O_5, H\,O$

PyrOlivilic Acid. Sparingly soluble in water. Easily soluble in alcohol, and ether. Also in alkaline solutions.
$C_{40} H_{12} O_{10} = C_{40} H_{11} O_9, H\,O$

PyrOlivilate of Lead. Insoluble in water. Soluble in alcohol.
$C_{40} H_{11} Pb\,O_{10}$

PyroMalic Acid. *Vid.* Maleic Acid.

PyroMaric Acid. *Vid.* Sylvic Acid, under Resins(of Turpentine).

PyroMeconic Acid. Readily soluble in warm, less soluble in cold water, and spirit. More readily soluble in alcohol than in water. (Robiquet; Stenhouse.) Soluble in ether (John), and in naphtha (rock-oil). (Choulant.) Soluble in warm concentrated sulphuric acid, without decomposition, being deposited again on cooling. (Brown.)
(*Isomeric with PyroMucic Acid.*)
$C_{10} H_4 O_6 = C_{10} H_3 O_5, H\,O$

PyroMeconate of Baryta. More soluble in water than the lime, magnesia, or strontia salt. Sparingly soluble in alcohol. (Brown.)
$C_{10} H_3 Ba\,O_6 + Aq$

PyroMeconate of Copper. Very sparingly soluble in boiling water, or alcohol. (Stenhouse.)
$C_{10} H_3 Cu\,O_6$

PyroMeconate *of sesquioxide* of Iron. Very sparingly soluble in water, either hot or cold. (Stenhouse.)
$C_{30} H_9 Fe_2''' O_{18}$

PyroMeconate of Lead. Sparingly soluble in hot water. Less soluble in alcohol, either warm or cold.
$C_{10} H_3 Pb\,O_6$

PyroMeconate of Lime. Soluble in 322.6 pts. of water at 15.5°. Sparingly soluble in boiling alcohol, being less soluble in alcohol than in water. (Brown.)
$C_{10} H_3 Ca\,O_6 + Aq$

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PyroMeconate of Magnesia. Insoluble in water, or alcohol. (Brown.)
$C_{10} H_3 Mg O_6$

PyroMeconate of Silver. Very sparingly soluble in water, decomposing even in the cold. (Stenhouse.)
$C_{10} H_3 Ag O_6$

PyroMeconate of Strontia. Slightly soluble in cold, more readily soluble in warm water, and alcohol. (Brown.)
$C_{10} H_3 Sr O_6 + Aq$

PyroMellic Acid. Sparingly soluble in cold, abundantly soluble in boiling water. The acid which has been dried at 120° is soluble in 70.42 pts. of water at 16°. Readily soluble in alcohol. Soluble, without much decomposition, in boiling concentrated sulphuric, nitric, and chlorhydric acids, and in aqua-regia. (Erdmann.) Its salts are all soluble in free pyromellic acid.
(*PyroMellithic Acid.*)
$C_{20} H_6 O_{16} = C_{20} H_2 O_{12}, 4 H O$

PyroMellate of Ammonia. Readily soluble in water. Insoluble in strong alcohol, sparingly soluble in weak alcohol.

PyroMellate of Baryta. Insoluble in boiling water.

PyroMellate of Gold.

PyroMellate *of sesquioxide* of Iron. Ppt.

PyroMellate of Lead. Insoluble in boiling water.
$C_{20} H_2 Pb_4 O_{16} + 2 Aq$

PyroMellate of Lime. Insoluble in boiling water.

PyroMellate of Manganese.

PyroMellate *of dinoxide* of Mercury. Ppt.

PyroMellate *of protoxide* of Mercury. Ppt.

PyroMellate of Nickel.

PyroMellate of Potash. Readily soluble in water. Insoluble in strong, sparingly soluble in weak alcohol.

PyroMellate of Silver. Almost insoluble in boiling water.
$C_{20} H_2 Ag_4 O_{16}$

PyroMellate of Soda. Readily soluble in water. Insoluble in strong, sparingly soluble in weak alcohol.

PyroMellate of Zinc.

PyroMellitic Acid. *Vid.* PyroMellic Acid.

PyroMoric Acid.
PyroMoriTannic Acid } *Vid.* OxyPhenic Acid.

PyroMucamid. Soluble in water, alcohol, and ether. (Malaguti.)
(*PyroMucylamid.*)
$C_{10} H_5 N O_4 = N \left\{ \begin{matrix} C_{10} H_3 O_4 \\ H_2 \end{matrix} \right.$

***Bi*PyroMucamid.** Sparingly soluble in cold water. More soluble than pyromucic acid in water. More soluble in alcohol, and ether, than in water. (Malaguti.)
(*PyroMucamide biamidée.*)
$C_{10} H_6 N_2 O_2 = N_2 \left\{ \begin{matrix} C_{10} H O_2 \\ H_5 \end{matrix} \right.$

PyroMucic Acid. Soluble in 28 pts. of water at 15°. (Houton-Labilladière); and in 4 pts. of boiling water. (Trommsdorff.) More soluble in alcohol than in water.
(*Furfuric Acid. Isomeric with PyroMeconic Acid.*)
$C_{10} H_4 O_6 = C_{10} H_3 O_5, H O$

PyroMucate of Ammonia.

PyroMucate of Baryta. Permanent. Difficultly soluble in water, though somewhat more readily in hot than in cold. Insoluble in alcohol. (Houton-Lab.)
$C_{10} H_3 Ba O_6$

PyroMucate of *quadri*ChlorEthyl. Decomposed by water. Easily soluble in alcohol, and ether. (Malaguti.)
(*Ether ChloroPyroMucique.*)
$C_{10} H_3 (C_4 H Cl_4) O_6$

PyroMucate of Copper. Sparingly soluble in water. (Houton-Labilladière.)

PyroMucate of Ethyl. Very sparingly soluble in water. Soluble in all proportions in alcohol, and ether. Easily soluble, without decomposition, in cold concentrated sulphuric and chlorhydric acids. (Malaguti.)
$C_{10} H_3 (C_4 H_5) O_6$

PyroMucate *of protoxide* of Iron. Very soluble in water. (Houton-Labilladière.)

PyroMucate *of sesquioxide* of Iron. Ppt.

PyroMucate of Lead. Soluble in water.

PyroMucate of Lime. Permanent. Somewhat more readily soluble in hot than in cold water. Insoluble in alcohol. (Houton-Labilladière.)

PyroMucate of Magnesia.

PyroMucate *of dinoxide* of Mercury. Insoluble in water.

PyroMucate of Nickel. Ppt.

PyroMucate of Potash. Deliquescent. Very soluble in water, and alcohol. Also soluble in ether.
$C_{10} H_3 K O_6$

PyroMucate of Silver. Soluble in water.
$C_{10} H_3 Ag O_6$

PyroMucate of Soda. Less deliquescent and less soluble in water than the potash salt. (Houton-Labilladière.)

PyroMucate of Strontia. Permanent. Somewhat more readily soluble in hot than in cold water. Insoluble in alcohol. (Houton-Lab.)

PyroMucate *of protoxide* of Tin. Ppt.

PyroMucate of Zinc. Soluble in water.

PyroPectic Acid. Insoluble in water. Soluble in alkaline liquors. (Fremy, *Ann. Ch. et Phys.*, (2.) **24.** 39.)

PyroPimaric Acid. *Vid.* Sylvic Acid, under Resins (of Turpentine).

PyroQuinic Acid (of Pelletier & Caventou). Appears to be a mixture.

PyroRacemic Acid (oily). *Vid.* Pyruvic Acid.

"**PyroRacemic Acid**" (crystalline). *Vid.* PyroTartaric Acid.

Pyroretin. *Vid.* Scleretinite, under Resins (fossil).

PyroSorbic Acid. *Vid.* Maleic Acid.

PyroTartanil. *Vid.* PhenylPyroTartrimid.

PyroTartanilic Acid. *Vid.* PhenylPyroTartramic Acid.

***Bi*PyroTartramid.** *Vid.* PyroTartrimid.

PyroTartranil. *Vid.* PhenylPyroTartrimid.

PyroTartranilic Acid. *Vid.* PhenylPyroTartramic Acid.

PyroTartoNitranil. *Vid.* NitroPhenylPyroTartrimid.

PyroTartoNitrAnilic Acid. *Vid.* NitroPhenylPyroTartramic Acid.

PyroTartaric Acid (Anhydrous). Very sparingly soluble in water, by which it is slowly converted into
(*PyroTartric Anhydride.*)
$C_{10} H_6 O_6 = C_{10} H_6 O_4'' \left\{ O_2 \right.$

the hydrated acid. Easily sóluble in alcohol, from which it is precipitated on the addition of water. By alkaline solutions it is quickly converted into the hydrated acid. (Arppe.)

PyroTartaric Acid. (*Crystalline Pyro Racemic Acid.*) Permanent. Much more soluble in water than its isomer, lipic acid. (Wirz.) Soluble in 4 pts. of water at 12.5° (Gœbel); in 3 pts. of water at 15° (Gruner); and in 1.5 pts. of water at 20°. (Arppe.) Very soluble in alcohol, and ether. (Arppe.) Soluble, without decomposition, in concentrated sulphuric, chlorhydric, nitric, and acetic acids. Most of the salts of pyrotartaric acid are soluble in water, but are only very sparingly soluble in alcohol. (Arppe.)
$C_{10} H_8 O_8 = C_{10} H_6 O_6, 2 H O$

PyroTartrate of Alumina.

I.) *monobasic.* Insoluble in water. Soluble in an aqueous solution of normal pyrotartrate of soda. (Arppe.)
$Al_2 O_3, C_{10} H_6 O_6 + 2 Aq$

II.) *acid.* Soluble in water.

PyroTartrate of Ammonia.

I.) *normal.* Very easily soluble in water. Sparingly soluble in cold, and is decomposed by boiling alcohol. (Arppe, *Ann. Ch. u. Pharm.*, **87.** 229.)
$C_{10} H_6 (N H_4)_2 O_8$

II.) *acid.* Permanent. Readily soluble in water. (Gruner.) Difficultly soluble in boiling, and still less soluble in cold alcohol. (Arppe.)
$C_{10} H_7 (N H_4) O_8$

PyroTartrate of Anilin(?). Soluble in water.

PyroTartrate of Baryta.

I.) *normal.* Readily soluble in hot and in cold water; from which solution it is precipitated on the addition of alcohol. (Arppe.)
$C_{10} H_6 Ba_2 O_8 + 4 Aq$

II.) *acid.* Permanent. Very soluble in water. Alcohol removes half the acid. (Arppe.)
$C_{10} H_7 Ba O_8 + 2 Aq$

PyroTartrate of Bismuth.

I.) [Soluble in a small amount of water ?] The solution becomes cloudy on ebullition, but clears up again on cooling. On the addition of much water the following compound (No. II.) is precipitated.

II.) $C_{30} H_{18} (Bi''')_2 O_{24} + 4 Aq$ Ppt.

PyroTartrate of Cadmium.

I.) *normal.* Very soluble in water. Alcohol removes a portion of the acid.
$C_{10} H_6 Cd_2 O_8 + 4 Aq$ & $6 Aq$

II.) *acid.* Soluble in water. Insoluble in alcohol.

PyroTartrate *of violet sesquioxide* of Chromium. Soluble in water.

PyroTartrate of Cobalt.

I.) Difficultly soluble in water.

II.) *basic.* Insoluble in water.
$C_{10} H_6 Co_2 O_8, 8 Co O + 12 Aq$

PyroTartrate *of protoxide* of Copper.

I.) *normal.* Soluble in about 250 pts. of water. (Pelouze.) Scarcely at all soluble in alcohol. Easily soluble in ammonia-water, and in acids. (Arppe.)
$C_{10} H_6 Cu_2 O_8 + 4 Aq$

II.) *basic.* Ppt.
$C_{10} H_6 Cu_2 O_8 ; 2 Cu O + 4 Aq$

PyroTartrate of Ethyl.

I.) *normal.* Nearly insoluble in water, in contact with which it is slowly decomposed. Soluble in all proportions in alcohol, and ether. Readily soluble in cold concentrated sulphuric and chlorhydric acids. (Gruner.)
$C_{10} H_6 (C_4 H_5)_2 O_8$

PyroTartrate of Glucina.

I.) *normal.*
$C_{30} H_{18} (Gl_2''')_2 O_{24}$

II.) *acid.* Soluble in water.
$Gl_2 O_3, 6 C_{10} H_8 O_8 + 7 Aq$

PyroTartrate *of protoxide* of Iron. Soluble in water.

PyroTartrate *of peroxide* of Iron.

I.) *normal.* Insoluble in water, or alcohol. (Arppe.)
$C_{30} H_{18} (Fe_2''')_2 O_{24}$

II.) *monobasic.* Soluble in 200 pts. of cold water. Insoluble in alcohol. (Pelouze.)
$Fe_2 O_3, C_{10} H_8 O_8 + 3 Aq$

III.) *hexa.* Insoluble in water. Very sparingly soluble in acetic acid; abundantly soluble in nitric acid. (Arppe.)
$6 Fe_2 O_3, C_{10} H_8 O_8 + 4 Aq$

IV.) 18 *basic.* Insoluble in water.
$18 Fe_2 O_3, C_{10} H_8 O_8 + 16 Aq$

V.) *peracid.* Easily soluble in water. Decomposed by alcohol.
$Fe_2 O_3, 9 C_{10} H_8 O_8$

PyroTartrate of Lead.

I.) *normal.* Very sparingly soluble in cold, more readily soluble in hot water. (Weniselos.) Insoluble in alcohol. Soluble in an aqueous solution of acetate of lead. (Arppe.)
$C_{10} H_6 Pb_2 O_8 + 4 Aq$

II.) *tetra.* Completely insoluble in water.
$C_{10} H_6 Pb_2 O_8 ; 2 Pb O$

III.) *hexa.* Insoluble in water. Soluble in an aqueous solution of subacetate of lead, and in acids. (Pelouze.)
$C_{10} H_6 Pb_2 O_8 ; 4 Pb O$

PyroTartrate of Lime.

I.) *normal.* Sparingly soluble in water, requiring nearly 100 pts. thereof for its solution. Very soluble in acetic, chlorhydric, and nitric acids. Insoluble in alcohol. (Arppe.)
$C_{10} H_6 Ca_2 O_8 + 4 Aq$

II.) *peracid.* Easily soluble in water. (Gruner.)
$C_{10} H_7 Ca O_8, 2 C_{10} H_8 O_8 + 2 Aq$

PyroTartrate of Magnesia.

I.) *normal.* Very readily soluble in water, from which it is precipitated on the addition of alcohol. (Arppe.)
$C_{10} H_6 Mg_2 O_8 + 6 Aq$ & $12 Aq$

II.) *acid.* Soluble in water.

PyroTartrate of Manganese.

I.) *normal.* Readily soluble in water, from which it is precipitated by alcohol. (Arppe.)
$C_{10} H_6 Mn_2 O_8 + 6 Aq$

PyroTartrate *of dinoxide* of Mercury. Nearly insoluble in water. Somewhat soluble in an aqueous solution of normal pyrotartrate of soda. Easily soluble in nitric acid. (Arppe.) Insoluble in alcohol, or ether. (Harff.)

PyroTartrate *of protoxide* of Mercury. Soluble in 119 pts. of water, the solution undergoing decomposition when boiled; more readily soluble in acidulated water, and in concentrated sulphuric acid, especially if this is warm. Nearly insoluble in alcohol, or ether. (Harff.)

PyroTartrate of Methyl. Sparingly soluble, or insoluble, in water. (Arppe.)

PyroTartrate of Nickel.

I.) *normal.* Very sparingly soluble in water. Insoluble in alcohol. (Arppe.)
$C_{10}H_6Ni_2O_8+4\,Aq$

II.) *peracid.* Soluble in water. Decomposed by alcohol.
$C_{10}H_7NiO_8, C_{10}H_8O_8+2\,Aq$

PyroTartrate of Potash.

I.) *normal.* Deliquesces in moist air. Soluble in water, from which it is precipitated on the addition of alcohol. The anhydrous salt is insoluble in absolute alcohol; the hydrated salt is somewhat soluble in hot, less soluble in cold, absolute alcohol. (Arppe.)
$C_{10}H_6K_2O_8+2\,Aq$

II.) *acid.* Permanent. Somewhat less soluble than the normal salt in water. Difficultly soluble in boiling alcohol. (Arppe.)
$C_{10}H_7KO_8$

PyroTartrate of Silver.

I.) *normal.* Sparingly soluble in cold water. Readily soluble in nitric and acetic acids, and in ammonia-water. (Arppe.)
$C_{10}H_6Ag_2O_8$

PyroTartrate of Soda.

I.) *normal.* Efflorescent. Very soluble in water. Insoluble in alcohol, even boiling. (Arppe.)
$C_{10}H_6Na_2O_8+6\,Aq\ \&\ 12\,Aq$

II.) *acid.* Readily soluble in water. Insoluble in alcohol. (Weniselos.)
$C_{10}H_7NaO_8$

PyroTartrate of Strontia.

I.) *normal.* Easily soluble in water, from which it is precipitated by alcohol. (Arppe.) Sparingly soluble in water; insoluble in alcohol. (Gruner.)
$C_{10}H_6Sr_2O_8+2\,Aq$

II.) *acid.* Soluble in water. Decomposed by alcohol. (Arppe.)
$C_{10}H_7SrO_8+2\,Aq$

PyroTartrate *of protoxide* **of Tin.**

I.) *tetra.* Soluble in a small quantity of water, from which solution it is precipitated on the addition of much water, or alcohol.
$C_{10}H_6Sn_2O_8, 2\,SnO$

II.) *basic.* Insoluble in water.

PyroTartrate *of sesquioxide* **of Uranium.** Readily soluble in water, from which solution it is precipitated on the addition of alcohol. (Arppe.)
$8\,Ur_2O_3, 3\,C_{10}H_8O_8+Aq$

PyroTartrate of Zinc.

I.) *normal.* Soluble in water, from which it is precipitated on the addition of alcohol. (Arppe.)
$C_{10}H_6Zn_2O_8+6\,Aq$

II.) *acid.* Insoluble in water.

PyroTartrimid. Readily soluble in water, alcohol, ether, alkaline solutions, and the ordinary acids. (Arppe, *Ann. Ch. u. Pharm.*, **87.** 233.)
(*BiPyroTartramid. PyroTartrylamid.*)
$C_{10}H_7NO_4=N\left\{\begin{matrix}C_{10}H_6O_4''\\H\end{matrix}\right.$

PyroTartrimid with Oxide of Lead. Partially soluble in water. (Arppe, *loc. cit.*)
$C_{10}H_7NO_4, 5\,PbO+5\,Aq$

PyroTartoNitranil. *Vid.* NitroPhenylPyroTartrimid.

PyroTartonitranilic Acid. *Vid.* NitroPhenylPyroTartramic Acid.

PyroTartranile. *Vid.* PhenylPyroTartrimid.

PyroTartroNitranil. *Vid.* NitroPhenylPyroTartrimid.

PyroTartroNitrAnilic Acid. *Vid.* NitroPhenylPyroTartramic Acid.

PyroTartrylNitroPhenylamid. *Vid.* NitroPhenylPyroTartrimid.

PyroTerebic Acid. Permanent. Soluble in 25 pts. of water; more soluble in alcohol, and ether. (Rabourdin.) The alkaline pyroterebates are soluble in water.
(*PyroTerebilic Acid.*)
$C_{12}H_{10}O_4=C_{12}H_9O_2, HO$

PyroTerebate of Lead.

I.) *basic.* Insoluble in water.

II.) *acid.* Soluble in water.

PyroTerebate of Silver. Sparingly soluble in water. (Rabourdin.)

PyroTerebilic Acid. *Vid.* PyroTerebic Acid.

PyroUric Acid. *Vid.* Cyanuric Acid.

Pyroxam. *Vid.* Xyloidin.

PyroXanthin. Soluble in warm spirit, ether, and acetic acid, crystallizing from the two first on cooling. Water precipitates it from its solution in alcohol and acetic acid. Soluble in cold concentrated sulphuric acid, with subsequent decomposition. Also soluble in sulphuric acid diluted with an equal volume of water, when this is gently heated, but after a few days the solution suffers decomposition. Soluble in highly concentrated chlorhydric acid, the solution undergoing decomposition when exposed to the air. When water is added to the sulphuric or chlorhydric solutions immediately after their formation, the pyroxanthin is reprecipitated unchanged. Soluble in strong nitric acid, with decomposition. Only very sparingly soluble in aqueous solutions of caustic potash or ammonia, even at 100°. (Apjohn & Gregory, *Ann. Ch. u. Pharm.*, 1837, **21.** 145.)
(*Eblanin.*)
$C_{20}H_8O_4=\left.\begin{matrix}C_{20}H_7O_2\\H\end{matrix}\right\}O_2$

PyroXanthogene. Very sparingly soluble in cold, more readily soluble in hot water. Readily soluble in alcohol, wood-spirit, and ether. (Schweizer.)

Pyroxilic Spirit. *Vid.* Hydrate of Methyl.

Pyroxilin. *Vid.* Gun-Cotton.

Pyrrol. Nearly insoluble in water. Easily soluble in alcohol, and ether. Insoluble in aqueous solutions of the caustic alkalies. Slowly soluble in sulphuric and chlorhydric acids. Dissolves rapidly, with decomposition, in nitric acid. (Anderson.)
$C_8H_5N=N\left\{C_8H_5'''\right.$

Pyrrol Red. Insoluble in water, dilute acids, or alkaline solutions.
$C_{24}H_{14}N_2O_2$

Very sparingly soluble in cold alcohol or ether. Somewhat more soluble in hot alcohol. (Anderson; Schwanert.)

Sparingly soluble in water, ether, acids, and ammonia-water. Easily soluble in alcohol. (O. Hesse.)

Pyruvic Acid. Miscible in all proportions with water, alcohol, and ether. (Berzelius.) Soluble, apparently without decomposition, in cold concentrated nitric acid, but the solution is decomposed when heated. (Vœlckel, *Ann. Ch. u. Pharm.*, **89.** 69.) The pyruvates of metallic oxides occur in two modifications, — the one crystalline, the other gummy. Most of them are soluble in water, and most of
(*OilyPyroRacemic Acid. Brenztraubensæure.*)
$C_6H_4O_6=C_6H_3O_5, HO$

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those not soluble in water are soluble in aqueous solutions of the alkalies; many of them also in solutions of the alkaline carbonates. They are but sparingly soluble in alcohol, dissolving the less readily in proportion as the alcohol is more concentrated, and are insoluble in ether. Some of them are decomposed by water, others by alcohol. (Berzelius.)

PYRUVATE OF ALUMINA.

I.) *normal.* Soluble in water, and in aqueous solutions of the caustic and carbonated alkalies.

II.) *basic.*

PYRUVATE OF AMMONIA. Deliquescent. Almost insoluble in alcohol. Insoluble in ether.

PYRUVATE OF BARYTA.

α = *crystalline.* Permanent. Tolerably soluble in water. Insoluble in aqueous solutions of the alkaline carbonates.

$C_6 H_3 Ba O_6 + Aq$

β = *gummy.* Very slowly soluble in water, even when this is boiling.

PYRUVATE OF BISMUTH.

β = *gummy.* Soluble in water, and in aqueous solutions of the caustic and carbonated alkalies.

PYRUVATE OF COBALT.

α = *crystalline.* Very slowly soluble in water, even when this is acidulated with pyruvic acid.

β = *gummy.* Very soluble in water. Insoluble in aqueous solutions of the caustic or carbonated alkalies.

PYRUVATE OF COPPER.

α = *crystalline.* Very sparingly soluble in cold, somewhat more soluble in hot water.

$C_6 H_3 Cu O_6 + Aq$

β = *gummy.* Tolerably soluble in water. Soluble in aqueous solutions of the caustic and carbonated alkalies.

PYRUVATE OF GLUCINA.

I.) *normal.* Soluble in water, and in aqueous solutions of the caustic and carbonated alkalies.

II.) *basic.* Insoluble in water.

PYRUVATE *of protoxide* OF IRON.

α = *crystalline.* Permanent in dry air. Sparingly soluble in water.

β = *gummy.* Readily soluble in water, and alcohol.

PYRUVATE *of sesquioxide* OF IRON.

I.) *normal.*

β = *gummy.* Soluble in water, and alcohol. Somewhat soluble in aqueous solutions of the caustic and carbonated alkalies.

II.) *basic.* Soluble in ammonia-water.

PYRUVATE OF LEAD.

I.) *normal.*

α = *crystalline.* Sparingly soluble in water. (Berzelius.) Insoluble, or very sparingly soluble in water. (Vœlckel, *Ann. Ch. u. Pharm.*, **89.** 70.)

$C_6 H_3 Pb O_6$

II.) *tri.* Very sparingly soluble in water.

$C_6 H_3 Pb O_6, 2 Pb O + Aq$

III.) *acid.* Decomposed by water.

PYRUVATE OF LIME.

α = *crystalline.* Soluble in cold water. Insoluble in aqueous solutions of the alkaline carbonates.

β = *gummy.*

PYRUVATE OF LITHIA.

α = *crystalline.* Sparingly soluble in water.

β = *gummy.* More readily soluble in water than the crystalline modification.

PYRUVATE OF MAGNESIA. Insoluble in aqueous solutions of the alkaline carbonates.

PYRUVATE OF MANGANESE.

α = *crystalline.* Slowly soluble in cold, more soluble in hot water.

β = *gummy.* Readily soluble in water.

PYRUVATE *of dinoxide* OF MERCURY. Sparingly soluble in boiling water, with partial decomposition.

PYRUVATE *of protoxide* OF MERCURY.

I.) *normal.* Decomposed by water to a soluble acid and an insoluble basic salt.

II.) *basic.* Insoluble in boiling water.

PYRUVATE OF NICKEL.

α = *crystalline.* } More difficultly soluble in

β = *gummy.* } water than the corresponding cobalt salts.

PYRUVATE OF POTASH. Deliquescent. Soluble in water. Insoluble in ether.

PYRUVATE OF SILVER.

α = *crystalline.* Soluble in boiling, but very sparingly soluble in cold water. Soluble in ammonia-water.

$C_6 H_3 Ag O_6$

β = *gummy.* Somewhat more soluble in hot than in cold water. (Berzelius.)

PYRUVATE OF SODA.

I.) *normal.*

α = *crystalline.* Soluble in water. Very sparingly soluble in boiling absolute alcohol; more, though still sparingly, soluble in spirit. Insoluble in ether.

$C_6 H_3 Na O_6$

β = *gummy.*

II.) *acid.* Soluble in water. Insoluble in alcohol.

PYRUVATE OF STRONTIA.

α = *crystalline.* Less soluble than the baryta-salt in water. Insoluble in aqueous solutions of the alkaline carbonates.

$C_6 H_3 Sr O_6 + 2 Aq$

β = *gummy.* Soluble in water.

PYRUVATE OF THORIA. Soluble in water, and ammonia-water.

PYRUVATE OF URANIUM. Readily soluble in water.

PYRUVATE OF YTTRIA.

α = *crystalline.* Slowly soluble in water.

β = *gummy.* Somewhat soluble in water. Soluble in aqueous solutions of the caustic and carbonated alkalies.

PYRUVATE OF ZINC.

α = *crystalline.* Sparingly soluble in water.

$C_6 H_3 Zn O_6 + 8 Aq$

β = *gummy.* Easily soluble in water.

PYRUVATE OF ZIRCONIA. Soluble in water, and ammonia-water.

Q.

QUADRICHLORIDE (&c.) OF *X*. See under CHLORIDE (&c.) of *X*, as *quadri*Chloride of *X*, *quadr*Oxalate of *X*, and the like.

QUASSIN. Permanent. Very sparingly soluble in water. 100 pts. of water at 12° dissolve only 0.45 pt. of it, i. e. 1 pt. of it is soluble in 222 pts. of water

(*Quassite, from Quassia amara.*)
$C_{20} H_{12} O_6(?)$

at 12°, and even this quantity is only slowly dissolved. Its solubility in water is increased to a remarkable extent by the presence of salts and of easily soluble organic substances, especially by those which accompany it in the quassia-wood. Very sparingly soluble in ether. Its best solvent is alcohol, which dissolves so much the more of it in proportion as it contains less water, and more readily when hot than in the cold. More soluble in dilute acids and alkaline solutions than in water. Abundantly soluble in cold concentrated sulphuric acid, from which it separates apparently unchanged on the addition of water. Decomposed by hot sulphuric acid. Abundantly soluble, apparently without decomposition, in cold nitric acid of 1.25 sp. gr., but is decomposed when this solution is heated. (Wiggers, *Ann. der Pharm.*, 1837, **21.** pp. 44–46.)

QUERCETIN. Permanent. Almost insoluble in cold, very sparingly soluble in boiling water. Readily soluble in alcohol. Soluble in warm acetic acid. Easily soluble in ammonia-water, and in dilute aqueous solutions of caustic potash and soda. (Rigaud, *Ann. Ch. u. Pharm.*, **90.** 294.)

$C_{24}H_9O_{11} = \left.\begin{matrix}C_{24}H_7O_8\\H\end{matrix}\right\}O_2 + Aq$

QUERCIN (from the bark of *Quercus robur*). Easily soluble in water, and in dilute spirit. Insoluble in absolute alcohol, or ether. Soluble in lime-water. (Gerber.)

QUERCITE. Soluble in 8 @ 10 pts. of cold water. Tolerably easily soluble in warm dilute alcohol. Soluble in concentrated sulphuric acid, with combination.

(*Sugar of Acorns. Isomeric with Pinite, Dulcinam, and Mannitan.*)

$C_{12}H_{12}O_{10} = \left.\begin{matrix}C_{12}H_{10}O_6''\\H_2\end{matrix}\right\}O_4$

QUERCITE with BARYTA. Soluble in water, and spirit.

$C_{12}H_{11}BaO_{10} + 8\,Aq$

QUERCITE with LEAD. Ppt.

QUERCITE with LIME.

QUERCITANNIC ACID.

QUERCITRIN. Almost insoluble in cold water. Soluble in 425 pts. of boiling water. (Rigaud, *Ann. Ch. u. Pharm.*, **90.** 287.) Soluble in 400 pts. of hot water, and in 4 @ 5 pts. of absolute alcohol. (Bolley.) Much more soluble in absolute or dilute alcohol than in water. Somewhat soluble in ether. Very sparingly soluble in ether. (Rigaud.) Soluble in warm acetic acid and in cold concentrated sulphuric acid. Sparingly soluble in cold concentrated chlorhydric acid. Easily soluble in warm concentrated chlorhydric acid, with decomposition. When boiled with acids, it is decomposed. Very easily soluble in weak aqueous solutions of caustic ammonia, and soda. (Rigaud, *loc. cit.*)

(*Rutin. Rutinic Acid. Rutic Acid. Quercitric Acid. Glucoside of Quercitin.*)

$C_{36}H_{19}O_{21} = \left.\begin{matrix}C_{24}H_7O_8\\C_{12}H_{11}O_{10}\end{matrix}\right\}O_2 + Aq$

QUINIC ACID. *Vid.* Kinic Acid.

QUINICIN. Almost insoluble in water. Very soluble in absolute alcohol, and in ordinary spirit. (Pasteur.)

(*Chinicin. Isomeric with Quinine and Quinidin.*)

$N_2\left\{C_{40}H_{24}O_4^{vi}\right.$

"**QUINIDIN** (or Chinidin)" of Winckler, Leers, &c. *Vid.* Cinchonidin (of Pasteur & Gerhardt).

QUINIDIN. Efflorescent. Soluble in 1500 pts. of cold, and in 750 pts. of boiling water; in 45 pts. of cold absolute alcohol; in 3.7 pts. of warm ordinary alcohol, and in 90 pts. of cold ether. (Van Heijningen.) 100 pts. of chloroform dissolve 25.3 pts. of it. (Schlimpert, *Kopp & Will's J. B., für* 1859, p. 405.)

(*Chinidin. Quinoidin. Chinoidin. β Quinine. Isomeric with Quinine and Quinicin.*)

$N_2\left\{C_{40}H_{24}O_4^{vi} + 4\,Aq\right.$

Most of the salts of quinidin are more easily soluble in water than the corresponding salts of quinine. They are also easily soluble in alcohol, but are insoluble in ether.

QUININE. Soluble in about 350 pts. of cold, and in 200 pts. of boiling water, the boiling saturated solution containing 0.5% of it.

(*Chinin. Isomeric with Quinidin and Quinicin.*)

$N_2\left\{C_{40}H_{24}O_4^{vi}\right.$ 6 Aq

Soluble in 480 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 75.) Soluble in all proportions in cold absolute alcohol, and in ether; and in almost all proportions in cold alcohol of 90%. (Bussy & Guibourt, *Journ. de Pharm. et Chim.*, 1852, (3.) **22.** pp. 414, 413.) Extremely soluble in alcohol. Much more soluble than cinchonin in ether.

Soluble in 2 pts. of alcohol; 60 pts. of ether; 2 pts. of chloroform; and 24 pts. of olive-oil. (Parrish's *Pharm.*, p. 401.) 100 pts. of chloroform dissolve 15 pts. of pure quinine at the ordinary temperature. (Schlimpert, *Kopp & Will's J. B., für* 1859, p. 405.) 100 pts. of chloroform dissolve 57.47 pts. of it. (Michael Pettenkofer, *Kopp & Will's J. B., für* 1858, p. 363.) 100 pts. of olive-oil dissolve 4.2 pts. of it. (Michael Pettenkofer, *Kopp & Will's J. B., für* 1858, p. 363.) Also soluble in the other fatty and in essential oils. Tolerably soluble in benzin; more readily soluble in the vapor of benzin, as it condenses, than in boiling liquid benzin. (Mansfield, *J. Ch. Soc.*, **1.** 262.) Soluble in carbonic-acid water, with combination. (Langlois, *Ann. Ch. et Phys.*, (3.) **41.** 89.)

More soluble in lime-water than in pure water, though still but sparingly soluble; also soluble in aqueous solutions of chloride of calcium, chloride of ammonium, chloride of potassium, carbonate of ammonia, caustic potash, and ammonia. Insoluble in solutions of caustic soda, or of carbonate or sulphate of soda, or of chloride of sodium. Easily soluble in dilute acids. Soluble in cold concentrated sulphuric and nitric acids. The normal salts of quinine are mostly easily soluble in water, while the basic salts are difficultly soluble therein; but they are all easily soluble in alcohol, and dilute acids, and some of them are soluble in ether also. They are ordinarily less soluble in water than the corresponding salts of cinchonin.

βQUININE. \
QUINOIDIN. } *Vid.* Quinidin.

QUINOIL. *Vid.* Kinone.

QUINOLEIN. Sparingly soluble in cold, somewhat more soluble in boiling water. Less soluble than anilin in water. Ether removes it from the aqueous solution. Miscible in all proportions with alcohol, wood-spirit, ether, aldehyde, acetone, sulphide of carbon, and the fatty and essential oils. Easily soluble in all the acids. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 169.) Quinolein dissolves a considerable quantity of water.

(*Chinolin. Leukol or Leucol. Leucolin. Chinolein. Chinoilin.*)

$N\left\{C_{18}H_{17}'''\right.$

Very sparingly soluble in water. When boiled

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with water it distils over without change. Soluble in acids, even in acetic, and the other vegetable acids. Very soluble in alcohol, ether, and the essential oils. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **7.** 252.)

According to Greville Williams the above statements refer to impure quinolein, that which was examined by Hofmann having been contaminated with lepidin($N\ C_{20}\ H_9$).

Quinone. *Vid.* Kinone.

Quinonamid. *Vid.* Kinonamid.

Quinonic Acid. *Vid.* Melanic Acid.

QuinoTannic Acid. *Vid.* KinoTannic Acid.

Quinovatic and **Quinovic** } **Acids.** *Vid.* Kinovic Acid.

Quinqui. See *quinqui*, as prefix, under the generic name of the substance sought for.

R.

Racemic Acid. *Vid.* ParaTartaric Acid.

*Dextro***Racemic Acid.** Identical with Tartaric Acid, *q. v.*

*Levo***Racemic Acid.** *Vid. left*Tartaric Acid.

RacemoMethylic Acid. *Vid.* MethylParaTartaric Acid.

RacemoVinic Acid. *Vid.* EthylParaTartaric Acid.

Raewsky's First Base.
$N_4\ H_{12}\ Pt_2\ Cl\ O_5$

Raewsky's Second Base.
$N_4\ H_{12}\ Pt_2\ Cl_2\ O_4$

Red Prussiate of Potash. *Vid.* Ferricyanide of Potassium.

Reiset's First Platinum Base. *Vid.* Platin(*ous*)*bi*amin.
$N_2\ H_6\ Pt\ O = N_2 \left\{ \begin{matrix} H_5 \\ Pt \end{matrix} \right. . H\ O$

Reiset's Second Base. *Vid.* Platin(*ous*)-amin.
$N\ H_3\ Pt\ O = N \left\{ \begin{matrix} H_2 \\ Pt \end{matrix} \right. . H\ O$

Resins. The resins are insoluble in water. Many of them are soluble in alcohol, and in spirit, while others are insoluble therein. Most of them are soluble in ether. Many are soluble in wood-spirit, — at least many of the resins are soluble in some samples of common wood-spirit ("wood-naphtha"), — while other samples of this liquid dissolve them only imperfectly. This, of course, depends upon the fact that commercial wood-spirit is always a mixed and very variable product. (Graham, *et al.*, *J. Ch. Soc.*, **8.** 133.) In general, they are soluble in oil of turpentine, especially if this be hot. In oil of ocotea (Hancock), in oil of mandarin (Luca).

Many of them are readily and abundantly soluble in benzin (Mansfield, *J. Ch. Soc.*, **1.** 261), and several of them are much more readily dissolved by allowing the vapor of benzin, of oil of turpentine, or of petroleum to condense upon them than when they are placed directly in these liquids. (Mansfield, *loc. cit.*, p. 262.) Many are soluble in acetone, fusel-oil, hydride of valeryl, valerianic acid, valerate of amyl (Trautwein), caoutchin, creosote (Reichenbach), anilin (Hofmann), toluene (Pelletier & Walter), in concentrated acetic acid, mercur(*ic*) methyl, chloride of ethyl, picolin, from which solution they are separated when it is boiled with water (Unverdorben), water acidulated with oxyphenic acid (Buchner, *Ann. Ch. u. Pharm.*, **96.** 189); readily in caprylic alcohol (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 104), in chloroform, and the like. They are also soluble in liquid (condensed) sulphurous, and chlorhydric acids. (Faraday, *Ann. Ch. et Phys.*, (3.) **15.** 268.)

Acryl Resin.
a. Insoluble in a mixture of alcohol and ether.

Resin of Aloes. Insoluble in water. Easily soluble in alcohol, ether, and aqueous alkaline solutions, even lime-water.

Alouchi Resin(from *Wintera aromatica*). Contains two resins: —

a. Easily soluble in cold spirit.

β. Difficultly soluble in cold, more soluble in boiling spirit. Easily soluble in ether. Insoluble in soda-lye. (Bonastre.)

Ammoniac Resin(Gummy resinous exudation from *Dorema ammoniacum*). (*Resin of Gum Ammoniac.*) Gum ammoniac is itself partially soluble in water, alcohol, ether, vinegar, and aqueous solutions of the alkalies. The resin which it contains is soluble in alcohol, and in the fixed and volatile oils. When treated with ether a portion of it dissolves, while another portion remains insoluble in this menstruum. Soluble in dilute acetic acid (vinegar). Easily soluble in sulphuric acid, from which it is reprecipitated on the addition of water. Soluble in caustic alkaline solutions.

Anime Resin(from *Hymenæa courbaril*). (*Gum anime. Soft Copal. Resin of Courbaril.*) The rare variety of anime which formerly came from the East Indies is entirely soluble in oil of turpentine; but absolute alcohol dissolves only mere traces of it. That which is brought from South America is completely soluble in boiling alcohol, while cold alcohol separates it into its two component resins.

α) *an acid resin.* Soluble in cold alcohol and in oils.

β) *an indifferent resin.* $C_{40}\ H_{32}\ O_2$ Insoluble in cold, but soluble in hot alcohol. Soluble in oils.

Anime resin is only slightly soluble in liquid benzin, but is rapidly dissolved when the vapor of benzin is caused to condense upon it. With oil of turpentine it behaves in a similar manner. (Mansfield, *J. Ch. Soc.*, **1.** 261.)

Anthracoxene(fossil resin). Insoluble in spirit; but after having been exposed for a long time to the air it becomes partially soluble. Partially soluble in ether. (Reuss.)

Antiar Resin(from *Antiaris toxicaria*). $C_{32}\ H_{24}\ O_2$ Insoluble in water. Soluble in 325 pts. of alcohol at 20°, in 44 pts. of boiling alcohol, and in 1.5 pts. of boiling ether. Easily soluble in the essential oils. Very sparingly soluble in an aqueous solution of caustic potash.

Resin of *l'Arbre à Brai* [Arbol-a-brea] (*Canarium album*). *Vid.* Resin of Canarium.

Resin of Assafœtida. $C_{40}\ H_{26}\ O_{10}$ Soluble in spirit, from which it is precipitated on the addition of water. Soluble in concentrated sulphuric acid, from which it is reprecipitated by water.

According to Brandes, it is a mixture of two resins, the one soluble, the other insoluble in ether.

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Resins of Benzoin(" Gum Benzoin"). (The concrete juice of *Styrax Benzoin.*) There are three different resins : —

α = $C_{70}H_{42}O_{14}$ Readily soluble in alcohol, ether, and oil of cumin. Also soluble in potash-lye. Insoluble in an aqueous solution of carbonate of potash. Insoluble in naphtha or in ammonia-water.

β = $C_{30}H_{20}O_{6}$ Soluble in boiling alcohol, and in an aqueous solution of carbonate of potash. Insoluble in ether, or the essential oils, or in ammonia-water.

γ = $C_{40}H_{22}O_{9}$ Soluble in alcohol. Sparingly soluble in ether. Insoluble in naphtha.

Benzoin is insoluble in benzin, and in the other light coal-naphthas. (De la Rue.)

Resin of Birch Bark. (*Betulin.*) Insoluble in water, or in aqueous alkaline solutions. Soluble in 120 pts. of cold, and in 80 pts. of hot alcohol. Also soluble in ether, and in the fatty and essential oils. Soluble in strong sulphuric acid. (Wittstein's *Handw.*)

Resin of Calophyllum. *Vid.* Maynas Resin.

Resin of Ceradia(from *Ceradia furcata*).

Canada Balsam(from *Abies balsamea*). (*Canadian Turpentine. Balsam of Fir.*) Contains about 40% of a resin soluble in alcohol; and 30% of a sub-resin difficultly soluble in alcohol. (Parrish's *Pharm.*, p. 352.)

Resin of Canarium(from *Canarium album*). (*Resine de l'Arbre à Brai.*) Three times as soluble in alcohol as Breane [from icica resin]. (Scribe, *Ann. Ch. et Phys.*, (3.) 13. 170.)

The portion sparingly soluble in cold alcohol dissolves easily in boiling alcohol, and in ether. Baup has found that it contains four substances.

α.) *Amyrin.* Very sparingly soluble in cold water, or alcohol of 85%. Readily soluble in ether and in warm absolute alcohol.

β.) *Brein.* Insoluble in water. Soluble in 70 pts. of alcohol of 85% at 20°, and more easily in absolute alcohol. Easily soluble in ether.

γ.) *Bryoidin.* Soluble in 350 pts. of cold, and much more readily in boiling water. Very soluble in alcohol, ether, fatty and essential oils, alkaline solutions, &c.

δ.) *Breidin.* Soluble in 270 [260] pts. of water at 10°, and much more soluble in warm water. Easily soluble in alcohol; less soluble in ether.

Caranna Resin(from *Amyris Caranna;* also from *Bursera gummifera*). (*Gum Caranna. Resine de Gomart. Resine de Chibou. Resine de Cachibou.*)

Resin of Cascarilla(from the bark of *Croton Cascarilla*, &c). Consists of two resins : —

α = *indifferent resin.* Soluble in alcohol, and ether, and in hot oil of turpentine, and fatty oils. Insoluble in acids, excepting concentrated acetic acid, or in alkaline solutions.

β = *acid resin.* Soluble in alcohol. Insoluble in ether, or fatty or essential oils. Easily soluble in alkaline solutions. (Trommsdorff.)

Its compound with copper is insoluble in alcohol.

Resins of Cassia.
Resins of Cinnamon. } See Resins from Oil of Cinnamon.

Resins of Copaiba. Balsam Copaiba (the juice of *Copaifera officinalis, etc.*), contains from 31 to 80% of a volatile oil [see under Essences], 1.6% of a soft brown resin (β), and from 20 to 66% of an acid resin (α), called also Copaivic Acid (see below).

Balsam Copaiba itself is insoluble in water; but is entirely soluble in absolute alcohol, ether, and the fixed and volatile oils. It is completely dissolved by strong alkaline solutions, but the resulting solution becomes turbid when largely diluted with water. (*U. S. Dispensatory.*) Soluble in alcohol of 90%. (Parrish's *Pharm.*, p. 355.) It is soluble in ammonia-water.

I.) α, or *Copaivic Acid.* Insoluble in water. $C_{40}H_{30}O_{4}$ More soluble in warm than in cold concentrated alcohol. Easily soluble in ether, fatty and essential oils, and bisulphide of carbon. Easily soluble in ammonia-water, and in aqueous solutions of the fixed alkalies. Soluble in cold petroleum. (*U. S. Dispensatory.*)

Copaivate of Ammonia. Soluble in water and in alcohol.

Copaivate of Lead. $C_{40}H_{29}PbO_{4}$ Insoluble, or very sparingly soluble in alcohol.

Copaivate of Lime. $C_{40}H_{29}CaO_{4}$ Soluble in alcohol, from which it is precipitated by water.

Copaivate of Potash. Soluble in alcohol, and in alkaline solutions; by the addition of much water it is precipitated from the latter.

Copaivate of Silver. $C_{40}H_{29}AgO_{4}$ Sparingly soluble in alcohol. Easily soluble in ammonia-water.

II.) Fehling has described a crystalline resin, $C_{40}H_{28}O_{6}$ oxycopaivic acid, from copaiba which differs from the preceding. It is insoluble in water. Very soluble in ether, less soluble in alcohol. Soluble in ammonia-water.

Its Lead Salt. Is a ppt.
$C_{40}H_{27}PbO_{6}$

Its Potash Salt. Is soluble in water.

Its Silver Salt. Is a ppt.
$C_{40}H_{27}AgO_{6}$

Its Soda Salt. Is soluble in water.

Posselt has described a sample of balsam copaiba which contained two uncrystallizable resins, the one soluble, the other insoluble in alcohol.

III.) β. Insoluble in cold petroleum. Easily soluble in absolute alcohol, and in ether. More soluble in ammonia-water than copaivic acid.

Copal(from several species of *Hymenæa*). Copal varies considerably in solubility as procured from different sources. In its natural state it is but sparingly soluble in absolute alcohol, but it becomes more soluble when exposed to the air in a state of fine powder during several weeks. As a rule, it is insoluble in spirit, but some varieties are dissolved when suspended in the vapor of boiling alcohol. In ether it first swells up, and then dissolves completely, the swollen mass is also readily soluble in boiling alcohol. Soluble in rectified oil of turpentine; but it is less readily soluble in oil of turpentine than in oil of rosemary, in which it is abundantly soluble. After having been melted, by which process it undergoes partial decomposition, it is much more readily soluble in alcohol and oil of turpentine. Only slightly soluble in liquid benzin, or oil of turpentine, but is rapidly dissolved by the vapors of these substances when these are condensed directly upon it. (Mansfield, *J. Ch. Soc.*, **1.** 261.) Unacted upon by anilin, or quinolein, even when melted beneath these liquids. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** pp. 143, 169.) "Soft" copal is very easily soluble in caprylic alcohol, and even "hard" copal swells up, and after a while dissolves in this liquid. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 104.) Insoluble in cold aqueous solutions of potash or ammonia; it combines with these alkalies when treated with boiling solutions, forming compounds soluble in pure water, but insoluble in liquids which are at all alkaline. (Filhol.) Several different varieties of resin have been distinguished in copal.

α. Soluble in alcohol of 72%, in ether, and in oil of turpentine. With alkalies it forms salts which are soluble in ether, but insoluble in alcohol, with the exception of the potash salt.

β. Soluble in all proportions in alcohol, ether, and oil of turpentine. With alkalies it forms salts soluble in ether, but insoluble in absolute alcohol.

γ. Soluble in absolute alcohol and in ether. Its alkaline salts are insoluble in alcohol or ether.

δ. Insoluble in alcohol or ether. Soluble in an alcoholic solution of potash.

ε. Insoluble in all the above-mentioned menstrua.

Resin of Cork. Soluble in ether. (Boussingault.)
$C_{33}H_{26}O$

Dammara Resin.

A.) *Ordinary*, or *East Indian Dammara Resin* (from *Dammara orientalis*). Only partially soluble in absolute alcohol, or in alkaline solutions; more easily soluble in ether; and still more easily in ethereal or fatty oils. According to Brandes, it contains 2 resins.
$C_{16}H_{13}O$

α (*of which it contains* 83%). Easily soluble in alcohol, and ether.

β (*of which it contains* 17%). Soluble in 1000 pts. of absolute alcohol; and in 40 @ 50 pts. of ether. Insoluble in alkaline solutions.
(*Dammarin.*)

According to Dulk, it is partially soluble in alcohol, and ether. Completely soluble in oils and in sulphuric acid; also soluble, with decomposition, in nitric acid; difficultly attacked by alkaline solutions; and contains 5 different resins.

I.) *Dammaryl* or *δ resin.* Soluble in ether. Insoluble in spirit.
$C_{46}H_{38}$

II.) *α* (*constitutes some* 24% *of the whole*). Soluble in cold dilute alcohol.
$C_{46}H_{30}O_4$

III.) *β* (10% *of the whole*). Soluble in hot, insoluble in cold dilute alcohol.

IV.) *γ* (44% *of the whole*). Insoluble in dilute spirit, either hot or cold. Soluble in absolute alcohol, ether, oils, and sulphuric acid.
(*Dammarylic Acid.*)
$C_{46}H_{38}O_3$

V.) *ε* (7% *of the whole*). Insoluble in ether, or in alkaline solutions. Soluble in oil of turpentine.
$2C_{46}H_{38} + HO$

B.) *Australian Dammara Resin* (from *Dammara Australis*). Only partially soluble in common alcohol; but is completely soluble in absolute alcohol, and in oil of turpentine. (R. D. Thomson.)
(*Cowdie Gum.*)
$C_{40}H_{31}O_6$

It is composed of Dammaric Acid, and Dammarane, *q. v.*

DisAcryl Resin. Insoluble in water. Soluble in alcohol, from which it is precipitated on the addition of water. Also soluble in ether, and in aqueous solutions of the caustic alkalies.
$C_{20}H_{13}O_6$

Dragon's Blood. (Resinous substance from the fruit of various species of *Calamus.*) Insoluble in water. Soluble in alcohol, ether, and the fixed and volatile oils. It contains about 90% of a resin which has been called Draconin.
(*Sanguis Draconis.*)

Elemi Resin(from *Amyris zeylanica*). Contains two resins.
(*Resin of Icica, q. v.*)

α = *crystalline.* Completely soluble in boiling concentrated alcohol, from which it separates out as the solution cools.
$C_{40}H_{32}O_2$

β = *amorphous, acid resin.* Very readily soluble in cold alcohol.

Resin of Euphorbïum(from various species of *Euphorbia*). Contains 3 different resins.

I.) *crystalline.* Insoluble in cold, soluble in hot alcohol.
$C_{40}H_{30}O_6$

II.) *amorphous.* Easily soluble in cold alcohol.

III.) Difficultly soluble in cold alcohol.

Fichtelite(*fossil resin from Bavaria*). Soluble in alcohol, and ether.
$C_{80}H_{70}$"

Fichtelite with **Oxide of Lead.** Insoluble in ether.

BromoFichtelite.
$C_{80}H_{69}Br$
*Bi*BromoFichtelite.
$C_{80}H_{68}Br_2$
*Bi*ChloroFichtelite.
$C_{80}H_{68}Cl_2$
*Quadri*ChloroFichtelite.
$C_{80}H_{66}Cl_4$

Soluble in alcohol, and ether. (T. E. Clark. *Am. J. Sci.*, (2.) **25.** pp. 164–176.)

Fossil Resin of Giron(New Granada). Insoluble in alcohol. Swells up in ether. (Boussingault, *Ann. Ch. et Phys.*, (3.) **6.** 507.)

Resin of Gamboge(or *Gummi Gutta*). Insoluble in water. Very soluble in ether; less soluble in alcohol. Soluble in warm ammonia-water, from which it is precipitated on the addition of carbonate of ammonia. It forms salts

with **Baryta.**

with **Lead.**

with **Potash.** Soluble in water, and in absolute alcohol.

with **Soda.** Insoluble in an aqueous solution of chloride of sodium.

Gilead, Balsam or Balm of (Resinous juice of *Amyris Gileadensis*).
(*Baume de la Mecque, Judea, ou Cairo.*)

Contains:

I.) A resin soluble in water[?] and in fatty and essential oils, but insoluble in alcohol.

II.) A resin, difficultly soluble in cold, more easily soluble in hot alcohol and ether. Also soluble in the fatty and essential oils.

III.) An essential oil soluble in alcohol, and ether, also in concentrated sulphuric acid, from which it is precipitated on the addition of water.

Resine de Gomart. *Vid.* Caranna Resin.

Resin of Guaiacum(from *Guaiacum officinale*). Guaiacum or "gum guaiac" is itself partially dissolved by water, about 9% of it being soluble therein. It is en-
(*Guaiacin.*)

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tirely soluble in alcohol of 83%. It is also soluble in ether, in alkaline solutions, in strong sulphuric acid, and in "nitrous ether" (solution of nitrite of ethyl in alcohol). The resin which it contains is insoluble in water. Alcohol dissolves about $\frac{9}{10}$ of this resin; ether dissolves somewhat less. Soluble in oil of turpentine, best when hot, insoluble in fatty oils. Soluble in concentrated sulphuric acid, and in an aqueous solution of caustic potash. Pelletier says that ammonia-water dissolves $\frac{9}{10}$ of the entire resin. Unverdorben, on the other hand, states that this resin contains two different resins, one of which is very soluble in ammonia-water, while the other forms with ammonia a tarry compound, which is soluble in 6000 pts. of water.

Gum guaiacum is insoluble in benzin, or the other light coal-naphthas. (De la Rue.)

RESINS OF GUTTA-PERCHA.

α = Pure *Gutta*, *q. v.*

β = *White resin.* (*Alban.*) Very soluble in boiling, less soluble in cold absolute alcohol. Very soluble in oil of turpentine, benzin, ether, chloroform, and bisulphide of carbon. Unacted upon by concentrated chlorhydric acid or by weak acids; decomposed by concentrated sulphuric and nitric acids. Unacted upon by boiling alkaline solutions.

γ = *Yellow resin.* Soluble in cold alcohol, ether, benzin, oil of turpentine, bisulphide of carbon and chloroform. Unacted upon by alkaline solutions, ammonia-water, weak acids, or concentrated chlorhydric acid. Decomposed by concentrated sulphuric, and nitric acids. (Payen.)

RESIN OF ICICA(from various plants of the family *Icica*). Insoluble in water. Soluble in 55 pts. of cold, and in 15 pts. of boiling alcohol of 36%. Soluble in 3.5 pts. of oil of turpentine at the ordinary temperature. In the cold, the action of these solvents is very slow. "Of all the resins this is the least soluble in alcohol." (Scribe, *Ann. Ch. et Phys.*, (3.) **13.** 167.) It contains three different resins.

α = "*Breane.*" $C_{40}H_{32}O_{3}$ Insoluble in water, or in alkaline solutions. Soluble in 100 pts. of alcohol at the ordinary temperature, being less soluble therein than either β or γ. Ether dissolves 4.35 pts. of it. Soluble in concentrated sulphuric acid. (Scribe, *loc. cit.*, p. 169.)

β = "*Icacine.*" $C_{40}H_{34}O_{3}$ Soluble in 50 pts. of cold alcohol, but less soluble than γ in alcohol. In ether it is as soluble as α. (Scribe, *loc. cit.*)

γ = *amorphous resin.* (*Icica Colophany.*) $C_{40}H_{30}O_{4}$ Easily soluble in alcohol, and ether, being much more soluble than either α or β. Insoluble in alkaline solutions. (Scribe.)

RESIN OF JALAP(from *Convolvulus schiedeanus*). (*Jalapin* (of commerce).) Soluble in alcohol. Insoluble in fixed oils, oil of turpentine, or ether. When powdered and thrown into cold water it does not dissolve, but forms a semifluid mass as if it had been melted. Soluble in acetic acid, from which it is precipitated on the addition of much water. (Parrish's *Pharm.*, pp. 189, 190.)

It contains two different resins:

α = "*Para Rhodeoretin.*" $C_{40}H_{34}O_{18}$(?) Soluble in alcohol and ether, in concentrated sulphuric acid, with decomposition, and in aqueous solutions of the caustic alkalies. Insoluble even in warm chlorhydric, nitric, and acetic acids.

β = *Resin insoluble in ether.* *Vid.* Convolvulin. (*Rhodeoretin. Jalapin.*) $C_{62}H_{50}O_{32}$

LAC. (*Shellac. Gum Shellac. Stick Lac. Seed Lac.*) Insoluble in water. Almost entirely soluble in alcohol, especially if this be warm. Soluble in ordinary spirit, and as a rule, in wood-spirit, but some samples of the latter dissolve it only imperfectly, wood-spirit being a mixed and very variable product. Sparingly soluble in lignone. (Graham, *et al.*, *J. Ch. Soc.*, **8.** 133.) Sparingly soluble in benzin, but a saturated solution of shellac in alcohol or wood-spirit is miscible with an equal volume of benzin. (Mansfield, *J. Ch. Soc.*, **1.** 260.) Partially soluble in ether and the volatile oils. Soluble in chlorhydric and acetic acids, and in aqueous solutions of potash and soda. According to Unverdorben, there are 5 different resins in lac.

I.) Soluble in alcohol, and ether.

II.) Soluble in alcohol. Insoluble in ether.

III.) Sparingly soluble in cold alcohol.

IV.)

V.) Insoluble in naphtha. Soluble in alcohol, and ether.

The coloring matter of lac is soluble in alkaline solutions, but its best solvent is concentrated sulphuric acid.

LABDANUM(Resinous substances from various species of *Cistus*). (*Ladanum.*) Soluble in alcohol.

RESINS OF MADDER.

α. Sparingly soluble in boiling water, from which it is precipitated on the addition of acids. Easily soluble in alcohol. Soluble in aqueous solutions of the caustic and carbonated alkalies, also in concentrated sulphuric acid, from which it is precipitated on the addition of water. Decomposed by boiling concentrated nitric acid.

β. Sparingly soluble in boiling water, from which it is precipitated on the addition of acids. Soluble in boiling, less soluble in cold alcohol. Soluble in aqueous solutions of the caustic and carbonated alkalies, and in concentrated sulphuric acid, from which it is precipitated on the addition of water. (Schunck, *Rep. Br. Assoc.*, 1848, p. 68.)

MASTICH(Resinous exudation of *Pistacia lentiscus*). Insoluble in water. Alcohol dissolves about $\frac{4}{5}$ of it. Completely soluble in ether, and oil of turpentine. Scarcely at all soluble in the fixed oils. Largely soluble in benzin. (Mansfield, *J. Ch. Soc.*, **1.** 261.) It contains two resins: —

α = $C_{40}H_{31}O_{4}$ Soluble in cold alcohol.

β = $C_{40}H_{31}O_{2}$ (*Masticin.*) Insoluble in cold, soluble in hot alcohol. In cold alcohol it softens and swells up.

RESIN OF MAYNAS(a province in South America). (*Resina Calophylli*(from *Calophyllum longifolium*).) $C_{28}H_{18}O_{8}$ Insoluble in water. Very soluble in alcohol, ether, and the fatty and essential oils; also soluble in acetic acid, even in the cold, and in concentrated sulphuric acid, from which water precipitates it unchanged. Easily soluble in aqueous solutions of caustic potash, soda, and ammonia, even in the cold. (Lewy, *Ann. Ch. et Phys.*, (3.) **10.** 382.)

MIDDLETONITE(Resin which occurs in coal at

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Middleton). Scarcely at all soluble in alcohol, ether, or oil of turpentine.

RESINS FROM OIL OF CINNAMON.

I.) *Resins formed by the action of the air.* There are two of these resins, both insoluble in water, but soluble in boiling alcohol.

$\alpha = C_{30} H_{15} O_4$ Easily soluble in cold alcohol, from which it is precipitated on the addition of acetic acid. Easily soluble in ether, oil of turpentine, and olive-oil. Slowly soluble in a boiling aqueous solution of caustic potash. At 25°, it is soluble in concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water. Insoluble in ammonia-water, or in concentrated chlorhydric acid. (Mulder.)

$\beta = C_{12} H_6 O$ Readily soluble in hot, very little soluble in cold alcohol. Readily soluble in ether. Scarcely at all soluble in an aqueous solution of caustic potash. Insoluble in ammonia-water. Soluble, without change, in concentrated chlorhydric and sulphuric acids; from this solution it is precipitated unchanged on the addition of water. (Mulder.)

II.) *Resins formed by the action of nitric acid upon oil of cinnamon.* There are two of these resins; both of them insoluble in water, but soluble in boiling alcohol.

$\alpha = C_{18} H_7 O_5$ Soluble in alcohol, and ether, in an aqueous solution of caustic potash, and in cold concentrated sulphuric acid. Insoluble in ammonia-water. (Mulder.)

$\beta =$ Soluble in boiling, less soluble in cold alcohol. (Mulder.)

III.) *Resins formed by the action of concentrated sulphuric acid upon oil of cinnamon.*

$\alpha = C_{30} H_{15} O_3$ Soluble in cold alcohol, in ether, oil of turpentine, and olive-oil; also in warm concentrated sulphuric acid. Insoluble in boiling chlorhydric acid, or in boiling aqueous solutions of caustic potash, or ammonia. (Mulder.)

$\beta = C_{30} H_{15} O_3$ Insoluble in boiling alcohol. Easily soluble in cold ether; also soluble in oil of turpentine, olive-oil, and concentrated sulphuric acid, when this is gently heated. Insoluble in boiling chlorhydric acid, or in boiling aqueous solutions of caustic potash or ammonia. (Mulder.)

IV.) *Resins produced by the action of chlorhydric acid upon oil of cinnamon.*

$\alpha = C_{14} H_6 O$ Easily soluble in cold alcohol, and in ether; also soluble in oil of turpentine, and in olive-oil. Soluble in cold concentrated sulphuric acid. Insoluble in boiling chlorhydric acid, or in aqueous solutions of caustic potash or ammonia.

$\beta = C_{28} H_8 O$ Insoluble in cold, and but sparingly soluble in boiling alcohol. Readily soluble in ether, oil of turpentine, and olive-oil. Soluble in concentrated sulphuric acid at a temperature of 50°. Insoluble in boiling chlorhydric acid, or in aqueous solutions of caustic potash or ammonia.

V.) *Resin formed by the action of ammonia upon oil of cinnamon.* $C_{14} H_6 O$ Insoluble in cold, soluble in boiling alcohol. Soluble in ether, in boiling aqueous solutions of caustic potash or ammonia, and in concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water. Insoluble in boiling chlorhydric acid. (Mulder.)

RESIN OF THE OLIVE-TREE
Contains: —

I.) A resin soluble in warm, but almost insoluble in cold alcohol. Soluble in warm ether.

II.) A resin sparingly soluble in ether; readily soluble in cold alcohol.

III.) A gum, sparingly soluble in water. Insoluble in alcohol, or ether.

IV.) Olivil, *q. v.*

RESIN OF OPIUM. $C_{32} H_{23} N O_{12}$ Insoluble in water, or ether. Easily soluble in alcohol, and in aqueous solutions of the alkalies. (Pelletier.)

RESIN OF OPOPONAX(from *Pastinica opoponax*). $C_{40} H_{24} O_{14}$ Easily soluble in alcohol, and ether. Also soluble in aqueous solutions of the caustic alkalies.

BALSAM PERU(from *Myrospermum peruiferum*). Insoluble in water. Completely soluble in strong alcohol. Partially soluble in ether, and in the fatty and essential oils.

RESIN OF THE PITCH-TREE. *Vid.* Resin of Canarium.

RESIN OF PODOPHYLLUM. (*Podophyllin*(of commerce).) Insoluble in water, or oil of turpentine. Partially soluble in alcohol, also partially soluble in ether, — one of its component resins being insoluble therein. Soluble, with combination, in aqueous solutions of the caustic alkalies. (Parrish's *Pharm.*, p. 191.)

RESIN OF SAGEPENUM(from *Ferula persica*).
(*Gum Seraphic.*)
$C_{40} H_{29} O_9$

SANDARACH(from *Thuya articulata, &c.*). Contains several different resins: — As a whole, it dissolves easily and completely in absolute alcohol, and in warm spirit of 80%. Cold spirit leaves about $\frac{1}{5}$ of it undissolved (Giese), but this residue ("sandaracin") is soluble in ether, and in oil of turpentine. Soluble in acetone, and in wood-spirit which contains acetone. Soluble, with combination, in alkaline solutions.

$\alpha = C_{40} H_{31} O_5$ Difficultly soluble in alcohol.

$\beta = C_{40} H_{31} O_6$ Easily soluble in cold alcohol.

$\gamma = C_{40} H_{30} O_6$ Soluble in boiling alcohol.

SCAMMONY RESIN. $C_{60} H_{54} O_{26}$ Insoluble in water. Soluble in alcohol, and ether. Almost entirely insoluble in oil of turpentine. Soluble in alkaline solutions, with decomposition.

RESIN OF STYRAX OR STORAX. *Vid.* Styracin.

RESINS FROM BALSAM OF TOLU.

$\alpha = C_{36} H_{18} O_8$ Easily soluble in cold alcohol, and ether. Soluble in alkaline solutions, and in cold concentrated sulphuric acid, with subsequent decomposition. (E. Kopp, *Ann. Ch. et Phys.*, (3.) 20. 381.)

$\beta = C_{36} H_{20} O_{10}$ Sparingly soluble in alcohol, and ether. Soluble in alkaline solutions, and in cold concentrated sulphuric acid. (E. Kopp, *loc. cit.*)

RESINS OF TURPENTINE. Contains three isomeric modifications: —
(*Ordinary Rosin. Colophany.*)
$C_{40} H_{30} O_4$

$\alpha =$ *Pinic Acid.* (*Amorphous Colophany Resin. Amorphous Pimaric Acid.*) Insoluble in water. Soluble in alcohol, wood-spirit, ether, naphtha, and the fixed and essential

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oils. This is the most soluble in cold weak spirit of any of the resins of turpentine. Also soluble in aqueous alkaline solutions.

The salts of pinic acid are less soluble in alcohol than those of sylvic acid.

β = *Sylvic Acid.* (*Crystalline Colophany Resin. PyroMaric Acid.*) Insoluble in water. Less soluble than the preceding in cold spirit. Readily soluble in hot spirit. Soluble in 8 @ 10 pts. of alcohol. Very soluble in ether. Also soluble in concentrated acetic acid, in wood-spirit, naphtha, in oil of turpentine, and the oils generally. Soluble in ammonia-water, but its potash-salt is insoluble in an aqueous solution of caustic potash. The sylvates are soluble in ether and in absolute alcohol.

γ.) *Pimaric Acid.* (Probably identical with Sylvic Acid. *Vid. Liebig & Kopp's Jahresbericht*, **1.** 572, *note.*) Insoluble in water. The crystallized acid is soluble in 10 pts. of alcohol at 18°, and in 1 pt. of boiling alcohol. Very soluble in ether. After pimaric acid has been fused it quickly dissolves in its own weight of alcohol at 18°, but in the course of a few moments it crystallizes out of this solution, and cannot now be redissolved in less than 10 pts. of the same alcohol. (Laurent, *Ann. Ch. et Phys.*, (3.) **22.** 461.)

Cailliot divides rosin into constituents which do not appear to be exactly equivalent to those mentioned above; his *Abietic Acid* (which may be identical with Pinic Acid(α)), is soluble in all proportions in alcohol, ether, and naphtha. Water precipitates it from the first two solutions, but not from the last. The salts of this acid will be given below, with the pinates. (Cailliot, *J. de Pharm.*, 1830, **16.** 438.) The *Abietic Acid* of Baup, which is stated to be soluble in 7.5 pts. of alcohol, of 0.88%, at 14°, is thought to be identical with Sylvic Acid(β) by Gerhardt (*Tr.*, **3.** 656, *note.*) Cailliot's *Abietin* (possibly identical with Sylvic Acid) is insoluble in water, or in cold alkaline lyes. Very soluble in alcohol at 34°. Soluble, in all proportions, in boiling alcohol, in ether, naphtha, and concentrated acetic acid. His "*Insoluble Neutral Resin*" is insoluble in cold alcohol of 40°, in naphtha, in alkaline lyes, &c. (*Loc. cit.*)

Rosin, as such, is insoluble in water. Easily soluble in alcohol, ether, wood-spirit, benzin, oil of turpentine, and the other essential oils; sparingly in lignone, partially in naphtha.

It is soluble in anilin, and quinolein. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** pp. 143, 169.)

Compare the general remarks upon Resins.

In the following list the salts of each of the several modifications of rosin are classed together, as Resinates (α, β, & γ), under the name of the base. Most of them are soluble in ether; some are soluble in alcohol, and a few dissolve in water.

Resinate of Alumina.

I.) α or *Pinate.* Insoluble in water, or alcohol. Soluble in ether.

Resinate of Ammonia.

I.) α or *Pinate?* Abietate (pinate ?) of ammonia is soluble in water. (Cailliot, *J. de Pharm.*, 1830, **16.** 439.)

II.) β or *Sylvate.* Soluble in 200 pts. of cold water. Very soluble in alcohol, and ether. (T.)

III.) γ or *Pimarate.* Soluble in alcohol.

Resinate of Baryta.

I.) α or *Pinate.* Sparingly soluble in water. Insoluble in alcohol. Readily soluble in ether. Abietate(pinate ?) of baryta is insoluble in water, and only sparingly soluble in cold alcohol; it is decomposed by boiling alcohol of 40°. (Cailliot, *J. de Pharm.*, 1830, **16.** 439.)

II.) β or *Sylvate.* Soluble in boiling absolute alcohol.

Resinate of Cobalt.

I.) α or *Pinate.* Soluble in ether.

Resinate *of protoxide* of Copper.

I.) α or *Pinate.* Insoluble in water. Very sparingly soluble in absolute alcohol. Very soluble in ether, oil of turpentine, and the fatty oils.

II.) β or *Sylvate.* Soluble in alcohol.

Resinate *of protoxide* of Iron.

I.) α or *Pinate.* Readily soluble in ether.

II.) β or *Sylvate.* Readily soluble in ether.

Resinate *of sesquioxide* of Iron.

I.) α or β. Sparingly soluble in water. Readily soluble in ether.

Resinate of Lead.

I.) α or *Pinate.* Insoluble in alcohol. Sparingly soluble in ether. Soluble in oil of turpentine, and the fatty oils.

II.) β or *Sylvate.* Insoluble in alcohol.

III.) γ or *Pimarate.* Partially soluble in an aqueous solution of caustic potash.

Resinate of Lime.

I.) α or *Pinate.* Sparingly soluble in water, and alcohol. Readily soluble in ether, and oil of turpentine. Abietate(pinate ?) of lime resembles the baryta salt. (Cailliot, *J. de Pharm.*, 1830, **16.** 439.)

II.) β or *Sylvate.* Soluble in absolute alcohol.

Resinate of Magnesia.

I.) α or *Pinate.* Sparingly soluble in water. Insoluble in alcohol. Readily soluble in ether. Abietate(pinate ?) of magnesia resembles the baryta salt. (Cailliot, *J. de Pharm.*, 1830, **16.** 439.)

II.) β or *Sylvate.* Readily soluble in alcohol, ether, and oil of turpentine.

Resinate of Manganese.

I.) α or *Pinate.* Insoluble in water, or alcohol. Soluble in ether.

II.) β or *Sylvate.* Readily soluble in absolute alcohol.

Resinate *of dinoxide* of Mercury.

I.) α or *Pinate.* Soluble in ether.

Resinate *of protoxide* of Mercury.

I.) β or *Sylvate.* Soluble in ether.

Resinate of Morphine.

I.) α or *Pinate?* Abietate(pinate ?) of morphine is insoluble in water. Soluble in alcohol, and ether. (Cailliot, *J. de Pharm.*, 1830, **16.** 439.)

Resinate of Nickel.

I.) α or *Pinate.* Readily soluble in ether, and oil of turpentine.

Resinate of Potash.

I.) α or *Pinate.* Soluble in water, and alcohol. Insoluble in oil of turpentine, or olive-oil, or in an excess of an aqueous solution of caustic potash.

Abietate(pinate ?) of potash is soluble in all proportions in cold water and in strong alcohol. (Cailliot, *J. de Pharm.*, 1830, **16.** 438.)

II.) β or *Sylvate.* Sparingly soluble in water, and cold alcohol. Tolerably soluble in boiling alcohol. (Unverdorben.)

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III.) γ or *Pimarate.* Soluble in alcohol.

Resinate of Quinine.

I.) α or *Pinate?* Abietate(pinate?) of quinine is insoluble in water. Easily soluble in alcohol, and ether. (Cailliot, *J. de Pharm.*, 1830, **16.** 439.)

Resinate of Silver.

I.) α or *Pinate.* Insoluble in water. Very sparingly soluble in absolute alcohol. Readily soluble in ether, and oil of turpentine.

II.) β or *Sylvate.* Sparingly soluble in alcohol. Soluble in ammonia-water.

III.) γ or *Pimarate.*

Resinate of Soda.

I.) α or *Pinate.* Soluble in water, and alcohol. Abietate(pinate?) of soda is soluble in water like the potash-salt. (Cailliot, *J. de Pharm.*, 1830, **16.** 439.)

II.) β or *Sylvate.*

III.) γ or *Pimarate.* Soluble in alcohol.

Resinate of Strontia.

I.) α or *Pinate.* Abietate(pinate?) of strontia resembles the baryta-salt. (Cailliot, *J. de Pharm.*, **16.** 439.)

Resinate *of binoxide* **of Tin.**

I.) α or *Pinate.* Insoluble in water, oil of turpentine, or the fatty oils. Partially soluble in alcohol, and ether.

Resinate of Zinc.

I.) α or *Pinate.* Insoluble in water, or alcohol. Soluble in ether.

II.) β or *Sylvate.* Soluble in alcohol.

Resins formed by the action of nitric acid upon oil of turpentine.

A = $C_{40} H_{24} O_{20}$ Insoluble in cold, sparingly soluble in boiling alcohol. Insoluble in aqueous solutions of caustic potash, or ammonia. (Cailliot, *Ann. Ch. et Phys.*, (3.) **21.** 36.)

B = $C_{40} H_{24} O_{10}$ Soluble in dilute cold alcohol. Insoluble in ammonia-water, or in alkaline lyes. (Cailliot, *loc. cit.*)

C = $C_{40} H_{24} O_{16}$ Soluble in alcohol, in ammonia-water, and in alkaline liquors. (Cailliot, *loc. cit.*)

Resin of Xanthorrea(from *Xanthorrhea hostilis*, from environs of Sydney). Insoluble in water. Easily soluble in alcohol, and ether. Also soluble in solutions of caustic alkalies.
$C_{40} H_{20} O_{12}$

Resinein(of Fremy).
$C_{20} H_{15} O$

Resineone(of Fremy). Easily soluble in alcohol.
$C_{29} H_{23} O$

Resinoin(of Fremy). Insoluble in water. Almost insoluble in alcohol. Easily soluble in ether.
$C_{20} H_{15} O$

Resinone(of Fremy). Insoluble in water. Soluble in alcohol, and ether.
$C_{10} H_9 O$

Retinaphtha. *Vid.* Hydride of Toluenyl.

RetinAsphaltum. Unacted upon by water. Partially soluble in alcohol, potash-lye, and nitric acid. (Hatchett.)

Retinic Acid. Soluble in alcohol, and ether. (Johnston.)
$C_{21} H_{14} O_3$

Retinyl. *Vid.* Cumene.

Retinol. Unacted upon by alkaline solutions.
(*Retinolin.*)
$C_{64}H_{32}''$

Retisterene. *Vid.* MetaNaphthalin.

Rhamnin(from *Rhamnus frangula*). Perhaps identical with Chrysorhamnin.

Very sparingly soluble or insoluble in cold water. Swells up in boiling water. Insoluble in cold, easily soluble in boiling alcohol. Insoluble in ether. Soluble in aqueous solutions of the caustic and carbonated alkalies. Also in concentrated chlorhydric, and sulphuric acids, from which solutions it is precipitated on the addition of water.

RhamnoTannic Acid. Almost insoluble in cold, somewhat soluble in boiling water. Readily soluble in alcohol, and ether. Soluble in aqueous solutions of caustic ammonia, potash, and lime. (Binschwanger.)

RhamnoXanthin. *Vid.* Frangulin.

Rheadic Acid(from *Papaver rhœas*).
(*Rhœadic Acid. Papaveric Acid.*)

Rhodallin. *Vid.* Thiosinnamin.

Rhodeoretic Acid. *Vid.* Convolvulic Acid.

Rhodeoretinolic Acid. *Vid.* Convolvulinolic Acid.

Rhodiate of Ammonia. Readily soluble in chlorhydric acid. (Berzelius.)

Rhodiate of Lime.

Rhodiate of Potash Soluble in nitric and chlorhydric acids, also in an aqueous solution of caustic potash. (Descotils.)

Rhodiate of Soda.

Rhodanide of *X.* *Vid.* SulphoCyanide of *X.*

RhodiCyanide of Potassium. Resembles Iridicyanide of Potassium, *q. v.* (Claus, *Beiträge*, p. 96.)
$C_{12} N_6 Rh_2 K_3 = 3 K Cy, Rh_2 Cy_3$

Rhodium. Insoluble in nitric or chlorhydric acid, in dilute sulphuric acid, or even in aqua-regia. (H. Rose, *Tr.*) Scarcely soluble in any acid. When alloyed with bismuth, lead, copper, or platinum, it is soluble in aqua-regia; but it is not soluble therein when combined with gold or silver. (Wollaston.)
Rh

Rhodizonic Acid. Readily soluble in water, alcohol, and ether. (Heller.)

The alkaline rhodizonates are soluble in water; those of the alkaline earths are in part soluble, while others are difficultly soluble, or insoluble; most of those of the metals proper are insoluble in water.

Rhodizonate of Alumina. Insoluble in water. (Berzelius's *Lehrb.*, **3.** 480.)

Rhodizonate of Ammonia. Readily soluble in water. Sparingly soluble in alcohol. (Heller.)

Rhodizonate of Baryta. Insoluble in water, alcohol, or ether. (Heller.) Sparingly soluble in strong acetic acid. (Werner.)

Rhodizonate of Bismuth. Ppt.

Rhodizonate of Cerium. Easily soluble in water, and alcohol. (Heller.)

Rhodizonate of Cobalt. Soluble in water, and alcohol.

Rhodizonate *of protoxide* **of Copper.** Ppt. Slightly soluble in water.

Rhodizonate of Glucina. Readily soluble in water, and alcohol. (Heller.)

Rhodizonate *of protoxide* **of Iron.** Soluble in water, and alcohol. (Heller.)

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Rhodizonate *of sesquioxide* of Iron. Soluble in water; and alcohol.

Rhodizonate of Lead. Insoluble in water, or alcohol. (Heller.)

Rhodizonate of Lime. Soluble in water. Insoluble in alcohol. (Heller.)

Rhodizonate of Lithia. Soluble in water, with subsequent decomposition.

Rhodizonate of Magnesia. Easily soluble in water, and alcohol. (Heller.)

Rhodizonate of Manganese. Soluble in water, and alcohol.

Rhodizonate *of dinoxide* of Mercury. Insoluble in water, or alcohol.

Rhodizonate *of protoxide* of Mercury. Insoluble in water.

Rhodizonate of Nickel. Soluble in water, and alcohol.

Rhodizonate of Potash. Permanent. Easily soluble in water. (Gerhardt's *Tr.*) Sparingly soluble in cold, scarcely more soluble in hot water. Insoluble in alcohol, or ether. (Berzelius's *Lehrb.*) The aqueous solution gradually undergoes decomposition on standing.

Rhodizonate of Silver. Very sparingly soluble in water.

Rhodizonate of Soda. Soluble in water. Insoluble in alcohol. (Heller.)

Rhodizonate of Strontia. Sparingly soluble in water. Insoluble in alcohol. (Heller.)

Rhodizonate *of binoxide* of Tellurium. Soluble in alcohol.

Rhodizonate *of protoxide* of Tin. Sparingly soluble in water. Insoluble in alcohol. (Heller.)

Rhodizonate of Titanium.

Rhodizonate of Uranium. Easily soluble in water, and alcohol.

Rhodizonate of Zinc. Soluble in water, and alcohol. (Heller.)

Rhodizonate of Zirconia. Easily soluble in water, and alcohol.

RhodoTannic Acid. Soluble in water.
$C_{28}H_{12}O_{14} = C_{28}H_{10}O_{12}, 2\,HO$

RhodoTannate of Lead. Ppt.

RhodoTannate of Tin(SnO_2). Ppt.

RhodoXanthin.
$C_{28}H_{14}O_{16}$

Rhoeadinic Acid(from *Papaver rhoeas*). Somewhat hygroscopic. Easily soluble in water, and alcohol. Insoluble in ether. (Leo Meier.)

RhusTannic Acid. Soluble in water.

RhusTannate of Lead. Ppt.
$C_{18}H_{14}Pb_3O_{15}$

RicinElaidic Acid. Insoluble in water. Soluble in all proportions in strong alcohol, and in ether. Soluble in 5 pts. of alcohol of 22° (B ?), at the temperature of 50° (C.).
(*Palmic Acid. Isomeric with Ricinolic Acid.*)
$C_{36}H_{34}O_6 = C_{36}H_{33}O_5, HO$

Only the alkaline ricinelaidates are soluble in water, but some of the others are soluble in alcohol.

RicinElaidate of Ammonia.

RicinElaidate of Baryta. Ppt.
$C_{36}H_{33}BaO_6$

RicinElaidate of Copper. Sparingly soluble in boiling alcohol of 40%.

RicinElaidate of Ethyl. Tolerably soluble in cold, readily soluble in boiling alcohol.
$C_{36}H_{33}(C_4H_5)O_6$

RicinElaidate of Glyceryl. *Vid.* RicinElaidin.

RicinElaidate of Lead. Soluble in boiling alcohol.

RicinElaidate of Lime. Very sparingly soluble in alcohol.

RicinElaidate of Magnesia. Soluble in alcohol, especially if this be warm.

RicinElaidate of Potash. Soluble in water, and alcohol. The aqueous solution is decomposed by much water, with separation of an acid salt.

RicinElaidate of Silver. Insoluble in water or alcohol. Soluble in ammonia-water. (Bouis, *Ann. Ch. et Phys.*, (3.) **44**. 85.) Insoluble in ether.
$C_{36}H_{33}AgO_6$

RicinElaidate of Soda.

I.) *normal.* Soluble in water, and alcohol. Decomposed by much water; free alkali remaining in solution, while an acid salt separates.

II.) *acid.* Soluble in water, and alcohol.

RicinElaidin. Insoluble in water. 100 pts. of alcohol of 36° (B ?) dissolve 50 pts. of it at the temperature of 30° (C.). Very soluble in ether.
(*Palmin.*)
$C_{78}H_{72}O_{14}$

Ricinolamid. Insoluble in water. Soluble in alcohol, and ether. Decomposed by acids. (Bouis, *Ann. Ch. et Phys.*, (3.) **44**. 96.)
$N\begin{cases}C_{36}H_{33}O_4\\H_2\end{cases}$

Ricinolic Acid. Insoluble in water. Miscible in all proportions with alcohol, and ether.
(*Elaiodic Acid. Isomeric with RicinElaidic Acid.*)
$C_{36}H_{34}O_6 = C_{36}H_{33}O_5, HO$

The metallic salts of ricinolic acid are soluble in alcohol, and some of them are also soluble in ether.

Ricinolate of Ammonia. Soluble in water.

Ricinolate of Baryta. Sparingly soluble in cold water, and alcohol. Very soluble in warm alcohol. Soluble in ammonia-water. (Bouis, *Ann. Ch. et Phys.*, (3.) **44**. 100.)
$C_{36}H_{33}BaO_6$

Ricinolate of Ethyl. Insoluble, or very sparingly soluble in water.
$C_{36}H_{33}(C_4H_5)O_6$

Ricinolate of Lead. Easily soluble in ether.
$C_{36}H_{33}PbO_6$

Ricinolate of Lime.
$C_{36}H_{33}CaO_6$

Ricinolate of Magnesia. Readily soluble in alcohol.
$C_{36}H_{33}MgO_6$

Ricinolate of Silver. Insoluble in water. Very sparingly soluble in cold, easily soluble in warm alcohol. Very sparingly soluble in ether. (Bouis, *Ann. Ch. et Phys.*, (3.) **44**. 100.) Sparingly soluble in hot alcohol or ether, with partial decomposition.
$C_{36}H_{33}AgO_6$

Ricinolate of Soda. Soluble in water. Insoluble in an aqueous solution of chloride of sodium. (Bouis.)

Ricinolate of Strontia. Soluble in hot, less soluble in cold alcohol.
$C_{36}H_{33}SrO_6$

Ricinolate of Zinc.

Rivulin(from *Rivula tubulosa*). Permanent. Forms a slimy solution with water.

Robinic Acid. Said to be identical with Asparagin.

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Roccellic Acid. Insoluble even in boiling water. Soluble in 1.81 pts. of alcohol of 0.819 sp. gr. Very readily soluble in ether. Insoluble in dilute acids. Soluble in aqueous solutions of the alkaline carbonates. Insoluble in lime or baryta-water.
(*Roccellin.*)
$C_{34}H_{22}O_6 = C_{34}H_{21}O_5, HO$

Roccellate of Ammonia. Soluble in water. Insoluble in aqueous solutions of the caustic alkalies.

Roccellate of Baryta.

Roccellate of Lead.
I.) *basic.*
$C_{34}H_{21}PbO_8 ; PbO$

Roccellate of Lime.

Roccellate of Potash. Soluble in water. Insoluble in aqueous solutions of the caustic alkalies.

Roccellinin. Soluble in boiling, but scarcely at all soluble in cold alcohol. Scarcely at all soluble in cold ether. Easily soluble in ammonia-water, and in aqueous solutions of the caustic alkalies. (Stenhouse.)
$C_{28}H_{16}O_{14}$

Roccillin. *Vid.* Roccellic Acid.

Rochelle Salt. *Vid.* Tartrate of Potash & of Soda.

Rocou. *Vid.* Annotto.

Rosacic Acid(of Prout). Was impure Uric Acid.

RoseoCobalt. The salts of roseocobalt are, for the most part, nearly insoluble in cold water; but soluble, without decomposition, in slightly acidulated warm water; this solution is easily decomposed by boiling. (Gibbs & Genth, *Smithson. Contrib.*, vol. 9.)
$5NH_3 . Co_2O_3$

Rosito(of Batilliat). (Rose-red coloring matter in sediment of new wine.) Soluble in water, and without decomposition, in sulphuric acid of 66°. Soluble in alcohol. Insoluble in ether. (Batilliat, *Traité sur les Vins de la France.*)

Rosolic Acid. Very sparingly soluble in cold, and still less soluble in boiling water. Water precipitates it from the alcoholic solution. Readily soluble in alcohol, and ether. Soluble in concentrated sulphuric, chlorhydric, and acetic acids. Soluble, with combination, in aqueous solutions of the caustic alkalies.
$C_{46}H_{22}O_8 = C_{46}H_{21}O_7, HO$

Rosolate of Lime. Soluble in water, and alcohol. (Runge.)

Rottlerin. Insoluble in water. Sparingly soluble in cold, more soluble in boiling alcohol. Easily soluble in ether. Soluble in aqueous solutions of the caustic and carbonated alkalies. Soluble in cold concentrated sulphuric acid. (Anderson.)
$C_{22}H_{10}O_6$

Ruberythric Acid. Sparingly soluble in cold water. Very easily soluble in boiling water, alcohol, and ether. Also soluble in alkaline solutions.

$$C_{28}H_{16}O_{16} = \left.\begin{array}{l} C_{20}H_4O_2'' \\ H . C_{12}H_{11}O_{10} \end{array}\right\} O_4 + 2Aq$$

Rubic Acid. Insoluble, or very sparingly soluble in water. Insoluble in dilute chlorhydric acid.
(*RufoCatechucic Acid.*
Rubinic Acid.)
$C_{18}H_6O_{10} = C_{18}H_5O_9, HO$

Rubate of Potash. Readily soluble in water. Insoluble in alcohol.

Rubate of Silver.
$C_{18}H_5AgO_{10}$

The other metallic rubates are sparingly soluble precipitates. (Svanberg.)

Rubiacic Acid. Very sparingly soluble in boiling water, and alcohol. Soluble in concentrated sulphuric acid, from which it is precipitated on the addition of water. Also soluble, with partial decomposition, in boiling concentrated nitric acid.
$C_{31}H_5O_{17}$(?)

Rubiacate of Potash. Soluble in water, especially if this be hot. (Schunck, *Rep. Br. Assoc.*, 1847, p. 124.)

Rubiacin. Is thought to be identical with Alizarin. Sparingly soluble in boiling water. Soluble in warm alcohol, and in boiling acetic acid, without change. Soluble in concentrated sulphuric acid, from which it is precipitated on the addition of water. Soluble in warm dilute nitric acid, without decomposition, but it is decomposed by boiling concentrated nitric acid. Soluble in aqueous solutions of the caustic and carbonated alkalies. (Schunck, *Rep. Br. Assoc.*, 1847, p. 123.)
"$C_{31}H_9O_{10}$"
"$C_{28}H_{17}O_{18}$", or $C_{20}H_{10}O_{10}$ (Gerhardt).

Rubiadin.

Rubiadinic Acid. *Vid.* Imasatinic Acid.

Rubiafin.

Rubiagin.

Rubian. Is considered by Rochleder to be identical with ruberthyric acid; but the latter is only sparingly soluble in cold water, while rubian is readily soluble therein. Somewhat less soluble in alcohol than in water. Insoluble in ether. Acids precipitate it from the aqueous solution. (Schunck.)
"$C_{46}H_{34}O_{30}$," or
$C_{28}H_{16}O_{16} + Aq$(Gerhardt).

Rubianin. More soluble in water, but less soluble in alcohol, than alizarin.

Rubichloric Acid.
$C_{14}H_8O_9, HO$

Rubinic Acid. *Vid.* Rubic Acid.

RubiTannic Acid. Very hygroscopic. Soluble in water.
$C_{28}H_{16}O_{18} + 7Aq = C_{28}H_{14}O_{16}, 2HO + 7Aq$

RubiTannate of Lead. Ppt.

RufiGallic Acid. Soluble in 3333 pts. of boiling water. Insoluble, or nearly so in cold water. Difficultly soluble in alcohol or ether. Soluble in concentrated sulphuric acid.
(*ParaEllagic Acid.*)
$C_{28}H_8O_{16} = C_{28}H_6O_{14}, 2HO + 4Aq$

RufiGallate of Potash. Very soluble in water.

Rufimoric Acid. Very easily soluble in alcohol; less soluble in water. Very sparingly soluble in ether. Soluble in all proportions in water which contains a little caustic ammonia. Soluble, without alteration, in concentrated sulphuric, and chlorhydric acids; also soluble in aqueous solutions of the caustic and carbonated alkalies.
$C_{14}H_7O_8$

Rufimorate of Copper. Ppt.
$8CuO, 2C_{14}H_7O_8$

Rufimorate of Lead. Insoluble in water, alcohol, or ammonia-water. Soluble in acetic acid, and in an aqueous solution of caustic potash.
$2PbO, C_{14}H_7O_8$

Rufin. Soluble in boiling water. Readily soluble in alcohol. Almost insoluble in ether. Soluble in aqueous solutions of caustic potash, and ammonia. Soluble
$C_{42}H_{20}O_{16}$

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in concentrated sulphuric acid, with combination. Insoluble in chlorhydric acid. Decomposed by nitric acid.

RufinSulphuric Acid. Soluble in water, but the solution undergoes decomposition when evaporated. (Mulder.)

RufinSulphate of Lead. Insoluble in water. (Mulder.)

RufinSulphate of Lime.

I.) $C_{14}H_7O_5, SO_3; CaO, SO_3 + HO$ Decomposed by water, which retains No. II. in solution.

II.) $2C_{14}H_7O_5, SO_3; CaO, SO_3 + HO$ Hygroscopic. Difficultly soluble in water. Insoluble in alcohol, ether, or oils. (Mulder, *J. pr. Ch.*, 18. 357, cited in *Wittstein's Handw.*)

RufoCatechucic Acid. *Vid.* Rubic Acid.

Rumicin. *Vid.* Chrysophanic Acid.

Rutamid. *Vid.* Rutylamid.

Ruthenic Acid.
RuO_3

Ruthenate of Potash.

I.) *basic.* Soluble in water, at least if this contain caustic alkali.

RuthenioCyanhydric Acid. Easily soluble in water, and spirit. Less soluble in ether. (Claus, *Beiträge*, pp. 97, 98.)
$RuCy, 2HCy$

RuthenioCyanide of Potassium. Effloresces in dry air. Easily soluble in water. Difficultly soluble in spirit. It crystallizes in all proportions with ferrocyanide of potassium. (Claus, *Beiträge*, pp. 97, 99.)
$C_6H_3RuK_2 + 3Aq = 2KCy, RuCy + 3Aq$

Ruthenium. Nearly insoluble in acids, aqua-regia alone dissolving a trace of it.
Ru

Rutic Acid. *Vid.* Rutylic Acid.

Rutilin. Insoluble in water, alcohol, or glacial acetic acid. Insoluble in alkaline solutions. Soluble in concentrated sulphuric acid. (Braconnot.) Insoluble in water, alcohol, ether, or boiling potash-lye. Soluble in concentrated sulphuric acid; also, with subsequent decomposition, in nitric acid. (Mulder.)

"**Rutinic Acid.**" *Vid.* Quercitrin.

Rutinic Acid. Insoluble in cold, soluble in boiling water. It does not separate out from the hot solutions as this becomes cold, but by evaporation it may be recrystallized. It behaves in a similar manner with alcohol. Insoluble in ether.
$C_{12}H_8O_8 = C_{12}H_7O_7, HO$

Rutinate of Lead. Ppt.

"**Rutin.**" *Vid.* Quercetrin.

RutylAldehyde. *Vid.* Hydride of Rutyl.

Rutylamid. Insoluble in water, or ammonia-water. Easily soluble in alcohol, and ether. (Rowney.)
(*Rutamid. Caprinamid. Capramid.*)
$N\left\{\begin{matrix}C_{20}H_{19}O_2\\H_2\end{matrix}\right.$

Rutylic Acid. Insoluble in cold, sparingly soluble in boiling water. Readily soluble in cold alcohol, and ether. Soluble, without alteration, in warm concentrated nitric, and chlorhydric acids, from which solutions it is precipitated on the addition of water. (Rowney.) Soluble in about 1000 pts. of water at 20°. Soluble in all proportions in absolute alcohol. (Chevreul.) All caprates, excepting those of the alkalies, are but sparingly soluble in water. (Lerch.)
(*Capric Acid.*)
$C_{20}H_{20}O_4 = C_{20}H_{19}O_3, HO$

Rutylate of Ammonia. Soluble in water.

Rutylate of Baryta. Permanent. Soluble in boiling, less soluble in cold water. Less soluble in water than the caprylate. After having become dry it is insoluble in water, since this cannot moisten it, but if wet with alcohol it again becomes soluble in water. Soluble in boiling alcohol.
$C_{20}H_{19}BaO_4$

100 pts. of water at 20° dissolve 0.5 pt. of it; the aqueous solution undergoes decomposition when left to itself. (Chevreul. [T.].)

Rutylate of Copper. Insoluble in water, or alcohol. Soluble in ammonia-water.

Rutylate of Ethyl. Insoluble in cold water. Easily soluble in alcohol, and ether. (Rowney.)
(*Capric Ether.*)
$C_{20}H_{19}(C_4H_5)O_4$

Rutylate of Lead. Insoluble in water. Very sparingly soluble in boiling alcohol. (Rowney.)
$C_{20}H_{19}PbO_4$

Rutylate of Lime. More soluble than the baryta-salt in water, and alcohol. (Rowney.) Soluble in boiling water, though less readily than the baryta-salt, crystallizing out on cooling. (Gottlieb.)
$C_{20}H_{19}CaO_4$

Rutylate of Magnesia. Difficultly soluble in cold water.
$C_{20}H_{19}MgO_4$

Rutylate of Potash. Very easily soluble in water.

Rutylate of Silver. Insoluble in cold, sparingly soluble in boiling water; more soluble in boiling alcohol. Easily soluble in ammonia-water.
$C_{20}H_{19}AgO_4$

Rutylate of Soda. Readily soluble in cold water, and alcohol.
$C_{20}H_{19}NaO_4$

Rutylate of Strontia. 100 pts. of water at 17.7° dissolve 0.5 pt. of it. (Chevreul. [T.].)
$C_{20}H_{19}SrO_4$

Rutylic Aldehyde. *Vid.* Hydride of Rutyl.

S.

Sabadillic Acid(from *Veratrum Sabadilla*). Soluble in water, alcohol, and ether. (Pelletier & Caventou.)

Sabadillin(from *Veratrum Sabadilla*).

I.) *anhydrous.* Sparingly soluble in cold, easily soluble in boiling water. Also soluble in alcohol, from which it does not crystallize on cooling. Insoluble in ether. Soluble, with combination, in dilute acids. (Courbe.) Simon doubted the existence of sabadillin, asserting that it was nothing but a mixture of resinate of soda, and resinate of veratrin; but Huebschmann supports Courbe's results, and describes it as being soluble in 143 pts. of boiling water. Ether only dissolves traces. The aqueous solution is partially precipitated on the addition of carbonate of potash, but not by ammonia-water.
$C_{20}H_{13}NO_5$

II.) *hydrated.* Easily soluble in water, and alcohol. Insoluble in ether. Soluble in acids, with combination. (Courbe.)
$C_{20}H_{14}NO_6$

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SACCHARIC ACID. (*Oxalhydric Acid. HydrOxalic Acid. Zuckersæure.*) $C_{12}H_{10}O_{16} = C_{12}H_8O_{14}, 2HO$ Very deliquescent. Easily soluble in water. Miscible, in all proportions, with alcohol. (Guérin-Varry.) Readily soluble in alcohol. (Heintz.) Sparingly soluble in boiling ether. Insoluble in cold, and only very sparingly soluble in boiling oil of turpentine. (Guérin-Varry.)

The bibasic saccharates are sparingly soluble in water; the monobasic salts, however, are easily soluble.

SACCHARATE OF AMMONIA.

I.) *normal.* Easily soluble in water. (Varry.) More soluble than the acid salt in water. (Heintz.)

II.) *acid.* $C_{12}H_9(NH_4)O_{16}$ Permanent. Soluble in 82 pts. of water at 15°, and in 4 pts. of boiling water. Insoluble in cold, soluble in hot alcohol. (Varry.) Sparingly soluble in water. Somewhat soluble in an aqueous solution of bisaccharate of potash.

SACCHARATE OF AMMONIUMCHLOROPLATIN(OUS)AMMONIUM. (*Gros's Saccharate.*) Somewhat soluble in water. (Gros, *Ann. der Pharm.*, 1838, **27.** 256.)

SACCHARATE OF BARYTA.

I.) *normal.* $C_{12}H_8Ba_2O_{16}$ When precipitated from cold solutions it is moderately soluble in water (Varry, Heintz); but when precipitated from hot solutions it is crystalline, and very sparingly soluble in water. (Heintz.) Soluble in saccharic acid.

II.) *acid.* Soluble in water.

SACCHARATE OF BISMUTH. $C_{12}H_4Bi_2O_{16} + 4Aq$ Insoluble in water. Sparingly soluble in acids. (Heintz.)

SACCHARATE OF CADMIUM. $C_{12}H_8Cd_2O_{16}$ Nearly insoluble in cold, somewhat more soluble in boiling water. (Heintz.)

SACCHARATE *of sesquioxide* **OF CHROMIUM.** Soluble in water.

SACCHARATE OF COPPER. Slightly soluble in water. (Heintz.)

SACCHARATE *of protoxide* **OF IRON.** Soluble in water.

SACCHARATE *of sesquioxide* **OF IRON.** Soluble in water.

SACCHARATE OF LEAD.

I.) *normal?* Insoluble in cold, sparingly soluble in boiling water. Readily soluble in saccharic and other acids; also soluble in ammonia-water. (Erdmann.)

II.) *acid?* Soluble in water. (Erdmann.)

III.) *basic.* Insoluble in water. (Erdmann.)

SACCHARATE OF LIME.

I.) *normal.* $C_{12}H_8Ca_2O_{16} + 2Aq$ When precipitated from cold solutions it is moderately soluble in water (Varry, Heintz); but when precipitated from hot solutions it is crystalline and nearly insoluble in boiling water. (Heintz.) Soluble in saccharic and chlorhydric acids.

II.) *acid.*

SACCHARATE OF MAGNESIA. $C_{12}H_8Mg_2O_{16} + 6Aq$ Very sparingly soluble in cold, somewhat more readily soluble in boiling water. (Heintz.)

SACCHARATE *of protoxide* **OF MERCURY**(Hg O). Nearly insoluble in water. (Varry.)

SACCHARATE OF POTASH.

I.) *normal.* $C_{12}H_8K_2O_{16}$ Deliquesces in very damp air. Soluble in water.

II.) *acid.* $C_{12}H_9KO_{16}$ Soluble in 88 @ 90 pts. of water at 6° @ 8°. (Heintz.) Sparingly soluble in cold, tolerably soluble in warm, and easily soluble in hot water. (Heintz.)

SACCHARATE OF SILVER. $C_{12}H_8Ag_2O_{16}$ Sparingly soluble in cold, more readily soluble in hot water. Readily soluble in ammonia-water. On boiling the solutions they are decomposed.

SACCHARATE OF SODA.

I.) *normal.* Deliquescent. Soluble in water.

II.) *acid.* Soluble in water.

SACCHARATE OF STRONTIA.

I.) *normal.* Ppt.

II.) *acid.*

SACCHARATE OF ZINC.

I.) *normal.* $C_{12}H_8Zn_2O_{12} + Aq$ Insoluble in cold, sparingly soluble in boiling water; more soluble in saccharic acid. (Varry; Thaulow.)

SAFRANIN (from *Crocus Sativa*). (*Polycroite. Crocic Acid.*) $C_{20}H_{18}O_{11}$ Very sparingly soluble in water. Readily soluble in alcohol. Almost insoluble in ether, and in the fatty and essential oils. Easily soluble in aqueous solutions of the caustic alkalies. (N. E. Henry.) Soluble in water, a trace of free alkali in the latter increasing the solubility to a high degree. Easily soluble in alcohol. Very difficultly soluble in ether. (Quadrat.)

SAGEPENUM. See under **RESINS.**

SAL-AMMONIAC. *Vid.* Chloride of Ammonium.

SAL ALEMBROTH. *Vid.* Chloride of Ammonium & of Mercury (Hg Cl).

SALHYDRAMID. *Vid.* Hydride of AzoSalicyl.

SALICIN. $C_{26}H_{18}O_{14} = \left.\begin{matrix} C_{14}H_7O_2 \\ C_{12}H_{11}O_{10} \end{matrix}\right\} O_2$ Permanent. Soluble in 17.85 pts. of water at 19.5°, and more freely, perhaps in all proportions, in boiling water. (Pelouze & Gay-Lussac.) Soluble in 14 pts. of water at 17° (Braconnot); in 30.31 pts. at 11.5° (Piria); in 28.57 pts. at the ordinary temperature (Bouchardat); in 6 pts. of water at 18.75° (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76); in 5.6 pts. of cold, and in much less boiling water; in 22 pts. of cold, and 0.5 pt. of hot water.

No more soluble in alcohol than in water. (Braconnot.) Soluble in 30 pts. of cold, and 3 pts. of hot alcohol. Insoluble in ether, oil of turpentine, or the fatty oils.

Soluble in cold, and more abundantly in hot creosote (Reichenbach); and in warm hydrate of anisyl. Soluble in acetic acid, and may be obtained again unchanged by evaporating the solution to dryness. (Braconnot; Hopff.) More easily soluble in aqueous solutions of the alkalies than in water. Does not combine with acids. Soluble, with decomposition, in concentrated sulphuric acid. Decomposed by dilute sulphuric and chlorhydric acids. Cold concentrated nitric acid dissolves salicin more abundantly than water, and does not decompose it at first. (Braconnot.)

SALICIN with OXIDE OF LEAD. $C_{26}H_{14}Pb_4O_{14}$ Insoluble in water. Soluble in acetic acid, and in an aqueous solution of caustic potash.

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Salicon. *Vid.* Phenic Acid.

Salicylamic Acid. *(Isomeric with Anthranilic and Benzamic Acids.)* $C_{14}H_7NO_4 = N\left\{\begin{matrix}C_{14}H_4O_2''\\H_2\end{matrix}\right..O, HO$ Sparingly soluble in cold, more abundantly soluble in boiling water. (Procter.) Scarcely at all soluble in cold, much more soluble in boiling water. Still more soluble in alcohol, and ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **10.** 350.) Abundantly soluble in alcohol, and ether, especially when these are hot; also soluble in aqueous solutions of caustic potash and ammonia. (Procter.) Soluble in warm aqueous solutions of caustic ammonia and of the alkaline carbonates, separating out again unchanged when these solutions are evaporated. (Limpricht.)

Salicylamate of Baryta. Easily soluble in water.

Salicylamate of Copper. $C_{14}H_6CuNO_4$ Ppt.

Salicylamate of Ethyl. *Vid.* EthylSalicylamic Acid.

Salicylamate of Lime. $C_{14}H_6CaNO_4$ Very easily soluble in water.

Salicylamate of Magnesia. Easily soluble in water.

Salicylamate of Potash. Soluble in water.

Salicylamate of Silver. $C_{14}H_6AgNO_4$ Ppt.

Salicylamate of Soda. Soluble in water.

Salicylamate of Strontia. $C_{14}H_6SrNO_4$ Soluble in water. (Limpricht, *Ann. Ch. u. Pharm.*, **98.** 256.)

Salicylamid. $C_{14}H_5NO_2 = N\left\{\begin{matrix}C_{14}H_4O_2''\\H\end{matrix}\right.$ Insoluble in water. Scarcely at all soluble in boiling alcohol, or ether. Soluble in an alcoholic, but insoluble in an aqueous solution of caustic ammonia. (Limpricht.)

SalicylAnilid. *Vid.* PhenylSalicoylamid.

Salicylic Acid(Anhydrous).

I.) *(Salicylid.)* $C_{14}H_4O_4 = C_{14}H_4O_2''\}O_2$ Insoluble in boiling water, or ether. Extremely sparingly soluble in boiling alcohol. (Gerhardt & Socoloff, *Ann. Ch. et Phys.*, (3.) **37.** 323.)

II.) *meta (or mono atomic) Salicylic Acid.* *(Salicylic Anhydride. Salicylic salicylate. Salicylate of Salicyl.)* $C_{14}H_5O_6 = \left.\begin{matrix}C_{14}H_4O_2''\\H\end{matrix}\right\}O_2$ Insoluble in cold, acidified by boiling water. Soluble in boiling, less soluble in cold alcohol. Soluble in boiling ether. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **37.** 323.)

Salicylic Acid. *(Spiroylic Acid. HyperSpiroylic Acid. Isomeric with Ampelic, and OxyBenzoic Acids.)* $C_{14}H_6O_6 = C_{14}H_4O_4, 2HO$ Permanent. Sparingly soluble in cold, abundantly soluble in boiling water. (Strecker.) Soluble in 1087 pts. of water at 0°. (Kolbe, *Lehrb.*, **2.** 247.) Very sparingly soluble in water at the ordinary temperature; much more soluble in boiling water. Easily soluble in alcohol, especially when this is warm; being much more soluble in alcohol than in water. Tolerably readily soluble in wood-spirit, especially when this is warm. Readily soluble in cold, and still more soluble in warm ether. Scarcely at all soluble in cold, but soluble in about 5 pts. of boiling oil of turpentine. (Cahours, *Ann. Ch. et Phys.*, (3.) **10.** 338; & (3.) **13.** 90.)

Salicylate of Acetyl. $C_{14}H_5(C_4H_3O_2)O_6$

Salicylate of Ammonia.

I.) *acid.* $C_{14}H_5(NH_4)O_6$ Very soluble in water. (Cahours, *loc. cit.*)

Salicylate of Amyl.

I.) *acid.* *(Hydrate of AmylSalicyl.)* $C_{14}H_5(C_{10}H_{11})O_6$ Insoluble in water.

Salicylate of Amyl & of Benzoyl. *(Benzoate of AmylSalicyl.)* $C_{14}H_4(C_{10}H_{11}.C_{14}H_5O_2)O_6$

Salicylate of Amyl & of Ethyl.

Salicylate of Amyl & of Methyl. $C_{14}H_4(C_{10}H_{11})(C_2H_3)O_6$

Salicylate of Baryta.

I.) *normal.* $C_{14}H_4Ba_2O_6 + 4Aq$ Much less soluble in water than the acid salt. (Piria.)

II.) *acid.* $C_{14}H_5BaO_6 + Aq$ Easily soluble in water. (Ettling.) Very readily soluble in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **13.** p. 94.)

Salicylate of Baryta & of Copper. $C_{14}H_4BaCuO_6 + 4Aq$ Insoluble in water. (Piria.)

Salicylate of Benzoyl. $C_{14}H_5(C_{14}H_5O_2)O_6$ Soluble in ether.

Salicylate of Benzoyl & of Ethyl. *(Benzoate of EthylSalicyl.)* $C_{14}H_4(C_4H_5.C_{14}H_5O_2)O_6$ Easily soluble in alcohol, and ether.

Salicylate of Benzoyl & of Methyl. *(Benzoate of MethylSalicyl.)* $C_{14}H_4(C_2H_3.C_{14}H_5O_2)O_6$ Insoluble in water. Easily soluble in alcohol, and ether. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **45.** 93.)

Salicylate of Copper.

I.) *normal.* $C_{14}H_4Cu_2O_6 + 2Aq$ Almost insoluble in water, alcohol, or ether. (Piria.)

II.) *acid.* $C_{14}H_5CuO_6 + 4Aq$ Readily soluble in large quantities of water, alcohol, and ether; but it is decomposed by these liquids when added in small proportions, especially if they are warm. (Piria, *Ann. Ch. u. Pharm.*, **93.** 264.)

Salicylate of Copper & of Potash. $C_{14}H_4CuKO_6 + 4Aq$ Very readily soluble in water. Insoluble in alcohol or ether. (Piria.)

Salicylate of Ethyl.

I.) *normal.*

II.) *acid*, or *mono.* $C_{14}H_5(C_4H_5)O_6$ *Vid.* EthylSalicylic Acid.

Salicylate of Ethyl & of Succinyl. *(Succinate af EthylSalicyl.)* $C_{44}H_{22}O_{16} = C_{14}H_4(C_4H_5)_2O_6; C_{14}H_4(C_8H_4O_4'')O_6$ Insoluble in water. Very soluble in boiling alcohol. Sparingly soluble in ether. (Gerhardt.)

Salicylate of Lead.

I.) *normul.* $C_{14}H_4Pb_2O_6$ Very sparingly soluble in water. (Piria.)

II.) *acid.* $C_{14}H_5PbO_6 + Aq$ Very sparingly soluble, or insoluble in cold, soluble, with decomposition, in boiling water. (Piria.) Sparingly soluble in cold, easily soluble in boiling water. (Cahours, *Ann. Ch. et Phys.*, (3.) **13.** pp. 91, 98.)

III.) *penta.* $C_{14}H_4Pb_2O_6; 3PbO$ Insoluble, or very sparingly soluble in water. (Piria.)

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Salicylate of Lime.
I.) *normal.* Nearly insoluble in water. (Piria.)
$C_{14} H_4 Ca_2 O_6 + 2 Aq$
II.) *acid.* Tolerably easily soluble in water.
$C_{14} H_5 Ca O_6 + 2 Aq$ (Cahours, *loc. cit.*; Ettling.)

Salicylate of Magnesia. Easily soluble in water at the ordinary temperature, and still more readily soluble in boiling water. (Cahours, *Ann. Ch. et Phys.*, (3.) **13.** 97.)

Salicylate of Methyl.
(*MethylSalicylate of Methyl.*)
I.) *normal.*
$C_{14} H_4 (C_2 H_3)_2 O_6$
II.) *acid, or mono.* *Vid.* MethylSalicylic Acid.
$C_{14} H_5 (C_2 H_3) O_6$

Salicylate of Methyl*bromé*, &c. *Vid.* Bromo(&c.)Salicylate of Methyl.

Salicylate of MethylCumyl. *Vid.* Cuminate of MethylSalicyl.

Salicylate of Methyl & of Succinyl.
(*Succinate of MethylSalicyl.*)
$C_{40} H_{18} O_{16} = C_{14} H_4 (C_2 H_3)_2 O_6 ;$
$C_{14} H_4 (C_8 H_4 O_4'') O_6$
Sparingly soluble in cold, somewhat soluble in boiling alcohol. Sparingly soluble in ether. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **45.** 96.)

Salicylate of Potash.
I.) *acid.* Soluble in water, and in boiling concentrated alcohol. Readily soluble in alcohol, and ether. (Cahours, *loc. cit.*)
$C_{14} H_5 K O_6 + Aq$

Salicylate of Salicyl. *Vid.* Salicylic Acid(Anhydrous, No. II.).

Salicylate of Silver.
I.) *acid.* Almost insoluble in cold, sparingly soluble in warm water. (Ettling; Cahours, *loc. cit.*)
$C_{14} H_5 Ag O_6$

Salicylate of Soda. Soluble in water. (Cahours, *loc. cit.*)

Salicylate of Strontia. Soluble in water. (Cahours, *loc. cit.*)

Salicylate of Zinc. Soluble in water. (Cahours, *loc. cit.*)

SalicylBenzamic Acid.
(*BenzoylSalicylamic Acid. BenzoylSalicylamide*(of Gerhardt).)
$C_{28} H_{11} N O_6 = N \left\{ \begin{matrix} C_{14} H_4 O_2'' \\ C_{14} H_5 O_2 \\ H \end{matrix} \right. . O, H O$
When amorphous it is easily soluble in alcohol; but the matter thus dissolved soon passes into a crystalline modification, which is deposited in great part from the alcohol. The crystalline modification is very sparingly soluble in alcohol, and almost insoluble in ether. It is not sensibly soluble in boiling water; but dissolves in warm ammonia-water and in other alkaline liquors. (Gerhardt & Chiozza, *Ann. Ch. et Phys.*, (3.) **46.** 139.) Soluble, with decomposition, in aqueous solutions of potash, soda, strontia, or warm carbonate of soda. (Limpricht.)

SalicylBenzamate of Silver. When in the viscous state it is easily soluble in alcohol.
$C_{28} H_{10} Ag N O_6$

SalicylBenzoyl. *Vid.* BenzoSalicyl.

SalicylBenzoylamid.
(*BenzoylSalicylimid.*)
$C_{28} H_9 N O_4 = N \left\{ \begin{matrix} C_{14} H_4 O_2'' \\ C_{14} H_5 O_2 \end{matrix} \right.$
Soluble in about 1000 pts. of boiling spirit. (Limpricht.)

SalicylCumylamic Acid.
(*CumylSalicylamid. SalicylCumylamid.*)
$C_{34} H_{17} N O_6 = N \left\{ \begin{matrix} C_{14} H_4 O_2'' \\ C_{20} H_{11} O_2 \\ H \end{matrix} \right. . O, H O$
Almost entirely insoluble in water. Very difficultly soluble in ammonia-water. When in the viscous condition it is soluble in cold alcohol, but soon separates out again in a crystalline state. It is slightly more soluble than salicylbenzamic acid in alcohol. Very sparingly soluble in ether. (Gerhardt & Chiozza, *Ann. Ch. et Phys.*, (3.) **46.** 141.)

Salicylid. *Vid.* Salicylic Acid(Anhydrous, No. I.)

"**Salicylide of** *X*." *Vid.* Salicylite of *X*.

Salicylide of Acetyl. *Vid.* AcetoSalicyl.

Salicylide of Benzoyl. *Vid.* BenzoSalicyl.

Salicylide of Toluyl. *Vid.* ToluoSalicyl.

Salicylimid(of Gerhardt). *Vid.* Hydride of AzoSalicyl.

Salicylimid(of Limpricht). *Vid.* Salicylamid.

Salicylous Acid.
(*Hydride of Salicyl. Spiroylous Acid. Spirous Acid. Ulmaric Acid. Salicoylic Acid. Essence de reine des prés. Isomeric with Benzoic Acid.*)
$C_{14} H_6 O_4 = C_{14} H_5 O_3, H O$
Abundantly soluble in water. Soluble in all proportions in alcohol, and ether. Readily soluble, with combination, in aqueous solutions of the caustic and carbonated alkalies. Decomposed by concentrated sulphuric acid. The alkaline salts of salicylous acid are tolerably soluble in water; the other salts are insoluble.

Salicylite of Ammonia.
(*Salicylammonium.*)
I.) *normal.* Insoluble in water. Sparingly soluble in cold, abundantly soluble in hot alcohol.
$C_{14} H_5 (N H_4) O_4$
II.) *acid.* More soluble in alcohol than in water. (Berzelius.)

Salicylite of Baryta. Very sparingly soluble in cold water.
$C_{14} H_5 Ba O_4 + 2 Aq$

Salicylite *of dinoxide* **of Copper.** Ppt.

Salicylite *of protoxide* **of Copper.** Difficultly soluble in water or alcohol.
$C_{14} H_5 Cu O_4$

Salicylite *of protoxide* **of Iron.** Ppt.

Salicylite *of sesquioxide* **of Iron.** Soluble in water.

Salicylite of Lead.
I.) *basic.* Insoluble in water. (Lœwig & Weidmann.)
$C_{14} H_5 Pb O_4 ; Pb O$

Salicylite of Lime. Sparingly soluble in water.

Salicylite of Magnesia. Nearly insoluble in water. (Lœwig.)

Salicylite *of protoxide* **of Mercury.** Ppt.

Salicylite of Potash.
I.) *normal.* Permanent in dry air. Sparingly soluble in water. Readily soluble in hot, less soluble in cold absolute alcohol. (Piria.) Soluble in less than 4 vols. of hot alcohol of 50%. (Ettling.)
$C_{14} H_5 K O_4$
II.) *acid.* Decomposed by water. Soluble in hot, less soluble in cold alcohol. (Ettling.)
$C_{14} H_5 K O_4, C_{14} H_6 O_4$

Salicylite of Silver. Ppt. Decomposed when heated with water. (Lœwig & Weidmann.)

Salicylite of Soda.
I.) *acid.* Soluble in hot, less soluble in cold alcohol. (Ettling.)
$C_{14} H_5 Na O_4, C_{14} H_6 O_4 + Aq$

Salicylite of Strontia. Sparingly soluble in water.

Salicylite of Zinc.

SalicylosAnilid. *Vid.* PhenylSalicoylamid.

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Salicyluric Acid. $C_{18}H_9NO_8$ Readily soluble in boiling, less soluble in cold water. Readily soluble in alcohol. Tolerably soluble in ether. Soluble in warm, fuming chlorhydric acid, and separates out unchanged when the solution is cooled; but when the chlorhydric solution is boiled during two or three hours it is decomposed. (Bertagnini.)

Salicylurate of Baryta. Sparingly soluble in cold water.

Salicylurate of Lime.

I.) Sparingly soluble in cold water. Insoluble in alcohol.

II.) Insoluble in boiling water.

Saligenin. $C_{14}H_8O_4$ Soluble in 15 pts. of water at 22°, and in almost all proportions in boiling water. Very soluble in alcohol, and ether. Ether removes it from the aqueous solution. Soluble in cold ammonia-water, without sensible alteration at first; but the solution subsequently undergoes decomposition. Decomposed by acids. (Piria, *Ann. Ch. et Phys.*, (3.) **14.** 261.)

Saliretin. (*Salicetin.*) $C_{14}H_6O_2$ Insoluble in water, or ammonia-water. Soluble in alcohol, ether, and concentrated acetic acid, from which solutions it is precipitated on the addition of water. Also soluble in aqueous solutions of caustic potash and soda. (Piria.)

Salithol. *Vid.* Phenate of Ethyl.

Saltpetre. *Vid.* Nitrate of Potash.

Salt of Tartar. *Vid.* Carbonate of Potash.

Salylic Acid. (*Isomeric with Benzoic Acid.*) $C_{14}H_6O_4 = C_{14}H_5O_3, HO$ Very easily soluble in boiling water, and is also much more abundantly soluble in cold water than benzoic acid. Soluble in 237 pts. of water at 0°. Easily soluble in alcohol, and ether, especially in the latter. Its salts are all soluble in water. (Kolbe & Lautemann, *Ann. Ch. u. Pharm.*, **115.** 187. [K.].)

Salylate of Baryta. $C_{14}H_5BaO_4 + 2Aq$ More soluble in water than the benzoate. (K. & L.)

Salylate of Lime. $C_{14}H_5CaO_4 + 3Aq$ Soluble in water.

Salylate of Silver. $C_{14}H_5AgO_4$ Soluble in hot, less soluble in cold water. (Griess.)

Salylate of Zinc. Soluble in water, but the solution is decomposed on boiling.

Sandarach. See under **Resins.**

Sanguinarin. (*Chelerythrin.*) $C_{36}H_{17}NO_8 = N\left\{C_{36}H_{17}O_8'''\right.$ Insoluble in water. Readily soluble in alcohol, and in acids, with combination, forming salts which are for the most part readily soluble in water. (Dana.) Insoluble in water. Soluble in alcohol, and ether. Most of its salts are soluble in water. (Probst, *Ann. der Pharm.*, **29.** 120.) Soluble in ether. (Schiel, *Am. J. Sci.*, (2.) **20.** 220.) Soluble in ether and in the fixed and volatile oils. Partially soluble in aqueous solutions of the caustic alkalies, and in acetic acid. (Parrish's *Pharm.*, pp. 193, 398.)

Santalic Acid. (*Santalin.*) $C_{30}H_{14}O_{10} = C_{30}H_{13}O_9, HO$ Insoluble in water. Readily soluble in alcohol, and ether. Easily soluble in aqueous solutions of caustic ammonia, and potash.

Santalate of Baryta. $C_{30}H_{13}BaO_{10}$ Ppt.

Santalate of Lead.

I.) *basic.* $C_{30}H_{13}PbO_{10}, PbO, HO$ Ppt.

Santonic Acid. (*Santonin.*) $C_{30}H_{18}O_6 = C_{30}H_{17}O_5, HO$ Permanent. Almost insoluble in cold, somewhat more soluble in boiling water. Soluble in 5000 pts. of water at 17.5°, and in 250 pts. at 100°.

Readily soluble in boiling alcohol. Soluble in 43 pts. of alcohol at 22.5°; in 12 pts. at 50°, and in 2.7 pts. at 80°. Less soluble in ether, being soluble in 75 pts. of ether at 17.5°, and in 42 pts. at 40°. (Trommsdorff.) 100 pts. of chloroform dissolve 23 pts. of pure santonin, and 33.3 pts. of that which has become yellow from exposure to sunlight. (Schlimpert, *Kopp & Will's J. B., für* 1859. p. 405.) Soluble, without decomposition, in cold concentrated sulphuric acid, from which solution it is precipitated on the addition of water. Also soluble in strong nitric acid; but is decomposed by weak nitric acid. Soluble in aqueous solutions of the fixed caustic alkalies. The salts of santonin are decomposed when boiled with water.

Santonate of Baryta. $C_{30}H_{17}BaO_6 + 3Aq$

Santonate of Lead. $C_{30}H_{17}PbO_6 + Aq$

Santonate of Lime. $C_{30}H_{17}CaO_6 + 2Aq$ Soluble in water, and in weak alcohol.

Santonate of Potash. Soluble in water.

Santonate of Soda. $C_{30}H_{17}NaO_6 + 6Aq$ Abundantly soluble in water. Soluble in strong alcohol.

Santonate of Zinc.

Santonin. *Vid.* Santonic Acid.

Sapogenin. *Vid.* Quinovatic Acid.

Saponic Acid. *Vid.* Quinovatic Acid.

Saponin. (*Senegin. Seneguin. Polygallic Acid. Githagin. Struthün. Polygalin.*) $C_{36}H_{28}O_{20}$ (or O_{24}) Sparingly soluble in cold, abundantly soluble in hot water. Soluble in absolute alcohol, but more readily in dilute spirit. More soluble in hot than in cold alcohol. Insoluble in ether. (Bolley, *Ann. Ch. u. Pharm.*, **90.** 212.) Easily soluble in water. More difficultly soluble in alcohol in proportion as this is stronger. 500 pts. of boiling absolute alcohol dissolve only 1 pt. of it, and this is almost completely deposited as the solution cools. Insoluble in ether. (Wittstein's *Handw.*) Decomposed by chlorhydric and nitric acids. Soluble in concentrated sulphuric acid, apparently with decomposition.

Sarcin. (*Sarkin. Isomeric, possibly identical with Hypo-Xanthin.*) $C_{10}H_4N_4O_2 = N_2\left\{\begin{matrix}(C_2N)_2\\ C_6H_2''.O_2\\ H_2\end{matrix}\right.$ Soluble in 300 pts. of water at 15°, and in 78 pts. of boiling water. Soluble in 900 pts. of boiling alcohol. Much more readily soluble in dilute chlorhydric acid, and in aqueous solutions of caustic ammonia, potash, or even baryta, than in water; less readily soluble in dilute nitric or sulphuric acids, but soluble in these acids when concentrated. Most of the salts of sarcin are decomposed by water. (Strecker, *J. Ch. Soc.*, **10.** 122.)

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Sarcin with Baryta.
$C_{10} H_3 Ba_2 N_4 O_2 + 4 Aq$

Sarcin with Copper. Ppt. Insoluble in water.

Sarcin with *protoxide* **of Mercury.** Ppt. Insoluble in water.

Sarcin with Silver. Insoluble in water, or ammonia-water, even when these are boiling.
$C_{10} H_2 Ag_2 N_4 O_2 + Aq$ & $2 Aq$

Sarcin with Zinc. Ppt. Insoluble in water.

Sarcocollin(from the sap of *Pœnea mucronata*). Soluble in 40 pts. of cold, and in 25 pts. of boiling water. Soluble in almost all proportions in alcohol. Insoluble in ether. The saturated aqueous solution deposits a substance which is no longer soluble in water.

SarcoLactic Acid. *Vid.* Lactic Acid(modification *α*, from flesh).

Sarcosin. Very soluble in water. Very sparingly soluble in alcohol. Insoluble in ether. Soluble in an aqueous solution of protochloride of mercury. (Liebig.)
(*Isomeric with Alanin, Urethan, and Lactamid.*)
$C_6 H_7 N O_4 = N \left\{ \begin{matrix} C_2 H O_2 \\ C_4 H_5 \\ H \end{matrix} \right. . O_2$

Sassafras-Camphor.
$C_{20} H_{10} O_4$

Sassaparillin. *Vid.* Smilacin.

Scammonic Acid. Hygroscopic. Soluble in water.

Scammonate of Lead. Insoluble in aqueous solutions of caustic ammonia, or acetate of ammonia. Soluble in dilute acetic acid. (Keller, *Ann. Ch. u. Pharm.*, **104.** 63.)
$C_{76} H_{64} O_{43}, 4 Pb O$

Scammonolic Acid. Insoluble in water. Soluble in alcohol, and ether.
$C_{36} H_{35} O_7 = C_{36} H_{33} O_6, 2 H O + Aq$

Scammonolate of Baryta.

I.) *normal.* $C_{36} H_{33} Ba_2 O_6$ II.) *acid.* $C_{36} H_{33} Ba O_6 + Aq$	Scarcely at all soluble in water. Easily soluble in boiling alcohol. (Keller, *Ann. Ch. u. Pharm.*, **104.** 63.)

Scammony Resin. See under **Resins.**

Scheererite Insoluble in water. Sparingly soluble in alcohol. Readily soluble in ether.
$C_{40} H_{30}''$

Scillitin(from *Scilla maritima*). Hygroscopic. Easily soluble in water. (Bley.) Permanent. Sparingly soluble in water. Very soluble in alcohol. Soluble in concentrated sulphuric and nitric acids. (Labourdais, *Ann. Ch. et Phys.*, (3.) **24.** 63.) Hygroscopic. Sparingly soluble in water. Soluble in alcohol. Insoluble in ether. (Tilloy.) Insoluble in water or oils. Soluble in 120 pts. of alcohol. Soluble in acids, with combination. (Landerer.)

Scleretinite. Insoluble in water, alcohol, ether, or in aqueous solutions of the caustic or carbonated alkalies, or in acids, excepting strong nitric acid, by which it is somewhat attacked. (J. W. Mallet.)
(*Pyroretin.*)
$C_{20} H_{14} O_2$

Scoparin. Sparingly soluble in cold water; readily soluble in boiling water, and alcohol. After having been boiled with a quantity of alcohol insufficient to dissolve it the undissolved portion becomes very sparingly soluble in water or alcohol, but regains its solubility when dissolved in ammonia-water, and is precipitated therefrom by acetic acid. Easily soluble in aqueous solutions of the caustic alkalies, and alkaline earths.
$C_{42} H_{22} O_{20}$

Scordein(from *Teucrium Scordium*).

Scrophularin. Soluble in water. (Parrish's *Pharm.*, p. 423.)

Scutellarin(from *Scutellaria lateriflora*).

Scyllite. Permanent. Less soluble than inosite in water. Insoluble in alcohol. Insoluble in cold nitric acid of 1.3 sp. gr. Slowly soluble, without alteration, in the same acid when boiling. Alcohol precipitates it from the aqueous and nitric acid solution. Unacted upon by cold, but is decomposed by hot concentrated sulphuric acid.

Sebacic Acid. Very sparingly soluble in cold, readily soluble in warm water. Readily soluble in alcohol, ether, and the fatty and essential oils. (Berzelius.) Insoluble in cold, but soluble, with partial decomposition, in hot nitric acid of 1.3 @ 1.4 sp. gr. When this solution is diluted with water, the unaltered sebacic acid is precipitated. (Schlieper, *Am. J. Sci.*, (2.) **7.** 420.) It is also soluble, without decomposition, in concentrated sulphuric acid, and, as a rule, is not easily decomposed by the action of acids or alkalies.
(*PyrOleic Acid. Fettsæure. Sebacylic Acid.*)
$C_{20} H_{18} O_8 = C_{20} H_{16} O_6, 2 H O$

The alkaline sebates are readily soluble in water; those of the alkaline earths are difficultly soluble, and those of the heavy metals insoluble.

Sebate of Ammonia.

I.) *normal.* Readily soluble in water.
$C_{20} H_{16} (N H_4)_2 O_8$

II.) *acid.* Soluble in boiling, less soluble in cold water. Sparingly soluble in alcohol. (Berzelius.)
$C_{20} H_{17} (N H_4) O_8$

Sebate of Baryta. Somewhat soluble in water. (Bouis.)

Sebate *of protoxide* **of Copper.** Ppt.
$C_{20} H_{16} Cu_2 O_8$

Sebate of Ethyl. Insoluble in cold water. Very easily soluble in alcohol. (Rowney, *J. Ch. Soc.*, **4.** 334.) Also soluble in ether.
$C_{20} H_{16} (C_4 H_5)_2 O_8$

Sebate *of sesquioxide* **of Iron.** Insoluble in water. Partially soluble in ammonia-water, with separation of a basic salt.

Sebate of Lead.

I.) $C_{20} H_{16} Pb_2 O_8$ Insoluble in water. (Berzelius.)

II.) *basic.*

Sebate of Lime. Very sparingly soluble in water. (Bouis.)
$C_{20} H_{16} Ca_2 O_8$

Sebate *of protoxide* **of Mercury.**

Sebate of Methyl. Soluble in alcohol.
$C_{20} H_{16} (C_2 H_3)_2 O_8$

Sebate of Potash. Permanent. Very readily soluble in water. Sparingly soluble in absolute alcohol. (Redtenbacher.)
$C_{20} H_{16} K_2 O_8$

Sebate of Silver. Very sparingly soluble in boiling water. Difficultly soluble in alcohol, and ether.
$C_{20} H_{16} Ag_2 O_8$

Sebate of Soda. Less soluble in water than the potash salt.

Soluble in water. Insoluble in hot absolute alcohol. (Schlieper, *Am. J. Sci.*, (2.) **7.** 420.)

Sebacic Ether. *Vid.* Sebate of Ethyl.

Sebacin. Insoluble in water. Easily soluble in alcohol, ether, and the fatty oils. Scarcely at all attacked by concentrated sulphuric or nitric acid, or by an aqueous solution of caustic potash. (Petersen, *Ann. Ch. u. Pharm.*, **103.** 184.)
(Isomeric with Menthene and Camphin.)
$C_{20} H_{18}''$

Sebamic Acid. Readily soluble in boiling water, in alcohol, and very easily in dilute ammonia-water. (Rowney, *J. Ch. Soc.*, **4.** 336.)
(Sebacylamic Acid.)
$C_{20} H_{19} N O_6 = N \left\{ \begin{matrix} C_{20} H_{16} O_4'' \\ H_2 \end{matrix} \right. . O, H O$

Sebamid. Insoluble in cold, tolerably soluble in boiling water. Slightly soluble in cold, very easily soluble in boiling alcohol. Insoluble in dilute ammonia-water. (Rowney, *J. Ch. Soc.*, **4.** 335.)
(Sebacylamid.)
$C_{20} H_{20} N_2 O_4 = N_2 \left\{ \begin{matrix} C_{20} H_{16} O_4'' \\ H_4 \end{matrix} \right.$

Sebates. See above under **Sebacic Acid.**

"**Sebate of** *X*"(of Thénard). *Vid.* Benzoate of *X*. (Berzelius.)

Sebin.
(Sebate of Glyceryl (basic.).)
$C_{28} H_{30} O_{16}$

Secalin. *Vid.* Propylamin.

Seignette Salt. *Vid.* Tartrate of Potash & of Soda.

SelAlembroth. *Vid.* Chloride of Ammonium & of Mercury(Hg Cl).

Selenaldin. Sparingly soluble in water, the solution undergoing decomposition when boiled. Easily soluble in alcohol, and ether. Soluble in dilute chlorhydric acid.
$C_{12} H_{13} N Se_4 = N \left\{ C_{12} H_{13} Se_4''' \right.$

SelenEthyl. Insoluble in water. Soluble, with decomposition, in warm, tolerably concentrated nitric acid.
(Selenide of Ethyl. Selenhydric Ether.)
$\left. \begin{matrix} C_4 H_5 Se \\ C_4 H_5 Se \end{matrix} \right\}$

Selenhydric Acid. More abundantly soluble in water than sulphydric acid. This solution gradually decomposes.
(Hydro Selenic Acid. Seleniuretted Hydrogen. Selenide of Hydrogen.)
$H Se$

Selenhydrate of Aluminum. Insoluble in water.

Selenhydrate of Ammonium. Soluble in water, the solution undergoing decomposition when exposed to the air.

Selenhydrate of Barium. Soluble in water.

Selenhydrate of Calcium. Soluble in water. (Berzelius.)
$Ca Se, H Se$

Selenhydrate of Ethyl. Insoluble in water. Soluble in alcohol. (Wœhler & Siemans.)
(Ethyl Selenhydric Acid. Selenium Mercaptan.)
$C_4 H_6 Se_2 = C_4 H_5 Se, H Se$

Selenhydrate of Magnesium. Soluble in water. (Berzelius.)

Selenhydrate of Potassium. Soluble in water, the solution undergoing decomposition when exposed to the air.

Selenhydrate of Sodium. Soluble in water, the solution undergoing decomposition when exposed to the air.

Selenhydrate of Strontium. Soluble in water.

Selenhydrate of Zinc. Insoluble in water.

Selenhydric Ether. *Vid.* SelenEthyl.

Selenic Acid.

a = anhydrous. Unknown in the free state.
$Se O_3$

b = hydrated. Hygroscopic. Soluble in water, with great evolution of heat.
$Se O_3, H O$

All the normal and acid salts of selenic acid are soluble in water, excepting the normal salts of baryta, strontía, lime, and lead, which are nearly or quite insoluble in water, or nitric acid.

Seleniate of Alumina. Similar to the tersulphate of alumina. (Berzelius.)
$Al_2 O_3, 3 Se O_3$

Seleniate of Argent*di***amin.** Decomposes in the air. Readily soluble in water, and ammonia-water. (Mitscherlich.)
$N_2 \left\{ H_6 . Ag O, Se O_3 \right.$

Seleniate of Baryta. Insoluble in water or nitric acid. (Berzelius.) It is decomposed and dissolved by long-continued boiling with chlorhydric acid. (H. Rose.)
$Ba O, Se O_3$

Seleniate of Cobalt.

Seleniate of Copper. Soluble in water. (Dumas, *Tr.*)
$Cu O, Se O_3$

Seleniate of Copper & of Potash.

Seleniate *of protoxide* **of Iron.** Resembles sulphate of iron.
$Fe O, Se O_3$

Seleniate *of sesquioxide* **of Iron.** Both the normal and basic salts resemble those of sulphuric acid.
$Fe_2 O_3, 3 Se O_3$

Seleniate of Lead. Insoluble in water, or nitric acid. Decomposed by long-continued boiling with chlorhydric acid.
$Pb O, Se O_3$

Seleniate of Lime. Its solubility is the same as that of sulphate of lime.

Seleniate of Magnesia. It resembles sulphate of magnesia in solubility. (Berzelius.)
$Mg O, Se O_3$

Seleniate *of dinoxide* **of Mercury.** Slightly soluble in water. (Kœhler.)
$6 Hg_2 O, 5 Se O_3$

Seleniate *of protoxide* **of Mercury.**

I.) $Hg O, Se O_3 + Aq$ Decomposed by water to an insoluble basic salt and a sparingly soluble acid salt. (Kœhler.)

II.) $2 (3 Hg O, Se O_3) + Aq$ Insoluble in water. Soluble in nitric, and chlorhydric acids. (Kœhler.)

Seleniate of Nickel.
$Ni O, Se O_3 + 7 Aq$

Seleniate of Potash. More soluble in water than nitrate of potash. Almost equally soluble in hot or cold water. (Mitscherlich.)
$K O, Se O_3$

Seleniate of Potash with Sulphate of Soda. Soluble in water.
$K O, Se O_3 ; Na O, S O_3$

Seleniate of Silver. Resembles the sulphate. Soluble in hot nitric acid, from which it is precipitated on the addition of water. (Berzelius.)
$Ag O, Se O_3$

Seleniate of Soda. Its maximum point of solubility in water is at the temperature of 33°. (Mitscherlich.) It resembles sulphate of soda in its remarkable changes of solubility at different degrees of temperature. (Berzelius, *Lehrb.*)
$Na\,O, Se\,O_3 + 10\,Aq$

Seleniate of Strontia. Insoluble in water, or nitric acid. Decomposed by long-continued boiling with chlorhydric acid.
$Sr\,O, Se\,O_3$

Seleniate of Zinc. Soluble in water.
$Zn\,O, Se\,O_3 + 3\ \&\ 7\,Aq$

Selenides. Among the metallic selenides, those only are soluble in water which correspond to the soluble oxides; thus, the selenides of potassium, sodium, lithium, barium, strontium, calcium, and magnesium, are soluble, while all the others are insoluble in water. (Persoz, *Chim. Moléc.*, p. 463.) The metallic selenides are more readily dissolved by nitric acid than the pure metals, excepting protoselenide of mercury ($Hg\,Se$) which is almost insoluble therein.

Selenide of Aluminum. Decomposed by water.

Selenide of Ammonium. Easily soluble in water. The aqueous solution undergoing decomposition when exposed to the air. (Bineau.)
$N\,H_4\,Se$

Selenide of Antimony.

Selenide of Arsenic.

Selenide of Barium. Soluble in warm water, but undergoes a decomposition similar to that of sulphide of barium. (Berzelius.)

Selenide of Bismuth.

Selenide of Cacodyl. Insoluble in water. Readily soluble in alcohol, and ether. (Bunsen.)
$\left.\begin{matrix}(C_2\,H_3)_2\,As\\(C_2\,H_3)_2\,As\end{matrix}\right\}Se_2$

Selenide of Calcium. Insoluble in water. Soluble in an aqueous solution of selenhydric acid. (Berzelius.)

Selenide of Cerium. Insoluble in water. Easily decomposed by acids. (Dumas, *Tr.*)

Selenide of Cobalt.

***Di*Selenide of Copper.**
$Cu_2\,Se$

***Proto*Selenide of Copper.**
$Cu\,Se$

***Proto*Selenide of Copper & of Lead.**
I.) $Cu\,Se; Pb\,Se$
II.) $Cu\,Se; 2\,Pb\,Se$
III.) $Cu\,Se; 4\,Pb\,Se$
Soluble in cold, moderately strong nitric acid, with separation of selenium. (Karsten.)

***Di*Selenide of Copper & of Silver.** Soluble in hot nitric acid, with decomposition. (Berzelius.)
$Cu_2\,Se, Ag\,Se$

Selenide of Ethyl. *Vid.* SelenEthyl.

Selenide of Ethyl & of Mercury. Insoluble in water. Soluble in hot, less soluble in cold alcohol.
$C_4\,H_5\,Hg\,Se_2 = \left.\begin{matrix}C_4\,H_5\\Hg\end{matrix}\right\}Se_2$

Selenide of *tri*EthylPhosphin. Soluble in water. (Hofmann & Cahours.)
$P\left\}(C_4\,H_5)_3. Se_2\right.$

Selenide of Furfuryl. Very easily decomposed.
(*SelenioFurful. Furfurolselenié.*)
$C_{10}\,H_4\,O_2{}''\left\}Se_2\right.$

Selenide of Glucinum. Slowly soluble in water, without decomposition.

Selenide of Iron. Soluble in chlorhydric acid, with decomposition.
$Fe\,Se$

Selenide of Lead. Difficultly attacked by nitric acid. Soluble in aqua-regia. (Dumas, *Tr.*)
$Pb\,Se$

Selenide of Lead & of Mercury.

Selenide of Magnesium. Insoluble in water, but soluble in an aqueous solution of selenhydric acid. (Berzelius.)

Selenide of Manganese. Insoluble in water.

Selenide of Mercury. Almost insoluble in hot nitric acid. Soluble in cold aqua-regia.

When recently precipitated it dissolves in an aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 317.)

Selenide of Mercury with Sulphide of Mercury. Unacted upon by chlorhydric, or nitric acids. Soluble, with decomposition, in aqua-regia.
$Hg\,Se; 4\,HgS$

Selenide of Methyl. *Vid.* SelenMethyl.

Selenide of *tri*MethylPhosphin.
$P\left\}(C_2\,H_3)_3\,Se_2\right.$

Selenide of Palladium.

Selenide of Phosphorus. Partially decomposed by water. Decomposed by alkaline solutions.

Selenide of Platinum.

Selenide of Potassium. Slowly hygroscopic. Easily soluble in water, the solution undergoing decomposition when exposed to the air.
$K\,Se$

Selenide of Silver.

I.) *proto.* Soluble, with decomposition, in boiling nitric acid. (Berzelius.) Insoluble in an aqueous solution of protonitrate of mercury. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 317.)
$Ag\,Se$

II.) *bi.*
$Ag\,Se_2$

Selenide of Sodium. Soluble in water, the solution undergoing decomposition when exposed to the air.

Selenide of Stib*tri*Ethyl. Decomposes in the air. Resembles the sulphide.
$Sb\left\}(C_4\,H_5)_3, Se_2\right.$

Selenide of Strontium. Soluble in an aqueous solution of selenhydric acid.
$Sr\,Se$

Selenide of Sulphur.

I.) $S_2\,Se$ Decomposed, with partial solution, by hot aqueous solutions of caustic potash and of sulphydrate of potassium.

II.) $S_3\,Se$ Entirely soluble, with decomposition, in aqueous solutions of the caustic alkalies.

Selenide of Tin.

Selenide of Yttrium. Not decomposed by water. Decomposed by acids.

Selenide of Zinc. Insoluble in water.

SelenioCyanhydric Acid. Soluble in water, the solution easily undergoing decomposition, especially when it is evaporated or boiled. Also decomposed by acids. (Crookes.)
(*HydroSelenioCyanic Acid.*)
$C_2\,H\,N\,Se_2 = Cy\,Se, H\,Se$

SelenioCyanide of Ammonium. Very deliquescent. Soluble in water. (Crookes.)
$N\,H_4\,Se, Cy\,Se$

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SelenioCyanide of Barium. Very soluble $Ba\,Se, Cy\,Se$ in water.

SelenioCyanide of Copper. Ppt. Very $Cu\,Se, Cy\,Se$ alterable.

SelenioCyanide of Iron. Soluble in absolute alcohol. (Crookes.)

SelenioCyanide of Lead. Soluble, with $Pb\,Se, Cy\,Se$ slight decomposition, in boiling water. Less soluble in cold water. Insoluble in alcohol. (Crookes, *J. Ch. Soc.*, **4.** 16.)

SelenioCyanide of Lime. Soluble in $Ca\,Se, Cy\,Se$ water.

SelenioCyanide of Magnesium. Soluble $Mg\,Se, Cy\,Se$ in water.

SelenioCyanide of Potassium. Very de- $K\,Se, Cy\,Se$ liquescent, and soluble in water, with great depression of temperature. More soluble in water than sulphocyanide of potassium. Soluble in alcohol. (Crookes, *J. Ch. Soc.*, **4.** 13.) Easily decomposed by acids.

SelenioCyanide of Silver. Insoluble in $Ag\,Se, Cy\,Se$ water. Almost insoluble in ammonia-water, or in cold weak acids. Instantly decomposed by strong boiling acids. (Crookes, *loc. cit.*, p. 15.)

SelenioCyanide of Sodium. Very soluble $Na\,Se, Cy\,Se$ in water. (Crookes.)

SelenioCyanide of Strontium. Soluble $Sr\,Se, Cy\,Se$ in water.

SelenioCyanide of Zinc. Permanent. Sol- $Zn\,Se, Cy\,Se$ uble in water.

SelenioFurfol (or Furfurol). *Vid.* Selenide of Furfuryl.

Selenious Acid

a = *anhydrous.* Liquefies when exposed to the $Se\,O_2$ air. (Muspratt, *J. Ch. Soc.*, **2.** 54.) Easily soluble in water, dissolving in almost all proportions in boiling water. Easily and abundantly soluble in alcohol. (Berzelius, *Lehrb.*, **2.** 206.)

b = *hydrated.* Easily soluble in water, alco- $Se\,O_2, H\,O$ hol, and nitric acid. (Berzelius.) Insoluble in caoutchin. Most of the protoselenites (M O, Se O₂), excepting those of the alkalies, are insoluble in water; but the bi and quadri selenites (M O, 2 Se O₂ and M O, 4 Se O₂) are easily soluble in water. All the metallic selenites are soluble in nitric acid, though the salts of lead and silver dissolve with great difficulty. Chlorhydric acid has no action upon them.

Selenite of Alumina.

I.) *ter.* Insoluble in water. Soluble in sele- $Al_2\,O_3, 3\,Se\,O_2 + 3\,Aq$ nious acid. (Berzelius.)

II.) *acid.* Easily soluble in water. (Berzelius.)

Selenite of Ammonia.

I.) *proto.* Deliquescent. Extremely soluble in $N\,H_4\,O, Se\,O_2$ water, from which solution it is precipitated on the addition of alcohol. Perfectly insoluble in ether. (Muspratt, *J. Ch. Soc.*, **2.** 59.)

II.) *bi.* Permanent. Soluble in water. $N\,H_4\,O, 2\,Se\,O_2$

III.) *quadri.* Deliquescent. Soluble in water. $N\,H_4\,O, 2\,Se\,O_2$ (Berzelius.)

Selenite of Baryta.

I.) *proto.* Insoluble in water. (Gm.) Soluble $Ba\,O, Se\,O_2$ in selenious, chlorhydric, and nitric acids. (Muspratt, *loc. cit.*, p. 60.)

II.) *bi.* Difficultly soluble in water. (Mus- $Ba\,O, 2\,Se\,O_2$ pratt, *loc. cit.*)

Selenite of Cadmium. Soluble in selenious acid. (Muspratt, *loc. cit.*, p. 66.)

Selenite *of protoxide* of Cerium.

I.) *proto.* Insoluble in water. Soluble in se- $Ce\,O, Se\,O_2$ lenious acid, and in nitric acid.

II.) *bi.* Soluble in water.

Selenite *of sesquioxide* of Cerium.

I.) *normal.* Soluble in selenious acid. $Ce_2\,O_3, 3\,Se\,O_2$

II.) *acid.* Soluble in water. (Berzelius; Muspratt.)

Selenite *of sesquioxide* of Chromium.

I.) *ter.* Soluble in selenious acid. (Muspratt.) $Cr_2\,O_3, 3\,Se\,O_2$

Selenite of Cobalt.

I.) *proto.* Insoluble in water. (Berzelius.) $Co\,O, Se\,O_2$

II.) *bi.* Soluble in water. (Muspratt.) $Co\,O, 2\,Se\,O_2$

Selenite *of dinoxide* of Copper.

I.) *proto.* Insoluble in water. (Berzelius.) $Cu_2\,O, Se\,O_2$ Soluble in ammonia-water. (Dumas, *Tr.*)

Selenite *of protoxide* of Copper.

I.) *proto.* Insoluble in water, or selenious acid. $3\,(Cu\,O, Se\,O_2) + Aq$ (Berzelius; Muspratt, *loc. cit.*, p. 66.)

II.) *basic* (*green ppt.*). Insoluble in water. Soluble in ammonia-water. (Muspratt, *J. Ch. Soc.*, **2.** 66.)

Selenite of Glucina.

I.) *normal.* Insoluble in water. (Berzelius, $Gl_2\,O_3, 3\,Se\,O_2$ *Lehrb.*, **3.** 495.)

II.) *acid.* Extremely soluble in water. (Mus- $Gl_2\,O_3, 6\,Se\,O_2$ pratt, *loc. cit.*) Soluble in water. (Berzelius.)

Selenite *of protoxide* of Iron.

I.) *proto.* When freshly precipitated it is solu- $Fe\,O, Se\,O_2$ ble in chlorhydric, and selenious acids. Soluble in nitric acid.

II.) *bi.* Slightly soluble in water. (Berzelius.)

Selenite *of sesquioxide* of Iron.

I.) *sesqui.* Insoluble in water.

II.) *ter.* Ppt. $Fe_2\,O_3, 3\,Se\,O_2 + 4\,Aq$

III.) *sexi* or "*bi.*" Insoluble in water. Solu- $Fe_2\,O_3, 6\,Se\,O_2$ ble in chlorhydric acid. (Berzelius.)

Selenite of Lead.

I.) *mono.* Slightly soluble in water. (Mus- $Pb\,O, Se\,O_2$ pratt.) Scarcely at all soluble in water, even when this is acidulated with selenious acid. Difficultly soluble in warm nitric acid. (Berzelius.)

Selenite of Lime.

I.) *proto.* Very sparingly soluble in water; $Ca\,O, Se\,O_2$ more soluble in selenious acid.

II.) *bi.* Permanent. Soluble in water. $Ca\,O, 2\,Se\,O_2$

Selenite of Lithia. Deliquescent. Solu- $Li\,O, Se\,O_2$ ble in selenious acid. (Muspratt.)

Selenite of Magnesia.

I.) *proto.* Soluble in boiling water, and in $Mg\,O, Se\,O_2 + 3\,Aq$ selenious acid. (Muspratt, *loc. cit.*, p. 61.) Difficultly soluble in water, requiring much boiling water to dissolve it. (Berzelius, *Lehrb.*, **3.** 457.)

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II.) *bi.* $Mg\,O, 2\,Se\,O_2$ Extremely deliquescent. Soluble in water. Insoluble in alcohol. (Muspratt, *loc. cit.*)

Selenite of Manganese.

I.) *proto.* $Mn\,O, Se\,O_2 + 2\,Aq$ Insoluble in water. Soluble in chlorhydric acid. (Muspratt, *loc. cit.*, p. 64.)

II.) *bi.* $Mn\,O, 2\,Se\,O_2$ Readily soluble in water. (Berzelius.)

Selenite *of dinoxide* **of Mercury.**

I.) *proto.* $Hg_2\,O, Se\,O_2$ Insoluble in water, or selenious acid. Partially soluble, with decomposition, in chlorhydric acid, and in an aqueous solution of caustic potash. (Berzelius.)

Selenite *of protoxide* **of Mercury.**

I.) *proto.* $Hg\,O, Se\,O_2$ Insoluble in water. (Muspratt.) Insoluble, or very sparingly soluble, in water. Somewhat soluble in selenious acid. (Berzelius.)

II.) *bi.* $Hg\,O, 2\,Se\,O_2 + x\,Aq$ Easily soluble in water Very slightly soluble in alcohol. Soluble in ammonia-water. (Berzelius.)

Selenite of Nickel

I.) *proto.* $Ni\,O, Se\,O_2 + Aq$ Insoluble in water. (Berzelius.) Soluble in selenious acid. (Muspratt.)

II.) *bi.* Soluble in water. (Berzelius.)

Selenite of Potash.

I.) *proto.* $K\,O, Se\,O_2$ Deliquescent. Remarkably soluble in water. Almost insoluble in alcohol. (Muspratt, *J. Ch. Soc.*, **2.** 55.)

II.) *bi.* $K\,O, 2\,Se\,O_2 + Aq$ Deliquescent. Very soluble in water. Only slightly soluble in alcohol. (Muspratt, *J. Ch. Soc.*, **2.** 56.)

III.) *quadri.* $K\,O, 4\,Se\,O_2$ Very deliquescent. Soluble in water, from which it is precipitated on the addition of alcohol. (Muspratt, *loc. cit.*)

Selenite of Silver. $Ag\,O, Se\,O_2$ Very sparingly soluble in cold, somewhat more freely soluble in hot water. Easily soluble in nitric acid, from which it is precipitated on the addition of water. (Berzelius.) Easily soluble in hot nitric acid, from which it separates as the solution cools. (Muspratt.)

Selenite of Soda.

I.) *proto.* $Na\,O, Se\,O_2$ Permanent. Extremely easily soluble in water. Insoluble in alcohol. (Muspratt, *loc. cit.*, p. 57.)

II.) *bi.* $Na\,O, 2\,Se\,O_2 + 8\,Aq$ Permanent. Easily soluble in water.

III.) *quadri.* $Na\,O, 4\,Se\,O_2 + 4\,Aq$ Not very deliquescent. Soluble in selenious acid. (Muspratt.)

Selenite of Strontia.

I.) *proto.* $Sr\,O, Se\,O_2$ Insoluble in water. Soluble in nitric acid. (Muspratt.)

II.) *bi.* $Sr\,O, 2\,Se\,O_2$ Slightly soluble in water. (Muspratt.) Scarcely at all soluble in cold, and very slightly soluble in boiling water. (Berzelius.)

Selenite *of binoxide* **of Tin.** $Sn\,O_2, 2\,Se\,O_2$ Insoluble in water. Soluble in chlorhydric acid, from which it is reprecipitated on the addition of water.

Selenite *of sesquioxide* **of Uranium.**

I.) *proto.* $Ur_2\,O_3, Se\,O_2$ Ppt.

II.) *bi.* Soluble in water. (Berzelius.)

Selenite of Yttria. $Y\,O, Se\,O_2$ Insoluble in water, or selenious acid. (Berzelius.)

Selenite of Zinc.

I.) $Zn\,O, Se\,O_2 + 2\,Aq$ Insoluble in water. Soluble in selenious and nitric acids. (Muspratt.)

II.) *bi.* Easily soluble in water. (Berzelius.)

III.) *quadri.* $Zn\,O, 4\,Se\,O_2 + 3\,Aq$ Permanent. Easily soluble in water. (Wœhler.)

Selenite of Zirconia. $Zr_2\,O_3, 3\,Se\,O_2$ Insoluble in water. Soluble in selenious acid. (Berzelius; Muspratt, *loc. cit.*)

Selenium. Se Insoluble in water. Concentrated sulphuric acid, especially when gently heated, dissolves it rapidly and in large quantities; from this solution it is precipitated on the addition of water. (Magnus.) Soluble in concentrated sulphuric acid, which contains free $S\,O_3$, without decomposition, and in warm ordinary oil of vitriol, with partial decomposition. (L. Gmelin.) Soluble in dichloride of sulphur. (P. & F.) Sparingly soluble in boiling, almost insoluble in cold creosote. (Reichenbach.) Soluble in the fatty oils, but insoluble in essential oils. Insoluble in caoutchin. Soluble in aqueous solutions of the caustic alkalies, from which it is gradually reprecipitated when these are exposed to the air. Insoluble in chlorhydric acid. Only slightly acted upon by cold, tolerably easily soluble in hot nitric acid; still more easily soluble in aqua-regia, with formation of selenious acid in either case. It is more readily soluble than sulphur in these acids.

Two allotropic modifications of selenium are admitted by several chemists: —

I.) *ElectroNegative Selenium.* Soluble in bisulphide of carbon. (Berthelot.) Soluble in boiling benzin, and in bisulphide of carbon. (Charles Deville, *Ann. Ch. et Phys.*, (3.) **47.** 106.)

II.) *ElectroPositive Selenium.* Insoluble in bisulphide of carbon (C. Deville; Berthelot), or in boiling benzin. (C. Deville.)

Selenium Mercaptan. *Vid.* EthylSelenhydric Acid.

Seleniuretted Hydrogen. *Vid.* Selenhydric Acid.

Selen Methyl. (*Selenide of Methyl.*) $\left.\begin{matrix}C_2\,H_3\,Se\\ C_2\,H_3\,Se\end{matrix}\right\}$ Insoluble in water. Soluble, with decomposition, in strong nitric acid. (Wœhler & Dean, *Ann. Ch. u. Pharm.*, **97.** 6.)

SelenoCyanide of *X*. *Vid.* SelenioCyanide of *X*.

SemiBenzidam. *Vid.* AzoPhenylamin.

SemiNaphthalidam. *Vid.* AzoNaphtylamin.

Senegin. }
Seneguin. } Identical with Saponin, *q. v.*

Sepeerin (from *Nectandra rodiei*). (*Sepirin.*) [Bebeeru bark]. Very sparingly soluble in water. Easily soluble in weak and in strong alcohol. Insoluble in ether. Soluble in acids. (Maclagan.)

Sepeerin was distinguished from beberin by Maclagan, on the ground that it is insoluble in ether; but Tilley subsequently maintained that this sepeerin was nothing but impure beberin.

Septem. See *septem*, as prefix, under the generic name of the substance sought for.

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Serolin. Insoluble in water. Very sparingly soluble in cold, somewhat more easily soluble in hot alcohol. Easily soluble in ether. Not saponified by caustic alkalies. Soluble in the serum of blood. (Boudet.)

SesquiCarbonate(&c.) of *X*. See under Carbonate(&c.) of *X*, as *sesqui*Carbonate of *X*, *sesqui*Chloride of *X*, and the like.

Sex. See *sex*, as prefix, under the generic name of the substance sought for.

Shellac. See under **Resins.**

Silicic Acid. Exists under two or more (*Silica.*) allotropic modifications: —
SiO_2[*]

I.) ***Insoluble modification*** (α SiO_2).

a = crystallized. Occurs as ***Quartz***, and several other minerals. Insoluble in water or in acids, excepting fluorhydric acid, by which it is readily dissolved. Only slightly soluble in boiling potash-lye. Flint or quartz enters into solution when boiled with aqueous solutions of caustic alkalies, under strong pressure. When finely powdered and boiled with aqueous solutions of the caustic or carbonated fixed alkalies it gradually changes to $b SiO_2$ and dissolves.

When pounded rock-crystal is boiled to dryness with three several quantities of potash-lye (till in fact nothing but hydrate of potash remains) solution is effected. (Lœwitz, *Crell's Ann.*, 1799, **2.** 375 [*Gm.*].)

Contrary to the assertion of Verdeil & Risler, quartz is completely insoluble in sugar-water. (Petzholdt, *J. pr. Ch.*, 1853, **60.** 368.)

b = ***amorphous.*** Obtained by evaporating a solution of the soluble modification of silicic acid in water or any volatile acid, excepting fluorhydric acid, and thoroughly drying the residue. It is insoluble in water or acids, with the exception of fluorhydric acid, but dissolves in potash-lye and in solutions of the fixed alkaline carbonates. The mineral opal and its varieties appears to belong under this head. Opal is not attacked by acids, with the exception of fluorhydric acid, which dissolves it more easily than quartz; when powdered it dissolves in boiling potash-lye. (Fuchs.) When an aqueous solution of water-glass (acid silicate of soda or potash) is evaporated to dryness, and the water wholly expelled from the residue by ignition a part of the silica goes over into the passive, insoluble state. Fremy found that after water-glass, of composition $RO, 4\frac{1}{2} SiO_2$, has been carefully dried, water dissolves the alkali out of the residue, and leaves the silica, which last, according as the heat has been more or less intense, is or is not soluble in dilute alkalies. (Ordway, *Am. J. Sci.*, (2.) **32.** 342.)

According to Fuchs, and Bischof, the mineral *Chalcedony* is a mixture of quartz and opal, the latter being dissolved, and the former left behind, when the mineral is boiled with potash-lye; dilute fluorhydric acid also dissolves out the opal faster than the quartz. According to W. B. & R. E. Rogers (*Am. J. Sci.*, 1848, (2.) **5.** 403), chalcedony is dissolved to a certain extent by carbonic acid-water.

II.) *Soluble modification.* (β SiO_2). The gelatinous hydrate, but not the powdery hydrate to

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[*] Formulæ in which silicic acid is expressed as SiO_2 may be readily converted into those in which it is regarded as SiO_3, by multiplying all of the terms of the SiO_2 formula by 3, and then correcting the silicic acid term in the product, in accordance with the fact that $1 SiO_2 = \frac{2}{3} SiO_3$.

Conversely, to change SiO_3 formulæ to those of SiO_2 divide each term by 3, and correct for $1 SiO_3 = \frac{3}{2} SiO_2$.

The case in which water of crystallization is present is, of course, included in this rule. The same rule, moreover, applies to formulæ in which the silicic acid is written SiO; it being only necessary to remember that one equivalent of SiO equals $\frac{1}{2} SiO_2$ or $\frac{1}{3} SiO_3$.

For convenient comparison, the following tables of some of the more commonly occurring silicates is added: —

SiO_2	SiO_3	SiO
(Equiv. Si = 14)	(Equiv. Si = 21)	(Equiv. Si = 7)
SiO_2	$\frac{2}{3} SiO_3$	$2 SiO$
RO, SiO_2	$3 RO, 2 SiO_3$	$RO, 2 SiO$
ditto + Aq	ditto + 3 Aq	ditto + Aq
$RO, 2 SiO_2$	$3 RO, 4 SiO_3$	$RO, 4 SiO$
$RO, 3 SiO_2$	$RO, 2 SiO_3$	$RO, 6 SiO$
$RO, 4 SiO_2$	$3 RO, 8 SiO_3$	$RO, 8 SiO$
$2 RO, SiO_2$	$3 RO, SiO_3$	RO, SiO
$2 RO, 3 SiO_2$	RO, SiO_3	$RO, 3 SiO$
$2 RO, 9 SiO_2$	$RO, 3 SiO_3$	$RO, 9 SiO$
$3 RO, SiO_2$	$9 RO, 2 SiO_3$	$3 RO, 2 SiO$
$3 RO, 2 SiO_2$	$9 RO, 4 SiO_3$	$3 RO, 4 SiO$
$3 RO, 4 SiO_2$	$9 RO, 8 SiO_3$	$3 RO, 8 SiO$
$4 RO, 3 SiO_2$	$2 RO, SiO_3$	$2 RO, 3 SiO$
$4 RO, 9 SiO_2$	$2 RO, 3 SiO_3$	$2 RO, 9 SiO$

SiO_3	SiO_2	SiO
(Equiv. Si = 21)	(Equiv. Si = 14)	(Equiv. Si = 7)
SiO_3	$\frac{3}{2} SiO_2$	$3 SiO$
RO, SiO_3	$2 RO, 3 SiO_2$	RO, SiO
ditto + Aq	ditto + 2 Aq	ditto + Aq
$RO, 2 SiO_3$	$RO, 3 SiO_2$	$RO, 6 SiO$
$RO, 3 SiO_3$	$2 RO, 9 SiO_2$	$RO, 9 SiO$
$RO, 4 SiO_3$	$RO, 6 SiO_2$	$RO, 12 SiO$
$2 RO, SiO_3$	$4 RO, 3 SiO_2$	$2 RO, 3 SiO$
$2 RO, 3 SiO_3$	$4 RO, 9 SiO_2$	$2 RO, 9 SiO$
$3 RO, SiO_3$	$2 RO, SiO_2$	RO, SiO |
$3 RO, 2 SiO_3$	RO, SiO_2	$RO, 2 SiO$
$3 RO, 4 SiO_3$	$RO, 2 SiO_2$	$RO, 4 SiO$
$3 RO, 8 SiO_3$	$RO, 4 SiO_2$	$RO, 8 SiO$
$4 RO, 3 SiO_3$	$8 RO, 9 SiO_2$	$4 RO, 9 SiO$
$9 RO, 4 SiO_3$	$3 RO, 2 SiO_2$	$3 RO, 4 SiO$

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which it is converted when dried in the air, is somewhat soluble in water, and in chlorhydric acid, the degree of this solubility being dependent on whether the hydrate has just been precipitated or has already become compact.

As obtained by passing fluosilicic acid gas into water, and thoroughly washing the precipitate, it is soluble, while still moist, in 7700 pts. of water, and in 11000 pts. of cold, or 5500 pts. of boiling chlorhydric acid of 1.115 sp. gr. (J. Fuchs, cited by Fresenius, *Quant.*, p. 164; also in *J. pr. Ch.*, 1852, **57.** 382.) · Hydrated silicic acid is soluble in 1000 pts. of water. (Kirwan.)

When prepared by the decomposition of fluosilicic acid ($Si\,Fl_3$) by water it dissolves in considerable quantity in water, forming a solution which may be evaporated to dryness, and the acid obtained as a powder which is still soluble in water; but if the solution be acidified with sulphuric or chlorhydric acid before being evaporated, the silicic acid obtained will be in the insoluble modification. (Berzelius.)

By allowing crystallized boracic acid to absorb gaseous fluoride of silicon, and then separating the excess of fluorhydric and boracic acids by digestion with a large excess of ammonia-water, a hydrate of silicic acid is obtained, which, after being thoroughly purified from the adhering acid, is very soluble in water. This solution gives no precipitate when boiled, but when evaporated to dryness the $Si\,O_2$ is left in the insoluble state. (Berzelius.)

When sulphide of silicon is mixed with water it undergoes decomposition, with evolution of sulphuretted hydrogen, but the $Si\,O_2$ formed does not separate; it all remains dissolved in the water. This solution of $Si\,O_2$ is often of great stability; when dilute it can be preserved for months without depositing $Si\,O_2$, but becomes gelatinous and deposits $Si\,O_2$ if it is evaporated, boiled, or mixed with soluble alkaline salts. After being evaporated to dryness, the $Si\,O_2$ is no longer soluble in water. The solution of $Si\,O_2$ above described is generally more stable than that obtained by dissolving hydrated silica in acids. (Fremy, *Ann. Ch. et Phys.*, (3.) **38.** 317.)

In the decomposition by acids of minerals, &c., containing silica, more or less of the latter usually goes into solution, and it is often exceedingly difficult to remove the last traces of this dissolved silica. (C. J. B. Karsten, *Pogg. Ann.*, 1826, **6.** 351.) On the addition to *liquor silicum* (basic silicate of potash) of an acid in quantity not sufficient for saturation, there is precipitated a compound of the potash, with excess of silica; a larger quantity of acid throws down the silica in the form of a gelatinous hydrate, leaving in solution a quantity of silica, which is greater in proportion to the degree of dilution and to the excess of acid employed. (Dalton.)

It has long been known that silica, after it has once been brought into solution by means of alkalies or acids, is somewhat soluble in pure water. More surprising, however, is the fact that this solubility is increased by the presence of a free acid; indeed, it can hardly be doubted that chemical combination between the silica and acid actually occurs. As a matter of universal experience, it is known that a concentrated aqueous solution of an alkaline silicate is immediately decomposed when an excess of acid is added to it, the silica separating out almost completely without being redissolved by the acid, no matter in how large excess the latter may have been added. But a solution of the same alkaline silicate, when diluted with a sufficient quantity of water, can no longer be thus decomposed by the addition of an excess of acid; on the contrary, it remains perfectly clear after such addition, and deposits none of its silica until it has been concentrated by evaporation, and the silica thereby rendered gelatinous. Thus, if an alkaline silicate be dissolved in such an amount of water that there shall be about 30 pts. of the latter to one part of silica, and an acid then added to the solution in no greater quantity than will suffice to neutralize it precisely, the liquor will remain clear for a considerable space of time, but gradually becomes cloudy, and by degrees deposits silica; and this precipitate cannot now be redissolved by the addition of more acid, or at least only insignificant quantities of it can be thus dissolved. But if, on the other hand, the point of neutrality be immediately overstepped before any cloudiness has manifested itself in the liquor, the solution will remain permanently clear, no silica being deposited even after the lapse of many weeks. This result is obtained alike with sulphuric, nitric, chlorhydric, and acetic acids. The question might arise, whether these solutions should not be regarded simply as solutions of silica in water, and the precipitation which occurs when an acid is added to concentrated liquors attributed to the want of a sufficient quantity of the solvent water; it being known that silica, when once separated from a solution, is either absolutely insoluble, or only exceedingly sparingly soluble in water and dilute acids. But if this were true, it would follow that at the ordinary temperature silica is soluble in about 25 @ 30 pts. of water; for a solution of an alkaline silicate need not be diluted more strongly than this, in order to prevent precipitation by acids. Nor would the reason be evident why silica should be precipitated by acids from the most dilute solutions of alkaline silicates, in spite of the large amount of water present, unless more acid is added than is required to saturate the alkali. If the water alone act as the solvent, it must, of course, be a matter of indifference whether or no the acid be present in excess. It cannot, therefore, be doubted but that the excess of acid exerts a greater influence than the water in retaining the silica in solution; and that water alone has no power to hold in solution such considerable quantities of silica. Why the silica, after having once actually separated, owing to insufficient dilution of the solution, should no longer be soluble even in the largest excess of concentrated or dilute acids, is a question which would appear to be inexplicable by chemical reasons. That it is really the acid and not the water which holds the silica in solution follows, moreover, from the fact that salts may be dissolved in the liquor resulting from the addition of an excess of acid to a solution of an alkaline silicate, even to its complete saturation, without occasioning any separation of silica. If those salts are employed which dissolve in water at a somewhat elevated temperature in much more considerable quantity than at the ordinary temperature, then that portion of the salt which can no longer be held in solution as the liquor becomes cold will separate out as the temperature falls, but the silica will still remain in the solution. For example, in a solution of an alkaline silicate to which an excess of nitric acid has been added, so much nitrate of potash may be dissolved by the application of heat that a large portion crystallizes out again on cooling; and yet no cloudiness occurs in the liquid and no silica is deposited. (C. J. B. Karsten, *Pogg. Ann.*, 1826, **6.** pp. 353 –

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359.) According to Bergman (*Opusc.*, **3.** 315), the solution of silica in acidulated water becomes turbid immediately on boiling. [*Gm.*]

When a dilute acid is added to a weak aqueous solution of an alkaline silicate there is no immediate precipitation of silica; but after some time the whole gelatinizes. With sulphuric acid the coagulation comes on soon; but with chlorhydric acid the change is delayed a long time, and the mixture may sometimes even be heated and partially evaporated, and still remain liquid. With nitric acid, the tendency to produce gelatinization is still less marked than with chlorhydric acid. An excess of nitric or chlorhydric acid added to very dilute waterglass (acid silicate of soda or potash), causes no apparent change for a long time. (Ordway, *Am. J. Sci.*, (2.) **32.** pp. 340, 164; **33.** 32.)

Even carbonic acid is capable of holding silica in solution, as might indeed be inferred from what is known of the solvent power of an acid so weak as acetic. This may very easily be shown by treating a dilute solution of an alkaline silicate with a large excess of any acid, for example, chlorhydric acid, and then, at the lowest possible temperature, neutralizing the clear liquid with carbonate of ammonia. The carbonic acid which is disengaged by this process dissolves in the water; and if the neutral liquor be put in a well-closed glass, it may be preserved for several weeks without the least deposition of silica, but on standing in the air, or more quickly on being heated in an open vessel, the solution decomposes in proportion as carbonic acid escapes, silica being deposited. (C. J. B. Karsten, *Pogg. Ann.*, 1826, **6.** 359.)

When silicic acid is precipitated from an alkaline solution by means of an acid, it may dissolve wholly, in part, or not at all in the excess of acid. These circumstances depend upon the state of concentration and on the manner in which the acid is added. If chlorhydric acid be slowly added, by small portions to a very concentrated solution of silicate of potash, the Si O_2 is precipitated, almost entirely, in the insoluble state. If the solution of silicate of potash be diluted, the amount of Si O_2 retained in solution will be increased.

10 c. c. of a solution of silicate of potash marking °B.	Being treated drop by drop, with H Cl till the latter was in excess.		Relation between the quantity of dissolved Si O_2 and the whole quantity of the Si O_2.
	precipitated grms. of Si O_2	quantities of Si O_2 retained in solution.	
36°	1.279 grs.	0.120	0.085
24°	0.843	0.080	0.086
21°	0.434	0.120	0.216
16°	0.280	0.162	0.366
12°	0.169	0.110	0.394
8°	0.129	0.092	0.410
6°	0.000	0.139	

These quantities must not be considered as absolutely correct, being offered merely as approximations to the truth. (Doveri, *loc. inf. cit.*, p. 42.) If, on the other hand, all the chlorhydric acid be added at once, and in large quantity, all the Si O_2 remains dissolved. A similar result is obtained when the silicate of potash is added to the chlorhydric acid, and this too whether the solutions be concentrated or dilute. If, however, solutions of silicate of potash, so dilute that the acid can no longer produce a precipitate in them, — for example, a solution of 6° B., — be taken, and so much chloride of potassium dissolved therein that the density of the solution shall be raised to 36° B., the addition of chlorhydric acid will precipitate silicic acid. A similar precipitation occurs when a concentrated solution of silicate of potash is poured into an excess of a dilute solution of chlorhydric acid which has been rendered sufficiently dense by means of chloride of potassium. Silicic acid is dissolved by acids only when it is in the nascent state; after having once been precipitated it cannot be redissolved. It is an error of Berzelius and others, that silica, precipitated from fluosilicic acid, is soluble in acids; for these only render it transparent, but do not dissolve it. A good means of obtaining a concentrated solution of silicic acid in chlorhydric acid consists in dissolving precipitated silicate of protoxide of copper in chlorhydric acid, and then precipitating the copper by means of sulphuretted hydrogen. (Doveri, *Ann. Ch. et Phys.*, (3.) **21.** 40.) In like manner, if a solution of nitrate of silver, acetate of lead, sulphate of iron, or some other metallic salt (instead of sulphate of copper) be poured into the solution of an alkaline silicate, an abundant precipitate of mixed silicic acid and the metallic silicate may be obtained. These metallic silicates are entirely soluble in dilute acids, and furnish a convenient means of obtaining concentrated solutions of silica in acids. (Doveri, *loc. cit.*, pp. 51, 52.)

Though the more or less easy solubility of silicic acid in water, and many acids is well known, the fact that very considerable quantities of it may be thus dissolved seems to be less generally accepted. Even after it has assumed the condition of a jelly, it is easy to prepare from it solutions containing 5 per cent or more, which are perfectly permanent. In making such solutions the chief point is, that the gelatinous acid to be acted upon shall be obtained in a condition as extended as possible, and be maintained, as it were, in the nascent state until it is ready to be dissolved. For this purpose an aqueous solution of silicated alkali (commercial waterglass) is diluted until it contains no more than 3% of silica, and then treated at the ordinary temperature with chlorhydric acid of 1.1 @ 1.13 sp. gr., the mixture being stirred violently, and the acid added as rapidly as possible until an excess of it is present; the excess of acid is now carefully neutralized with new portions of the solution of alkaline silicate, until only a slight trace of free acid remains. As the point of neutralization is approached the liquid becomes slightly milky and exhibits a yellowish-red opalescence,* at the first appearance of which, or better just before it appears, the addition of the alkaline solution should cease, lest a thick jelly be suddenly formed; the liquid should then be slowly heated to a temperature not exceeding 31.25°, the heat being maintained as uniform as possible by means of constant stirring. Under these circumstances, gelatinization usually occurs in the course of the first half-hour, and long before the temperature has risen to 31°. The jelly obtained is, in the first few seconds of its existence, exceedingly loose and only slightly coherent, but in a very short time, if left to itself, it acquires a more compact consistence, which is adverse to its solubility. Hence the first moment of its formation must be carefully observed, and as soon as this occurs, the whole mixture must be quickly poured into half its weight of cold water, contained in another vessel, in order to prevent, as much as possible, the further progress of the gelatinization, though

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* This cloudiness disappears on the addition of a few drops of acid.

this is not always to be entirely avoided. The best result, i. e. a completely soluble jelly, is obtained when the neutralization of the liquid above described is not carried to the point of opalescence; in which event the gelatinization, on the application of heat, takes place somewhat later than in the case described, in which, for the sake of rapidity, opalescence was induced, and also progresses more slowly after it has begun, so that it is easy to stop the process at the right moment, and obtain the jelly in a suitable condition. The attenuated jelly thus obtained is thrown upon a filter of open cotton cloth, like lawn, tied across one end of a glass cylinder, and washed with cold water until the foreign salts are removed; the process of washing should be a continuous one, and the jelly must be kept constantly covered with water in order to prevent it from contracting. When prepared with proper care, the washed jelly is completely soluble in boiling water, and to a considerable extent in cold water. In order to dissolve it it should be mixed with an equal volume of water, and the whole boiled during 12 @ 16 hours in a deep flask, water being added from time to time in order to replace that which evaporates, at the end of which time all of it will have passed into solution excepting a few small particles which have accidentally acquired a somewhat too strong coherence. Somewhat more consistent jellies than that now described will indeed afford weak solutions, but the greater portion will remain as an insoluble residue. The strong solution above described may be concentrated by boiling it down in a deep vessel, care being taken to avoid unnecessary contact with the air, it being easy to obtain in this way solutions which contain 6% and more of silicic acid; these may be preserved, unchanged, in well-closed bottles. These solutions, according to their degree of concentration are more or less opalescent or perfectly clear; the opalescence appearing to indicate that the silicic acid may be in a sort of intermediate condition between mere suspension and actual solution [*pseudo-solution* of Selmi]. By operating over sulphuric acid, or in a vacuum, the concentration may be pushed still further, solutions containing 10% and more of silica being easily obtained, and if protected against loss of water these may be subjected to long-continued boiling without gelatinizing. The 10% solution is of a thickish, oily consistence, but is readily miscible with water. When alcohol is added to the solution containing 5% of silicic acid, a portion of the latter is precipitated as a soft, very light powder, which is deposited with difficulty. Sulphuric acid coagulates the solution. An amorphous powder is deposited when the solution freezes; and none of these precipitates are soluble like the original jelly, any more than the residues which are obtained by evaporating the above solutions. The soluble jelly dissolves much more rapidly in ammonia-water than in pure water; but by long-continued boiling the ammonia appears to be expelled, and the solution thus obtained behaves like the aqueous solution. These aqueous solutions of silica have no action on the color of litmus; their taste is somewhat astringent, but not in the least acid. (H. Kuehn, *J. pr. Ch.*, 1853, **59**. pp. 1 - 6.)

A sample of silicic acid, prepared by passing a current of carbonic acid through a solution of soluble glass, washing the gelatinous precipitate first with water, then with cold dilute chlorhydric acid, and finally again with water, until all the chlorhydric acid was removed, tested while still moist, had the following solubility: 100 pts. of pure water dissolved 0.021 pt. of it. 100 pts. of water, through which, as it was in contact with the silicic acid, an uninterrupted stream of carbonic acid was passed during a week, dissolved 0.0136 pt. of $Si O_2$. 100 pts. of dilute chlorhydric acid, of 1.088 sp. gr., in which the silicic acid was digested in the cold during 11 days, dissolved 0.0172 pt. of $Si O_2$. 100 pts. of a solution of carbonate of ammonia, containing 5 pts. of sesquicarbonate of ammonia to 95 pts. of water, dissolved 0.02 pt. of $Si O_2$. 100 pts. of a solution of carbonate of ammonia, containing only 0.1% of the sesquicarbonate, dissolved 0.062 pt. of $Si O_2$. 100 pts. of ammonia-water, containing 19.2% of $N H_3$, dissolved 0.071 pt. of $Si O_2$. 100 pts. of ammonia-water, containing 1.6% of $N H_3$, dissolved 0.0986 pt. of $Si O_2$. (Struckmann, *Ann. Ch. u. Pharm.*, 1855, **94**. 337.)

In criticising Struckmann's paper, Liebig remarks that the solubility of silicic acid in water depends in great measure upon the comparative amount of water in presence of which it is set free by the action of dilute acids, or carbonic acid, on solutions of its alkaline salts. If water is present in sufficient quantity to retain the silicic acid, much more of this will remain in solution than can be dissolved by digesting the gelatinous acid with water. 1 pt. of $Si O_2$ can thus be held in solution in 500 pts. of water. The presence of ammonia, carbonate of ammonia, or chloride of ammonium (in solutions of which silicic acid is remarkably insoluble) diminishes the power of water to retain silica in solution. In all cases the solubility of silicic acid is greater in dilute than in strong solutions of caustic ammonia. (Liebig, *Ann. Ch. u. Pharm.*, 1855, **94**. 373.)

H. Ludwig (from *Arch. der Pharm.*, (2.) **84**. 129; in *Liebig & Kopp's J. B., für* 1855), suggests that the silica examined by Struckmann may not have been pure, but rather a hyperacid silicate of an alkali. According to Ludwig's own experiments, the hydrated silica obtained by precipitating a solution of silicate of potash with chloride of ammonium retains most persistently a certain amount of potash, and also some ammonia; it is soluble in about 10000 pts. of water. Even the precipitate prepared by adding an excess of chlorhydric acid to a solution of silicate of potash retains a portion of potash; this was somewhat soluble in water, even after having been ignited, 1 pt. of it dissolving in about 25000 pts. of water.

Maschke also remarks, that the results of his experiments do not coincide with those of Struckmann. M. operated upon the stiff jelly obtained by passing a current of carbonic acid through a dilute solution of waterglass, this jelly being first washed as thoroughly as possible with distilled water, then stirred about in water which had been acidulated with a few drops of chlorhydric acid, and finally again thrown upon a filter, and again washed with distilled water. As thus obtained, the hydrated silica is tolerably pure, but retains most obstinately traces of chlorhydric acid; after being digested with frequent agitation at the ordinary temperature during three days, it was found that 100 pts. of water had dissolved 0.09 pt. of silicic acid, and that 100 pts. of carbonic acid-water had dissolved 0.078 pt. of silicic acid. But the hydrated silicic acid behaves very differently towards water when heated therewith for a long time in closed vessels upon the water-bath, for in this case complete solution ensues, — even the addition of water is unnecessary, since the jelly itself becomes fluid when thus heated. Such a liquefied jelly contains in 100 pts. 2.49 pts. of silicic acid; it is not precipi-

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tated even by very considerable quantities of alcohol, but concentrated saline solutions, as those of carbonate of ammonia, chloride of sodium, and chloride of calcium, cause it to gelatinize. When allowed to evaporate spontaneously, the liquefied jelly at length becomes a thick syrup, and finally solidifies to a mass insoluble in water. (O. Maschke, *J. pr. Ch.*, 1856, **68.** 234.)

Steam having been passed into a large potter's kiln, more than two hundred pounds of silica were dissolved, several pounds of it being subsequently deposited in the form of snow around the openings by which the steam escaped from the kiln, and upon those places which were not heated to redness. (Jeffreys, *Ann. Min.*, 1841, (3.) **19.** 474; compare Dumas, *C. R.*, **13.** 932.) Soluble in aqueous solutions of the caustic alkalies, especially if these are warm, and with still greater ease at the high temperatures produced by heating the liquid under strong pressure in closed vessels.

Soluble in aqueous solutions of the basic alkaline silicates (*liquor silicum*). (Fuchs & Pettenkofer.) Also soluble in aqueous solutions of carbonate of potash and carbonate of soda. Freshly precipitated, unignited silica dissolves even in a cold aqueous solution of potash, with evolution of heat; artificially prepared silica, after strong ignition, also dissolves completely but slowly in a cold solution, and rapidly in a boiling solution of potash. The different kinds of opal behave like precipitated silica; of all the varieties, hyalite dissolves the most slowly in a cold solution of potash. Quartz, even in a state of minute division, is perfectly insoluble in a cold solution, and dissolves only very slowly and with great difficulty in a boiling solution of potash. (Fuchs, *Schw.*, **24.** 378; **67.** 418 [*Gm.*].)

Hydrated silicic acid is very abundantly soluble in a boiling aqueous solution of carbonate of soda separating out again, as a jelly, as the solution cools. (Pfaff, *Schweigger's Journ. für Ch. u. Phys.*, **29.** 383 [T.].) Boiling aqueous solutions of the carbonates of soda and potash dissolve moderately ignited silica or its hydrate in large quantity, depositing it again as a jelly on cooling. (Pfaff, *Schw.*, **29.** 383 [*Gm.*].) Powdered quartz is the least soluble; opal and ignited silica are more readily dissolved, and unignited silica most readily of all. (H. Rose.) If alumina is mixed with the silica it remains undissolved, in combination with a large portion of the silica and some of the alkali. (Forchhammer.) Recently precipitated, and still moist silica is soluble in aqueous solutions of the carbonates of potash and soda, as was first noticed by Pfaff. This solution may occur at a very moderate heat, and is then unattended with any evolution of carbonic acid. It can hardly be believed that an amount of bicarbonate of the alkali is formed proportional to the silica dissolved, since recently precipitated silica is even soluble in the bicarbonates of potash and soda, though very much more difficultly, and, as it would appear, in much smaller quantity than in the normal carbonates. Carbonate of ammonia appears to exert only a very slight solvent action upon recently precipitated silica; but when the latter is digested with caustic ammonia no inconsiderable quantity of it is taken up; this separates again as the ammonia evaporates. (C. J. B. Karsten, *Pogg. Ann.*, 1826, **6.** pp. 356, 357.) Readily soluble in a tolerably concentrated, almost boiling solution of carbonate of potash; the strong solution solidifies to a non-gelatinous mass on cooling, but hot dilute solutions gelatinize on cooling. (Maschke, *J. pr. Ch.*, 1856, **68.** 237.) Pulverulent silica, obtained by evaporating the gelatinous hydrate to dryness upon a water-bath, is soluble in a boiling aqueous solution of carbonate of soda. (Berzelius, *Pogg. Ann.*, 1829, **16.** 388.) From a concentrated solution in a boiling solution of alkaline carbonate much of the silica separates as a jelly on cooling, but if the hot solution is diluted with boiling water, the silica will remain dissolved, even when the solution has become cold, a small portion only separating after a time, if the carbonated alkali was completely saturated with it. In this dilute solution the alkali may be saturated with an acid without precipitating any of the silica, this having been dissolved by the water rather than by the alkali (Berzelius, *Lehrb.*, **1.** 668.) On the addition of chloride of ammonium, or other ammonia-salt, to the solution in carbonate of soda silica is precipitated, — a good test for the presence of the latter being thus afforded. (A. Mueller, *J. pr. Ch.*, 1860, **80.** 118.) When in the gelatinous condition, silica is "very sensibly soluble" in butylamin. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **42.** 166.) Gelatinous silicic acid is very slowly and sparingly dissolved by sulphuric, nitric, and chlorhydric acids. These acids dissolve the largest quantity when a compound of silica with a fixed alkali, in which the latter predominates, is mixed with an excess of the acid in a state of great dilution, — so that the silica, at the moment of its separation from the alkali, meets with a sufficient quantity of acid and water to dissolve it. From these solutions, ammonia, carbonate of ammonia, potash, and soda precipitate a portion of the silicic acid. Carbonate of lime also precipitates it, best when the solution is warm, and not too dilute. When a solution of silica in any volatile acid, excepting fluorhydric acid, is evaporated to perfect dryness, the $Si\ O_2$ left as a residue is insoluble, either in water or acids. Readily soluble in an aqueous solution of fluorhydric acid. Neither amorphous nor crystalline silicic acid is at all soluble in an aqueous solution of cane-sugar. (Petzholdt.) All the metallic salts of silicic acid are insoluble in water, excepting some of those of potash, soda, and lithia.

SILICATE OF ALUMINA.

I.) *mono.*

a = anhydrous. Occurs as the minerals *Andalusite*, *Cyanite*, and *Sillimanite.* It is scarcely, or not at all, acted upon by acids.

$Al_2\ O_3,\ Si\ O_2 + 5\ Aq$ or $6\ Aq$

b = hydrated. Occurs as the mineral *Allophane*, which is decomposed by concentrated acids, the alumina being dissolved and the silica separated in the gelatinous condition. It dissolves completely in dilute acids.

(*Kaolin.*)

$Al_2\ O_3,\ 2\ Si\ O_2 + 2\ Aq$

II.) *bi.* As they occur in nature, the kaolins or clays very frequently contain, besides other impurities, an excess of silica. Clays do not dissolve in dilute chlorhydric or nitric acid. (Forchhammer.) They are attacked by strong acids, but, as a rule, the alumina only, and not the silica, is dissolved. Hot sulphuric acid decomposed many of them almost completely, with separation of silica. When carefully heated until the whole of its water is expelled, clay still remains soluble in sulphuric acid and potash; by ignition, however, its solubility is destroyed. [*Gm.*, **3.** 415.] When plastic clay is calcined at a dull red heat, too high a temperature being avoided, it is rendered much more soluble in acids than it was in its crude, hydrated condition. (Compare

Ordway, *Am. J. Sci.*, 1858, (2.) **26.** 203, *note.*) By boiling clay with a solution of potash, a double silicate of alumina and potash is formed, which is dissolved more perfectly in proportion to the excess of potash employed. [*Gm.*, **3.** 415.] According to Brongniart and Malaguti, boiling potash-lye abstracts a certain amount of silica (¼ of the whole) from many varieties of kaolin, and according to Bauer, potash-lye is capable of abstracting ⅓ of the silicic acid from ignited kaolin of Zettlitz; but according to Rammelsberg (*Mineralchemie*, pp. 572, 575), and Stephan, bisilicate of alumina ($Al_2 O_3, 2 Si O_2 + 2 Aq$) is dissolved out as such, when kaolin is repeatedly boiled with potash-lye, almost pure silica being left behind.

The mineral *Halloysite* contains more water than *kaolin*, being of composition $Al_2 O_3, 2 Si O_2 + 4 Aq$. It is easily decomposed by concentrated acids.

III.) *di.* $2 Al_2 O_3, Si O_2 + 9 Aq$ Occurs as the mineral *Collyrite*, which is decomposed by acids, the solution yielding a jelly on evaporation.

IV.) *sesqui.* $2 Al_2 O_3, 3 Si O_2 + 4 Aq$ Occurs as the mineral *Pholerite*, which is insoluble in nitric acid. (Guillemin.)

Besides these silicates of alumina there are various other ill-defined basic compounds.

V.) $2 Al_2 O_3, 9 Si O_2 + 4 Aq$ Occurs as the mineral *Pyrophillite.* Partially soluble in sulphuric acid.

Silicate of Alumina & of Baryta.

I.) $(3 Ba O, Si O_2); 4 (Al_2 O_3, 2 Si O_2) + 12 Aq$ Occurs as the mineral *Edingtonite.* Decomposed by acids, with separation of gelatinous silica.

II.) $2 Ba O, 3 Si O_2 ; 2 (Al_2 O_3, 3 Si O_2) + 10 Aq$ Occurs as the mineral *Harmotome.* When finely powdered, it is completely, though difficultly decomposed by hot chlorhydric acid, silica being separated in the pulverulent state.

Silicate of Alumina & of Glucina.

I.) $Al_2 O_3, 3 Si O_2 ; Gl_2 O_3 . 3 Si O_2$ Occurs in nature as *Beryl*, *Emerald*, &c. It is not decomposed by acids, or only partially by sulphuric acid after strong ignition.

II.) (*Euclase.*) Unacted upon by acids.
$3 Al_2 O_3, 2 Gl_2 O_3, 6 Si O_2 + 3 Aq$

Silicate of Alumina & of Lime.

I.) $Ca O, Si O_2 ; Al_2 O_3, Si O_2$ Occurs as the mineral *Anorthite.* Completely decomposed by concentrated chlorhydric acid, with separation of pulverulent silica.

II.) $2 (Ca O, Si O_2) ; Al_2 O_3, Si O_2 + Aq$ Occurs as the mineral *Prehnite.* Only imperfectly acted upon by acids; but after strong ignition or fusion, acids decompose it completely, forming a jelly. (v. Kobell.)

Decomposed and dissolved to a certain extent by carbonic acid-water, and also even by pure water. (W. B. & R. E. Rogers, *Am. J. Sci.*, 1848, (2.) **5.** 403.)

III. *a.*) $Ca O, Si O_2 ; Al_2 O_3, 2 Si O_2$ Occurs as the mineral *Ersbyite* (*Lime-labradorite*).

III. *b.*) $Ca O, Si O_2 ; Al_2 O_3, 2 Si O_2 + 3 Aq$ Occurs as the mineral *Scolecite* (*Lime-mesotype*). Readily decomposed by chlorhydric acid, but without separation of gelatinous silica. Partially soluble in oxalic acid, with separation of oxalate of lime.

Decomposed and dissolved to a certain extent by carbonic acid-water, and also even by pure water. (W. B. & R. E. Rogers, *Am. J. Sci.*, 1848, (2.) **5.** 403.)

III. *c.*) $Ca O, Si O_2 ; Al_2 O_3, 2 Si O_2 + 4 Aq$ Occurs as the mineral *Levyne.* When pulverized, it is decomposed by acids, without gelatinizing.

IV. *a.*) $Ca O, 2 Si O_2 ; Al_2 O_3, 2 Si O_2 + 3 Aq$ Occurs as the mineral *Caporcianite.* Easily soluble in acids, with separation of gelatinous silica.

IV. *b.*) $Ca O, 2 Si O_2 ; Al_2 O_3, 2 Si O_2 + 4 Aq$ Occurs as the mineral *Laumonite.* Easily soluble in chlorhydric acid, with separation of a siliceous jelly. It gelatinizes also with nitric acid, but is not affected by sulphuric acid unless this is hot.

IV. *c.*) $Ca O, 2 Si O_2 ; Al_2 O_3, 2 Si O_2 + 6 Aq$ Occurs as the mineral *Chabazite.* When powdered, it may be completely decomposed by chlorhydric acid, though this is only accomplished with difficulty.

V. *a.*) $Ca O, 2 Si O_2 ; Al_2 O_3, 4 Si O_2 + 5 Aq$ Occurs as the mineral *Heulandite.* Readily decomposed by chlorhydric acid, with separation of viscid silica.

V. *b.*) $Ca O, 2 Si O_2 ; Al_2 O_3, 4 Si O_2 + 6 Aq$ Occurs as the mineral *Stilbite* (*Desmine*). Slowly but completely decomposed by concentrated chlorhydric acid, with separation of viscid silica.

VI.) $2 (Ca O, Si O_2) ; 2 Al_2 O_3, 3 Si O_2$ Occurs as the mineral *Barsowite*, which gelatinizes easily when heated with chlorhydric acid.

VII.) $3 (2 Ca O, Si O_2) ; 2 (2 Al_2 O_3, 3 Si O_2)$ Occurs as the mineral *Meionite.* Completely decomposed by chlorhydric acid, with separation of gelatinous silica.

Silicate of Alumina, of Lime & of Potash.

I.) $K O, Si O_2 ; 2 (Ca O, Si O_2) ; 3 (Al_2 O_3, 3 Si O_2) + 15 Aq$ Occurs as the mineral *Phillipsite* (*Lime-harmotome*). Easily and completely decomposed by chlorhydric acid, with separation of gelatinous silica.

II.) $Ca O, K O, Si O_2 ; Al_2 O_3, Si O_2 + 4 Aq$ Occurs as the mineral *Gismondine.* Readily and completely soluble in chlorhydric acid, the solution yielding a siliceous jelly on being evaporated.

Silicate of Alumina, of Lime & of Soda.

I.) $Ca O, Si O_2 ; Na O, Si O_2 ; Al_2 O_3, 2 Si O_2 + 6 Aq$ Occurs as the mineral *Gmelinite* (*Soda-chabazite*). Completely decomposed by chlorhydric acid, with separation of gelatinous silica.

II.) $Ca O, Si O_2 ; Na O, Si O_2 ; 2 Al_2 O_3, 7 Si O_2 + 18 Aq$ Occurs as the mineral *Faujasite.* Soluble in chlorhydric acid.

Silicate of Alumina & of Potash.

I.) $K O, 2 Si O_2 ; Al_2 O_3, 2 Si O_2$ Occurs as the mineral *Leucite.* The powdered mineral is completely decomposed by acids, with separation of pulverulent silica.

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Decomposed and dissolved to a certain extent by carbonic acid-water and also even by pure water. (W. B. & R. E. Rogers, *Am. J. Sci.*, 1848, (2.) **5.** 403.)

II.) $KO, 3 SiO_2; Al_2O_3, 3 SiO_2$ Occurs as the mineral *Orthoclase* (*Feldspar*), which is not acted upon to any great extent by acids. Powdered feldspar dissolves with difficulty and only partially in hot chlorhydric acid. (G. Rose.) When finely powdered feldspar is exposed to a prolonged digestion in sulphuric or chlorhydric acid a portion of the mineral is dissolved, even at the ordinary temperature; 30 grains of potash feldspar being digested during 12 hours in chlorhydric acid, at 15.56°, lost nearly a grain in weight, the solution containing both chloride of potassium and chloride of aluminum. (W. B. & R. E. Rogers, *Am. J. Sci.*, 1848, (2.) **6.** 396.) It is decomposed and dissolved to a certain extent by carbonic acid-water, and also even by pure water. (W. B. & R. E. Rogers, *Am. J. Sci.*, 1848, (2.) **5.** pp. 403, 404.) If powdered feldspar is ignited and then boiled with milk of lime it gives up potash to the water, the lime taking the place of potash in the compound. (Fuchs, Zierl.) When in a state of minute division, feldspar is not sensibly acted upon by water at a temperature of 100°; at 125°, in a Papin's digester, it renders the water feebly alkaline; at 150° strongl, and at 220° still more strongly alkaline. (Forchammer, *Pogg. Ann.*, **35.** 353 [*Gm.*].)

SILICATE OF ALUMINA & OF SODA.

I.) $NaO, SiO_2; Al_2O_3, 2 SiO_2 + 2 Aq$ Occurs as the mineral *Natrolite* (*Soda-mesotype*). Readily soluble even after ignition, in chlorhydric acid, with separation of gelatinous silica.

Easily soluble in oxalic acid. (Fuchs.) Decomposed and dissolved to a certain extent by carbonic acid-water, and also even by pure water. (W. B. & R. E. Rogers, *Am. J. Sci.*, 1848, (2.) **5.** 403.)

II.) $NaO, 2 SiO_2; Al_2O_3, 2 SiO_2 + 2 Aq$ Occurs as the mineral *Analcime*. Readily decomposed by chlorhydric acid, with separation of gelatinous silica. After the mineral has been ignited, however, the decomposition becomes more difficult.

Decomposed and dissolved to a certain extent by carbonic acid-water, and also even by pure water. (W. B. & R. E. Rogers, *Am. J. Sci.*, 1848, (2.) **5.** 403.)

III.) $NaO, 3 SiO_2; Al_2O_3, 3 SiO_2$ Occurs as the mineral *Albite* (*soda-feldspar*), which is not decomposed by alkaline solutions or by acids, but is acted upon to a certain extent by hot acids.

Decomposed and dissolved to a certain extent by carbonic acid-water, and also even by pure water. (W. B. & R. E. Rogers, *Am. J. Sci.*, 1848, (2.) **5.** pp. 403, 404.)

SILICATE OF AMYL.

I.) *di.* Insoluble in water, by which it is very slowly decomposed.
(“*Protosilicate*” [$C_{10}H_{11}O, SiO$] of Ebelmen.)
$2 C_{10}H_{11}O, SiO_2$
Soluble in all proportions in alcohol, ether, and hydrate of amyl (fusel-oil). (Ebelmen, *Ann. Ch. et Phys.*, (3.) **16.** 155.)

SILICATE OF BARYTA. One part of silica fused with 2 pts. or more of baryta yields a compound soluble in acids. (Kirwan; Vauquelin.)

As prepared in the wet way, by adding an aqueous solution of baryta to a solution of waterglass, it is readily soluble in an excess of a solution of waterglass. (Bolley.)

SILICATE OF CERIUM. Occurs as the mineral *Cerite*.
$2 CeO, SiO_2 + Aq$
When finely powdered it dissolves easily in chlorhydric acid, with separation of gelatinous silica. After having been ignited it is more easily soluble in acids than before.

SILICATE OF COPPER.

$a = CuO, SiO_2 + Aq$ Occurs as the mineral *Dioptase*. Soluble in hot nitric and chlorhydric acids, with separation of gelatinous silica.

Unacted upon by a solution of caustic potash, but dissolves, with separation of silica, in solutions of caustic or carbonated ammonia. (Damour.)

$b = CuO, SiO_2 + 2 Aq$ Occurs as the mineral *Chrysocolla*. Decomposed by chlorhydric and other acids, with separation of gelatinous silica.

SILICATE OF ETHYL.

I.) *mono.* Permanent. Insoluble in water, and only very slowly decomposed by contact therewith.
(“*Bisilicate*” [$C_4H_5O, 2 SiO$], of Ebelmen.)
C_4H_5O, SiO_2
Soluble in all proportions in alcohol, and ether; also soluble in the other silicates of ethyl. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **16.** pp. 150, 153.)

II.) *bi.* Soluble in alcohol, and ether, and in monosilicate and disilicate of ethyl. (Ebelmen.)
(“*Quadrisilicate*” [$C_4H_5O, 4 SiO$] of Ebelmen.)
$C_4H_5O, 2 SiO_2$

III.) *di.* Insoluble in water, but is slowly decomposed thereby.
(“*Protosilicate*” [C_4H_5O, SiO] of Ebelmen.)
$2 C_4H_5O, SiO_2$
Soluble in all proportions in alcohol, and ether. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **16.** 145.)

SILICATE OF GLUCINA.

I.) *basic.* Occurs as the mineral *Phenacite.*
$2 Gl_2O_3, 3 SiO_2$

SILICATE *of protoxide* OF IRON.

I.) *normal.*
FeO, SiO_2

II.) *basic.* Chlorhydric acid extracts the oxid of iron, and leaves the silica undissolved. (Mitscherlich, and others.)
$2 FeO, SiO_2$
Occurs native as *Fayalite*, a mineral easily attacked by acids. (Delesse.)

SILICATE *of sesquioxide* OF IRON.

I.) $Fe_2O_3, 3 SiO_2 + 3 Aq$ Occurs as the mineral *Chloropal.* Insoluble in cold acids, but soluble in hot sulphuric, chlorhydric, and nitric acids, with separation of gelatinous silica. (Berthier.)

II.) $2 Fe_2O_3, 9 SiO_2 + 2 Aq$ Occurs as the mineral *Anthosiderite.* Acids decompose it.

SILICATE OF IRON & OF MAGNESIA.

I.) $FeO, SiO_2; 3 (MgO, SiO_2)$ Occurs as a variety of the mineral *Anthrophyllite.* Scarcely at all acted upon by acids.

II.) $FeO, SiO_2; 6 (MgO, SiO_2)$ Occurs as a variety of the mineral *Anthrophyllite.* Scarcely at all acted upon by acids.

III.)

$a = 2 FeO, SiO_2; 2 (2 MgO, SiO_2)$ Occurs in nature as

Hyalosiderite, which is difficultly soluble in cold concentrated chlorhydric acid, the solution yielding a jelly on being evaporated. (Walchner.)

b = various compounds. Varieties of the mineral $2\,FeO, SiO_2; 4\ @\ 7\,(2\,MgO, SiO_2)$. *Olivine.* See under **Silicate of Magnesia**. $2\,FeO, SiO_2; 13\,(2\,MgO, SiO_2)$.

Silicate of Iron & of Manganese.

I.) *basic.* MnO, FeO, SiO_2. Occurs native as *Knebelite*, which is decomposed by chlorhydric acid, with partial solution and separation of gelatinous silica. (Dœbereiner.)

Silicate of Lime.

I.) *normal.* CaO, SiO_2. Insoluble in water. The native mineral (*Tabular-spar, Wollastonite*) is decomposed and partially dissolved by chlorhydric acid, gelatinous silica separating out.

II.) *bi.* $CaO, 2\,SiO_2 + 2\,Aq$. Occurs as the mineral *Okenite.* When powdered, this is easily decomposed by cold chlorhydric acid, with separation of gelatinous flakes of silica; but after ignition it cannot be thus dissolved. (v. Kobell.)

Recently precipitated silicic acid being added to lime-water removes all the lime from the solution, excepting a small quantity which remains in combination with the silica, the compound thus formed not being completely insoluble in water. (Gadolin, *Ann. de Chim.*, 1797, **27.** 320.) As prepared in the wet way, by adding lime-water to a dilute solution of waterglass, silicate of lime is readily soluble in an excess of the waterglass solution. (Bolley.)

Silicate of Lime & of Magnesia.

I.) $CaO, SiO_2; 2\,(MgO, SiO_2)$ Occurs as the mineral *Diopside.* Only very slightly acted upon by acids.

Decomposed and dissolved to a certain extent by carbonic acid-water, and also even by pure water. (W. B. & R. E. Rogers, *Am. J. Sci.*, 1848, (2.) **5.** 403.)

II.) $CaO, SiO_2; 3\,(MgO, SiO_2)$ Occurs as the mineral *Tremolite*, which is not acted upon by acids.

Decomposed and dissolved to a certain extent by carbonic acid-water, and also even by pure water. (W. B. & R. E. Rogers, *Am. J. Sci.*, 1848, (2.) **5.** pp. 403, 404.)

Silicate of Lime & of Potash. Occurs as $KO, 2\,SiO_2; 8\,(CaO, 2\,SiO_2) + 18\,Aq$ the mineral *Apophyllite.* The powdered mineral is easily decomposed by chlorhydric acid, with separation of silica; but after ignition it is with difficulty acted upon by chlorhydric acid.

When apophyllite is heated with water to 180° @ 190°, under a pressure of 10 @ 12 atmospheres, it dissolves, and crystallizes again as the solution cools (Wœhler); but at the ordinary temperature, even under a pressure of 12 @ 79 atmospheres, no trace of it is dissolved. (Bunsen.)

Silicate of Lime & of Soda. Occurs as $NaO, 4\,CaO, 6\,SiO_2 + Aq$ the mineral *Pectolite.* This is very slowly acted upon by chlorhydric acid, unless it be in powder. If the mineral is ignited before being treated with chlorhydric acid, the latter causes the silica to separate in the gelatinous condition. (v. Kobell.)

Silicate of Lime with Titanate of Lime. $CaO, 2\,SiO_2; CaO, 2\,TiO_2$ Occurs as the mineral *Sphene* (*Titanite*).

When finely powdered, it is partially decomposed by chlorhydric, and more completely by sulphuric acid. Fluorhydric acid decomposes it more easily.

Silicate of Magnesia.

I. *a.*) MgO, SiO_2 Insoluble in chlorhydric acid or a solution of caustic potash. (Ebelmen, *loc. inf. cit.*) It occurs also in nature as the mineral *Enstatite.* Unacted upon by acids. (Kenngott.)

As prepared in the wet way, by adding an aqueous solution of magnesia to a dilute solution of waterglass, silicate of magnesia is readily soluble in an excess of a solution of waterglass. (Bolley.)

$b = 2\,(MgO, SiO_2) + Aq$ Occurs as the mineral *Picrosmine.*

$c = 2\,(MgO, SiO_2) + 3\,Aq$ Occurs as the mineral *Kerolite.* It is unacted upon by acids.

$d = 4\,(MgO, SiO_2) + 3\,Aq$ Occurs as the mineral *Aphrodite.* Decomposed by concentrated acids, with separation of gelatinous silica.

II.) $2\,MgO, SiO_2$ Insoluble in water, or cold dilute chlorhydric acid. Decomposed by hot concentrated chlorhydric acid. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **33.** 57.) It occurs also in nature, mixed with disilicate of iron, as the mineral *Chrysolite* (*Olivine*) of composition $2\,FeO, SiO_2; 32\ @\ 40\,(2\,MgO, SiO_2)$. Chrysolite is not decomposed by chlorhydric acid, but is decomposed by sulphuric acid, with separation of pulverulent silica. (v. Kobell, *J. pr. Ch.*, **5.** 214 [*Gm.*].) Olivin is decomposed with the greatest facility by chlorhydric acid, with separation of gelatinous silica. (Berzelius, in his *Jahresbericht*, 1836, **15.** 217.) Decomposed and dissolved to a certain extent by carbonic acid-water, and also even by pure water. (W. B. & R. E. Rogers, *Am. J. Sci.*, 1848, **5.** 403.)

III.) $2\,MgO, 3\,SiO_2 + 2\,Aq\ \&\ 4\,Aq$ Occurs as the mineral *Meerschaum.* Decomposed by chlorhydric acid, with separation of silica.

IV.) $5\,MgO, 6\,SiO_2 + 4\,Aq$ Occurs as the mineral *Spadaite.* Easily decomposed by chlorhydric acid, with separation of gelatinous silica. (v. Kobell.)

V.) $12\,MgO, 15\,SiO_2 + 4\,Aq$ Occurs as the mineral *Talc* and *Steatite.* It is not acted upon by acids.

Decomposed and dissolved to a certain extent by carbonic acid-water, and also even by pure water. (W. B. & R. E. Rogers, *Am. J. Sci.*, 1848, **5.** 403.)

VI.) $3\,MgO, 2\,SiO_2 + 2\,Aq$ Occurs as the mineral *Serpentine.* Powdered serpentine dissolves in concentrated chlorhydric acid, leaving a siliceous jelly; it is still more easily acted upon by sulphuric acid.

Decomposed and dissolved to a certain extent by carbonic acid-water, and also even by pure water. (W. B. & R. E. Rogers, *Am. J. Sci.*, 1848, **5.** 403.)

VII.) $4\,MgO, 3\,SiO_2 + 6\,Aq$ Occurs as the mineral *Deweylite* (*Gymnite.*)

Silicate of Manganese.

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I.) *normal.* $Mn O, Si O_2$ Occurs native as *Manganese Spar*, or *Rhodonite.* This is partially soluble in concentrated chlorhydric acid, being completely decomposed thereby.

II.) *basic.* $2 Mn O, Si O_2$ Occurs as the mineral *Tephroite*, which forms a stiff jelly with chlorhydric acid, being completely decomposed. (Rammelsberg.)

SILICATE *of dinoxide* OF MERCURY.

SILICATE OF MOLYBDENUM.

SILICATE OF POTASH.

I.) *mono.* $K O, Si O_2$ Deliquescent. Soluble in cold water. (H. Rose.)

II.) *basic.* 1 @ 2 (or more) $K O, Si O_2$ Deliquescent. Readily soluble in cold water, forming the *liquor silicum*, or *Kieselfeuchtigkeit*, of the earlier chemists. Also soluble in aqueous alkaline solutions.

On adding to *liquor silicum* an acid in quantity not sufficient for saturation, there is precipitated a compound of the potash with excess of silica; but a larger quantity of acid throws down the silica as a gelatinous hydrate. (Dalton.) For further details of the behavior of the aqueous solution with acids, see under Silicic Acid. If acetate of soda be added to a solution of silicate of potash, with or without an excess of base, silicic acid will be precipitated. Several other soda salts may be substituted for the acetate in this experiment. (Persoz, *Ann. Ch. et Phys.*, 1836, (2.) **63.** 445; compare Ordway's statements, under Silicate of Soda.)

III.) *acid.*

a = $K O, 2\frac{1}{2}$ @ $4\frac{1}{2} Si O_2$ (*Waterglass. Soluble glass.*) Permanent. Fused waterglass is slowly, but almost completely soluble in boiling water. (Fuchs.) More readily soluble in water than the corresponding soda-salt, the potash silicates being more soluble than the corresponding soda compounds. (Ordway, *Am. J. Sci.*, (2.) **32.** 155.) Potash silicates, which are rather alkaline, are more deliquescent than the corresponding soda silicates. (Ordway.) Waterglass is much less readily soluble when contaminated with earthy impurities than when pure. Fuchs says that an insoluble glass cannot be prepared from pure quartz and pure potash. "For if we take two pts of quartz to one of potash we obtain, as I have convinced myself, a glass which partly dissolves in water." These proportions would make about $K O, 5 Si O_2$. (*Ibid.*, p. 162.)

When an aqueous solution of waterglass is evaporated to dryness, there is obtained a permanent, hydrated mass which dissolves very slowly in cold water, but readily in boiling water. (Fuchs, [*Gm.*].) A concentrated aqueous solution containing 28% of anhydrous $K O, 4 Si O_2$ is of 1.25 sp. gr. (Fuchs.)

Alcohol, even in small quantity, precipitates waterglass from its aqueous solution, and thus affords a means of purifying it from other salts of potash, which are soluble in spirit. (Fuchs, *Kastner's Archiv.*, **5.** 385. [*Gm.*].) The alcohol, however, withdraws potash, even in the precipitation of the salt, and still more on washing, until octosilicate of potash alone remains. (Forchhammer.)

Alcohol, and wood-spirit, precipitates silicate of potash, as such, from its aqueous solution, even when this is very dilute. Contrary to the view formerly held by Fuchs, the alcohol, in this experiment, always effects a partial decomposition of the silicate, the precipitate thrown down being somewhat more siliceous than the original silicate. [Compare Silicate of Soda.] (Ordway, *Am. J. Sci.*, (2.) **33.** pp. 27, 29.) Silicate of potash is thrown down somewhat less readily and completely than silicate of soda. The precipitates thus obtained by alcohol are for the most part readily soluble in cold water. (*Ibid.*, **32.** pp. 340, 341.)

In determining what is the highest possible relative proportion of silica capable of entering into complete solution it is very important to eliminate the last traces of foreign matters and to operate only upon pure products. Fuchs could not get much beyond $K O, 3\frac{3}{4} Si O_2$, and even this solution he describes as being usually lacking in clearness; and Forchhammer (*Pogg. Ann.*, **35.** 341), says that while silicate of potash, in which the oxygen of the acid is eight times as great as that of the base is still soluble, the slightest additional quantity of silica is no longer dissolved. Both these observers evidently overlooked the disturbing influence of minute portions of earthy matter. For in reality, by operating with a well-purified silicate, prepared by precipitation with alcohol, as above mentioned, it is possible to get at, least as far as $K O, 4\frac{1}{2} Si O_2$, or $Na O, 4\frac{1}{2} Si O_2$, and have a solution perfectly transparent. (Ordway, *Am. J. Sci.*, (2.) **33.** 33.)

For the precipitation of waterglass by salts of potash and soda, and for numerous other points concerning it, see under Silicate of Soda.

b = *hyperacid.* A hydrated octosilicate ($K O, 8 Si O_2 + x Aq$) obtained by Forchhammer, by precipitating an aqueous solution of waterglass with an excess of alcohol, and washing the precipitate with spirit of 30%, so long as the filtrate exhibited an alkaline reaction, was only partially soluble in hot water. The insoluble residue obtained by thoroughly boiling the octosilicate in water contained $K O, 18 Si O_2 + 9 Aq$. $K O, 24 Si O_2$ is a gelatinous precipitate insoluble in water. (Forchhammer.)

SILICATE OF POTASH & OF STRONTIA. Insoluble in water.

SILICATE OF POTASH & OF ZINC. Soluble in an aqueous solution of caustic potash, and in acids, with separation of gelatinous $Si O_2$.

SILICATE OF POTASH with TITANATE OF POTASH. Insoluble in water. While still moist it is readily soluble in concentrated chlorhydric acid. (H. Rose.)

SILICATE OF SODA.

I.) *mono.* $Na O, Si O_2 + 6, 7, 8,$ or $9 Aq$ Permanent. Very soluble in water. Melts in its water of crystallization. (Fritzsche; Hermann.)

II.) *basic.* (*Liquor silicum.*) See the corresponding potash compound.

III.) *acid.*

a = *Waterglass.* $Na O, 2$ @ $3\frac{3}{4}$ (or more) $Si O_2$ Permanent. Slowly but completely soluble in boiling water. (Fuchs.) Fused waterglass is but little acted on by cold water, but when pure it dissolves without much difficulty in water kept continually boiling; though the solution goes on slowly and so evenly that bits retain to the last their exact original form, the sharp angles even not being rounded. (Ordway, *Am. J. Sci.*, (2.) **32.** 337.) For making a liquid or pasty silicate, the glass coarsely ground may be boiled with water till the solution stands at about 25° B. after cooling. If it is made much stronger than this it will not settle readily. Some manu-

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facturers dissolve waterglass by blowing steam directly into the water, but in that case the solution goes on very slowly, because the heat is insufficient. It is far better to have an iron kettle heated by a fire. After the solution has been allowed to deposit suspended insoluble matters, it may be concentrated by evaporation to any required degree, within certain limits. When it becomes thick, the further application of heat is attended with no little difficulty; for the silicate then rapidly adheres to the kettle, and there is needed very diligent scraping with a chisel-pointed bar to keep the bottom and sides of the vessel clear of the spongy coating; and to push the evaporation to dryness is quite out of the question. A solution of the silicate $\mathrm{Na\,O},\ 2\frac{1}{4}\ \mathrm{Si\,O_2}$ cannot conveniently be made stronger than 50° B. (Ordway, *Am. J. Sci.*, (2.) **32.** 162.)

In operating in the large way, where solutions are wanted day after day, it saves much time and fuel not to try to dissolve completely any given quantity of the glass in a particular amount of water, but always to keep an excess of the coarsely ground silicate in the kettle, and boil, with frequent stirring, till the liquor acquires a sufficient strength, as shown by the hydrometer. If the solution is dipped out hot, either the kettle must be immediately filled again with hot water, or the glass also must be taken out and held back till the water becomes hot, otherwise the silicate is apt to stick together and adhere most obstinately to the bottom of the kettle.

When a waterglass contains a greater portion of silica than is needed to constitute a tersilicate ($\mathrm{Na\,O},\ 3\ \mathrm{Si\,O_2}$) its solution is the work of many hours. As the relative amount of silica is increased, the precise point at which the product ceases to be integrally soluble has never yet been ascertained. (Ordway, *Am. J. Sci.*, (2.) **32.** 337.)

When boiled with a large excess of water, fused waterglass tends to undergo decomposition, a small portion of it being left undissolved; the amount of this insoluble matter depending in great measure upon the quantity of water used. In other words, very siliceous waterglass is not integrally soluble in mere water, but dissolves without any considerable decomposition in a strong solution of the silicate itself. When the least practicable proportion of water is taken, the light flocculent deposits actually obtained are made up chiefly of earthy and metallic silicates; and it may be fairly inferred that in such cases an absolutely pure silicate of potash or soda would give no remainder except the very little produced by the first contact of pure water with the outer surface. But the sediment left after the action of a large quantity of water is dense and scaly, and under the microscope appears to consist of purely siliceous filmy skeletons of the original particles of the glass; and there would doubtless be such a residue even though the silicate were completely free from foreign matter. The greater the proportion of alkali, the less decomposable is fused waterglass; and it may safely be said that pure products, a little more alkaline than $\mathrm{Na\,O},\ 2\frac{1}{4}\ \mathrm{Si\,O_2}$, would dissolve without remainder in any quantity of water, however great. (Ordway, *Am. J. Sci.*, (2.) **35.** pp. 193 – 195; for the *quantitative results* obtained by Ordway in this connection we must refer the reader to the original memoir.)

The aqueous solution of waterglass must not be confounded with the much more alkaline *liquor silicum* (*Kieselfeuchtigkeit*, of the Germans) obtained by dissolving basic, *deliquescent*, silicate of soda. It is true, that, strictly speaking, no actual line of demarcation can be drawn between these substances, yet they really constitute two distinct bodies, at least in so far as difference of properties is concerned. Any silicate of soda more alkaline than $\mathrm{Na\,O},\ 2\frac{1}{4}\ \mathrm{Si\,O_2}$ is prone to deliquescence, and is too poor in silica for most uses to which waterglass is applied, and it would perhaps be but just to consider "waterglass" as including nothing more basic than this. (Ordway, *Am. J. Sci.*, (2.) **32.** 156.) $\mathrm{Na\,O},\ 1\frac{1}{2}\ \mathrm{Si\,O_2}$ is readily taken up by water at less than the boiling heat. (Ordway, *loc. cit.*, **32.** 338.)

Silicate of soda is somewhat harder to dissolve in water than a corresponding silicate of potash. (Ordway, *Am. J. Sci.*, (2.) **32.** pp. 338, 155.) Waterglass which contains both potash and soda forms a thinner solution than either of these silicates taken separately. (Dœbereiner.)

A simple (fused) soda or potash silicate with $4\frac{1}{2}$ or more equivalents of acid to one of base may be considered as practically insoluble in water, though of course such glass would be, like ordinary window-glass, etc., somewhat acted upon by boiling water. Peligot found the so-called "alabaster glass" of commerce to consist almost entirely of silica and potash in such proportions as to make $\mathrm{K\,O},\ 7\frac{1}{2}\ \mathrm{Si\,O_2}$, were the silica all in combination; but in this case a part of the silica is merely diffused, and so produces the opacity of the glass. (Ordway, *Am. J. Sci.*, (2.) **32.** 163.) For Fuchs's view, that no insoluble glass can be prepared from pure silica and pure potash, see below, among the remarks upon ordinary glass.

The solubility of waterglass is much impaired by the presence of earthy impurities; hence, when it is desired to obtain the greatest possible relative amount of silica in solution, it is necessary to make the glass of none but the purest materials. Earthy or metallic oxides very much lessen the solubility of the product, and if more than a mere trace of them is present, a larger proportion of alkali is required to render the mass capable of yielding readily to boiling water. A silicate so contaminated will not in fact enter directly into solution; it is only decomposed by boiling with water, into a more alkaline silicate which dissolves, and a compound earthy silicate which remains as a bulky residue, often in the form of plates or scales. Thus, of a well-worked waterglass made from crude sulphate of soda, water took up only 89%, leaving a copious sediment consisting of soda, lime, magnesia, alumina, ferrous and ferric oxides, and silica. Indeed, common glass is but an alkaline silicate, rendered insoluble by a more considerable amount of lime or oxide of lead. Sand which contains clay, mica, feldspar, lime, or oxide of iron is unsuitable for the manufacture of waterglass. When waterglass thus contaminated is treated with boiling water, the earths and metallic oxides are mostly left behind as compound silicates; and if sulphides are present, a part of the iron remains, as sulphide, giving a blackish color to the sediment. But these foreign matters are not left wholly undissolved, for a solution of waterglass has the power of taking up small quantities of most oxides, and the solvent power increases with the strength of the solution; so that a liquor which is slightly turbid while weak, may become quite clear by concentration, and, on the other hand, this clear, strong liquid is rendered turbid again by large dilution. (Compare Silicate of Potash.) (Ordway, *Am. J. Sci.*, (2.) **32.** pp. 162, 338.)

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On the addition of alcohol or wood-spirit to an aqueous solution of waterglass the greater part of the silicate is precipitated as such, even when the solution is very weak. This precipitation is, however, attended with a certain amount of decomposition, the alcohol tending to retain in solution a portion of a silicate more alkaline than that previously dissolved in the water, while the precipitate formed is always somewhat more siliceous than the original silicate. The more any given waterglass solution is diluted before adding alcohol, the greater will be the relative amount of silica in the precipitate. Hence by mere precipitation under varied conditions, an unlimited number of differently constituted silicates may be obtained. But while the ratio of acid and base admits of an infinite diversity, the quantity of water in the principal products appears to be nearly constant, generally amounting to not far from fifty per cent. The quantity of silicate which remains dissolved in the supernatant alcoholic liquid is always exceedingly small, but is somewhat increased by heat. A mother liquor of this sort, which is quite milky when first decanted, becomes perfectly transparent by being warmed a few degrees, and the opacity reappears on cooling. Indeed, a nicely balanced solution of this kind is quite sensitive to changes of temperature in the room; and the nearer we get to an entire precipitation of the silica, the more apt is the remaining liquid to exhibit such alternations of opacity and clearness. The silicates, containing less than 2½ equivalents of $Si\,O_2$ to 1 equivalent of alkali, are usually thrown down in the liquid state; those more siliceous yield solids of greater and greater firmness as the relative proportion of silica increases. In most cases these precipitates dissolve readily in cold water. Silicate of soda is thrown down by alcohol somewhat more readily and completely than silicate of potash.

When a waterglass is contaminated with saline and earthy impurities, these may be got rid of by several properly conducted fractional precipitations with alcohol, — the salts remaining dissolved in the alcoholic liquors while the earthy and metallic oxides are withdrawn by the first small fractional deposits. Since solutions containing even as much as ten per cent of any of the salts commonly occurring in crude waterglass are not immediately affected by a moderate addition of alcohol, it is not strange that the greater part of these salts should remain in the supernatant liquor while the waterglass is almost wholly precipitated. (Ordway, *Am. J. Sci.*, (2.) **32.** 340; **33.** pp. 35, 27. For the numerous *quantitative results* obtained by Ordway in his experiments upon the precipitation of waterglass by alcohol, see *Am. J. Sci.*, (2) **33.** pp. 27 – 33.)

Many neutral potassium and sodium salts precipitate waterglass, as such, when added to its aqueous solution, the salt used as a precipitant not entering into the chemical composition of the deposit, which consists of silica, alkali, and water united in no definite proportions. Like alcohol, these saline solutions exert a slight parting force on the constituents of waterglass, the precipitate being always more siliceous than the original silicate; and the more siliceous, moreover, in proportion as the solutions employed are more dilute before being mixed. The less alkaline the silicate is, the more matter is thrown down by a given saline liquid; and the more concentrated the solutions are, the more complete is the precipitation. With strong liquors, an increase in the quantity of the precipitant used is not attended by a proportionate increase in the amount of coagulum; but a little more of the saline liquid than will just produce a disturbance usually suffices to throw down the greater part of all that is precipitable. The precipitates have a greater or less tendency to cohere into hard or pasty masses, which can be in great measure freed from adhering mother liquor by strong pressure. After having thus been forcibly cleared of foreign matter, all the precipitates, which are less siliceous than $R\,O, 4\frac{1}{2}\,Si\,O_2$, are wholly soluble in cold water; when exposed to the air for a day or two in a warm place, they lose 20% or more of their weight, and become dry and hard, — their solubility remaining unimpaired. Silicate of soda yields a larger deposit than silicate of potash does under similar conditions. When a silicate of one alkali is precipitated by a salt of the other, both bases enter into the composition of the solid product, and the relative proportion of potash and soda therein is very nearly the same as in the average of the liquors mixed.

Different salts possess very unequal precipitating power, the acetates and chlorides being particularly efficient. Heat increases the precipitating power of the chlorides, sulphates, and nitrates, and diminishes that of the acetates. The alkaline acetates are rather more efficient than the chlorides, in throwing down waterglass; but acetate of soda gives only very slight precipitates with $Na\,O, 2\frac{1}{2}\,Si\,O_2$, and this after standing some time. Nitrate of soda has but very little effect upon the more alkaline silicates. Sulphate of soda has still less precipitating power than the nitrate. Normal carbonate of soda is devoid of precipitating power; and normal (tris) arseniate, and phosphate, of soda has little or no effect. Bisulphate, bicarbonate, diphosphate, and dinarseniate of soda all act as acid salts, throwing down gelatinous silica. (Ordway, *Am. J. Sci.*, (2.) **35.** pp. 185 – 193. The results of numerous *quantitative* experiments are given by O. in this memoir. Compare *Ibid.*, **32.** 340.) Ammonia salts throw down silica from a strong solution of waterglass, while ammonia is evolved, silicate of ammonia being a compound apparently incapable of more than a momentary existence under the ordinary pressure of the atmosphere. (*Ibid.*, **32.** 340.) Of course most earthy and metallic salts effect a double decomposition when mixed with alkaline silicates, and generally a thickening of the whole mass very soon ensues. But sulphate and carbonate of baryta seem to be without action, and so does fluoride of calcium. Most lime salts, whether soluble or insoluble, are particularly energetic in their operation; carbonate of lime does not produce any decided change, yet when it is boiled with a very siliceous silicate it becomes flocculent, showing that there is a partial exchange of constituents. The basic carbonates of zinc and magnesia, and the carbonates of lead and manganese produce an immediate coagulation, as does also carbonate of ammonia. (*Ibid.*, **32.** 339.) Baryta, strontia, and lime-water, and likewise a solution of aluminate of potash throw down the whole of the silica, together with part of the potash, in the form of a double silicate, the rest of the potash remaining in the liquid in the free state. (Guyton-Morveau, *Ann. Chim.*, **31.** 246; Bucholz, *Taschenb.*, 1812, p. 156; Dœbereiner, *Schw.*, **10.** 113 [*Gm.*].) Zincate of soda mixed with a cold aqueous solution of waterglass at first shows no change, but a precipitate soon forms. In like manner aluminate and glucinate of soda speedily cause a precipitation. But manganate, stannate,

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and chromate of soda produce no alteration. (Ordway, *Am. J. Sci.*, (2.) **32.** 339.)

When an aqueous solution of waterglass is evaporated to dryness, and the whole of the water expelled by ignition, a part of the silica goes over into the passive state, and the mass is consequently no longer completely soluble in water. (Ordway, *Am. J. Sci.*, (2.) **32.** 342.) Fremy found that after $RO, 4\frac{1}{2}\ SiO_2$ has been carefully dried, water dissolves the alkali out of the residue, and leaves the silica, which last, according as the heat has been more or less intense, is or is not soluble in dilute alkalies. The compounds $RO, 2\frac{1}{4}\ SiO_2$ also he found to be decomposable by heat, but the compounds $RO, 1\frac{1}{2}\ SiO_2$ were ascertained to be unchanged by dehydration. (*Ibid.*)

When a dilute acid is added to a weak solution of a silicate there is no immediate precipitation of silica, but after some hours the whole gelatinizes. With sulphuric acid the coagulation comes on soon; but with chlorhydric acid the change is delayed a long time, and the mixture may sometimes even be heated and partially evaporated and still remain liquid. (Ordway, *Am. J. Sci.*, (2.) **32.** pp. 340, 164.) Almost any sample of waterglass may be rendered more siliceous by adding a portion of dilute acid to its aqueous solution, in order to neutralize a part of the base, and then precipitating with alcohol. But in doing this it is necessary to precipitate with alcohol very soon after the addition of the dilute acid; otherwise, under the influence of the neutral salt formed, the silicate gradually undergoes a change of state and finally gelatinizes. Nitric acid is peculiarly suitable for withdrawing the alkali, because the nitrates have less modifying power than most other salts. (*Ibid.*, **33.** 32.)

A solution of waterglass so far diluted as to contain from $\frac{1}{10}$ to $\frac{1}{40}$ pt. of silica solidifies immediately when exactly neutralized with an acid, and forms a solid, transparent jelly. With $\frac{1}{50}$ @ $\frac{1}{100}$ pt. of silica it does not form a jelly till after the lapse of twelve hours; with $\frac{1}{500}$ pt. of silica, no reaction takes place. The slightest excess of acid prevents the formation of the jelly. If a current of carbonic acid gas is passed through a solution containing $\frac{1}{100}$ pt. of silica, no jelly is formed till the liquid has been boiled, or exposed to the air. With sulphate or chlorhydrate of ammonia, a solution of the above strength forms a jelly after a few minutes; a solution containing $\frac{1}{500}$ @ $\frac{1}{1000}$ pt. of silica deposits a few flakes in the course of 24 hours. (Walcker, *Quar. J. Sci.*, (N. S.) **3.** 371 [*Gm.*].) For further details of the action of acids upon solutions of the alkaline silicates, see above, under Silicic Acid.

a′ = Precipitated Waterglass. The hydrated compounds obtained by precipitating aqueous solutions of ordinary waterglass with saline solutions, or with alcohol or wood-spirit, as above described, deserve to be here mentioned under a special heading, although their behavior with solvents has already been alluded to under the preceding title. These hydrates which, as Ordway states, may be regarded as compounds of NaO, SiO_2, with varying amounts of $SiO_2, (HO)_x$ are not only very much more readily soluble in water than ordinary fused waterglass, but they also dissolve in water without decomposition, thereby differing, to a certain extent, from the fused glass, which, when more siliceous than $NaO, 2\frac{1}{4}\ SiO_2$, undergoes partial decomposition in dissolving in pure water, as stated above.

After having been freed from foreign matter by expression, all the precipitates less siliceous than $RO, 4\frac{1}{2}\ SiO_2$, are wholly soluble in cold water. After being exposed to the air for a day or two, in a warm place, they lose 20% or more of their weight, and become dry and hard, but their solubility remains unimpaired. A very hard, precipitated product a little more siliceous than $NaO, 4\frac{1}{2}\ SiO_2$, afforded a clear solution with four times its weight of cold water, being taken up completely except a thin external film of silica. A potash salt, of composition $KO, 4\frac{7}{10}\ SiO_2$, dissolved completely in cold water while new, yielding a perfectly clear solution; but exposure to the air for several days rendered the superficial portions insoluble (Ordway, *Am. J. Sci.*, (2.) **35.** 192; **33.** pp. 32, 30, 34.)

IV.) *Ordinary Glass.* A few facts concerning the action of solvents upon *ordinary glass* may here be cited. The glasses of commerce are mixtures in various proportions of an acid silicate of potash or soda, or of both, with an acid silicate of some one, or more, of the alkaline earths or metallic oxides, the latter being most commonly silicate of lime, but sometimes silicate of lead, as in flint glass, &c. In green bottle-glass the easily fusible silicate of iron replaces in part the fixed alkaline silicate.

Pure silicate of potash or soda, or a mixture of the two, even with a sufficient quantity of silica to form a very infusible glass, would still be attacked by water and acids. Silicate of lime is likewise acted on by acids, but a mixture of it with silicate of potash or soda resists their action much more strongly. Ordinary glass is more easily attacked by water and acids, the greater the excess of potash, soda, baryta, lime, magnesia, or oxide of lead which it contains, an excess of lead rendering it peculiarly liable to be corroded by acids. (Gmelin's *Handbook.*)

Glass, as that of a flask, is decomposed to a considerable extent, by long-continued [several days] boiling with water, a portion of the fixed alkali being dissolved; but when powdered glass is rubbed with distilled water during two hours in a glass mortar, the water remains pure and exhibits no alkalinity. (Scheele, cited by Pelouze, *C. R.*, **43.** 117.) Glass, of alembics, is partially dissolved after long-continued boiling with water. (Lavoisier, *Ibid.*) Water extracts potash or soda from glass, together with a portion of silica, the decomposition taking place with greater ease in proportion as the glass is richer in these alkalies, and more minutely divided, and the temperature of the water higher. The powder filed off from a tube of white glass reddens moistened turmeric-paper. (Bischof, *Kastner's Archiv.*, **1.** 443 [*Gm.*].) Finely pounded plate-glass acts in a similar manner. (Faraday, *Pogg. Ann.*, **18.** 569 [*Gm.*].) Fuchs (*Kastner's Archiv.*, **5.** 396 [*Gm.*]) says that with pure quartz and pure potash an insoluble glass cannot be prepared. "For if we take two parts of quartz to one of potash, we obtain — as I have convinced myself — a glass which partly dissolves in water." This mixture would make about $KO, 5\ SiO_2$. "Besides, even glass containing lime is more or less attacked by boiling water, as has long been known, and as Scheele especially proved. I found that many a glass, when it is rubbed a long time in an agate mortar, reacts very sensibly alkaline, and that when finely powdered glass is boiled for many hours with water, a fluid is obtained which has an alkaline reaction, and gives a flocculent precipitate with sal-ammoniac." (Cited by Ordway, *Am. J. Sci.*, (2.) **32.** 162.) Water does not act upon all kinds of glass; but there are, nevertheless, many kinds that it tends to decompose into a soluble alkaline silicate, and an insoluble earthy and alkaline silicate. Window-glass, and other varieties of analogous composition, are altered in this manner, and to a very considerable extent, by boiling water, as was long ago noticed by Scheele. Hence water which is boiled for a long time in glass vessels becomes alkaline, and also cloudy, owing to the insoluble earthy silicate, which is a residue of the action, and, being detached from the walls of the vessel, remains suspended in the water. This effect is even so pronounced upon crown-glass, and some varieties of window-glass, &c., that it is only necessary to reduce them to fine powder, and place this in contact with cold water, in order to obtain an alkaline reaction. (Dumas, *Tr.*, **6.** 428.) An alkaline reaction is exhibited by the powder of bottle-glass, and also of devitrified glass formed from it; of plate-glass, crown-glass, flint-glass, and white enamel. After sufficient washing, it no longer reddens turmeric-paper, unless it be recrushed in a mortar. 100 pts. of finely divided flint-glass, boiled for a week with water, lose 7 pts. of potash, which may be recovered in the solid state by evaporation. (Griffiths, *Quar. J. Sci.*, **20.** 258 [*Gm.*].) The moisture in the atmosphere produces a similar alteration, separating the potash and soda, and leaving the greater part of the silica with the lime on the surface of the glass. (Griffiths.) Retorts of ordinary glass, and those of flint-glass, are partially dissolved when water is evaporated in them. (Chevreul, 1811, cited by Pelouze, *C. R.*, **43.** 118.) Flint-glass, green bottle-glass, green German glass, and hard, white Bohemian glass, when finely powdered in an agate mortar, and treated with distilled water at the ordinary temperature, all exhibit well-marked alkaline reactions. (W. B. & R. E. Rogers, *Am. J. Sci.*, 1848, (2.) **5.** 401.) All the varieties of glass which occur in commerce, — such as mirror and window-glass, bottle-glass, crystal, flint-glass, and the other glasses employed for optical instruments, — when reduced to fine powder and left in contact with the air decompose slowly, with absorption of carbonic acid, so that after a little time they effervesce with acids. The same effervescence is produced when an acid is added to a mixture of powdered glass and water which has been exposed to the air during several days; the acid solution thus obtained contains a large quantity of soda and lime, also almost always some sulphuric acid from a trace of sulphate of soda contained in the glass. All glasses, when in fine powder, exhibit an immediate alkaline reaction with colored vegetable solutions; this is a consequence of their instantaneous alteration by water. Powdered glass which has been acted upon by cold water is further decomposed by boiling water, as is noted below. Devitrified glass behaves with water like ordinary glass, only it appears to be still more easily decomposed. (Pelouze, *C. R.*, 1856, **43.** pp. 121, 122.)

While water only acts with excessive slowness upon vessels of glass in which it is boiled, and with infinitely less energy upon these vitreous surfaces when it is cold, it is nevertheless capable of decomposing powdered glass with an extraordinary facility. Thus a phial of about 500 c. c. capacity lost scarcely 0.1 grm. of its weight after water had been boiled in it during five days, but when the neck of this phial was cut off, reduced to powder and boiled in the same vessel during the same space of time, decomposition occurred to the extent of one third the weight of the phial. On the other hand, a vessel which might have held water for years without experiencing any sensible loss of weight, at once undergoes a decomposition representing 2 @ 3% of its weight, if, after having reduced it to powder, it be placed in contact with cold water during a few minutes. A sample of the best commercial white glass, which afforded, on analysis, 72.1% of silica, 12.4% of soda, 15.5% of lime, — [8 Na O, 11 Ca O, 48 Si O_2,] — together with traces of alumina and oxide of iron, having been reduced to powder and ground very finely upon an agate plate, 5.51 grms. of it were boiled with distilled water in a porcelain dish, the water being renewed as it evaporated. The clear liquid obtained from this treatment being evaporated to dryness, the ignited residue weighed 0.175 grm. [= 3.18%]. The portion insoluble in water, which effervesced with dilute acids, contained 0.078 grm. of lime, a weight corresponding to 1.5% of the glass employed. As the glass in question contained 15% of lime, we may conclude that water decomposes about 10% of the glass. Of another sample of first quality glass which contained 77.3% of silica, 16.3% of soda, 6.4% of lime, — [8 Na O, 4 Ca O, 39 Si O_2], — and traces of alumina and oxide of iron, 5.18 grms. were taken, the experiment being conducted as the foregoing instance. There was obtained 0.945 grm. [= 18 24%] as the residue of the aqueous solution, and 0.103 grm. as the weight of lime, i. e. 2% of the weight of the glass employed. As the glass contained 6.4% of lime, it follows that 32% of the glass was destroyed in this second experiment. The residue of the aqueous solution being analyzed was found to contain 0.281% of soda, or 5.6% of the weight of the glass employed, the remainder being silica. As the glass contained 16.3% of soda, this result would indicate that 34% of the glass had been attacked. In spite of the difference of 2% between the numbers derived from the soda and the lime, it may safely be affirmed that all the basic portion of the glass is extracted from the portion destroyed, and that by a sufficiently prolonged action, nothing but silica would be left if an exceedingly fine powder were operated upon. After five days' ebullition, a sample of ordinary glass, similar to that first mentioned, had undergone decomposition to the extent of one third of its weight, — the silicate of soda given up to the water having in each case the formula 4 Na O, 9 Si O_2. Crystal, in fine powder, having been agitated during a few instants with cold water mixed with a very small quantity of acid, affords a precipitate of sulphide of lead when treated with sulphuretted hydrogen. After half an hour's ebullition with water and the addition of an acid, 5 grms. of powdered crystal furnished 0.05 grm. of sulphide of lead, a figure which corresponds with the decomposition of about 3% of the crystal. Flint-glass, which contains more lead than crystal, experiences a still more considerable decomposition. The extraordinary rapidity and ease with which powdered glass is decomposed, as compared with the great stability of vessels and other objects of moulded or blown glass, might almost lead one to ask whether the latter were not in a peculiar condition, possessing properties different from those of the former; but this is improbable, in view of the stability of the surfaces of "polished" glass, i. e. those in which the natural surface has been removed. And it appears to be more simple to refer these differences to different conditions of cohesion and mechanical resistance. The multiplicity of surfaces and facility of movement of powdered glass hasten its alteration by water. (Pelouze, *C. R.*, 1856, **43.** pp. 119 - 123.) When finely powdered

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glass — for example, flint-glass, green bottle-glass, hard, white Bohemian glass, or green German glass — is treated for a few moments at the ordinary temperature with carbonic acid water, it is partially decomposed and dissolved. (W. B. & R. E. Rogers, *Am. J. Sci.*, 1848, **5.** 401.) When finely powdered glass is boiled with water through which a current of carbonic acid is caused to pass, this gas is absorbed, and in a few instances the powder effervesces when treated with acids. (Pelouze, *C. R.*, 1856, **43.** 121.) When boiled during several hours with sulphate of lime, powdered glass produces a notable quantity of sulphate of soda. (Pelouze, *C. R.*, **43.** 121.)

The acids act upon glass with more or less facility. Fluorhydric acid especially attacks all kinds of glass quickly and easily, a hot concentrated solution of phosphoric acid likewise decomposes every variety; the other acids also tend to decompose glass, abstracting the bases and setting free the silica. Many of the green bottle-glasses, which resist the action of wine, are strongly attacked by nitric, chlorhydric, and sulphuric acids. Bottle-glass which contains too much alumina is one of the kinds most easily attacked by acids; glass of this sort sometimes occurs which is so quickly acted upon by the bitartrate of potash contained in wine that its alteration may even be appreciated after the lapse of a few days; besides the corrosion of the bottle itself and the deposition of salts, the alumina salt formed enters into solution, discolors the wine, and communicates to it a disagreeable taste. (Dumas, *Tr.*, **6.** 430, and *Gm.*) On pounded glass the acids act with much greater energy. From pulverized flint-glass, boiling chlorhydric acid extracts potash only, not the oxide of lead. (Griffiths.) Glass which is poor in silica is attacked by boiling concentrated sulphuric acid; and glass of yet inferior quality is acted on by boiling chlorhydric and nitric acids, and aqua-regia, a dull spot remaining after the evaporation of the acid. (Berzelius.) In distilling chlorhydric acid from a green glass retort, a portion of the latter was dissolved. (Hess, *Pogg. Ann.*, **20.** 540 [*Gm.*].) Glasses which contain lead are the more readily attacked by acids in proportion as they are richer in lead; a good quality of crystal resists them very well. So too with window-glasses, when too strongly alkaline they are attacked very readily, but when well made they withstand the acids. When a glass has been *dépoli* by exposure to a dull, red heat, it is sure to be attacked by acids when treated therewith. (Dumas, *Tr.*, **6.** 431.) Glass is attacked not only by the vapor of fluorhydric acid, but also by the vapor of sulphuric acid, and with more or less energy by the vapors of all acids. (J. Nicklès, *C. R.*, 1857, **44.** pp. 680, 681.) Many ammonia salts containing the stronger acids also attack glass, especially lead glass, when heated in contact with it; such is the case with a mixture of chloride of ammonium and nitrate of ammonia (Silliman), or with sulphate or bisulphate of ammonia. (Marchand, *Pogg. Ann.*, **42.** 556 [*Gm.*].) Glass dissolves with various degrees of readiness in a hot solution of caustic potash. (Lœwitz.)

Solutions of potash and soda decompose glass to a certain extent, dissolving out the silica with greater ease in proportion as they are more concentrated and hotter; even at ordinary temperatures they partially dissolve the white glass bottles and other vessels in which they are ordinarily kept, frequently causing the glass to crack. (Gmelin, in his *Handbook*, **3.** pp. 384, 14.) Even ammonia-water attacks many kinds of glass. A bottle made of flint-glass, and containing a solution of carbonate of ammonia, became so fragile that, on shaking it, pieces of glass were detached. (Griffiths.)

Silicate of Strontia. Containing 3 equivalents of strontia is sparingly soluble in water, but readily soluble in dilute acids. (Vauquelin.)

Silicate of Thoria. Occurs as the mineral $2\,ThO, SiO_2 + 2\,Aq$ *Thorite.* After having been ignited, this is scarcely at all acted upon by chlorhydric acid; but when unignited, it is completely decomposed by hot chlorhydric acid, with separation of gelatinous silica. (Berzelius, *Pogg. Ann.*, 1829, **16.** 388.)

Silicate of Zinc.

I.) *basic.*

$a = 2\,ZnO, SiO_2$ Occurs as the mineral *Willemite,* which is soluble, for the most part, in an aqueous solution of caustic potash, and dissolves readily in acids with separation of a siliceous jelly.

$b = 2\,ZnO, SiO_2 + Aq$ Occurs as the mineral *Calamine.* Readily soluble in acids, even in acetic acid, with separation of a siliceous jelly. Soluble, for the most part, in potash lye.

Silicate of Zirconia.

I.) *basic.* Occurs as *Zircon*, or *Hyacinth.* Is $2\,Zr_2O_3, 3\,SiO_2$ not decomposed by acids, not even by fluorhydric acid; hot concentrated sulphuric acid, however, acts upon it slightly. (Berzelius.)

Silicide of Bismuth.

Silicide of Iron. Insoluble in hot water. Soluble, with decomposition, in acids, even in hydrofluosilicic acid. (Berzelius.)

Silicide of Platinum. Less easily soluble than platinum in aqua-regia. (Boussingault.)

Silicide of Potassium. Decomposed by water. (Berzelius.)

SilicoFluoride of *X.* *Vid.* FluoSilicate of *X.*

Silicon. (*Silicium.*)

I.) *pulverulent.*

a = recently prepared. Insoluble in and unacted $Si + x\,Aq$ upon by water, sulphuric, or nitric acid, or aqua-regia, even when boiled with them. But is dissolved even in cold liquid fluorhydric acid and in a warm concentrated aqueous solution of caustic potash. (Berzelius, *Lehrb.*, **1.** 323.)

β = ignited. Unacted upon by fluorhydric acid, or by potash lye, even when these are boiling, but is very easily dissolved by a mixture of nitric and fluorhydric acids. (Berzelius, *Ibid.*)

II.) *graphite-like.* Unacted upon by any acid. Slowly, but completely, soluble in tolerably concentrated warm potash or soda lye, with evolution of hydrogen. (Wœhler.)

III.) *amorphous.* After ignition it is insoluble in all acids, but dissolves in potash or soda lye.

Siliciuretted Hydrogen. Insoluble in pure water free from air, in an aqueous solution of chloride of sodium, or in dilute chlorhydric or sulphuric acid. Decomposed by a solution of potash. (Wœhler & Buff, *Ann. Ch. u. Pharm.*, **103.** 224.)

Silver. Unacted upon by water. Insoluble Ag in the vegetable acids. Insoluble in dilute sulphuric or phosphoric acid. Only slightly attacked by boiling chlorhydric acid, but a mixture of chlorhydric and arsenic acids attacks it

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vigorously. Warm concentrated iodhydric acid, on the other hand, dissolves it with evolution of hydrogen, though it is insoluble in dilute iodhydric acid. Nitric acid dissolves it even in the cold. Soluble in hot concentrated sulphuric acid, in cold fuming sulphuric acid, and in arsenic acid.

Iodhydric acid attacks silver with extraordinary energy, hydrogen being evolved. After the action has ceased at the ordinary temperature, because the acid is saturated with iodide of silver, it may be reincited by heating the mixture. (H. Deville, *C. R.*, 1856, **42.** 895.) A warm concentrated solution of iodide of potassium converts it into iodide of silver, which dissolves in the excess of iodide of potassium.

Silver is not attacked by pure dilute nitric acid (of 1.405 sp. gr., or less) so long as the temperature is low. It is attacked, however, by dilute nitric acid which contains nitrous acid. In pure concentrated nitric acid the silver is soon covered with a gray or white coat, which arrests further action. [Compare Copper.] (Millon, *Ann. Ch. et Phys.*, (3.) **6.** 98.) Slightly soluble at the ordinary temperature in an aqueous solution of sulphate of sesquioxide of iron, and more readily if this contain free sulphuric acid (Wetzlar, *Schweigger's Journ. für Ch. u. Phys.*, 1828); more readily soluble in a boiling solution of persulphate of iron, dissolving completely, even when the solution is made as nearly neutral as possible by the introduction of hydrated sesquioxide of iron; in this reaction a portion of the sesquioxide of iron is reduced to protoxide. Completely insoluble in, and unacted upon, by a boiling aqueous solution of pure sulphate of protoxide of iron; but if even a slight quantity of sesquioxide of iron be present in the solution, silver will dissolve in it on boiling, though in presence of so much protoxide of iron a portion of the silver is reduced to the metallic state as the solution cools. (A. Vogel, *J. pr. Ch.*, 1840, **20.** 362.) When boiled in an aqueous solution of protochloride of mercury, the latter is reduced to dichloride, which is precipitated together with the insoluble chloride of silver which forms. (A. Vogel, *J. pr. Ch.*, 1840, **20.** 365.)

Sinamin. Easily soluble in water, alcohol, and ether. (Robiquet & Bussy; Will.)
(*Allyl Cyanamin.*)
$C_8\,H_6\,N_2 = N\left\{\begin{matrix}C_6\,H_5\\C_2\,N\\H\end{matrix}\right.$ & + Aq

Sinapic Acid. Very slowly soluble in cold, somewhat more readily soluble in boiling water, and alcohol. Insoluble in ether. Almost insoluble in acids. Easily soluble with combination in alkaline solutions. (V. Babo & Hirschbrunn.)
$C_{22}\,H_{12}\,O_{10}$

The alkaline salts of sinapic acid are readily soluble in water, those of the alkaline earths are difficultly soluble; most of the sinapates are very easily decomposed.

Sinapate of Ammonia. Readily soluble in water.

Sinapate of Baryta. Difficultly soluble in water.
$C_{22}\,H_{10}\,Ba_2\,O_{10}$

Sinapate of Potash. Soluble in water. Insoluble in absolute alcohol.

Sinapate of Soda. Soluble in water.

"**Sinapin**" (of Berzelius). *Vid.* SulphoCyanhydrate of Sinapin.

Sinapin. Soluble in water, but the aqueous solution is decomposed on evaporating it. (V. Babo & Hirschbrunn.)
$C_{32}\,H_{23}\,N\,O_{11}$

Sinapolin. Soluble in water, abundantly at the temperature of boiling, in alcohol, and ether. Readily soluble, without decomposition, in cold concentrated sulphuric acid; also soluble in other acids, from which it is precipitated by ammonia. (Simon; Will.) It is neither dissolved nor decomposed by potash lye.
(*DiAllyl Urea. Cyanate of diAllylammonium.*)
$C_{14}\,H_{12}\,N_2\,O_2 = N_2\left\{\begin{matrix}C_2\,O_2''\\(C_6\,H_5)_2\\H_2\end{matrix}\right.$

SinEthylamin. *Vid.* EthylSinamin.

Sinkalin. Exceedingly deliquescent. Soluble in water. (V. Babo & Hirschbrunn.)
(*Sincalin.*)
$C_{10}\,H_{13}\,N\,O_2$

Sipeerin. *Vid.* Sepeerin.

Smilacin (from *Smilax Sarsaparilla*). Readily soluble in boiling, less soluble in cold water, and alcohol. Soluble in ether and the volatile oils, less soluble in the fatty oils. Also soluble in dilute alkaline solutions and in dilute acids.
(*Pariglin. Sarsaparillin.*)
$C_{16}\,H_{15}\,O_6$? or $C_{18}\,H_{15}\,O_6$?

Soaps. In ordinary language, the term soap is applied to mixtures of various compounds of the fatty acids with alkaline bases; but sometimes the term is made to include the compounds of fatty acids with other metallic oxides. Taking it in the most general sense, it may be said that all soaps, excepting those of potash, soda, ammonia, (and lithia?), are insoluble in water, and but difficultly soluble or insoluble in alcohol. The ordinary soaps, however, i. e. those with an alkaline base, are readily soluble in boiling water and in boiling alcohol. When the moderately concentrated aqueous solution is treated with a large excess of water the soap is decomposed, an acid salt separates out, while an equivalent quantity of the alkaline base remains in solution. The soaps most commonly employed are mixtures, in variable proportions, of the stearates, margarates, palmitates, and oleates of soda or of potash. Those in which the base is soda are always more consistent and less readily attacked by water than the potash soaps. On the other hand, those soaps in which the oleates predominate are less consistent than those containing more of the solid fatty acids.

The alkaline soaps are insoluble in aqueous solutions of sebate of potash or sebate of soda, — as they are in solutions of chloride of sodium. (Bouis, *Ann. Ch. et Phys.*, (3.) **48.** 165.)

Soaps *of the protoxide* **of Iron** are soluble in oil of turpentine, and the other essential oils.

Soda. *Vid.* Oxide of Sodium.

Sodium. Decomposed by water, alcohol, wood-spirit, ether, and in general by all oxygenated substances. Insoluble in naphtha, &c.
Na

The compounds of sodium are nearly all readily soluble in water, except the antimoniate, tartrate, fluorhydrate, and picrate, which are somewhat sparingly soluble.

Sodiumamid. Decomposed by water, and alcohol.
$N\left\{\begin{matrix}H_2\\Na\end{matrix}\right.$

*Tri***Sodiumamid.** *Vid.* Nitride of Sodium.
$N\left\{Na_3\right.$

SodiumEthyl. Not isolated.
$C_4\,H_5\,Na$

SodiumEthyl with ZincEthyl. Decomposed by water. Soluble in zincethyl.
$C_4\,H_5\,Na\,;\;2\,C_4\,H_5\,Zn$

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Solanin. Permanent. Sparingly soluble in cold water, alcohol, ether, and the fatty and essential oils. Soluble in boiling alcohol. Soluble in concentrated sulphuric and nitric acids.

$C_{42}H_{35}NO_{14} = N\left\{\begin{matrix}C_{42}H_{33}O_{14}\\H_2\end{matrix}\right.$

The salts of solanin are generally readily soluble in water, and spirit.

"**Sorbic Acid**" (of Donovan). See **Malic Acid.**

Sorbic Acid. Almost insoluble in cold, tolerably soluble in boiling water. Easily soluble in alcohol, and ether. The most convenient solvent is a mixture of 1 vol. alcohol and 2 vols. water. (Hofmann.)

$C_{12}H_8O_4 = C_{12}H_7O_3, HO$

Sorbate of Ammonia.

Sorbate of Baryta. Less soluble in alcohol than in water.

$C_{12}H_7BaO_4$

Sorbate of Copper. Ppt.

Sorbate of Ethyl.

$C_{12}H_7(C_4H_5)O_4$

Sorbate of Lead. Ppt.

Sorbate of Lime. Resembles the baryta salt.

$C_{12}H_7CaO_4$

Sorbate of Manganese. Ppt.

Sorbate of Nickel. Ppt.

Sorbate of Potash. Very soluble in water.

Sorbate of Silver. Insoluble in water.

$C_{12}H_7AgO_4$

Sorbate of Soda. Very soluble in water.

Sorbate of Zinc. Ppt.

Sorbinic Acid. Insoluble in water, alcohol, or feeble acids. Very readily soluble in aqueous solutions of caustic potash, soda, and ammonia. (Pelouze, *Ann. Ch. et Phys.*, (3.) **35.** 227.)

$C_{32}H_{17}O_{15} = C_{32}H_{13}O_{11}, 3HO + Aq$

Sorbinate of Alumina. Ppt.

Sorbinate of Ammonia. Soluble in water.

Sorbinate of Baryta. Ppt.

Sorbinate of Cobalt. Insoluble in ammonia-water.

Sorbinate of Copper. Soluble in ammonia-water.

Sorbinate of Gold. Ppt.

Sorbinate *of sesquioxide* **of Iron.** Ppt.

Sorbinate of Lead.

$C_{32}H_{13}Pb_2O_{15}$

Sorbinate of Lime. Ppt.

Sorbinate of Nickel. Soluble in ammonia-water.

Sorbinate of Platinum. Ppt.

Sorbinate of Potash. Soluble in water.

Sorbinate of Soda. Soluble in water.

Sorbinate *of protoxide* **of Tin.** Ppt.

Sorbin (from *Sorbus aucuparia*). Soluble in about 0.5 pt. of water. Very sparingly soluble in boiling and still less soluble in cold alcohol. Unaltered by dilute, but is decomposed by strong, sulphuric acid. (Pelouze, *Ann Ch. et Phys.*, (3.) **35.** 225.) The aqueous solution, saturated at 15°, is of 1.372 sp. gr.

(*Sorbite.*)

$C_{12}H_{12}O_{12} = \left.\begin{matrix}C_{12}H_{10}O_8''\\H_2\end{matrix}\right\}O_4$

Sorbin with Oxide of Lead. Ppt.

SpanioLitmin. Only sparingly soluble in water. Insoluble in alcohol or ether. Soluble in alkaline solutions. (Kane.)

$C_{18}H_{17}O_{16}?$

Spartein. Very sparingly soluble in water, but a little water is dissolved by it. Readily soluble in alcohol, and ether. Soluble, with combination, in dilute acids. Decomposed by hot chlorhydric and nitric acids.

$N\left\{C_{16}H_{13}'''\right.$

The salts of spartein are soluble in water.

Spermaceti. *Vid.* Palmitate of Cetyl.

Spermatin. Easily soluble in water. Insoluble in alcohol or ether. Soluble in cold concentrated sulphuric acid, from which it is precipitated on the addition of water. Soluble in warm nitric acid, from which it is precipitated on the addition of water. In concentrated acetic acid it swells up, and when the mixture is treated with water and boiled it dissolves.

Spiræin (yellow coloring matter of the flowers of *Spiræa ulmaria*). Insoluble in water. Readily soluble in alcohol, and ether. Soluble in concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water. Soluble in warm concentrated nitric acid, by which it is altered only after prolonged ebullition. Insoluble in chlorhydric acid. Soluble in aqueous solutions of the caustic alkalies.

$C_{42}H_{24}O_{20}(?)$

Spirin. *Vid.* BenzoSalicyl.

Spirite of *X*. *Vid.* Salicylite of *X*.

Spirol. *Vid.* Phenic Acid.

Spirous Acid. *Vid.* Salicylous Acid.

Spiroylic Acid. *Vid.* Salicylic Acid.

Sponge (organic matter of the). Insoluble in water, alcohol, ether, ammonia-water, or dilute chlorhydric acid. Soluble in boiling concentrated chlorhydric acid, and partially soluble in nitric acid. Also soluble in boiling baryta-water.

Stann(*ous*)**Amyl.**

$\left.\begin{matrix}C_{10}H_{11}Sn\\C_{10}H_{11}Sn\end{matrix}\right\}$

Stann(*ic*)**Amyl.**

(*BistannAmyl.*)

$\left.\begin{matrix}C_{10}H_{11}Sn_2\\C_{10}H_{11}Sn_2\end{matrix}\right\}$

III.) $\frac{2}{2}$ *or methylene stannamyl.*

$(C_{10}H_{11})_2Sn_2$

IV.) $\frac{2}{3}$ *or methstannamyl.*

$(C_{10}H_{11})_3Sn_2$

The stannamyls are all insoluble in water; they are the less soluble in alcohol in proportion as they contain more tin; they are all readily soluble in ether.

V.) $\frac{2}{4}$ *or methstannbiamyl.* Readily soluble in alcohol, and ether.

$(C_{10}H_{11})_4Sn_2$

Stannic Acid. *Vid. bin*Oxide of Tin.

SnO_2

All the soluble stannates and metastannates are precipitated from their aqueous solutions on the addition of salts of potash, soda, or ammonia. All the metastannates, excepting those of potash, soda, and ammonia, are insoluble in water. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** pp. 474, 484.)

Stannate of Ammonia. Soluble in pure water. Insoluble in dilute ammonia-water. (Berzelius.)

$NH_4O, 2SnO_2$

*Meta***Stannate of Ammonia.** Soluble in water, from which solution it is precipitated on the addition of alcohol. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 474.)

Stannate of Baryta. Ppt.

$BaO, SnO_2 + 6Aq$

*Meta***Stannate of Baryta.** Insoluble in water. (Fremy, *loc. cit.*, p. 477.)

Stannate *of sesquioxide* **of Chromium.**

Stannate of Cobalt.

Stannate *of dinoxide* **of Copper.**

Stannate *of protoxide* **of Copper.** Ppt.
$Cu\,O, Sn\,O_2 + 3\,Aq$

Stannate of Gold. Insoluble in water. Insoluble in dilute chlorhydric acid. (Berzelins.) Slowly acted upon by boiling chlorhydric acid, with solution of some tin. (Proust; Fuchs.) Boiling nitric acid dissolves out some of the tin (Proust), as does also boiling dilute sulphuric acid. Aqua-regia dissolves out gold, leaving white oxide of tin. Chlorhydric acid dissolves out tin, leaving metallic gold. (Berzelius's *Lehrb.*) While still moist, purple of Cassius is generally soluble in ammonia-water, from which solution the purple is gradually redeposited, but some samples prepared from hydrated sesquioxide of tin and a solution of terchloride of gold or by dissolving an alloy of gold, silver, and tin in nitric acid, are insoluble in ammonia-water, even while they are yet moist; after drying, the purple is always insoluble in ammonia.
(*Purple of Cassius.*)
$Au\,O, 3\,Sn\,O_2 + 4\,Aq$

As ordinarily precipitated, purple of Cassius contains an excess of uncombined binoxide of tin, but this may be dissolved out by boiling the precipitate in an aqueous solution of caustic potash. The precipitate which has been thus treated dissolves in part in cold water, or rather a quasi-solution is produced, forming a strongly colored liquid, from which it may be completely reprecipitated by the addition of a little chloride of ammonium. (L. Figuier, *Ann. Ch. et Phys.*, (3.) **11.** 353.)

Stannate of Lead. Ppt. (Berzelius's *Lehrb.*) Appears to be somewhat soluble. (Moberg.)
$Pb\,O, Sn\,O_2$

Stannate of Lime. Ppt. Difficultly soluble in water. (Berzelius's *Lehrb.*)
$Ca\,O, Sn\,O_2 + 4\,Aq$

Stannate of Magnesia. Ppt.

Stannate of Manganese. Ppt. Oxidizes when exposed to the air.
$Mn\,O, Sn\,O_2$

Stannate *of dinoxide* **of Mercury.** Ppt.
$Hg_2\,O, Sn\,O_2 + 5\,Aq$

Stannate *of protoxide* **of Mercury.** Ppt.
$Hg\,O, Sn\,O_2 + 6\,Aq$

Stannate of Potash.

I.) *proto.* Easily soluble in water. (Moberg.) Insoluble in an aqueous solution of chloride of potassium. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 469.) Slightly hygroscopic. Very soluble in water, but water appears to decompose it after a time, a gelatinous metastannate being formed. Insoluble in alcohol. It is precipitated from its aqueous solution on the addition of almost any soluble salt, — notably by the salts of ammonia, of potash, and of soda. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 484.) On fusing calcined oxide of tin with hydrate of potash, and treating the mass with water, crystals of stannate (*a*) of potash may be obtained. These are completely soluble in water. Also easily and completely soluble in alcohol. The aqueous solution is not rendered cloudy on the addition of a solution of potash. Nor is it precipitated on the addition of solutions of the chlorides of sodium, or potassium, or of sulphate of potash. A solution of chloride of ammonium occasions no precipitate at first, but forms an abundant precipitate after a time. In presence of dilute sulphuric acid, chlorhydric, or nitric acid, the solution remains clear. (H. Rose, *Tr.*, **1.** 251.) When prepared by dissolving hydrate of tin in a solution of caustic potash it is difficultly soluble in a concentrated aqueous solution of caustic potash. (H. Rose, *Tr.*, **1.** 245.)
$K\,O, Sn\,O_2$

II.) *acid.* Soluble in water, forming a milky liquor. Insoluble in alcohol. (Berzelius.)

*Meta***Stannate of Potash.** Generally it is soluble in water, but is liable to become insoluble in water when merely dried at the ordinary temperature. Alcohol precipitates it from the aqueous solution. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 474.) Soluble in water. Completely insoluble in a large excess of an aqueous solution of caustic alkali. Insoluble in alcohol. (Fremy, *loc. cit.*, (3.) **23.** 394.) On adding a solution of chloride of sodium to the aqueous solution an abundant precipitate is produced, and no tin remains in solution; solutions of the chlorides of potassium and ammonium and of sulphate of potash behave in the same way, but on washing these precipitates with water they dissolve. (H. Rose, *Tr.*)
$K\,O, Sn\,O_2 + 4\,Aq$
($K\,O, Sn_5\,O_{10}$, according to Fremy.)

Stannate of Silver. Unacted upon by ammonia-water, or boiling chlorhydric acid. (Fischer.)

*Meta***Stannate of Silver.** Insoluble in water. (Fremy.)

Stannate of Soda. Soluble in water. (Moberg.) Insoluble in an aqueous solution of chloride of sodium. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 469.) Much more soluble in *cold* than in hot water. Insoluble in alcohol. It is precipitated from the aqueous solution on the addition of salts of potash, of soda, or of ammonia. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** pp. 486, 484.) When a certain amount of alcohol is added to an aqueous solution of stannate of soda, a concentrated aqueous solution of the latter is thrown down; but when a larger quantity of alcohol is employed crystals separate. (Ordway, *Am. J. Sci.*, (2.) **33.** 35.)
$Na\,O, Sn\,O_2$

*Meta***Stannate of Soda.** While still moist it is soluble in water; but by drying it is decomposed and becomes insoluble. Alcohol precipitates it from the aqueous solution. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 477.) Very difficultly soluble in water. Insoluble in alcohol. Completely insoluble in a large excess of an aqueous solution of caustic alkali. (Fremy, *loc. cit.*, (3.) **23.** pp. 394, 399.)
$Na\,O, Sn\,O_2 + 4\,Aq$
($Na\,O, Sn_5\,O_{10}$ of Fremy.)

*Meta***Stannate of Strontia.** Insoluble in water. (Fremy.)

*Meta***Stannate of Tin.** Insoluble in water. Soluble, with decomposition, in acids and in alkaline solutions. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 479.)
(*Yellow oxide of Tin.*)
$Sn\,O, Sn\,O_2 + 3\,Aq$

Stannate of Zinc.
$Zn\,O, Sn\,O_2 + 2\,Aq$

Stann(*ous*)**Ethyl.** Insoluble in water. Sparingly soluble in absolute alcohol. Readily soluble in ether. (Lœwig; Frankland.) Very easily soluble in alcohol. (Cahours.)
(*MethyleneStannEthyl. EthyleneStannEthyl.*)
$$\left.\begin{matrix}C_4\,H_5\,Sn\\C_4\,H_5\,Sn\end{matrix}\right\}$$

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STANN(*ic*)*di*ETHYL. (*StannicEthide.*) $Sn(C_4H_5)_2$ Nearly insoluble in water. Sparingly soluble in alcohol. Readily soluble in ether. Unacted upon by concentrated acids at the ordinary temperature, but when heated therewith it is decomposed. (Buckton.)

***Bi*STANN(*ic*)*tri*ETHYL.** (*MethyloStannEthyl. SesquiStannEthyl.*) $Sn_2(C_4H_5)_3$ Insoluble, or but sparingly soluble, in alcohol. (Cahours.) Lœwig enumerated seven different StannEthyls, viz.:

a = Ordinary StannEthyl = $Sn\,C_4H_5$ (*vid. sup.*)
b = Methylene, or $\frac{2}{2}$ do. = $Sn_2(C_4H_5)_2$
c = Ethelene or
Elayl, or $\frac{4}{4}$ do. = $Sn_4(C_4H_5)_4$
d = Aceto, or $\frac{4}{3}$ do. = $Sn_4(C_4H_5)_3$
e = Methylo, or $\frac{2}{3}$ do. = $Sn_2(C_4H_5)_3$
f = Ethylo, or $\frac{4}{5}$ do. = $Sn_4(C_4H_5)_5$
g = $\frac{6}{4}$ do. = $Sn_6(C_4H_5)_4$

All of which are insoluble in water. Sparingly soluble in absolute alcohol. Soluble in ether. Some of the oxides of the compounds are insoluble in water, alcohol, or ether, while others, sparingly soluble in water, are readily soluble in alcohol and ether.

Strecker, on the other hand, refers all of these compounds to three separate radicals, viz.:

StannEthyl = $Sn\,C_4H_5$ or $\left\{\begin{matrix}C_4H_5Sn\\C_4H_5Sn\end{matrix}\right.$ as given above.

Bi Stann Ethyl = $Sn_2(C_4H_5)$

Bi Stannic tri Ethyl, or Methylo Stann Ethyl $\left.\begin{matrix}\\\end{matrix}\right\}$ = $Sn_2(C_4H_5)_3$ as given above.

According to Strecker's view the bodies *a*, *b*, and *c* in the above list are identical. *f* is a mixture of *a* and *e*. While *d* is a mixture of *a*, with bistannethyl. (See *Gmelin's Handbook*, **13.** 505.)

***Sesqui*STANNETHYL.** *Vid.* *Bi*Stann(*ic*)*tri*-Ethyl.

STANNETHYLIUM. *Vid.* StannEthyl.

STANN(*ic*)ETHYLMETHYL.
(*StannicEthyloMethide.*)
$Sn\left\{\begin{matrix}C_2H_3\\C_4H_5\end{matrix}\right.$

STANNICETHIDE. *Vid.* Stann(*ic*)*bi*Ethyl.

STANNICETHYLMETHIDE. *Vid.* Stann(*ic*)-EthylMethyl.

STANNIDE OF METHYL. *Vid.* StannMethyl.

STANNITE OF POTASH.

STANNITE OF SODA.

STANNMETHYL.
$\left.\begin{matrix}C_2H_3Sn\\C_2H_3Sn\end{matrix}\right\}$

STAPHISAIN (from *Delphinium Staphisagria*). Sparingly soluble in water. Soluble in absolute alcohol. Insoluble, or but sparingly soluble, in ether. Soluble in acids.

STARCH. (*Amylum.*) $C_{12}H_{10}O_{10} = \left.\begin{matrix}C_{12}H_8O_6''\\H_2\end{matrix}\right\}O_4$ When in its natural state of aggregation it is insoluble in cold water, alcohol, or ether. In hot water it swells up to a paste, and when boiled with much water appears to dissolve; but if the liquor thus obtained be exposed to temperatures below 0°, the water in congealing will deposit the starch, which regains a certain aggregation, and cannot be dissolved in water at the ordinary temperature; by long-continued boiling with water starch is converted into dextrin. When treated with dilute acids, it forms a paste in the cold, and when boiled with them is converted into dextrin and sugar. Strong acids disaggregate and decompose it much more rapidly, with the single exception of acetic acid, which, when concentrated, has no action upon it, and but little when it is diluted.

When covered with concentrated chlorhydric acid, and allowed to stand during several days, it dissolves. (Leuchs, *J. pr. Ch.*, 1841, **22.** 511.) Starch is dissolved, with decomposition, by sulphuric, nitric, chlorhydric. and oxalic acids, and probably by other acids (excepting acetic acid) in the cold, if the acid be concentrated, and gradually by the aid of heat and pressure when the acid is very dilute. (Biot, *Ann. Ch. et Phys.*, (3.) **11.** 101.) It is even gradually disaggregated and rendered soluble by the action of water containing only $\frac{2}{1000}$ of oxalic acid, if it be strongly heated therewith in a closed vessel. (Jacquelain, *Ann. Ch. et Phys.*, (3.) **11.** 102.)

By the action of water at 150° starch is converted into dextrin and sugar. The same change is brought about, after a time, by dilute acids at the temperature of boiling. Concentrated sulphuric acid changes it to dextrin. When starch paste is treated with dilute sulphuric acid, glacial acetic acid, or better with ordinary acetic acid, it liquefies and passes into another molecular condition, viz. into Soluble Starch. (*Vid. infra.*) When treated with an aqueous solution of caustic alkali starch swells up enormously, and if this paste be heated, gently at first, it soon liquefies; from the solution thus obtained a mixture of acetic acid and alcohol precipitates a starch which, before drying, forms a translucid emulsion when treated with cold water; from this emulsion the starch subsequently separates, with the exception of a small quantity which remains in solution. Boiling water dissolves this precipitate no more than cold water, and the starch which has thus been disorganized by alkalies is no longer susceptible of forming a paste. The amount of this disorganized starch which is dissolved by water, either hot or cold, is always greater when one treats recently precipitated starch, than when one operates on that which has been already dried. After the starch has been boiled for a long time with a solution of caustic potash, a somewhat larger amount of it becomes soluble in water. These solutions, apparent or real, are, however, not permanent, and the starch which they contain may all be precipitated by alcohol. After long contact with alcohol, and subsequent drying, the starch is no longer soluble in water. When ordinary starch is treated with a solution of chloride of zinc, it swells up to a paste like that formed by warm water. This paste does not liquefy in the cold, but when heated to 100° it soon liquefies, and finally becomes quite fluid. From this solution alcohol precipitates a starch which behaves like that obtained from alkaline solutions. But if the paste produced by the action of chloride of zinc be heated over a free fire, and the solution which forms be precipitated as before by means of alcohol, a much more soluble variety of starch is obtained. To sum up the case: — Starch is modified insensibly without changing its nature, and passes from the insoluble state to another modification in which it is capable of dissolving in water. There are several varieties of "disorganized" starch, some of which are insoluble in water, either hot or cold. Others are soluble in water at the temperature of 80°, but the solution becomes cloudy on cooling. Others are soluble in cold and in hot water, forming solutions which remain clear on cooling. The latter Bèchamp calls

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"soluble starch," and considers identical with the "amidin" of De Saussure and Geurin-Varry, and the "dextrin" of Biot.

When ordinary starch is treated with warm dilute sulphuric acid, the paste which is at first formed soon liquefies if heated to 90°, but solidifies again to a jelly on cooling. When treated with alcohol and dried it leaves a starch insoluble in water, and not susceptible of forming a paste with water. Nor can the jelly be again entirely liquefied when it is reheated; the portion of starch which remains in this case is entirely insoluble. When ordinary starch is treated with common nitric acid, a paste is obtained which is readily soluble in strong nitric acid, and the liquid thus obtained is readily soluble in water. Alcohol, however, precipitates from it all the starch which was originally employed. This precipitate, when recent, appears to dissolve in water, but most of it soon separates out again, and it is then no longer soluble either in cold or boiling water. The action of ordinary nitric acid is consequently similar to that of caustic potash, but is somewhat more rapid. By allowing the nitric acid to act for a longer time on the starch before precipitating with alcohol, a starch is obtained which is completely soluble in cold water, even after it has been dried at 100°. Concentrated sulphuric acid produces the same changes as nitric acid, only more rapidly. "Soluble starch" is precipitated from its solution in water or acid, by acetic acid, as it is by alcohol. When ordinary starch is treated with monohydrated acetic acid it is not disaggregated, but is rendered apt to dissolve in warm water, or even in cold water. Warm dilute acetic acid, by prolonged action, converts ordinary starch into soluble starch. (Bèchamp, *Ann. Ch. et Phys.*, (3.) **48.** 458.)

"*Soluble Starch.*" Under this heading Bèchamp (*loc. cit.*) distinguished several different products, as has been already indicated, of variable solubility. In its most characteristic form soluble starch dissolves in cold water when recently precipitated, and in warm water after it has been dried. These solutions may be frozen without causing anything to separate, and without altering in any way the properties of the soluble starch dissolved in them. They may also be evaporated to the consistence of a thick syrup without separating anything. Soluble starch is insoluble in alcohol, even dilute.

STEARIC ACID. Insoluble in water. Easily soluble in alcohol, even in dilute; and still more soluble in ether. More soluble in hot than in cold alcohol. Less soluble in alcohol than palmitic acid. Separates from the hot alcoholic solution somewhat sooner than margaric acid.

(*Stearophanic Acid. Anamirtic Acid. Bassic Acid.*)
$C_{36} H_{36} O_4 = C_{36} H_{35} O_3, HO$

Soluble in 40 parts of cold alcohol of 0.794 sp. gr., and in all proportions in the same alcohol when boiling. (Chevreul.) Ether dissolves 0.12 pt. of it. Soluble in 20 pts. of oil of turpentine. (Braconnot.) Soluble in wood-spirit, oil of turpentine, and coal-tar naphtha. (Hardwick.) Soluble in creosote. (Reichenbach.)

1 pt. of benzin dissolves 0.22 pt. of it at 23°. (Vogel & Scheller, *Dingler's Polytech. Journ.*, **164.** 221.)

1 pt. of bisulphide of carbon dissolves 0.3 pt. of it at 23°. (Vogel & Scheller, *Dingler's Polytech. Journ.*, **164.** 221.)

Easily soluble in aqueous solutions of the caustic alkalies. Soluble in concentrated sulphuric acid when this is gently warmed, from which solution it is precipitated on the addition of water.

The normal alkaline salts of stearic acid are soluble in small quantities (10 @ 20 pts.) of pure water, but are easily decomposed by large quantities of water. Only extremely small quantities of the alkaline stearates are dissolved by water which contains salts in solution, their aqueous solutions are therefore precipitated by saline solutions; for example, by a solution of chloride of sodium. All the other stearates are insoluble in water. The alkaline stearates are soluble in alcohol, especially if this is hot, though somewhat less so than the corresponding margarates. All the stearates are insoluble in ether, and, excepting those of the alkalies, in absolute alcohol also.

STEARATE OF AMMONIA.

I.) *normal.* Soluble in dilute ammonia-water, especially when this is warm.

II.) *acid.* Sparingly soluble in boiling water.

STEARATE OF AMYL. Very soluble in hot alcohol, and ether.
$C_{36} H_{35} (C_{10} H_{11}) O_4$

STEARATE OF BARYTA. Insoluble in water, alcohol, or ether. (Hardwick, *J. Ch. Soc.*, **2.** 236.)
$C_{36} H_{35} Ba O_4$

STEARATE OF BORNEOL. Soluble in alcohol, and ether.
(*Stearate of Camphol.*)
$C_{56} H_{52} O_4 = C_{36} H_{35} (C_{20} H_{17}) O_4$

STEARATE OF CETYL. Slightly soluble in boiling alcohol. Easily soluble in boiling, but only sparingly soluble in cold ether.
$C_{36} H_{35} (C_{32} H_{33}) O_4$

STEARATE OF CHOLESTERIN. Very sparingly soluble in boiling alcohol, or in cold ether. Difficultly soluble in boiling ether.
$C_{88} H_{78} O_4 = C_{36} H_{35} (C_{52} H_{43}) O_4$

STEARATE OF COPPER.
$C_{36} H_{35} Cu O_4$

STEARATE OF ETHYL. Insoluble in water, not being decomposed even by boiling water. Soluble in hot, less soluble in cold alcohol. Very soluble in ether.
$C_{36} H_{35} (C_4 H_5) O_4$

STEARATE OF ETHYLENE. Soluble in ether. (Wurtz.)
$C_{72} H_{70} (C_4 H_4'') O_8$

STEARATE OF GLYCERYL. *Vid.* Stearin.

STEARATE OF LEAD.

I.) *normal.* Very sparingly soluble in boiling alcohol or ether. Soluble in all proportions in hot oil of turpentine.
$C_{36} H_{35} Pb O_4$

Stearate of lead [normal ?] is insoluble in water, alcohol, or ether. (Hardwick, *J. Ch. Soc.*, **2.** 236.)

II.) *acid.* Soluble, with partial decomposition, in more than 60 pts. of boiling alcohol of 0.823 sp. gr. Completely soluble in warm oil of turpentine.
$C_{36} H_{35} Pb O_4, C_{36} H_{36} O_4$ (?)

III.) *basic.*
$C_{36} H_{35} Pb O_4, 3 Pb O$

STEARATE OF LIME.
$C_{36} H_{35} Ca O_4$

STEARATE OF MAGNESIA. Tolerably soluble in boiling, almost insoluble in cold alcohol. Insoluble, or nearly so, in water.
$C_{36} H_{35} Mg O_4$

STEARATE *of dinoxide* **OF MERCURY.** Insoluble in water or in cold alcohol. Sparingly soluble in boiling alcohol. Readily soluble in ether.

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Stearate *of protoxide* **of Mercury.**

Stearate of Methyl. Insoluble in water.
$C_{36}H_{35}(C_2H_3)O_4$

Stearate of Nicotin. Sparingly soluble in water. Readily soluble in warm ether.

Stearate of Potash.

I.) *normal.* Decomposed by water, forming a thick gelatinous paste (Chevreul); and with production of the bisalt, if enough water be employed. (*Idem.*, *C. R.*, 1859, **48.** 714.) Sparingly soluble in cold water. With 10 pts. of cold water it forms an opaque jelly, which becomes fluid at 99°. With 25 pts. of hot water it is completely dissolved; and it dissolves in still less water when this contains free alkali. All the stearate of potash is separated from this solution on the addition of chloride of potassium. (If chloride of sodium were added stearate of soda would separate out.) When 1 pt. of the normal salt is mixed with 1000 pts. of water an acid salt (No. 2) separates out. (Wittstein's *Handw.*) Permanent. Forms a gelatinous mass with water. Readily soluble in alcohol, and in ether which contains alcohol, though less so in cold than in hot. Almost entirely insoluble in pure ether. (Hardwick, *J. Ch. Soc.*, **2.** 235.) Soluble in 6⅔ pts. of boiling absolute alcohol. Soluble in 10 pts. of alcohol, of 0.821 sp. gr., at 66°. When the temperature of this solution is reduced to 55° it becomes turbid, and at 38° it solidifies. 100 pts. of boiling alcohol, of 0.794 sp. gr., dissolve 15 pts. of it, and 100 pts. of alcohol, of 0.821 sp. gr., dissolve 0.432 pt. of it at 10°. Very sparingly soluble in ether, even when this is boiling, with partial decomposition. [T.] Very sparingly soluble even in boiling ether. 100 pts. of boiling ether dissolve 0.16 pt. of it.

$C_{36}H_{35}KO_4$

II.) *bi.* Unacted upon by cold water, but is decomposed by boiling with much water.

$C_{36}H_{35}KO_4, C_{36}H_{36}O_4$

Cold water exerts scarcely any action upon it. When 1 pt. of it is treated with 1000 pts. of boiling water a milky, cloudy emulsion is formed, which becomes fluid and transparent at 75°, and deposits flocks of No. 3 at 67°, the salt itself finally crystallizes out at from 59 @ 26°. Very sparingly soluble in cold, easily soluble in hot alcohol. The alcoholic solution has a neutral reaction, but when a solution which has been prepared in the cold is treated with a small quantity of water it acquires an acid reaction, and if a little water is added to a hot solution this acquires an alkaline reaction. Boiling ether removes the excess of acid, and leaves the normal salt. (Wittstein's *Handw.*) 100 pts. of boiling absolute alcohol dissolve 27 pts. of it, but at 24° they retain only 0.36 pt. of it: moreover, partial decomposition occurs, on account of the tendency of the alcohol to dissolve stearic acid in preference to the salt. The portion which remains in solution is consequently richer in stearic acid than that which separated out as the solution cooled.

Soluble in alcohol, without alteration. Ether dissolves out the second equivalent of acid, thus reducing it to the normal salt. (Chevreul, *C. R.*, 1859, **48.** 714.)

III.) *quadri?* Swells up in cold water. Decomposed by boiling alcohol.

Stearate of Silver. Insoluble in water. Easily soluble in ammonia-water. (Francis.)

$C_{36}H_{35}AgO_4$

Stearate of Soda.

I.) *normal.* Not sensibly changed when mixed with 10 times its weight of water. (Chevreul.) Scarcely at all soluble in cold, difficultly soluble in warm water. Easily soluble in warm alcohol, the solution gelatinizing on cooling. (Hardwick, *J. Ch. Soc.*, **2.** 235.) Sparingly soluble in cold water. More readily decomposed by hot water than the potash salt. With 10 pts. of boiling water it affords a thick, almost opaque, solution, viscous at 90°, and which when cooled to 62° becomes solid. With 50 pts. of hot water it gives a solution which may be filtered even at temperatures somewhat lower than 100°; when this solution is treated with 2000 pts. of water the acid salt is precipitated. With 20 pts. of hot alcohol it forms a perfect solution, from which it crystallizes on cooling. Unacted upon by boiling ether. (Wittstein's *Handw.*) Soluble in 20 pts. of boiling alcohol, of 0.821 sp. gr., and in 500 pts. of the same alcohol at 10°. Very slightly soluble in ether.

$C_{36}H_{35}NaO_4$

II.) *bi.* Insoluble in cold, soluble in hot water. Sparingly soluble in cold, easily soluble in hot alcohol.

$C_{36}H_{35}NaO_4; C_{36}H_{36}O_4$

Insoluble in ether. (W. Marcet.)

Stearate of Strontia.
$C_{36}H_{35}SrO_4$

Stearate of Trehalose.
$C_{72}H_{70}(C_{12}H_8O_6{}'')O_8$

Stearene. *Vid.* Stearone.

Stearerin. Soluble in 1000 pts. of alcohol, of 0.805 sp. gr., at 15°. Very slowly attacked by potash lye. (Chevreul.)

Stearin. Insoluble in glycerin. Very sparingly soluble in cold, more readily soluble in boiling ether. (Berthelot, *Ann. Ch. et Phys.*, (3.) **41.** 221.)

(*Bibasic Stearate of Glyceryl.*)
$C_{42}H_{42}O_8 = C_6H_5O_3, 2HO, C_{36}H_{35}O_3$

Bi~~~~**Stearin.** Soluble in boiling, but very sparingly soluble in cold ether.

(*Monobasic Stearate of Glyceryl.*)
$C_{78}H_{78}O_{12} = C_6H_5O_3, HO, 2C_{36}H_{35}O_3 + 2Aq$

*Tri***Stearin** (probably identical with Natural Stearin). Soluble in boiling, but very sparingly soluble in cold ether. (Berthelot, *loc. cit.*)

(*Normal Stearate of Glyceryl.*)
$C_{114}H_{110}O_{12} = C_6H_5O_3, 3C_{36}H_{35}O_3$

Natural stearin is insoluble in water. Soluble in 6 @ 7 pts. of boiling, much less soluble in cold alcohol. It is very much more soluble in absolute alcohol than in spirit, the power of alcohol to dissolve the fats diminishing in an extremely rapid progression in proportion as it is diluted, or as its sp. gr. is increased from 0.795 to 0.821. Thus: 100 pts. of boiling alcohol of
0.7908 sp. gr. dissolved 100 pts. (and more) of mutton stearin.
0.7952 sp. gr. dissolved 16.07 pts. of mutton stearin.
0.805 " " 6.63 " "
0.821 " " 2.00 " "
(Chevreul, *Ann. Ch. et Phys.*, 1816, (2.) **2.** 361, *note.*)

100 pts. of boiling alcohol of
0.7952 sp. gr. dissolve 21.50 pts. of stearin from man.
" " 15.04 @ 16.07 " " the sheep.
" " 15.48 " " ox.
" " 17.65 @ 18.25 " " hog.
" " 36.00 " " goose.
(Chevreul, *Ann. Ch. et Phys.*, 1816, (2.) **2.** 364.)

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Readily soluble in boiling, very much less soluble in cold ether. Soluble in 225 pts. of ether at 15°. Soluble in creosote. (Reichenbach.)

StearoChlorhydrin. Insoluble in water. Soluble in ether. (Berthelot, *Ann. Ch. et Phys.*, (3.) **41.** 304.)
$C_{42} H_{41} Cl O_6$

Stearone. Insoluble in water. Soluble in boiling alcohol. Very readily soluble in ether. (Rowney, *J. Ch. Soc.*, **6.** 98.)
(*Margarone. Stearene.*)
$C_{70} H_{70} O_2$

Stearophanic Acid. *Vid.* Stearic Acid.

Stearophanin. *Vid.* Anamirtin.

Stib*di*Amyl. Insoluble in water. Miscible in all proportions with alcohol, and ether. (Berlé.)
$(C_{10} H_{11})_2 Sb$, or $\left.\begin{matrix}(C_{10} H_{11})_2 Sb\\(C_{10} H_{11})_2 Sb\end{matrix}\right\}$

Stib*tri*Amyl. Insoluble in water. Sparingly soluble in absolute alcohol. Very easily soluble in ether. (Berlé.) Easily soluble in alcohol. (Cramer.)
$Sb \left\{ (C_{10} H_{11})_3 \right.$

Stib*tri*Ethyl. Insoluble in water. Readily soluble in alcohol, and ether. (Lœwig & Schweizer.)
$Sb \left\{ (C_4 H_5)_3 \right.$

"StibEthylic Acid." *Vid.* Antimonite of StibEthyl.

StibEthylium. Not isolated.
$Sb \left\{ (C_4 H_5)_4 \right.$

Stib*tri*Methyl. Insoluble in water. Sparingly soluble in alcohol. Very easily soluble in ether. (Landolt.) The compounds of stibtrimethyl are in general very soluble in water, less soluble in alcohol, and almost insoluble in ether.
$Sb \left\{ (C_2 H_3)_3 \right.$

StibMethylium. Not isolated.
$Sb \left\{ (C_2 H_3)_4 \right.$

Stictic Acid (from *Sticta pulmonacea*). Much more difficultly soluble in absolute alcohol than cetraric acid.

Stictate of Potash. Much less soluble than cetrarate of potash. (Knop & Schnedermann.)

Stilbene. Insoluble in water. Very sparingly soluble in cold, more soluble in boiling alcohol. More soluble in ether than in alcohol. Soluble, with combination, in concentrated sulphuric acid. (Laurent.)
(*Picramyl. Hydride of Stilbyl.*)
$C_{28} H_{12}''$

Stilbesic Acid. Insoluble in water. Very sparingly soluble in alcohol, and ether. Soluble in aqueous and alcoholic solutions of caustic potash, and ammonia; from which it is precipitated on the addition of acids.
(*Suroxyde de Stilbèse.*)
$C_{28} H_{10} O_7$ (?)

Stilbesate of Silver. Ppt., from alcohol.
$C_{28} H_8 Ag_2 O_7$ (?)

Stilbic Acid. *Vid.* Benzilic Acid.

Stilbous Acid. Insoluble in cold, abundantly soluble in boiling alcohol. Readily soluble in ether. Insoluble in ammonia-water.
(*Benzoate of Hydride of Benzoyl. Benzoate of Benzoyl. Suroxyde de Stilbène. Stilbinigesæure.*)

Stilbite of Potash. Easily soluble in water. Soluble in all proportions in alcohol. Insoluble in ether. (Laurent.)

StilbylAnilin. }
StilbylPhenylamin. } *Vid.* PhenylBenzölamin.

Stramonin (from *Datura Strammonium*). Insoluble in water. Difficultly soluble in spirit. More soluble in ether and the fixed and ethereal oils. Also in creosote and in concentrated sulphuric acid.

Strontia. *Vid.* Oxide of Strontium.

Strontium. Many of the compounds of strontium are insoluble in water, but all of them, excepting sulphate of strontia, are soluble, with partial decomposition, in dilute nitric and chlorhydric acids.
Sr

Strychnic Acid. Readily soluble in water. Sparingly soluble in alcohol. (Rousseau.)

Strychnate of Potash. Soluble in water. Sparingly soluble, or insoluble, in weak alcohol.

Strychnine. Permanent. Almost insoluble in water, since it requires 6667 pts. of water at 10°, and 2500 pts. of boiling water, to dissolve it.
$N_2 \left\{ C_{42} H_{22} O_4'' \right.$

Less soluble in water than either igasurin or brucin.

At ordinary temperatures it dissolves in water saturated with carbonic acid, but at 0° it is deposited again as such. (Langlois, *Ann. Ch. et Phys.*, (3.) **48.** 503.) Soluble in 7196.4 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, *in Canstatt's Jahresbericht, für* 1854, p. 76.) Soluble in 1200 pts. of alcohol, of 80%, at the ordinary temperature, and in 10 pts. of boiling alcohol of 80%. Insoluble in ether or in aqueous solutions of the caustic alkalies. Easily soluble in acids, with combination. It is not decomposed by cold dilute nitric acid, but when this solution is heated decomposition ensues. (Wittstein's *Handw.*) Strychnine is very sparingly soluble in the cold in neutral solvents. It dissolves in about 100 pts. of dilute alcohol. (Bouchardat, *Ann. Ch. et Phys.*, (3.) **9.** 228.) Readily soluble in common 70% spirit, but almost insoluble in absolute alcohol. Easily soluble in the essential oils. Insoluble in pure ether. Not sensibly soluble in the fatty oils.

Sparingly soluble in benzin. (Mansfield, *J. Ch. Soc.*, **1.** 262.) 100 pts. of chloroform dissolve 14.1 pts. of it. (Schlimpert, *Kopp & Will's J. B., für* 1859, p. 405.) 100 pts. of chloroform dissolve 20.16 pts. of it. (Michael Pettenkofer, *Kopp & Will's J. B., für* 1858, p. 363.) 100 pts. of olive-oil dissolve 1 pt. of it. (Pettenkofer, *Ibid.*)

Strychnine is insoluble in aqueous solutions of the fixed caustic or carbonated alkalies, but is soluble in ammonia-water. Easily soluble in acids, even weak and dilute, with combination. Most of its salts are easily soluble in water.

Strychnochrome. Sparingly soluble in water. Soluble in alcohol. Sparingly soluble in ether and in ethereal oils. (Pelletier & Caventou.)

Styphnic Acid. *Vid.* OxyPicric Acid.

Styracin. *Vid.* Cinnamate of Styracyl.

Styracol. }
Styracone. } *Vid.* Styrone.

Styracyl. Not isolated.
(*Styryl.*)
$C_{18} H_9$

Styrol. Very slightly soluble in water, the undissolved portion of the styrol taking up at the same time a very small quantity of water. Miscible in all proportions with absolute alcohol, it dissolves with more and more difficulty in spirit according to the
(Isomeric, or identical, with Cinnamene.)
$C_{16} H_8''$

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amount of water which this contains. Miscible in all proportions with ether. Soluble in wood-spirit, acetone, bisulphide of carbon, and in fatty and volatile oils. (Blyth & Hofmann.)

STYRONE. (*Styracone. Styracol. Styrax Alcohol. Peruvin. Zimmt Alcohol. Hydrate of Styracyl.*) $C_{18} H_{10} O_2 = C_{18} H_9 O, HO$ Tolerably readily soluble in water. Soluble in 90 @ 100 pts. of cold, and in 30 pts. of boiling water. (Simon.) Very soluble in alcohol, ether, styrol, naphtha, benzin, and the fatty and essential oils. Insoluble in hot nitric acid, by which it is only very slowly attacked. (Toel; Scharling.)

"STYRYL"(of Kolbe). $C_{18} H_9$ *Vid.* Styracyl.

SUB-CARBONATE (&c.) **OF** *X*. See under Carbonate (&c.) of *X*.

SUBERAMID. (*Suberylbiamid.*) $C_{16} H_{16} N_2 O_4 = N_2 \left\{ \begin{matrix} C_{16} H_{12} O_4'' \\ H_4 \end{matrix} \right.$ Soluble in boiling, much less soluble in cold alcohol. (Laurent.)

SUBERAMIC ACID. (*Suberylamic Acid.*) $C_{16} H_{15} N O_6 = N \left\{ \begin{matrix} C_{16} H_{12} O_4'' \\ H_2 \end{matrix} \right. . O, HO$ Soluble in boiling, less soluble in cold water.

SUBERAMATE OF BARYTA. Soluble in water.

SUBERAMATE OF SILVER. Ppt.

SUBERANIL? *Vid.* PhenylSuberimid.

SUBERANILID. *Vid.* PhenylSuberamid.

SUBERANILIC ACID. *Vid.* PhenylSuberamic Acid.

SUBERIC ACID. (*Korksæure* (of the Germans). $C_{16} H_{14} O_8 = C_{16} H_{12} O_6, 2 HO$ Permanent. Sparingly soluble in cold, much more soluble in boiling water.

Soluble in 120 pts. of cold, and in 2 pts. of boiling water (Bouillon); in 50 pts. of cold water (Fourcroy); in 80 pts. of water at 13°, and in 38 pts. at 60°. (Chevreul, *Ann. de Chim.*, 1807, **62**. 328.)

Soluble in 100.1 pts. of water at 9°.
" 86.2 @ 95 " 12°.
" 5.0 " 84°.
" 1.87 " boiling.

Or, 100 pts. of water
at 9° dissolve 9.991 pts. of it.
" 12° " 1.054 @ 1.15 "
" 84° " 20.00 "
" 100° " 54.00 "

The boiling aqueous solution solidifies on cooling. (R. Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1821, **32**. pp. 404 – 407.)

100 pts. of water at 18° dissolve 1.014 pts. of it; or 1 pt. is soluble in 98.6 pts. of water at 18°. Much more soluble in hot water. On cooling the hot solution much suberic acid separates, yet at 18° 100 pts. of water still contained 2.32 pts. of it. (Wirz, *Ann. Ch. u. Pharm.*, **104**. 271.) 100 pts. of water, at 15.56° dissolve 0.69 pt. of it, and at 100° 50 pts. (Ure's *Dict.*) It is much more soluble in water, but less soluble in ether than the acids above it in the series $C_n H_{n-2} O_8$. (Wirz, *loc. cit.*, p. 269.) Soluble in alcohol, especially if this is warm, in ether, and in the fatty and volatile oils.

Soluble in 4.56 pts. of absolute alcohol at 10°, and in 0.87 pt. at boiling; or, 100 pts. of absolute alcohol dissolve 21.9 pts. of it at 10°; and 114 pts. at boiling. (Brandes, *Schweigger's Journ.*, **32**. pp. 407, 408.) Easily soluble in alcohol; from a saturated alcoholic solution it is partially precipitated on the addition of water. Soluble, without alteration, in boiling nitric acid, from which it is deposited again on cooling, and more readily on the addition of water. (Chevreul, *Ann. de Chim.*, 1807, **62**. 332.)

Soluble in 10.11 pts. of ether at 4°.
" 7.80 " " 10°.
" 7.75 " " 20°.
" 6.00 " " 35° (boil.pt.)

Or, 100 pts. of ether
at 4° dissolve 9.8 pts. of it.
" 10° " 12.82 "
" 20° " 12.90 "
" 35° (boil. pt.) 16.60 "

(Brandes, *Schweigger's Journ.*, **32**. pp. 409, 410.)

Soluble in 19 pts. of oil of turpentine at 5°.
" 16 " " 12°.
" 11.5 " " 44°.
" 2.12 " " 120°.
" 1 " (boiling) 174.44°.

Or, 100 pts. of oil of turpentine
at 5° dissolve 5.2 pts. of it.
" 12° " 6.1 "
" 44° " 8.7 "
" 120° " 47 "
" 174.44° (boiling) 100 "

Both the boiling solution and that saturated at 120° solidify on cooling, to a viscid, waxy mass. These results were obtained by cooling down boiling saturated solutions; if the solutions had been prepared by agitating mixtures of the acid and oil of turpentine different results would have been obtained, the quantities of acid dissolved being much less in the latter case. With ether and alcohol also the acid exhibits a great tendency to form supersaturated solutions. [The solubilities in ether, given above, are probably, from this cause, too high; but the determination in alcohol, at 10°, was exempt from this source of error.] (Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1821, **32**. pp. 410 – 412.) Also soluble in the fatty oils, especially when these are hot. (Brandes, *Schweigger's Journ.*, **32**. 412.)

The alkaline suberates and those of the alkaline earths are soluble in water.

SUBERATE OF ALUMINA. Ppt.

SUBERATE OF AMMONIA. Deliquescent. Readily soluble in water. (Bouillon; Chevreul, *loc. cit.*, p. 331.) Very easily soluble in water. (Brandes, *Schweigger's Journ.*, **33**. 86.)

SUBERATE OF BARYTA. $C_{16} H_{12} Ba_2 O_8$ Somewhat soluble in water. (Chevreul, *loc. cit.*, p. 330.) Soluble in 59 pts. of water at 15°, and in 16.5 pts. at boiling.

Or, 100 pts. of water
at 15° dissolve 1.3 pts. of it, and
at 100° " 6 "

Or, the aqueous solution
saturated at 15° contains 1.67% of it, and
" 100° " 5.91% "

(Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1821, **33**. pp. 89, 90.) [The figures given by Brandes for the experiment at 15°, and cited above, do not accord with his statement, that "66 grains of the solution made at that temperature gave 1 grain of residue"; these figures are, moreover, headed "suberic acid," instead of suberate of baryta.] Insoluble in water. (Laurent.)

SUBERATE OF CHLORETHYL. $C_{16} H_{12} (C_4 H_4 Cl)_2 O_8$

SUBERATE OF COBALT. Ppt.

SUBERATE OF COPPER. $C_{16} H_{12} Cu_2 O_8$ Very slightly soluble in water, but more soluble

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than the silver salt. (Brandes, *Schweigger's Journ.*, **33.** 97.)

Subberate of Ethyl. Soluble in all proportions in alcohol, and ether. Soluble in cold concentrated sulphuric acid; the solution undergoing decomposition when heated. Scarcely at all acted upon by an aqueous solution of caustic potash. (Laurent.)
$C_{16} H_{12} (C_4 H_5)_2 O_8$

Suberate *of protoxide* of Iron. Insoluble in water. (Brandes, *Schweigger's Journ.*, **33.** 102.)

Suberate *of sesquioxide* of Iron. Insoluble in water. (Brandes.)

Suberate of Lead.

I.) *normal.* Water only dissolves a trace of it. (Brandes, *Schweigger's Journ.*, **33.** 101.) Completely insoluble in water or alcohol, even when these are warm. Soluble in dilute acetic acid. (Bromeis.)
$C_{16} H_{12} Pb_2 O_8$

II.) *basic.* Insoluble in water.
$C_{16} H_{12} Pb_2 O_8, 2 Pb O$

Suberate of Lime. Soluble in 39 pts. of water at 14°, and in 9 pts. of boiling water.
$C_{16} H_{12} Ca_2 O_8$

Or, 100 pts. of water

at 14°	dissolve	2.6	pts. of it, and
at 100°	"	11.11	"

Or, the aqueous solution saturated

at 14°	contains	2.5%	of it, and
at 100°	"	10%	"

(R. Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1821, **33.** pp. 87, 88.) Appears to be soluble in alcohol.

Suberate of Magnesia. Somewhat hygroscopic. Easily soluble in water, being soluble in 1 pt. of water at 12°, and in much less water at higher temperatures. (Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1821, **33.** 93.) Sparingly soluble, or insoluble, in alcohol. (Bouillon.)
$C_{16} H_{12} Mg_2 O_8$

Suberate of Manganese. Soluble in water. (Brandes, *loc. cit.*, p. 103.)

Suberate *of dinoxide* of Mercury. Insoluble in water. Decomposed when boiled with water or alcohol. Soluble in 2500 pts. of ether. Quickly soluble in hot, slowly soluble in cold nitric acid. (Harff.)

Suberate *of protoxide* of Mercury. Soluble in more than 2000 pts. of cold water, more readily soluble in boiling water. Nearly insoluble in alcohol. Soluble in 1200 pts. of ether. Soluble in chlorhydric and nitric acids. (Harff.)
$C_{16} H_{12} Hg_2 O_8$

Suberate of Mercur(*ous*)Ammonium. (?) Insoluble in water, alcohol, or ether. Soluble in concentrated acetic acid, with decomposition. (Harff.)
("Compound with $Hg_2 O + N H_3$")

Suberate of Mercur(*ic*)Ammonium. Insoluble in water, alcohol, or ether. Soluble in chlorhydric, and partially in nitric acid. Insoluble in cold, decomposed by hot concentrated sulphuric acid. (Harff.)
("Compound with $Hg O + N H_3$")

Suberate of Methyl. Insoluble, or but sparingly soluble, in water.
$C_{16} H_{12} (C_2 H_3)_2 O_8$

Suberate of Potash. Hygroscopic. As soluble in water as the soda salt. (Brandes, *Schweigger's Journ.*, **33.** 85.) Difficultly soluble in water. (Bouillon-La Grange.)

Suberate of Silver. Nearly insoluble in water. (Brandes, *Schweigger's Journ.*, **33.** 94.)
$C_{16} H_{12} Ag_2 O_8$

Suberate of Soda. Somewhat hygroscopic. Soluble in 1 pt. of cold, and in much less hot water. (Brandes, *Schweigger's Journ.*, **33.** 83.) Soluble in alcohol. (Bouillon.)
$C_{16} H_{12} Na_2 O_8$

Suberate of Strontia. Somewhat more soluble in water than the baryta salt. (Brandes, *loc. inf. cit.*)
$C_{16} H_{12} Sr_2 O_8$

Soluble in	21.2	pts. of water at	20°.
"	15.7	"	30°.
"	13.3	"	50°.
"	12.5	"	boiling.

(Brandes.)

Or, 100 pts. of water

at 20°	dissolve	4.6	pts. of it.
" 30°	"	6.4	"
" 50°	"	7.5	"
" 100°	"	8.7	"

Or, the aqueous solution saturated

at 20°	contains	4.5%	of it.
" 30°	"	6%	"
" 50°	"	7%	"
" 100°	"	8%	"

(Brandes, *Schweigger's Journ. für Ch. u. Phys.*, 1821, **33.** pp. 91, 92.) Sparingly soluble, or insoluble, in alcohol.

Suberate *of protoxide* of Tin. Insoluble in water. Soluble in alcohol. (Bromeis.)

Suberate *of sesquioxide* of Uranium. Soluble in 300 pts. of boiling water. (Brandes, *Schweigger's Journ.*, **33.** 100.)

Suberate of Zinc. Ppt.

Suberone. *Vid.* Hydride of Suberyl.

Succinamic Acid. Not isolated.
$C_8 H_7 N O_6 = N \left\{ \begin{matrix} C_8 H_4 O_4'' \\ H_2 \end{matrix} \right. . O, H O$

Succinamate of Silver. Much more soluble in water than the compound of oxide of silver with succinimid ($C_8 H_4 Ag N O_4$).
$C_8 H_6 Ag N O_6$

Succinamid. Almost insoluble in cold, tolerably soluble in boiling water. (D'Arcet.) Soluble in 220 pts. water at 15°, and in 9 pts. of boiling water. Sparingly soluble in spirit. Insoluble in absolute alcohol, or in ether. (Fehling.)
(*Succinylbiamid.*)
$C_8 H_8 N_2 O_4 = N_2 \left\{ \begin{matrix} C_8 H_4 O_4'' \\ H_4 \end{matrix} \right.$

*Bi*Succinamid. *Vid.* Succinimid.

*Tri*Succinamid. Decomposed by water, and alcohol. Soluble, under pressure, in warm anhydrous ether. (Gerhardt & Chiozza, *Ann. Ch. et Phys.*, (3.) **46.** 162.)
(*TriSuccinylbiamide.*)
$C_{24} H_{12} N_2 O_{12} = N_2 \left\{ (C_8 H_4 O_4'')_3 \right.$

SuccinAnil. *Vid.* PhenylSuccinimid.

Succinanilic Acid. *Vid.* PhenylSuccinamic Acid.

SuccinAnilid. *Vid. di*PhenylSuccinamid.

Succinic Acid(Anhydrous). It does not absorb water from the air. Less quickly soluble in water than the hydrated acid. Much more soluble in alcohol than in water. Very sparingly soluble in ether.
$C_8 H_4 O_6 = \left. C_8 H_4 O_4'' \right\} O_2$

Succinic Acid. Permanent. Much more soluble in warm than in cold wa-
(*Bernsteinsæure* (of the Germans)).
$C_8 H_6 O_8 = C_8 H_4 O_6, 2 H O$

ter. Soluble in 5 pts. of water at 16° [10, as cited by Wirz], and in 2.2 pts. of water at 100° (Lecanu & Serbat); in 24 pts. of water at 11.1°, and in 2 pts. of water at 100° (Stockar de Neuforn, *De Succino*, [T.]); in 96 pts. of water at 10°. (Spielman, *Inst. Chem.*, § **12.** [T].) According to Neuforn the greater part of it crystallizes out of the hot solution as this becomes cold, but Roux maintains that the cooled solution retains more of it than cold water is capable of dissolving. (Morveau, *Encyc. Méthod.*, *Chim.*, **1.** 72 [T.].) Soluble in 25 pts. of cold, and in 3 pts. of boiling water; the saturated cold solution containing 3.85% of it, and the saturated boiling solution 25%. (Berzelius's *Lehrb.*) Soluble in 20 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.) 100 pts. of water dissolve 4 pts of it at 15.56°, and 50 pts. at 100° (Ure's *Dict.*); 20 pts. at 16, and 46 pts. at 100°. (Lecanu & Serbat.) An aqueous solution of 1.01 sp. gr. contains 2.78% of the acid, one of 1.04 sp. gr. contains 10.82% of it. (Richter.)

Soluble in 3 pts. of cold, and 1.5 pts. of boiling alcohol. Also soluble in ether. (Wittstein's *Handw.*) Soluble in 1.356 pts. of boiling highly rectified spirit, crystallizing out again in part as the solution cools. (Wenzel, in his *Verwandtschaft*, p. 305 [T].) Less soluble in alcohol than in water, and scarcely at all soluble in ether. (D'Arcet.) Only slightly soluble in oil of turpentine, even when this is boiling. (Lecanu & Serbat.) Insoluble in caoutchin. (Himly.) Soluble in warm sulphuric and nitric acids, apparently without decomposition. Chlorhydric acid has but little action on it in the cold, but when heated with it the whole coagulates to a jelly. (Thomson's *System.*)

Most succinates are soluble in water; those insoluble in water are soluble in an aqueous solution of acetate of potash, hence a mixture of succinate of potash and acetate of potash cannot precipitate any metallic salt. (Lecanu & Serbat.) Also soluble in succinic acid.

On the addition of a small portion of a ferment to dilute aqueous solutions of the alkaline succinates, exposed to the air in a warm place, decomposition rapidly ensues, the salt being finally converted into a carbonate. (Buchner, Jr., *Ann. Ch. u. Pharm.*, 1851, **78.** 207.)

SUCCINATE OF AMMOLIN (of Unverdorben). Very readily soluble in water, and alcohol. Insoluble in ether.

SUCCINATE OF ALUMINA. There are two salts, one of which is soluble, the other insoluble in water. (Wenzel.)

SUCCINATE OF AMMONIA.

I.) *normal*. Loses ammonia when exposed to the air. Readily soluble in water (Dœpping), the solution undergoing partial decomposition, in the course of a considerable time. (Horst.) When treated with boiling water some ammonia is evolved, and the solution obtained exhibits an acid reaction. (Emmet, *Am. J. Sci.*, (1.) **18.** pp. 255, 256.) Readily soluble in alcohol, and ether.

$C_8 H_4 (N H_4)_2 O_8$

Soluble in boiling creosote. (Reichenbach.)

II.) *acid*. Permanent. Readily soluble in water, and alcohol. (Dœpping.)

$C_8 H_5 (N H_4) O_8$

SUCCINATE OF ANILIN. Soluble in water, and alcohol. (Gerhardt.)

SUCCINATE OF ANTIMONY. Soluble in water. [Y.]

SUCCINATE OF BARYTA.

I.) *normal*. Sparingly soluble in water or succinic acid. More readily soluble in acetic acid, and still more readily in dilute nitric or chlorhydric acid. Insoluble in alcohol or ammonia-water. (Dœpping.)

$C_8 H_4 Ba_2 O_8$

SUCCINATE OF BENZOL. Soluble in ether, but the solution is decomposed by evaporation. Decomposed by a dilute aqueous solution of caustic soda. (Wicke.)

(*Succinate of Benzol Ether.*)
$C_{22} H_{10} O_8 = C_8 H_4 (C_{14} H_6'') O_8$

SUCCINATE OF BISMUTH. There are two salts, the one soluble in water, the other insoluble. (Wenzel.)

$C_{24} H_{12} (Bi''')_2 O_{24}$

SUCCINATE OF CADMIUM.

I.) *normal*. Insoluble in water or ordinary alcohol. Very sparingly soluble in succinic acid. (Schiff, *Ann. Ch. u. Pharm.*, **104.** 326.)

$C_8 H_4 Cd_2 O_8$

II.) *acid* ? Readily soluble in water. Decomposed by alcohol to a compound soluble in alcohol, and another easily soluble in water. (John.)

SUCCINATE *of protoxide* OF CERIUM. Sparingly soluble in water, even when this is acidulated with succinic acid. Readily soluble in the stronger acids. (Berzelius.)

$C_8 H_4 Ce_2 O_8$

SUCCINATE OF CETYL. Sparingly soluble in alcohol, more easily soluble in a mixture of alcohol and ether, and still more easily in pure ether.

$C_8 H_4 (C_{32} H_{33}) O_8$

SUCCINATE *of protoxide* OF CHROMIUM. Ppt.

$C_8 H_4 Cr_2 O_8 + 2 Aq$

SUCCINATE *of sesquioxide* OF CHROMIUM. Insoluble in water. Soluble in acetic acid. (Hayes.) Insoluble in alcohol, soluble in an aqueous solution of succinate of soda. (Berlin.)

SUCCINATE OF COBALT. Difficultly soluble in water. (Berzelius; Macaire-Princep.)

$C_8 H_4 Co_2 O_8$

SUCCINATE OF COPPER. Difficultly soluble in water or succinic acid, more easily soluble in acetic acid. Insoluble in alcohol (Dœpping), or ether. (Unverdorben.)

$C_8 H_4 Cu_2 O_8$

SUCCINATE OF ETHYL. Somewhat soluble in water. Soluble in all proportions in alcohol. Also soluble in ether. (Fehling.)

$C_8 H_4 (C_4 H_5)_2 O_8$

SUCCINATE OF ETHYL *perchloré*. *Vid. quadri*-ChloroSuccinate of perChlorEthyl.

SUCCINATE OF ETHYLSALICYL. *Vid.* Salicylate of EthylSuccinyl.

SUCCINATE OF GLUCINA. Difficultly soluble in water.

$Gl_2 O_3, 8 H O, 8 C_8 H_4 O_6$

SUCCINATE *of protoxide* OF IRON. Difficultly soluble in water, somewhat more readily soluble in succinic acid. (Berzelius.) Partially soluble in ammonia-water and in aqueous solutions of ammoniacal salts. (Wittstein.)

$C_8 H_4 Fe_2 O_8$

SUCCINATE *of sesquioxide* OF IRON.

I.) *polybasic*. Several precipitates.

9 to 15 $Fe_2 O_3, C_8 H_4 O_6$

II.) Insoluble in cold, sparingly soluble in hot water. Easily soluble in mineral acids. Caustic ammonia removes a portion of the acid, insoluble

$Fe_2 O_3, H O, 2 C_8 H_4 O_6$

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basic salts being produced. Insoluble in cold, very dilute succinic acid, more readily soluble, however, in a warm solution. It was formerly erroneously thought that this precipitate was decomposed by hot water into an insoluble basic and a soluble acid salt. (Fresenius, *Quant.*, p. 14.) Insoluble in water. Readily soluble in dilute mineral acids. (Bucholz.) Very sparingly soluble in boiling water. When recently precipitated it is tolerably soluble in boiling succinic acid. Slowly soluble in cold, readily in hot acetic acid. (Dœpping.) Soluble in an excess of a solution of caustic ammonia or of soda, being reprecipitated after the lapse of some hours. (Winckler.) Insoluble in an aqueous solution of chloride of ammonium, or in alcohol. (Berzelius, *Lehrb.*, 3. 631.) It is not precipitated from solutions which contain citrate of soda. (Spiller.)

SUCCINATE OF LEAD.

I.) *normal.* $C_8H_4Pb_2O_8$ Very sparingly soluble in water, acetic acid, or succinic acid, even when hot. Insoluble in alcohol. (Dœpping.) Soluble in an aqueous solution of normal acetate of lead. (Winckler.) Easily soluble in nitric acid.

II.) $2\,C_8H_4Pb_2O_8;\ 2\,PbO$ Insoluble in water or alcohol. Soluble in an aqueous solution of caustic potash. (Dœpping.)

III.) } Fehling's basic salts.
IV.) }

V.) *hexa.* $C_8H_4Pb_2O_8,\ 4\,PbO$ Very sparingly soluble in water. (Berzelius.) Insoluble in alcohol. Readily soluble in dilute nitric acid and in potash-lye. (Dœpping.)

SUCCINATE OF LIME.

I.) *normal.* $C_8H_4Ca_2O_8 + 2\,Aq\ \&\ 6\,Aq$ Permanent. Sparingly soluble in water, and acetic acid; more readily soluble in succinic acid, and very easily soluble in nitric and chlorhydric acid. Insoluble in alcohol. (Dœpping.)

II.) *acid.* $C_8H_5CaO_8 + 2\,Aq$ Permanent. Sparingly soluble in water, though more readily than the normal salt. Hot alcohol decomposes it, dissolving out half of the acid. (Dœpping.)

SUCCINATE OF LITHIA.

I.) *normal.* $C_8H_4Li_2O_8$ Very deliqnescent and soluble in water. (Scheibler; Troost.) Insoluble in alcohol, or ether.

SUCCINATE OF MAGNESIA.

I.) *normal.* $C_8H_4Mg_2O_8 + 12\,Aq$ Permanent. Readily soluble in water. Insoluble in alcohol. (Dœpping.)

Fehling has observed salts containing different amounts of water of crystallization which are more slowly soluble than this one.

II.) *hexa.* Ppt. Insoluble in acetic acid.
$C_8H_4Mg_2O_8,\ 4\,MgO + 8\,Aq$

SUCCINATE OF MAGNESIA & OF POTASH. $C_8H_4MgKO_8 + 5\,Aq$ Permanent. (The anhydrous salt is deliquescent.) Readily soluble in water. Sparingly soluble in spirit. (Dœpping.)

SUCCINATE OF MANGANESE. $C_8H_4Mn_2O_8 + 8\,Aq$ Permanent. Soluble in 10 pts. of water at 19° [13°]. Insoluble in alcohol. (John.)

SUCCINATE *of dinoxide* OF MERCURY (Hg_2O). $C_8H_4Hg_4O_8$ Somewhat soluble in pure water. Insoluble in water which contains succinate of soda. (H. Rose.) Insoluble in water. 1000 pts. of alcohol dissolve 0.75 pt. of it. (Harff, in *Berzelius's Lehrb.*) Insoluble in water, alcohol, or succinic acid. Readily soluble in nitric acid. (Dœpping.)

SUCCINATE *of protoxide* OF MERCURY. Sparingly soluble in water. Insoluble in alcohol.

SUCCINATE OF METHYL. $C_8H_4(C_2H_3)_2O_8$ Scarcely at all soluble in water. (Fehling.) Soluble in alcohol, and ether.

SUCCINATE OF METHYLSALICYL. *Vid.* Salicylate of Methyl & of Succinyl.

SUCCINATE *of protoxide* OF MOLYBDENUM. Insoluble in water. Slightly soluble in succinic acid. (Berzelius's *Lehrb.*)

SUCCINATE *of binoxide* OF MOLYBDENUM. $C_8H_4Mo''O_8$ Ppt. Soluble in succinic acid. (Dumas, *Tr.*)

SUCCINATE OF MOLYBDIC ACID. Soluble in water. Decomposed by alcohol. (Berzelius's *Lehrb.*)

SUCCINATE OF NICKEL. $C_8H_4Ni_2O_8 + 8\,Aq$ Soluble in water, acetic acid, and ammonia-water. Insoluble in alcohol. (Dœpping.)

SUCCINATE OF POTASH.

I.) *normal.*

a $= C_8H_4K_2O_8 + Aq$ Permanent. Easily soluble in water, and alcohol.

b $= C_8H_4K_2O_8 + 4\,Aq$ Deliquescent. (Dœpping; Lecanu & Serbat.) Very soluble in water. Soluble in spirit. Insoluble in ether. (Dœpping.)

II.) *acid.* $C_8H_5KO_8 + 4\,Aq$ Efflorescent. Readily soluble in water, and alcohol. (Dœpping.)

III.) *peracid.*
$C_8H_5KO_8,\ C_8H_6O_8 + 8\,Aq$

SUCCINATE OF POTASH & OF URANIUM. $C_8H_4K_2O_8;\ 2\,(2\,Ur_2O_3,\ C_8H_4O_6)$ Insoluble in water, but is gradually decomposed by long-continued washing with warm water. Insoluble in alcohol.

SUCCINATE *of dinoxide* OF SILVER. $C_8H_4Ag_4O_8$ Insoluble in water. (Wœhler.)

SUCCINATE *of protoxide* OF SILVER. $C_8H_4Ag_2O_8$ Very slowly soluble in water or acetic acid. Readily soluble in dilute nitric acid, and in ammonia-water. Insoluble in alcohol. (Dœpping.)

SUCCINATE OF SODA.

I.) *normal.* $C_8H_4Na_2O_8 + 12\,Aq$ Slightly efflorescent. Readily soluble in water, especially when this is hot. (Lecanu & Serbat.) Soluble in spirit. (Dœpping.)

II.) *acid.* Readily soluble in water, and spirit.
$C_8H_5NaO_8 + 4\,Aq\ \&\ 6\,Aq$ (Dœpping.)

SUCCINATE OF SODA & OF URANIUM. $C_8H_4Na_2O_8;\ (2\,Ur_2O_3,\ C_8H_4O_6)$ Insoluble in water, or alcohol. Slowly decomposed when washed with water.

SUCCINATE OF SOLANIN. Readily soluble in water.

SUCCINATE OF STIBETHYLIUM. Very easily soluble in water, and alcohol.

SUCCINATE OF STRONTIA.

I.) *normal.* Sparingly soluble in water [though much more soluble than the baryta salt], more readily in succinic and acetic acids. [Soluble in the acids generally. (H. Rose, *Tr.*)] Insoluble in alcohol. (Dœpping.)

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Succinate of Thoria. Ppt. Succinic acid $C_8H_4Th_2O_8$ dissolves only a trace of it. (Berzelius, *Pogg. Ann.*, 1829, **16.** 414.)

Succinate *of protoxide* **of Tin.** Insoluble in water. Soluble in chlorhydric acid. Wenzel obtained an ill-defined soluble compound also.

Succinate *of binoxide* **of Tin.** Insoluble in water.

Succinate *of protoxide* **of Uranium.** Ppt. (Berzelius, *Lehrb.*)

Succinate *of sesquioxide* **of Uranium.**

I.) Very sparingly soluble in water. Partially $2\,Ur_2O_3, C_8H_6O_8$ decomposed by boiling water. Insoluble in alcohol. (Richter.)

II.) *basic.* Insoluble in water.

Succinate of Urea. Rather more soluble $2\,C_4H_4N_2O_2, C_8H_6O_8$ in water than the oxalate of urea. (Hlasiwetz.)

Succinate *of binoxide* **of Vanadium.**

Succinate of Yttria. Very sparingly soluble in cold, readily soluble $C_8H_4Yr_2O_8 + 12\,Aq$ in warm water. (Berlin.)

Succinate of Zinc. Very slowly soluble in $C_8H_4Zn_2O_8$ water, and succinic acid. Readily soluble in mineral acids, in acetic acid, and in aqueous solutions of caustic potash, and ammonia.

Insoluble in alcohol. (Dœpping.)

Succinate of Zirconia. Insoluble in water.

Succinic Anhydride. *Vid.* Succinic Acid (Anhydrous).

Succinic Ether. *Vid.* Succinate of Ethyl.

Succinimid. Abundantly soluble in water. (*BiSuccinamid. Succinylamid.*) $C_8H_5NO_4 + 2Aq = N\left\{\begin{matrix}C_8H_4O_4'' \\ H\end{matrix}\right. + 2\,Aq$ Tolerably soluble in alcohol. Sparingly soluble in ether. (D'Arcet.)

Succinimid with Argentammonium.

$N\left\{\begin{matrix}C_8H_4O_4'' \\ (NH_3Ag)\end{matrix}\right.$

Succinimid with Lead. Hygroscopic. Soluble in water. Insoluble in alcohol. (Fehling.) $3\,C_8H_5NO_4;\ 4\,PbO + 3\,Aq$

Succinimid with Mercury. Soluble in water. (Dessaignes.) $N\left\{\begin{matrix}C_8H_4O_4'' \\ Hg\end{matrix}\right.$

Succinimid with Silver. Sparingly soluble in cold, easily soluble in boiling water, and alcohol. Soluble in all proportions in ammonia-water. Decomposed by long-continued boiling with water. (Laurent & Gerhardt.) $N\left\{\begin{matrix}C_8H_4O_4'' \\ Ag\end{matrix}\right.$

Succinin. Insoluble in water, alcohol, ether, $C_{14}H_{10}O_{10}$ or bisulphide of carbon. Slowly soluble in boiling water, and alcohol. Slowly soluble in cold alkalies, and more quickly when heated. (Van Bemmelen.)

Succinyl*bi***Amid.** *Vid.* Succinamid.

SuccinylArgent*bi***Amid.**

$C_8H_7N_2AgO_4 = N_2\left\{\begin{matrix}C_8H_4O_4'' \\ Ag \\ H_3\end{matrix}\right.$

SuccinylSulphoPhenylamic Acid. *Vid.* SulphoPhenylSuccinylamic Acid.

SuccinylSulphoPhenylamid. Sparingly (*SulphoPhenylSuccinamid. SulphoSuccinanil.*) $C_{20}H_9NS_2O_8 = N\left\{\begin{matrix}C_{12}H_5S_2O_4 \\ C_8H_4O_4''\end{matrix}\right.$ soluble in boiling, less soluble in cold water, alcohol, and ether. Not immediately soluble in solution of caustic ammonia. (Gerhardt & Chiozza, *Ann. Ch. et Phys.*, (3.) **46.** 157.)

Succinyl*di***SulphoPhenyl***di***Benzoyl***bi***Amid.** (*SuccinyldiSulphoPhenylBenzamid.*) $C_{60}H_{24}N_2S_4O_{16} = N_2\left\{\begin{matrix}C_8H_4O_4 \\ (C_{14}H_5O_2)_2 \\ (C_{12}H_5S_2O_4)_2\end{matrix}\right.$ There are two modifications, one of which is crystalline, the other viscous. When heated under pressure with ether both modifications dissolve easily. But at the ordinary atmospheric pressure the crystalline modification is difficultly soluble in ether, while the viscous modification dissolves in all proportions in ether. (Gerhardt & Chiozza, *Ann. Ch. et Phys.*, (3.) **46.** 161.)

Succisterene. Insoluble in water. Scarcely (White substance from the distillation of amber.) $C_{24}H_8$ at all soluble in cold, more readily soluble in hot alcohol or ether. Soluble in the fixed and volatile oils. Unacted upon by alkaline solutions, or by cold mineral acids; but is soluble in warm concentrated sulphuric acid, with subsequent decomposition. It appears to be a little more soluble in alcohol, and ether, than its isomer idrialin. The presence of a small quantity of the yellow substance obtained from amber (chrysene?) renders it much less soluble in alcohol, and ether. (Pelletier & Walter, *Ann. Ch. et Phys.*, (3.) **9.** 96.)

Sucrate of *X.* *Vid. infra*, under **Sugar**, p. 573.

Sugar. Permanent. Soluble in ⅓ its own (*Cane Sugar. Palm Sugar. Beet Sugar. Maple Sugar. &c.*) $C_{12}H_{11}O_{11}$ weight of cold water, and in all proportions in water at high temperatures, such as are obtained by heating strong solutions of sugar, but when kept for a long time at temperatures near ebullition, it is converted into molasses, or uncrystallizable sugar. (*Vid. inf.*) At 100° water takes up 5 times its own weight of sugar, of which it loses 3 pts. by crystallization when the solution is cooled. (Dubrunfaut.) When a very concentrated solution of sugar (*viscid syrup*) is allowed to cool, it solidifies, as barley candy.

At 15.5° a saturated aqueous solution of sugar is composed of 2 pts. of sugar and 1 pt. of water; at 79.4° of about 4 pts. of sugar and 1 pt. of water; and at 100°, of 5 pts. of sugar and 1 pt. of water. (McCulloh, *Report, U. S. Senate Document*, No. 209, 29th Congress, 2d Session.) The aqueous solution saturated at 15° is of 1.345082 sp. gr., and contains dissolved in every 100 pts. of water at least 209.738 pts. of sugar. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.) From a hot solution containing 5 pts. of sugar to 1 pt. of water, ⅘ of the sugar crystallizes out on cooling. (Henry.)

Beet-root-sugar crystals are somewhat more *slowly* soluble in water than those of cane-sugar, they are also more readily obtained of large size than the latter. Probably the other varieties, as maple or palm sugar, have also slightly different degrees of solubility.

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Percentage of Sugar in aqueous Solutions.

Sp Gr. (at 17.5°)	Percent of Sugar.	Sp. Gr. (at 17.5°)	Percent of Sugar.
1.0035	1	1.1582	36
1.0070	2	1.1631	37
1.0106	3	1.1681	38
1.0143	4	1.1731	39
1 0179	5	1.1781	40
1.0215	6	1.1832	41
1.0254	7	1.1883	42
1.0291	8	1.1935	43
1.0328	9	1.1989	44
1.0367	10	1.2043	45
1.0410	11	1 2098	46
1.0456	12	1.2153	47
1.0504	13	1.2209	48
1.0552	14	1.2265	49
1.0600	15	1.2322	50
1.0647	16	1.2378	51
1.0693	17	1.2434	52
1.0738	18	1.2490	53
1.0784	19	1.2546	54
1.0830	20	1.2602	55
1.0875	21	1.2658	56
1.0920	22	1.2714	57
1.0965	23	1.2770	58
1.1010	24	1.2826	59
1.1056	25	1.2882	60
1.1103	26	1.2938	61
1.1150	27	1.2994	62
1.1197	28	1.3050	63
1.1245	29	1.3105	64
1.1293	30	1.3160	65
1.1340	31	1.3215	66
1.1388	32	1.3270	67
1.1436	33	1.3324	68
1.1484	34	1.3377	69
1.1533	35	1.3430	70

(Niemann, *Ann. der Pharm.*, 1832, 2. 340.)

Sp. Gr. (at 17.5°)	Percent of Sugar.	Sp. Gr. (at 17.5°)	Percent of Sugar.
0	1.0000	32	1.1391
1	1.0040	33	1.1440
2	1 0080	34	1.1490
3	1.0120	35	1.1540
4	1.0160	36	1 1590
5	1.0200	37	1.1641
6	1.0240	38	1.1692
7	1.0281	39	1.1743
8	1.0322	40	1.1794
9	1.0363	41	1.1846
10	1.0404	42	1.1898
11	1.0446	43	1.1951
12	1.0488	44	1.2004
13	1.0530	45	1.2057
14	1.0572	46	1.2111
15	1.0614	47	1.2165
16	1.0657	48	1.2219
17	1.0700	49	1.2274
18	1.0744	50	1.2329
19	1.0788	51	1.2385
20	1.0832	52	1 2441
21	1.0877	53	1.2497
22	1.0922	54	1.2553
23	1.0967	55	1.2610
24	1.1013	56	1.2667
25	1.1059	57	1.2725
26	1.1106	58	1.2783
27	1.1153	59	1.2841
28	1.1200	60	1.2900
29	1.1247	61	1.2959
30	1.1295	62	1.3019
31	1.1343	63	1.3079
64	1.3139	71	1.3570
65	1.3190	72	1.3633
66	1.3260	73	1.3696
67	1.3321	74	1.3760
68	1.3383	75	1.3824
69	1.3445	75.35	1.3847
70	1.3507		

(Balling, in his *Gährungs-chemie*, Prag, 1854, 1. table II. to page 118; compare Brix, *Verhandlungen des Vereins zur Beförderung des Gewerbefleisses, in Preussen*, 1854, p. 132, and Gerlach, *Sp. Gew. der Salzlösungen*, 1859, p. 43.)

An aqueous solution at 15.5° (*water at* 15.5° = 1).

Of Sp. Gr. (according to Steinheil).	Contains Percent of Sugar.	Of Sp. Gr. (according to Balling).
1.000000	0	1.00000
1.004066	1	1.00438
1.008182	2	1.00839
1.012345	3	1.01239
1.016554	4	1.01639
1.020807	5	1.02040
1.025100	6	1.02441
1.029434	7	1.02851
1.033807	8	1.03261
1.038214	9	1.03673
1.042652	10	1.04083
1.047123	11	1.04504
1.051618	12	1.04925
1.056133	13	1.05346
1.060669	14	1.05767
1.065219	15	1.06188
1.069778	16	1.06621
1.074343	17	1.07054
1.078913	18	1.07496
1.083483	19	1.07940
1.088053	20	1.08384

(Steinheil, in his *Gehaltprobe für Biere, München*, 1847; Balling, in his *Gährungs-chemie*, Prag, 1854, 1. table II. to page 118; both cited by Pohl, *loc. cit.*, p. 18, who has also reduced Balling's table to the temperature of 15.5°, as above.)

Sp. Gr. (at 15°*)	Percent of Sugar	Sp. Gr. (at 15°)	Percent of Sugar.
1.00000	0	1.04718	11
1.00412	1	1.05167	12
1.00824	2	1.05619	13
1.01240	3	1 06072	14
1.01661	4	1.06527	15
1.02086	5	1.06983	16
1.02515	6	1.07440	17
1.02949	7	1.07897	18
1.03386	8	1 08354	19
1.03827	9	1.08811	20
1.04271	10		

(Pohl, *Denkschriften der Wiener Akad. math.-nat. Klasse*, 1851, vol. 2. p. 25 of the memoir.) In his very elaborate memoir Pohl also gives tables of corrections for temperature, expansion of instruments employed, &c., &c.

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* Sp. Gr. of water at 15° = 1.

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An aqueous solution containing pts. of Sugar	pts. of Water	Is of Sp. Gr. (at 17.5°).
1	10	1.036
1	9	1.040
1	8	1.045
1	7	1.051
1	6	1.057
1	5	1.068
1	4	1.080
1	3	1.105
1	2	1.143
1	1	1.230
2	1	1.332

(R. Brandes & G. Reich, *Brandes's Archiv.*, 1827, (1.) **22.** 70.)

A Mixture of kilogrammes of Sugar.	Water.	Is of Sp. Gr. (at 15°)	Contains Sugar In 100 Litres Kilogs.	In 100 Kilogs. Kilogs.
100	50	1345.29	89.68	66.6
“	60	1322.31	82.64	62.5
“	70	1297.93	76.35	58.8
“	80	1281.13	71.17	55.5
“	90	1266.66	66.66	52.6
“	100	1257.86	62.88	50.
“	120	1222.22	55.55	45.4
“	140	1200.	50.	41.6
“	160	1187.21	45.66	38.4
“	180	1176.47	42.	35.7
“	200	1170.72	39.	33.3
“	250	1147.54	32.7	28.5
“	350	1111.11	24.6	22.2
“	450	1089.10	19.8	18.1
“	550	1074.38	16.5	15.3
“	650	1063.83	14.18	13.3
“	750	1055.90	12.42	11.7
“	945	1045.	10.	9.5
“	1445	1030.	6.66	6.4
“	1945	1022.05	5.	4.8
“	2445	1018.	4.	3.3
“	2945	1015.	3.33	3.2

(Payen, in *Dumas's Traité*, Liége Edition, **2.** 197.)

A Solution of Sugar of Sp. Gr.	Contains, in 1000 pts. of Water, pts. of Sugar.
1010.1	25.
1020.2	50.
1030.2	75.
1040.6	100.
1051.	125.
1061.8	150.
1072.9	175.
1083.8	200.
1095.2	225.
1106.7	250.

(Graham, Hofmann, & Redwood, *J. Ch. Soc.*, **5.** 231. These authors remark, that "the tables of sp. gr. constructed by Mr. Bate have been verified and are considered entirely trustworthy. The table here given, however, is by ourselves." When yeast is added to solutions of cane-sugar the sp. gr. of the solution is at first increased, owing to the change of the sugar into starch-sugar. When fermentation commences, however, the sp. gr. of the solution soon falls. When cane-sugar is converted into starch-sugar by the action of acids, a similar increase of sp. gr. occurs. (*Ibid.*) When 20 grms. of cane-sugar are dissolved in 100 cc. of water, the temperature falls half a degree. (Dubrunfaut.) When 560 grms. of cane-sugar are dissolved in 1100 grms. of water at 16.62° the temperature falls to 15.5°. (Pohl.)

Soluble in 80 pts. of boiling absolute alcohol, separating out again almost completely as the solution cools. (Pfaff.) Soluble in 4 pts. of strong boiling alcohol. (Wenzel, in his *Verwandtschaft*, p. 300 [T.]). Soluble in 24 5 pts. of alcohol of 0 83 sp. gr. Much more soluble in hot than in cold ordinary alcohol, and still more soluble in weaker spirit, the more readily in proportion as this is dilute and warm, but always less soluble in spirit than in water.

Insoluble in ether. Ether precipitates it from the alcoholic solution. (Dœbereiner.) More soluble in an aqueous solution of borax than in pure water. (Stürenberg.)

When boiled with water during 15 @ 20 hours cane-sugar begins to undergo change, being converted into uncrystallizable sugar and grape-sugar. (Pelouze & Malaguti, 1832, cited by M., *Ann. Ch. et Phys.*, 1835, (2.) **59.** 416.) A solution of cane-sugar in pure water may be preserved for weeks in closed vessels without undergoing any change; but if a solution of about 10° B. is exposed to the air, being protected from dust the while, traces of altered sugar will be found after 3 days, and the amount of the latter increases from day to day. This change does not depend upon organic matter from the air, as was formerly held, for solutions of pure sugar being brought into intimate contact with the air alter very quickly: in an experiment, where the solution of sugar of 10° B. was caused to flow over bits of glass, in a cylinder open at both ends, at 18.75°, it was found that traces of sugar were altered at the end of 6 hours, the change then going on so rapidly that scarcely any crystallizable sugar remained after 36 hours. (Hochstetter, *J. pr. Ch.*, 1843, **29.** pp. 22, 40.) In case the nitrogenized matter of beet-juice (or of the sugar-cane) is present in the sugar solution of the last experiment, all the cane-sugar is changed in the course of a few hours. (*Ibid.*, pp. 32, 40.) When its aqueous solution is persistently boiled or exposed to a temperature higher than that of boiling water, cane-sugar is decomposed, as has been noticed by several observers, and loses its power of crystallizing. This alteration by water and warmth, nevertheless, takes place with exceeding slowness; it being necessary to boil the sugar solution during several hours in order to clearly detect any change. A solution of pure sugar of 25° B. was boiled in an open dish, in one instance during 1 hour, in another 1½ hours, and in another 2 hours, the evaporated water being added only when the temperature of the boiling liquid had risen to 110° @ 112°: no coloration of the liquid occurred in either case, and an abundant crystallization of cane-sugar was obtained from all three; decomposition had, nevertheless, begun, traces of uncrystallizable sugar being detected on testing. This experiment having been frequently repeated always gave the same result. In case the sugar solution is boiled in a flask a larger amount of sugar is changed than would be altered in the same space of time in the dish. This may perhaps depend upon the condensed water which flows back from the neck of the flask, and may contain traces of formic acid. This may also be the explanation of Soubeiran's results, he having found a considerable change after 2 @ 3 hours' boiling, and a strong acid reaction. It is very easy, in any event, to perceive that the decomposition of the sugar proceeds more rapidly after long-continued boiling than is the case at the beginning of the experiment; and in proportion to the formation of products of decomposition, so much the more is the latter accelerated. Cane-sugar is changed much more

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rapidly by boiling, if air be passed through the hot solution. A current of air being drawn through a boiling sugar solution of 15° B., contained in a flask, the liquid became considerably colored in less than 1½ hours, and was found to contain no inconsiderable amount of altered sugar, the change being materially greater than when no air was passed through the boiling liquor. (Hochstetter, *J. pr. Ch.*, 1843, **29**. pp. 23 – 26, 40.)

An aqueous solution of cane-sugar partially loses its dextro-rotatory power at the common temperature by standing; finally losing it entirely, and acquiring a rotatory power towards the left, the cane-sugar being converted into inverse sugar. A solution being heated for 3 hours upon the water-bath lost 3.5 @ 4% of its rotatory power. (Maumené.) On boiling an aqueous solution of sugar, the water which evaporates being replaced, its dextro-rotatory power becomes weaker and weaker, and is at last completely lost. At this point and until the subsequent lævo-rotatory power has not arrived at its maximum, the liquor still contains unaltered cane-sugar, for the addition of acids still increases the lævo-rotation. When the transformation is complete, for which 114 hours' boiling is necessary, longer boiling causes the formation of formic and acetic acids, and a dark coloration. (Soubeiran.) No ordinary (dextro-) glucose is formed when an aqueous solution of cane-sugar is boiled, but after 60 hours' boiling a peculiar non-crystallizable sugar. (Bouchardat.) The formation of ordinary (dextro-) glucose and lævo-glucose unquestionably occurs simultaneously in the decomposition of aqueous solutions of cane-sugar. (Dubrunfaut, Maumené, Béchamp.) This transformation of cane-sugar takes place at 90° @ 100°. (Thénard.)

When warmed with dilute acids, or when left to itself, an aqueous solution of cane-sugar loses its dextro-rotatory power and acquires a lævo-rotatory power. (Biot.) When boiled, or even when heated to 95°, with dilute acids, cane-sugar is converted into grape-sugar; the latter being subsequently decomposed by the continued action of the acid. As a general rule all acids, whether organic or inorganic, act in the same manner when heated with cane-sugar. Even very dilute acids cause this transformation, though more slowly than acids which are somewhat more concentrated. (Malaguti, *Ann. Ch. et Phys.*, 1835, (2.) **59**. pp. 417, 422, 407.) The conversion of cane- into grape-sugar is most remarkable, it being only necessary to add a few percent of sulphuric acid to a solution of cane-sugar in order to bring about the formation of grape-sugar; and this change occurs even when no heat is applied to the mixture. Besides sulphuric acid, other acids easily transform cane- into grape-sugar in the cold; and even acetic acid produces this change at the temperature of boiling. (Mitscherlich, *Berlin Bericht*, 1841, p. 390.) All acids effect the complete conversion of cane-sugar, but strong acids more quickly than the same quantity of weaker acids, and the same acid acts more rapidly the higher the temperature. The change is complete with $\frac{1}{10}$ @ $\frac{1}{11}$ measure of chlorhydric acid at the temperature of the air in a few hours, the rotatory power then possessed by the liquid remaining constant for two days, or until coloration sets in. With sulphuric acid the transformation takes place slowly at the common temperature, but at 60° @ 70° instantaneously and without coloration of the liquid. A solution of cane-sugar, containing 66% of racemic acid, is only partially changed after 16 days, completely after a year; ¼ measure of glacial acetic acid does not occasion the transformation within 2 months, but completely within a year. (Biot, *C. R.*, **15**. 528 [*Gm.*].) Small quantities of organic acids do not sensibly increase the decomposing action of water at common temperatures. A 30% solution of cane-sugar mixed with $\frac{1}{10}$ of its weight of tartaric acid was not completely converted into inverse sugar after 5 years. (Maumené, *C. R.*, **39**. 917 [*Gm.*].) The cane-sugar of lemon-juice (containing 6.5% of acid) is only very slightly changed after 12 days, not more so than when the free acid is neutralized. The acid juice of the apricot may likewise be concentrated on the water-bath to half its bulk without the inversion of much of its cane-sugar. (Buignet.) If solutions of cane-sugar are heated with equivalent quantities of different acids, sulphuric acid causes inversion more quickly than tartaric acid, and tartaric acid more quickly than citric or than acetic acid. A larger quantity of the same acid is required if the sugar solution is dilute than if it is concentrated. (Buignet.)

In the transformation of cane-sugar by dilute acids there is produced grape-sugar (Kirchhoff), granular sugar (Guibourt, Boullay), gum-sugar (Bouillon-Lagrange), a sugar differing from ordinary (dextro-) glucose, which rotates the plane of polarization to the left (Biot), and is afterwards converted into ordinary (dextro-) glucose (Biot, Soubeiran). Cane-sugar heated with acids forms first lævo-glucose, and then, if the heat be continued, dextro-glucose. (Bouchardat.) But since boiling with acids does not alter the rotatory power of inverse sugar until coloration takes place, the crystals of dextro-glucose which are deposited after some months may be produced, not by the action of the acid, but by the molecular transformation which takes place in the course of time. (Soubeiran.)

Decomposed by concentrated sulphuric, chlorhydric, nitric, and arsenic acids.

When heated in closed tubes to 100° with aqueous solutions of the chlorides of sodium, barium, or strontium, more inverse sugar is formed than would be the case with pure water. The same transformation takes place quickly, the mass being blackened, with chloride of ammonium, but not with chloride of potassium, chloride of sodium, or fluorspar. (Berthelot.) Sugar solutions to which have been added alkaline chlorides, or the chlorides of the alkaline earths, or normal sulphates or carbonates behave like pure solutions of sugar when kept for a long time or boiled, since the salts in question exert no decomposing influence upon the sugar and do not alter it in any way; but most salts, and especially the chlorides of the alkalies and alkaline earths, hinder the crystallization of cane-sugar. Solutions, to which had been added 2 pts. of chloride of sodium, or chloride of calcium, for every 100 pts. of sugar, could not be made to crystallize until the salts had been removed by means of animal charcoal. Alkaline carbonates behave in the same way. But salts of nitric and sulphuric acid disturb the crystallization much less than chlorides. This action seems to be purely mechanical, since the uncrystallizable sugars behave in a similar way. (Hochstetter, *J. pr. Ch.*, 1843, **29**. pp. 28, 41.)

On heating a mixture of cane-sugar with 4 or 5 pts. of hydrate of potash and a small quantity of water oxalate of potash is formed. (Gay-Lussac.) When a solution of sugar, to which a small quantity of potash has been added, is boiled for a long time, out of contact with the air, the potash finally becomes saturated with ulmic acid; if the experiment is made in the air, formic acid is also produced. (Malaguti, *Ann. Ch. et Phys.*, 1835, (2.) **59.** pp. 420, 423.) Cane-sugar does not become sensibly brown when boiled with potash-lye. (Boullay; Chevalier.) A solution of cane-sugar heated with potash-lye to 88°, and then neutralized with acid, does not regain the whole of its rotatory power, which is still further diminished if the liquor is boiled or evaporated. Carbonate of potash does not diminish the rotatory power of cane-sugar when heated therewith to 88°; and when boiled it does so to a less extent than caustic potash. (Michaelis.) On boiling a solution of cane-sugar for 72 hours with $\frac{1}{60}$ pt. of crystallized carbonate of soda, an acid black liquor is formed possessing lævo-rotatory power. (Soubeiran.)

When a solution of cane-sugar, in which lime has been dissolved, is heated, even to 120°, or boiled for a long time, the cane-sugar undergoes no alteration; the lime even protecting this sugar from the decomposing influence which is exerted upon it at high temperatures, by nitrogenous matters. (Hochstetter, *J. pr. Ch.*, 1843, **29.** pp. 40, 27.) [Compare Oxide of Calcium, and Sucrate of Lime.] But under certain circumstances the alkalies may promote the decomposition of cane-sugar; for example, in presence of nitrogenized matters at temperatures favorable to processes of fermentation. (Hochstetter, *loc. cit.*, p. 40.) Solutions of cane-sugar mixed with hydrate of lime exhibit greater stability when boiled or long kept than pure aqueous sugar solutions. (Bouchardat, Soubeiran, and others.)

Moderately concentrated aqueous solutions of cane-sugar left in contact with certain nitrogenous bodies, at temperatures between 10° and 30°, undergo transformations distinguished by the names *Vinous*, *Lactous*, and *Mucous Fermentation;* for descriptions of which see Gmelin's *Handbook*, **7.** 96, and **15.** 265.) But cane-sugar is not altered either by diastase (Guérin-Varry), or by emulsin. (O. Schmidt.) When gelatinous, nitrogenized substances are present in solutions of cane-sugar the latter changes to uncrystallizable sugar before any phenomena of fermentation are apparent; and this change occurs as well after or during long-continued boiling. (Hochstetter, *J. pr. Ch.*, 1843, **29.** pp. 29–34, 40.) Cane-sugar does not undergo vinous fermentation till, under the influence of a peculiar substance in the yeast, or of a substance contained especially in the kernel of fruits, it has been resolved, with assumption of water, into lævo- and dextro-glucose. (Dubrunfaut, Berthelot, Buignet [*Gm.*].) It is converted, previous to fermentation, into uncrystallizable sugar (Dubrunfaut, 1838), lævo-rotatory sugar (Persoz, *C. R.*, **17.** 755), grape-sugar (H. Rose, *Pogg. Ann.*, **52.** 293 [*Gm.*]). The spontaneous fermentation which sacchiferous vegetable juices undergo on standing produces inversion of the cane-sugar contained in them. (Biot, *C. R.*, **15.** 528 [*Gm.*].)

Uncrystallizable Sugar. (***Fruit-Sugar. Lævo-Glucose.***) $C_{12} H_{12} O_{12}$ Very deliquescent. Readily soluble in water, and spirit; being more readily soluble in the latter than ordinary (dextro-)glucose. Insoluble in absolute alcohol or in ether.

Lævo-Glucose with Lime.

I.) Sparingly soluble in water. Decomposed by water when exposed to light and air. (Dubrunfaut.) $3\,Ca\,O, C_{12} H_{12} O_{12}$

II.) *basic.* Soluble in water.

SUGAR OF GELATINE. *Vid.* Glycocoll.

GRAPE-SUGAR. *Vid.* Glucose.

MILK-SUGAR. *Vid.* Lactin.

All the sugars are very soluble in water. (Berthelot.) Many of them are soluble in concentrated acetic acid.

SUGAR(CANE) with CHLORIDE OF SODIUM. $2\,(C_{12} H_{11} O_{11});\ Na\,Cl$ Deliquescent. Soluble in water. (Peligot.)

SUGAR(CANE) with SULPHATE OF COPPER. $C_{12} H_{11} O_{11}, Cu\,O, S\,O_3 + 4\,Aq$ Soluble in water, the solution undergoing decomposition when boiled. (Barreswil.)

SUCRATE (Cane-Sugar) OF BARYTA.

I.) *mono.* Sparingly soluble in cold water. $C_{12} H_{11} Ba\,O_{11} + Aq$ (Dubrunfaut.) 100 pts. of water dissolve 2.1 pts. of it at 15° and 2.3 pts. at 100°; or 1 pt. of it dissolves in 47.6 pts. of water at 15°, and in 43.5 pts. of water at 100°; it being more soluble than sucrate of lime, No. III. (Peligot, *C. R.*, 1851, **32.** 334.) Insoluble in alcohol or wood-spirit.

II.) *biacid.?* Ppt., produced by alcohol in the solution of No. I. (Brendecke.)

SUCRATE OF BARYTA & OF COPPER. Soluble in water, the solution behaving like that of the corresponding lime salt. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 156.)

SUCRATE OF BARYTA & *of protoxide* OF IRON. Soluble in water, the solution behaving like that of the lime salt. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 156.)

SUCRATE OF BARYTA & OF LEAD. Soluble in water. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 156.)

SUCRATE OF COPPER & OF LIME. Permanent. Readily soluble in water. When the aqueous solution is heated to 71° in a flat open vessel a flaky blue precipitate separates, but this dissolves again completely as the solution cools. If the solution is heated in a deep narrow-mouthed vessel, however, as a test-tube, decomposition occurs, some dinoxide of copper being precipitated. Dinoxide of copper also separates, even in an open vessel, if an excess of sugar be present, but the presence of free alkali tends to retard this deoxidation. If, instead of heating the solution, it be left to itself, dinoxide of copper gradually separates, — more rapidly in closed than in open test-tubes, and much more rapidly in solutions to which an excess of sugar has been added; but very slowly in those containing an excess of alkali. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** pp. 153, 154.) Neither a solution of sugar nor of sucrate of lime will by itself dissolve hydrate of copper, but when these solutions are mixed they readily dissolve the hydrate, with combination.

SUCRATE OF COPPER & OF POTASH. Soluble in water, and no precipitate is formed on heating, unless free sugar be present, in which case dinoxide of copper falls down. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 156.)

SUCRATE OF COPPER & OF SODA. Soluble in water, and no precipitate is formed on heating this solution, unless free sugar be present, in which case dinoxide of copper is precipitated. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 156.)

SUCRATE OF COPPER & OF STRONTIA. Soluble in water, the solution behaving like that of the corresponding lime salt. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 156.)

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Sucrate *of protoxide* of Iron. Very soluble $C_{12}H_{10}FeO_{11}$? in water. Insoluble in alcohol. (Gladstone, *J. Ch. Soc.*, **7.** 196.)

Sucrate *of protoxide* of Iron & of Lime. Soluble in water, but the solution is very liable to undergo decomposition, both in closed and open vessels, carbonates of lime and iron being formed. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 155.)

Sucrate *of protoxide* of Iron & of Potash. Soluble in water. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 156.)

Sucrate *of protoxide* of Iron & of Soda. Soluble in water. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 156.)

Sucrate *of protoxide* of Iron & of Strontia. Soluble in water, the solution behaving like that of the corresponding lime salt. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 156.)

Sucrate of Lead. Insoluble in water, whether $C_{12}H_9Pb_2O_{11}$ cold or boiling. Easily soluble in acids, and in an aqueous solution of acetate of lead. Soluble in an aqueous solution of cane-sugar.

Sucrate of Lead & of Lime. Soluble in water. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 155.)

Sucrate of Lead & of Potash. Soluble in water. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 156.)

Sucrate of Lead & of Soda. Soluble in water. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 156.)

Sucrate of Lead & of Strontia. Soluble in water. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 156.)

Sucrate of Lime.

I.) *mono.* Very soluble in water. Insoluble in $C_{12}H_{10}CaO_{11} + Aq$ spirit of 85%, but soluble in an alcoholic solution of sugar. (Brendecke.)

When the aqueous solution is heated it becomes cloudy, and finally coagulates completely if sufficiently concentrated, the compound No. 3 being precipitated (Peligot), but when the temperature is allowed to fall this precipitate redissolves, the liquid becoming perfectly limpid and transparent, even before it is completely cold. (Lowitz, *Crell's Chem. Ann.*, **1.** 347, cited by Schweigger, in his *Journ. für Ch. u. Phys.*, **5.** 53; Osann, *Gilbert's Ann. der Phys.*, 1821, **69.** 292, and *Kastner's Archiv.*, 1824, **3.** 212; Peligot, *C. R.*, 1851, **32.** 333.) The precipitate disappears on adding to the hot liquid, cane-sugar, glucose, lactine, or mannite. (Brendecke.) Dilute solutions of sucrate of lime become turbid at 80°, and more concentrated solutions at 100°; no precipitate is formed on heating very highly concentrated solutions. (Dubrunfaut.)

II.) *di.*

a = $C_{12}H_{11}O_{11},2(CaO,HO)$ This compound may be isolated by carefully evaporating the aqueous solution of sucrate of lime at temperatures below 82°, at which temperature it is insoluble in water; or by adding alcohol, which precipitates it from the aqueous solution. (Hunton, *Phil. Mag.*, 1837, (3.) **11.** 153.)

b = $C_{12}H_9Ca_2O_{11} + 2Aq$ May be admitted, according to Peligot, as the compound which tends to be produced when lime is dissolved in a solution of No. 1.

For the amounts of lime which can be dissolved by solutions of sugar of different densities, see Oxide of Calcium.

On attempting to saturate with lime a syrup containing more than about 30% of sugar the solution becomes very viscous, and after a time solidifies. An immediate precipitation of the sugar may also be brought about by adding lime to a syrup of 35° B., when a solid calcareous compound is formed, which is insoluble, or only very slightly soluble. But in both these cases the precipitate is mixed with an excess of free hydrate of lime. (Péligot, *C. R.*, **32.** 336.)

III.) *tri.* Almost insoluble, either in cold or $C_{12}H_9Ca_2O_{11},CaO,HO + 2Aq$ in boiling water. 100 pts. of cold water dissolve less than 1 pt. of it; and on heating this cold saturated solution half of the sucrate which it contains is precipitated; hence at least 200 pts. of boiling water are required in order to dissolve 1 pt. of this compound. It is consequently less soluble than the baryta salt. Very soluble in an aqueous solution of cane-sugar. (Péligot, *C. R.*, 1851, **32.** pp. 333, 334.) See also above, under No. I.

IV.) *sesqui?* Readily soluble in water, a pre- $2C_{12}H_{11}O_{11},3CaO$ cipitate being formed when this solution is heated. Insoluble in alcohol or spirit. (Brendecke.) Soluble in an alcoholic solution of sugar. (Soubeiran.)

Péligot disproves the existence of this compound (Soubeiran's). Compare Berthelot, *Ann. Ch. et Phys.*, (3.) **46.** 180.) A saturated solution of lime in sugar-water having been boiled continually during 2 hours over a free fire, the water being replaced as it evaporated, no uncrystallizable sugar was formed. (Hochstetter, *J. pr. Ch.*, 1843, **29.** 27.)

Sucrate of Magnesia. Soluble in water.

Sucrate of Potash. Readily soluble in $C_{12}H_{10}KO_{11} + Aq$? water. Scarcely soluble in alcohol, but readily soluble in an alcoholic solution of sugar. (Brendecke; compare Hunton, *Phil. Mag.*, 1837, (3.) **11.** 156.)

Sucrate of Soda. Similar to the Potash $C_{12}H_{10}NaO_{11} + Aq$? Compound.

Sucrate of Strontia. Efflorescent. Soluble in water.

Sudoric Acid. Soluble in absolute alcohol. (*Hydrotic Acid.*) $C_{10}H_9NO_{14}$ The salts of sudoric acid are all soluble in water, and in absolute alcohol, excepting the silver salt.

Sudorate of Silver. Insoluble in absolute $C_{10}H_8AgNO_{14}$ alcohol.

*Mono*Sulhyposulphuric Acid. *Vid. tri*Thionic Acid.

*Bi*Sulhyposulphuric Acid. *Vid. tetra*Thionic Acid.

*Ter*Sulhyposulphuric Acid. *Vid.* Pentathionic Acid.

SulphAcetic Acid. Very deliquescent. Soluble in water. (*SulphAcetylic Acid.*) $C_4H_4S_2O_{10} = C_4H_2O_2'',2HO,S_2O_6$ The metallic salts of sulphacetic acid all appear to be soluble in water. Alcohol precipitates them from the aqueous solution.

SulphAcetate of Ammonia. Soluble in water, from which it is precipitated on the addition of alcohol. (Melsens.)

SulphAcetate of Baryta.

I.) *normal.* Soluble in water, from which solu- $C_4H_2Ba_2S_2O_{10} + 3Aq$ tion it is precipitated on the addition of alcohol. There appears to be two or more different salts. When it has been deposited as an amorphous powder, it is very difficult to redissolve it; and after having been dried at 250°, it is still more difficultly soluble in water. In both cases, however, it is immediately dissolved when treated with chlorhydric acid (Melsens, *Ann. Ch. et Phys.*, (3.) **10.** 373.)

SulphAcetate *of protoxide* **of Iron.** Soluble in water, from which solution it is precipitated on the addition of alcohol. (Melsens, *loc. cit.*)

SulphAcetate of Lead. Permanent. Soluble in water, from which it is precipitated on the addition of alcohol. (Melsens, *loc. cit.*)
$C_4H_2Pb_2S_2O_{10}$

SulphAcetate of Lime. Soluble in water, from which it is precipitated on the addition of alcohol. (Melsens, *loc. cit.*)

SulphAcetate *of protoxide* **of Mercury.** Soluble in water, from which it is precipitated on the addition of alcohol. (Melsens, *loc. cit.*)

SulphAcetate of Potash. Soluble in water, especially when this is hot.
$C_4H_2K_2S_2O_{10} + 2\,Aq$

SulphAcetate of Silver. Soluble in water, from which it is precipitated on the addition of alcohol. (Melsens, *loc. cit.*)
$C_4H_2Ag_2S_2O_{10}$

SulphAcetate of Soda. Soluble in water. (Melsens, *loc. cit.*)

SulphAcetoThymic Acid. *Vid.* ThymylSulphAcetic Acid.

SulphAcetoVinic Acid. Soluble in water, and absolute alcohol. (Melsens, *Ann. Ch. et Phys.*, (3.) **10.** 377.)

SulphAcetoVinate of Silver. Hygroscopic. More soluble than sulphacetate of silver in water. Soluble in hot, less soluble in cold absolute alcohol. (Melsens, *loc. cit.*)
$C_8H_6Ag_2S_4O_{12}$

SulphAcetylic Acid. *Vid.* Ethionic Acid.

SulphAldehyde. *Vid.* Hydride of SulphAcetyl.

SulphAllylAnilinUrea. *Vid.* PhenylThiosinamin.

Sulphamic Acid.
$NH_3S_2O_6 = N\left\{\begin{matrix}S_2O_4''\\H_2\end{matrix}\right..O,HO$

Sulphamate of Baryta. Soluble in water. (Laurent, in his *Chemical Method*, p. 250.)

Sulphamate of Lead. Soluble in water. (Laurent, *loc. cit.*)

Sulphamate of Lime. Soluble in water. (Laurent, *loc. cit.*, p. 251.)

Sulphamate of Methyl. Very deliquescent. Miscible, in all proportions, with water.
(*SulphoMethylane.*)
$N\left\{\begin{matrix}S_2O_4''\\H_2.(C_2H_3)\end{matrix}\right\}O_2$

Sulphamate of Silver. Soluble in water. (Laurent, *loc. cit.*, p. 250.)

I.) **Sulphamid.** Soluble in 9 pts. of cold water. Permanent. Decomposed by aqueous solutions of the caustic alkalies.
(*Sulphate of Ammon*, of H. Rose.)
$a = (NH_3SO_3)$ or $N_2\left\{\begin{matrix}S_2O_4''\\H_4\end{matrix}\right. + 2\,HO$

α) pulverulent. } *β) crystalline.* } There are two forms of this compound, both of which are soluble, without decomposition, in cold water, but when the aqueous solution is heated higher than 50° the compound is converted into sulphate of ammonium (NH_4O, SO_3); this transformation is especially rapid when the solution is boiled, and is more readily effected with the amorphous than with the crystalline variety. The presence of free acids generally accelerates the transformation. (H. Rose, in *Berzelius's Lehrb.*, **3.** 299.)

b = *Sulphamid* (of Regnault). Very deliquescent. Almost equally soluble with chloride of ammonium in water, and alcohol.
$N_2\left\{\begin{matrix}H_4\\S_2O_4''\end{matrix}\right.$

II.) *Sulphamid* (of Jacquelain). Permanent. Very soluble in water with reduction of temperature. Alcohol precipitates it from the aqueous solution. Soluble in cold concentrated sulphuric acid, decomposing when the solution is heated. (Jacquelain, *Ann. Ch. et Phys.*, (3.) **8.** pp. 301, 306, 309.)
"$8\,N_2H_6, 4\,SO_3$"

Sulphamid (No. 2) **with Ammonia & Baryta.** Sparingly soluble in water. Insoluble in alkaline water. Completely dissolved by dilute chlorhydric acid, which retains it only for a few minutes, however. Decomposed by warm concentrated sulphuric acid. (Jacquelain, *loc. cit.*, pp. 306, 309.)

Sulphamid (No. 2) **with Baryta.** Insoluble [or very sparingly soluble?] in water or in alcohol. (Jacquelain, *loc. cit.*, p. 304.)
"$(N_2H_6, 2\,BaO)\,3\,SO_3$"

Sulphamid (No. 2) **& Lead.** Insoluble in water. (Jacquelain, *loc. cit.*, p. 307.)

Sulphamid (No. 1) **with Sulphate of Ammonia.** Deliquescent. Very easily soluble in water. (H. Rose.)
$NH_3, SO_3; NH_4O, SO_3$

SulphAmidonic Acid. Deliquescent. Soluble in water. The aqueous solution decomposes readily. Its salts are soluble in water.

SulphAmidonate of Baryta. Easily soluble in water, the solution undergoing decomposition when heated.

SulphAmidonate of Lead. Soluble in water.

SulphAmidonate of Lime. Soluble in water, from which it is precipitated on the addition of alcohol.

SulphAmylic Acid. *Vid.* AmylSulphuric Acid.

SulphAmylSulphuric Acid. *Vid.* AmylSulphurous Acid.

SulphAnilic Acid. Sparingly soluble in cold, more soluble in boiling water. Less soluble in alcohol than in water. (Gerhardt.)
(*PhenylSulphamic Acid. AnilinSulphuric Acid.*)
$C_{12}H_7NS_2O_6 = N\left\{\begin{matrix}S_2O_4''\\C_{12}H_5.O,HO\\H\end{matrix}\right.$

SulphAnilate of Ammonia. Very soluble in water.
$C_{12}H_6(NH_4)NS_2O_6$

SulphAnilate of Anilin. Soluble in water.

SulphAnilate of Baryta. Tolerably soluble in water.
$C_{12}H_6BaNS_2O_6$

SulphAnilate of Copper. Soluble in water.
$C_{12}H_6CuNS_2O_6 + 4\,Aq$

SulphAnilate of Silver. Soluble in water.
$C_{12}H_6NAgS_2O_6$

SulphAnilate of Soda. Soluble in water, and in boiling alcohol. Insoluble in ether.
$C_{12}H_6NaNS_2O_6 + 2\,Aq$

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*Bi*SulphAnilic Acid. Easily soluble in water. Insoluble in alcohol or ether. (Buckton & Hofmann.)
$C_{12}H_7NS_4O_{12} = C_{12}H_7N, 4SO_3$

*Bi*SulphAnilate of Baryta. Easily soluble in water. Insoluble in alcohol or ether.
$C_{12}H_5Ba_2NS_4O_{12}$

*Bi*SulphAnilate of Silver. Soluble in water. Insoluble in alcohol, and ether. (Buckton & Hofmann.)
$C_{12}H_5Ag_2NS_4O_{12}$

SulphAnilid. Tolerably soluble in water. Soluble in concentrated sulphuric acid, from which it is reprecipitated on the addition of water. (Gerhardt, *Ann. Ch. et Phys.*, (3.) 15. 92.)

SulphAnisic Acid. Permanent. Soluble in water. Insoluble in alcohol. Soluble in ether. (Zervas, *J. Ch. Soc.*, 10. 214.)
(*AnisSulphuric Acid.*)
$C_{16}H_8S_2O_{12} + 2 Aq = C_{16}H_6O_2, 2HO, 2SO_4 + 2 Aq$

SulphAnisate of Ammonia. Soluble in water.

SulphAnisate of Baryta. Readily soluble in water, but becomes less soluble after repeated crystallization. (Zervas.) Easily soluble in water, from which it is precipitated on the addition of alcohol. (Limpricht.)
$C_{16}H_6Ba_2S_2O_{12} + 2 Aq \;\&\; 3 Aq$

SulphAnisate of Lead.

I.) *normal.* Sparingly soluble in cold, somewhat more readily soluble in hot water. By repeated crystallization its solubility is diminished. Insoluble in alcohol. (Zervas.)
$C_{16}H_6Pb_2S_2O_{12} + 2 Aq \;\&\; 3 Aq$

II.) *acid.* Easily soluble in cold and in hot water.
$C_{16}H_7PbS_2O_{12} + 2 Aq$

SulphAnisate of Magnesia. Readily soluble in water.

SulphAnisate of Potash. Soluble in water.

SulphAnisate of Silver. Somewhat difficultly soluble in water. (Zervas.) Sparingly soluble in water, especially after recrystallization. (Limpricht.)

SulphAnisolic Acid. *Vid.* Sulphate of Toluenyl, No. II.

*Bi*SulphAnisolic Acid.
$C_{14}H_8S_4O_{14}$

*Bi*SulphAnisolate of Baryta. Soluble in water.
$C_{14}H_6Ba_2S_4O_{14} + 2 Aq$

*Bi*SulphAnisolate of Lead. Soluble in water. Insoluble, or but sparingly soluble, in alcohol. (Zervas, *J. Ch. Soc.*, 10. 215.)

SulphAnisolid. *Vid.* Sulphate of Toluenyl, No. I.

SulphAnisylous Acid. *Vid.* Hydride of SulphAnisyl.

SulphAntimonic Acid. *Vid. quinqui*Sulphide of Antimony. The alkaline salts of sulphantimonic acid are soluble in water, but these solutions slowly undergo decomposition when exposed to the air. Most of the sulphantimoniates of the metals proper are insoluble in water. All sulphantimoniates are insoluble in alcohol. (Rammelsberg.)
SbS_5

SulphAntimoniate of Ammonium. Soluble in cold water, free from air. Decomposed by hot water. Decomposed by alcohol, ether, and acids.
$3NH_4S, SbS_5$

SulphAntimoniate of Barium. Soluble in water. Insoluble in alcohol. (Rammelsberg.)
$3BaS, SbS_5 + 6 Aq$

SulphAntimoniate of Bismuth.
BiS_3, SbS_5

SulphAntimoniate of Cadmium. Ppt.
$3CdS, SbS_5$

SulphAntimoniate of Calcium. Partially soluble in water. Insoluble in alcohol. (Rammelsberg.)
$3CaS, SbS_5$

SulphAntimoniate of Cobalt. Ppt. Decomposed by chlorhydric acid. (Rammelsberg.)
$3CoS, SbS_5$

SulphAntimoniate of Copper. Ppt.
$3CuS, SbS_5$

SulphAntimoniate of Copper & of Iron.

SulphAntimoniate of Iron.

SulphAntimoniate of Lead. Decomposed by an aqueous solution of caustic potash.
$3PbS, SbS_5$

SulphAntimoniate of Magnesium. Deliquescent. Soluble in water. Decomposed by alcohol. (Rammelsberg.)
$3MgS, SbS_5$

SulphAntimoniate of Manganese. Ppt.
$3MnS, SbS_5$

SulphAntimoniate *of disulphide* of Mercury. Ppt.
$3Hg_2S, SbS_5$

SulphAntimoniate *of protosulphide* of Mercury. Ppt.
$3HgS, SbS_5$

SulphAntimoniate of Nickel. Decomposed by hot chlorhydric acid. (Rammelsberg.)
$3NiS, SbS_5$

SulphAntimoniate of Potassium. Deliquesces, with decomposition. Soluble in water. More soluble in water than the sodium salt. (Rammelsberg.)
$3KS, SbS_5 + 9 Aq$

SulphAntimoniate of Silver. Insoluble in water. Decomposed by an aqueous solution of caustic potash.
$3AgS, SbS_5$

SulphAntimoniate of Sodium.
(*Schlippe's salt.*)
$3NaS, SbS_5 + 18 Aq$

Soluble in 3 pts. of cold water (Van den Corput);
" 4 " (Duflos);
" 2.9 pts. of water at 15° (Rammelsberg);
" 1 pt. of boilingwater (Duflos).
Insoluble in alcohol, (Van den Corput);
or in dilute alcohol. (Rammelsberg).

SulphAntimoniate of Strontium. Soluble in water. Alcohol precipitates a dense oily liquid when added to the aqueous solution. (Rammelsberg.)
$3SrS, SbS_5$

SulphAntimoniate *of protosulphide* of Tin.

SulphAntimoniate of Uranium.

SulphAntimoniate of Zinc.

I.) *normal.* Soluble in a boiling aqueous solution of sulphantimoniate of sodium; insoluble in a solution of sulphate of zinc. Partially soluble, with decomposition, in a solution of caustic potash. Soluble in boiling chlorhydric acid. (Rammelsberg.)
$3ZnS, SbS_5$

SulphAntimonious Acid. *Vid. ter*Sulphide of Antimony. The alkaline sulphantimonites are decomposed by water, the sulphide of the alkali in combination with a small quantity of the tersulphide of antimony dissolving, while the greater part of the latter remains undissolved. (Berzelius's *Lehrb.*, 2. 299.)
SbS_3

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SulphAntimonite of Barium. Partially soluble in water. (Pagenstecher.)

SulphAntimonite *of disulphide* **of Copper.**
Cu_2S, SbS_3

SulphAntimonite of Iron.

I.) Soluble, with decomposition, in cold chlorhydric acid.
FeS, SbS_3

II.) $3FeS, 2SbS_3$

III.) $3FeS, 4SbS_3$

SulphAntimonite of Lead. Soluble, with decomposition, in hot concentrated chlorhydric and nitric acids.

SulphAntimonite of Lead & of Silver.
$3PbS, 2AgS, 2SbS_3$

SulphAntimonite of Potassium. Deliquescent. Those samples which contain an excess of the alkaline sulphide are completely soluble in water, while those which contain an excess of SbS_3 are partially insoluble. The aqueous solution is decomposed by all acids, including carbonic acid, and by solutions of the carbonates of potash and soda, and the bicarbonates of potash, soda, and ammonia. The crystalline salt is insoluble in absolute alcohol, but is dissolved by dilute alcohol in proportion to the water which this contains. (Kohl.)
$5KS, 2SbS_3 + 10Aq$; or rather, $(KS)_x, (SbS_3)_x$

SulphAntimonite of Silver.
Various compounds from AgS, SbS_3 to $6AgS, SbS_3$

SulphAntimonite of Sodium.

I.) Deliquescent. Decomposed by hot water. Those samples which contain an excess of NaS are entirely soluble in water, but those in which SbS_3 predominates are only partially soluble.

II.) Permanent. Easily soluble in water. Insoluble in alcohol or ether. (Kohl.)
$4NaS; 3SbS_3 + 3Aq$

SulphAntimonite of Stib*tri*Amyl. Insoluble in water, alcohol, or ether. (Berlé.)
$Sb\left\{(C_{10}H_{11})_3S_2, 2SbS_3\right.$

SulphAntimonite of Stib*tri*Ethyl. Ppt.
$C_{12}H_{15}Sb_3S_8 = Sb\left\{(C_4H_5)_3S_2, 2SbS_3\right.$

SulphArsenic Acid. *Vid. quinqui*Sulphide of Arsenic. The sulpharseniates of the alkalies and alkaline earths are soluble in water, but the others, with a few exceptions, are insoluble. The solution may be readily preserved when concentrated, but when dilute it is slowly decomposed.
AsS_5

SulphArseniate of Aluminum. Ppt. (Berzelius [T.].)

SulphArseniate of Ammonium.

I.) *tris.* Tolerably permanent. Soluble in water. Sparingly soluble in alcohol. (Berzelius.)
$3NH_4S, AsS_5$

II.) *di.* Soluble in water, and in ammonia-water. Insoluble in alcohol. (Berzelius.)
$2NH_4S, AsS_5$

III.) *mono.* Soluble in alcohol.
NH_4S, AsS_5

IV.) *peracid.* Insoluble in water.
$NH_4S, 12AsS_5$

SulphArseniate of Ammonium & of Magnesium. Easily soluble in water. Insoluble in alcohol. (Berzelius.)
$NH_4S, 2MgS, AsS_5$

SulphArseniate of Ammonium & of Sodium. Permanent. Much more easily soluble in water than the sodium-salt by itself. Sparingly soluble in cold, more soluble in hot spirit. (Berzelius's *Lehrb.*)
$3NH_4S, AsS_5; 3NaS, AsS_5$

SulphArseniate of Barium.

I.) *tris.* Easily soluble in water. Sparingly soluble in alcohol.
$3BaS, AsS_5$

II.) *di.* Soluble in all proportions in water. Decomposed by alcohol.
$2BaS, AsS_5$

III.) *mono.* Soluble in alcohol.
BaS, AsS_5

IV.) *acid.* Insoluble in water.
$BaS, 3AsS_5$ (?)

SulphArseniate of Bismuth.

I.) $2BiS_3, 3AsS_5$
II.) $BiS_3, 3AsS_5$
} Soluble in an aqueous solution of sulpharseniate of sodium. (Berzelius.)

SulphArseniate of Cadmium. Ppt.
$2CdS, AsS_5$

SulphArseniate of Calcium.

I.) *tris.* Easily soluble in water. Insoluble in alcohol.
$3CaS, AsS_5$

II.) *di.* Hygroscopic. Easily soluble in water, and alcohol. (Berzelius.)
$2CaS, AsS_5$

SulphArseniate *of protosulphide* **of Cerium.**

I.) *tris.*
II.) *di.*
$2CeS, AsS_5$
} Ppts.

SulphArseniate *of sesquisulphide* **of Cerium.** Slightly soluble in water. (Berzelius's *Lehrb.*)
$2Ce_2S_3, 3AsS_5$

SulphArseniate *of sesquisulphide* **of Chromium.** Ppt.
$2Cr_2S_3, 3AsS_5$

SulphArseniate of Cobalt.

I.) *di.* Soluble in an aqueous solution of sulpharseniate of sodium. (Berzelius.)
$2CoS, AsS_5$

SulphArseniate of Copper.

I.) *di.* Soluble, for the most part, in an aqueous solution of sulphide of ammonium. (Anthon.) Ammonia-water, when very dilute, takes up only the AsS_5, but when stronger dissolves also some CuS. (Gmelin.)
$2CuS, AsS_5$

SulphArseniate of Glucinum. Somewhat soluble in water.
$2Gl_2S_3, 3AsS_5$

SulphArseniate of Gold.

I.) Soluble in water. Insoluble in an aqueous solution of trisulpharseniate of sodium. (Berzelius.)
AuS_3, AsS_5

II.) Soluble in water. Insoluble in an aqueous solution of disulpharseniate of sodium. (Berzelius.)
$2AuS_3, 3AsS_5$

SulphArseniate *of protosulphide* **of Iron.** Soluble in an aqueous solution of di or trisulpharseniate of sodium. (Berzelius.)
$2FeS, AsS_5$

SulphArseniate *of sesquisulphide* **of Iron.** Partially soluble in an aqueous solution of di or trisulpharseniate of sodium. (Berzelius.)
$2Fe_2S_3, 3AsS_5$

SulphArseniate of Lead.

I.) *tris.* Ppt.

II.) *di.* Ppt.
$2PbS, AsS_5$

SulphArseniate of Lithium.

I.) *tris.* Easily soluble in water. Sparingly soluble in dilute alcohol.
$3LiS, AsS_5$

II.) *di.* Permanent. Completely soluble in water. Decomposed by alcohol.
$2LiS, AsS_5$

III.) *acid.*
IV.) *hyperacid.*
} Similar to the corresponding sodium-salts.

SulphArseniate of Magnesium.

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I.) *tris.* Hygroscopic. Soluble in water. Decomposed by alcohol, which dissolves out No. 2.
$3 MgS, AsS_5$

II.) *di.* Permanent. Soluble in water in all proportions. Soluble in alcohol. (Berzelius.)
$2 MgS, AsS_5$

III.) *polybasic.* Nearly insoluble in water. Insoluble in alcohol.

SulphArseniate of Manganese.

I.) *di.* Somewhat soluble in water.
$2 MnS, AsS_5$

II.) *tri.* Permanent. Somewhat soluble in water. (Berzelius.)
$3 MnS, AsS_5$

SulphArseniate *of disulphide* of Mercury.

I.) *di.* Ppt.
$2 Hg_2S, AsS_5$

SulphArseniate *of protosulphide* of Mercury. Ppt.
$2 HgS, AsS_5$

SulphArseniate of Nickel.

I.) *tris.*
$3 NiS, AsS_5$
II.) *di.*
$2 NiS, AsS_5$
Ppts. Soluble in an aqueous solution of sulpharseniate of sodium. Insoluble in chlorhydric acid. (Berzelius.)

SulphArseniate *of bisulphide* of Platinum. Soluble in water.
PtS_2, AsS_5

SulphArseniate of Potassium.

I.) *tris.* Deliquescent. Soluble in water. Insoluble in alcohol.
$3 KS, AsS_5$

II.) *di.* Deliquescent. Soluble in water. Alcohol precipitates a strong aqueous solution of No. 1.
$2 KS, AsS_5$

III.) *mono.* Soluble in alcohol. (Berzelius.)
KS, AsS_5

IV.) *peracid.* Insoluble in water.
$KS, 12 AsS_5$

SulphArseniate of Potassium & of Sodium.

I.) *tris.* Soluble in water. (Berzelius.)

SulphArseniate of Silver.

I.) *tris.*
$3 AgS, AsS_5$
II.) *di.*
$2 AgS, AsS_5$
Ppts.

SulphArseniate of Sodium.

I.) *tris.* Permanent. Easily and abundantly soluble in water, especially if this be warm. Insoluble in alcohol. (Berzelius.)
$3 NaS, AsS_5 + 15 Aq$

II.) *di.* Hygroscopic. Soluble in water. Alcohol precipitates No. 1 from the aqueous solution. (Berzelius, *Lehrb.*)
$2 NaS, AsS_5$

III.) *mono.* Soluble in alcohol, and is known only in alcoholic solution. (Berzelius.)
NaS, AsS_3

IV.) *peracid.* Insoluble in water.
$NaS, 12 AsS_5$

SulphArseniate of Strontium.

I.) *tris.* Easily soluble in water. (Berzelius.) Insoluble in alcohol.

II.) *di.* Easily soluble in water. Alcohol precipitates No. 1 from the aqueous solution. (Berzelius, *Lehrb.*)
$2 SrS, AsS_5$

SulphArseniate *of protosulphide* of Tin. Ppt.
$2 SnS, AsS_5$

SulphArseniate *of bisulphide* of Tin. Ppt.
SnS_2, AsS_5

SulphArseniate *of sesquisulphide* of Uranium. Ppt. Soluble in an aqueous solution of sulpharseniate of sodium, as is also the trisalt.
$2 Ur_2S_3, AsS_5$

SulphArseniate of Yttrium. Slightly soluble in water.
$2 YS, AsS_5$

SulphArseniate of Zinc.

I.) *tris.* Ppt.
$3 ZnS, AsS_5$

II.) *di.* Ppt.
$2 ZnS, AsS_5$

III.) *mono.*
ZnS, AsS_5

SulphArseniate of Zirconium. Insoluble in water. It is not in the least acted upon by acids. (Berzelius, *Lehrb.*)
$2 Zr_2S_3, 3 AsS_5$

SulphArsenious Acid. *Vid. ter*Sulphide of.
AsS_3
The only sulpharsenites which are soluble in water are those which contain the alkaline and alkaline-earthy sulphides, or sulphide of magnesium; and even these are decomposed by water, unless this is present in considerable quantity. Hence the solutions are decomposed by evaporation.

SulphArsenite of Ammonium.

I.) *tri.* Decomposes in the air. Soluble in water, or at least in an aqueous solution of sulphide of ammonium. Insoluble, or very sparingly soluble, in alcohol. (Berzelius, *Lehrb.*)
$3 NH_4S, AsS_3$

II.) *di.* Soluble in water. Alcohol, when added to the aqueous solution, precipitates the tri (No. 1) salt. (*Ibid.*)
$2 NH_4S, AsS_3$

SulphArsenite of Barium.

I.) *tri.* Difficultly soluble in water. Insoluble in alcohol.

II.) *di.* Difficultly soluble in water. Decomposed by alcohol.
$2 BaS, AsS_3$

SulphArsenite of Bismuth. Ppt.
$2 BiS_3, 3 AsS_3$

SulphArsenite of Cadmium. Ppt.
$2 CdS, AsS_3$

SulphArsenite of Calcium.

I.) *tri.* Soluble in water. Insoluble in alcohol.
$3 CaS, AsS_3 + 15 Aq$

II.) *di.* Soluble in water. Alcohol precipitates the tri-salt from the aqueous solution, but also dissolves a portion of the disalt. (Berzelius, *Lehrb.*, 3. 429.)
$2 CaS, AsS_3$

SulphArsenite of Cerium. Very slightly soluble in water.
$2 CeS, AsS_3$

SulphArsenite *of sesquisulphide* of Chromium. Ppt. Insoluble in an aqueous solution of sulphide of sodium.
$2 Cr_2S_3, 3 AsS_3$

SulphArsenite of Cobalt. Soluble in an aqueous solution of sulpharsenite of sodium. (Berzelius.)
$2 CoS, AsS_3$

SulphArsenite of Copper.

I.) *tris.* Soluble in aqueous solutions of the alkaline arsenites.
$3 CuS, AsS_3$

II.) *di.* Ppt.
$2 CuS, AsS_3$

III.) *basic.* Insoluble in aqueous solutions of the alkaline sulphides.
$12 CuS, AsS_3$

SulphArsenite of Glucinum. Slightly soluble in water. Decomposed by ammonia-water. (Berzelius, *Lehrb.*)
Gl_2S_3, AsS_3

SulphArsenite *of tersulphide* of Gold. Insoluble in water. (Berzelius.)
$2 AuS_3, 3 AsS_3$

SulphArsenite *of protosulphide* of Iron. Soluble in an aqueous solution of sulpharsenite of sodium. (Berzelius.)
$2 FeS, AsS_3$

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SulphArsenite *of sesquisulphide* **of Iron.**
$2\,Fe_2S_3, 3\,As\,S_3$ Soluble in an aqueous solution of sulpharsenite of sodium. (Berzelius.)

SulphArsenite of Lead.
I.) *di.* Ppt.
$2\,Pb\,S, As\,S_3$

SulphArsenite of Lithium. Similar to
$2\,Li\,S, As\,S_3$ the potassium compounds.

SulphArsenite of Magnesium. Easily
$2\,Mg\,S, As\,S_3$ soluble in water. Decomposed when treated with a small quantity of water, and also when the aqueous solution is evaporated. Easily soluble in alcohol. (Berzelius.)

SulphArsenite of Manganese. Ppt. De-
$3\,Mn\,S, As\,S_3$ composed by chlorhydric acid.

SulphArsenite *of bisulphide* **of Molybdenum.**

SulphArsenite *of disulphide* **of Mercury.**
I.) *di.* Ppt.
$2\,Hg_2S, As\,S_3$

SulphArsenite *of protosulphide* **of Mercury.**
I.) *di.* Ppt.
$2\,Hg\,S, As\,S_3$
II.) *mono.*
$Hg\,S, As\,S_3$

SulphArsenite of Nickel. Ppt.
$2\,Ni\,S, As\,S_3$

SulphArsenite *of bisulphide* **of Platinum.**
$Pt\,S_2, As\,S_3$ Ppt.

SulphArsenite of Potassium.
I.) *tris.* Soluble in water. Insoluble in alco-
$3\,K\,S, As\,S_3$ hol. Decomposed when treated with a small quantity of water, and also when the aqueous solution is evaporated.
II.) *di.* Soluble in water. Decomposed by
$2\,K\,S, As\,S_3$ alcohol. Decomposed by evaporation, and by small quantities of water, like No. 1.
III.) *mono.* Soluble in water, and in alcohol.
$K\,S, As\,S_3$
IV.) *peracid.* Insoluble in water.
$K\,S, x\,As\,S_3$

SulphArsenite of Silver.
I.) $3\,Ag\,S, As\,S_3$
II.) $2\,Ag\,S, As\,S_3$
III.) $Ag\,S, As\,S_3$
IV.) $12\,Ag\,S, As\,S_3$
Alkaline solutions dissolve out $As\,S_3$. Partially soluble, with decomposition, in nitric acid.

SulphArsenite of Sodium. Similar to the potassium compounds.

SulphArsenite of Strontium.
I.) *tris.* Soluble in water. Insoluble in alco-
$3\,Ca\,S, As\,S_3 + 15\,Aq$ hol. (Voigt & Gœttling.)
II.) *di.* Soluble in water. Decomposed by alcohol.

SulphArsenite *of protosulphide* **of Tin.** Ppt.
$2\,Sn\,S, As\,S_3$

SulphArsenite *of bisulphide* **of Tin.** Ppt.
$Sn\,S_2, As\,S_3$

SulphArsenite *of sesquisulphide* **of Uranium.** Ppt.
$2\,Ur_2S_3, As\,S_3$

SulphArsenite of Yttrium. Partially
$2\,Y\,S, As\,S_3$ soluble in an aqueous solution of sulphide of sodium.

SulphArsenite of Zinc. Ppt.
$2\,Zn\,S, As\,S_3$

SulphArsenite of Zirconium. Slightly
$2\,Zr_2S_3, As\,S_3$ soluble in an aqueous solution of sulphide of sodium. Not decomposed by acids. (Berzelius.)

SulphAurate of Potassium. Soluble in
(*AuroSulphate of Potash.*) water. (Yorke, *J. Ch. Soc.*, 1. 244.)

SulphAurate of Sodium. Decomposes in
$Na\,S, Au\,S + 8\,Aq$ the air. Very soluble in water. Soluble in spirit. (Yorke, *loc. cit.*, p. 240.)

Sulphuric Acid(Anhydrous). Miscible in
$S\,O_3$ all proportions in water, dissolving therein with evolution of much heat. Soluble in strong acetic acid. Soluble, with decomposition, in alcohol, and ether.

Sulphuric Acid.
(*Oil of Vitriol.*)

a = *monohydrated.* Sp. gr. = 1.848. It boils
$H\,O, S\,O_3$ at 288° (Henry), at 327° (Dalton). Miscible in all proportions with water, alcohol, and strong vinegar.

b = *bihydrated.* Sp. gr. = 1.780.
$2\,H\,O, S\,O_3$

c = $3\,H\,O, S\,O_3$ Sp. gr. = 1.6321. It boils at 163° @ 170°. (Liebig.)

An aqueous Solution of Sp. Gr. at 15°	An aqueous Solution of Sp. Gr. at 25°	Contains Percent of concentrated Sulphuric Acid.
0.998635	0.995478	0
	1.011532	2.5
1.028375	1.027204	5
1.065856	1.060449	10
1.099755		15
1.137816	1.131126	20
1.176687		25
1.215421	1.207842	30
1.256211		35
1.297562	1.286807	40
1.340860		45
1.386607	1.377973	50
1.434725		55
1.486006	1.476711	60
1.540191		65
1.594626	1.586291	70
1.653449		75
1.709026	1.699580	80
1.760161		85
1.804971	1.793986	90
1.831763		95
1.840556	1.828646	100

(Delezenne, from *Recueil des travaux de la Soc. de Sci. Agric. et Arts, de Lille*, 1823 – 1824, p. 1, in *Férussac's Bulletin*, 1827, 8. 133.)

Quantities of monohydrated Acid ($H\,O, S\,O_3$) *in aqueous Sulphuric Acid.*

Sp. Gr. at 0°.	$H\,O, S\,O_3$ percent.	Sp. Gr. at 0°.	$H\,O, S\,O_3$ percent.
1.000	0	1.336	42.2*
1.028	3.86*	1.362	45.
1.035	5.	1.399	48.9*
1.051	7.1*	1.410	50.
1.073	10.	1.460	55.
1.086	11.7*	1.475	56.4
1.112	15.	1.514	60.
1.131	17.5*	1.553	63.4*
1.151	20.	1.570	65.
1.162	21.4*	1.581	66.
1.192	25.	1.593	67.
1.232	30	1.600	67.6*
1.250	32.2*	1.605	68.
1.274	35.	1.608	68.2*
1.317	40.	1.617	69.

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Sp. Gr. at 0°.	HO, SO_3 percent.	Sp. Gr. at 0°.	HO, SO_3 percent.
1.628	70.	1.781	83.
1.632	70.3*	1.791	84.
1.640	71.	1.792	84.1*
1.643	71.3*	1.800	85.
1.648	71.7*	1.808	86.
1.652	72.	1.813	86.6*
1.663	72.9*	1.816	87.
1.664	73.	1.823	88.
1.666	73.1*	1.828	88.4*
1.6675	73.3*	1.830	89.
1.676	74.	1.836	90.
1.6775	74.2*	1.841	91.
1.685	74.7*	1.845	92.
1.688	75.	1.848	93.
1.6935	75.5*	1.8495	93.5*
1.700	76.	1.850	94.
1.712	77.	1.851	94.5*
1.724	78.	1.852	95.
1.729	78.4*	1.853	96.
1.736	79.	1.8545	97.*
1.748	80.	1.855	98.
1.750	80.2*	1.856	98.5*
1.759	81.	1.8564	99.
1.770	82.	1.857	100.

The following data are given for the purpose of correcting observations made at any temperature above 0°.

Sp. Gr. of the acid at 0° C.	Decrease of the sp. gr. by a rise of témperature = 10° C. or 18° F.
1.04	0.002
1.07	0.003
1.10	0.004
1.15	0.005
1.20	0.006
1.30	0.007
1.45	0.008
1.70	0.009
1.85	0.0096

(Bineau, *Ann. Ch. et Phys.*, (3.) **24.** 337.)

[* The numbers marked with a star are those which were determined by direct experiment.]

From Bineau's data, Otto has calculated the following table for the temperature of 15° C.

Percent of monohydrated acid, HO, SO_3.	Sp gr. at 15°.	Percent of anhydrous acid, SO_3.
100	1.8426	81.63
99	1.8420	80.81
98	1.8406	80.00
97	1.8400	79.18
96	1.8384	78.36
95	1.8376	77.55
94	1.8356	76.73
93	1.8340	75 91
92	1.8310	75.10
91	1.8270	74.28
90	1.8220	73.47
89	1.1860	72.65
88	1.8090	71.83
87	1.8020	71.02
86	1.7940	70.10
85	1.7860	69.38
84	1.7770	68.57
83	1.7670	67.75
82	1.7560	66.94
81	1.7450	66.12
80	1.7340	65.30
79	1.7220	64.48
78	1.7100	63.67
77	1.6980	62.85
76	1.6860	62.04
75	1 6750	61.22
74	1.6630	60.40
73	1.6510	59.59
72	1.6390	58.77
71	1.6370	57.95
70	1.6150	57.14
69	1.6040	56.32
68	1.5920	55.59
67	1.5800	54.69
66	1.5780	53.87
65	1.5570	53.05
64	1.5450	52.24
63	1.5340	51.42
62	1.5230	50.61
61	1.5120	49.79
60	1.501	48.98
59	1.490	48.16
58	1.480	47 34
57	1.469	46.53
56	1.4586	45.71
55	1.448	44.89
54	1.438	44.07
53	1.428	43.26
52	1.418	42.45
51	1.408	41.63
50	1.398	40.81
49	1.3886	40.00
48	1.3790	39.18
47	1.3700	38.36
46	1.3610	37.55
45	1.3510	36.73
44	1.3420	35.82
43	1.3330	35.10
42	1.3240	34 28
41	1.3150	33.47
40	1.3060	32.65
39	1.2976	31.83
38	1.2890	31.02
37	1.2810	30.20
36	1.2720	29.38
35	1.2640	28.57
34	1.2560	27.75
33	1.2476	26.94
32	1.2390	26.12
31	1.231	25 30
30	1.223	24.49
29	1.215	23.67
28	1.2066	22.85
27	1.1980	22.03
26	1.1900	21.22
25	1.1820	20.40
24	1.1740	19.58
23	1.1670	18.77
22	1.1590	17.95
21	1.1516	17.14
20	1.1440	16.32
19	1.1360	15.51
18	1.1290	14.69
17	1.1210	13.87
16	1.1136	13.06
15	1.1060	12.24
14	1.0980	11.42
13	1.0910	10.61
12	1.0830	9.79
11	1.0756	8.98
10	1.0680	8.16
9	1.0610	7.34
8	1.0536	6.53
7	1.0464	5.71
6	1.0390	4.89
5	1.0320	4.08

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Percent of monohydrated acid, HO, SO_3.	Sp. gr. at 15°.	Percent of anhydrous acid, SO_3.
4	1.0256	3.260
3	1.0190	2.445
2	1.0130	1.630
1	1.0064	0.816

Gerlach (in his *Sp. Gew. der Salzlœsungen*, p. 38) has calculated the following table from Bineau's data.

A solution of sp. gr. at 15°.	Contains		Formula.
	Percent of HO, SO_3	Percent of SO_3.	
1.8426	100.	81.633	HO, SO_3
1.779	84.483	68.965	$2HO, SO_3$
1.652	73.137	59.701	$3HO, SO_3$
1.552	64.474	52.632	$4HO, SO_3$
1.477	57.647	47.059	$5HO, SO_3$
1.419	52.128	42.553	$6HO, SO_3$
1.376	47.572	38.835	$7HO, SO_3$
1.339	43.661	35.714	$8HO, SO_3$
1.310	40.495	33.057	$9HO, SO_3$
1.286	37.693	30.769	$10HO, SO_3$

Sp. Gr.	Percentage of	
	SO_3	HO, SO_3
1.8485	81.54	100
1.8460	79.90	98
1.8410	78.28	96
1 8336	76.65	94
1.8233	75.02	92
1.8115	73.39	90
1.7962	71.75	88
1.7774	70.12	86
1.7570	68.49	84
1.7360	66.86	82
1.7120	65.23	80
1.6870	63 60	78
1.6630	61.97	76
1.6415	60.34	74
1.6204	58.71	72
1.5975	57.08	70
1.5760	55.45	68
1.5503	53.82	66
1.5280	52.18	64
1.5066	50.55	62
1.4860	48.92	60
1.4660	47.29	58
1.4460	45.66	56
1.4265	44.03	54
1.4073	42.40	52
1.3884	40.77	50
1.3697	39.14	48
1.3530	37.51	46
1.3345	35.88	44
1.3165	34.25	42
1.2999	32.61	40
1.2826	30.98	38
1.2654	29.35	36
1.2490	27.72	34
1.2334	26.09	32
1.2184	24.46	30
1.2032	22.83	28
1.1876	21.20	26
1.1706	19.57	24
1.1549	17.94	22
1.1410	16.31	20
1 1246	14.68	18
1.1090	13.05	16
1.0953	11.41	14
1.0809	9.78	12
1.0682	8.15	10
1.0544	6.52	8
1.0405	4.89	6
1.0268	3.26	4
1.0140	1.63	2

(Ure, *Schweigger's Journ. Ch. u. Phys.*, **35.** 444; and *Gmelin's Handbook*, **2.** 137. Compare Langberg's remarks in *Report of the 17th meeting of the British Association*, Oxford, 1847, p. 1.)

Sp. Gr.	Percent HO, SO_3.
1.842	100
1.725	84.22
1.618	74.32
1.524	66.45
1.466	58.02
1.375	50.41
1.315	43.21
1.260	36.52
1.210	30.12
1.162	24.01
1.114	17.39
1.076	11.73
1.023	6.60

(Vauquelin, *Ann. Chim.*, **76.** 260; in *Gmelin's Handbook*, **2.** 186.)

Sp. Gr. (at 15.56°).	Percent of SO_3	Boiling point.
1.850	81	326.66°
1.849	80	318.33°
1.848	79	310°
1.847	78	301.66°
1.845	77	293.33°
1.842	76	285°
1.838	75	276.66°
1.833	74	268.33°
1.827	73	260.56°
1.819	72	252.78°
1.810	71	245°
1.801	70	237.78°
1.791	69	230.56°
1.780	68	223.89°
1.769	67	216.33°
1.757	66	210°
1.744	65	204.44°
1.730	64	199.44°
1.715	63	194.44°
1.699	62	190°
1.684	61	186.11°
1.670	60	182.33°
1.650	58.6	176.66°
1.520	50	143.33°
1.408	40	126.66°
1.30+	30	115.56°
1.200	20	106.66°
1.10—	10	103.33°

(Dalton, in his *New System*, Pt. **2.** p. 404.)

Sp. Gr.	Percent of HO, SO_3
1.844	100
1.717	82.34
1.618	74.32
1.603	72.70
1.586	71.17
1.566	69.30
1.550	68.03
1.532	66.45
1.515	64.37
1.500	62.80
1.482	61.32
1.466	59.85
1.454	58.02

(Darcet, *Ann. Ch. et Phys.*, (1.) **1.** 198; and *Gmelin's Handbook*, **2.** 186.)

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Table by which to prepare sulphuric acid of any desired strength, by mixing the acid of 1.86 *sp. gr. with water.*

100 pts. of water at 15° @ 20° being mixed with pts. of sulphuric acid of 1.86 sp. gr.	Gives an acid of sp. gr.
1	1.009
2	1.015
5	1.035
10	1.060
15	1.090
20	1.113
25	1.140
30	1.165
35	1.187
40	1.210
45	1.229
50	1.248
55	1.265
60	1.280
65	1.297
70	1.312
75	1.326
80	1.340
85	1.357
90	1.372
95	1.386
100	1.398
110	1.420
120	1.438
130	1.456
140	1.473
150	1.490
160	1.510
170	1.530
180	1.543
190	1.556
200	1.568
210	1.580
220	1.593
230	1.606
240	1.620
250	1.630
260	1.640
270	1.648
280	1.654
290	1.667
300	1.678
310	1.689
320	1.700
330	1.705
340	1.710
350	1.714
360	1.719
370	1.723
380	1.727
390	1.730
400	1.733
410	1.737
420	1.740
430	1.743
440	1.746
450	1.750
460	1.754
470	1.757
480	1.760
490	1.763
500	1.766
510	1.768
520	1.770
530	1.772
540	1.774
550	1.776
560	1.777
580	1.778
590	1.780
600	1.782

(Anthon.)

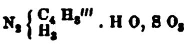
For experiments and observations, by Meissner and Gerlach, on the varying sp. gr. of sulphuric acid, according as it is prepared from sulphate of iron (Nordhausen acid), or from sulphur (English acid), see Gerlach's *Sp. Gew. der Salzlösungen*, pp. 35, 37.

When equal weights of concentrated sulphuric acid and alcohol of 0.82 sp. gr. are mixed, at the ordinary temperature, heat is evolved, and a considerable amount of ethylsulphuric acid formed. (Hennel, *Phil. Trans.*, 1826, **116.** 246.)

The normal salts of sulphuric acid, *i. e.* those of the formula $M O, S O_3$, are mostly soluble in water, excepting the lime, and silver salts, which are sparingly, and the baryta, lead, and strontia salts scarcely at all soluble. Several of them are soluble in glycerin. As a rule, they are all insoluble, or very slightly soluble, in alcohol or wood-spirit.

In presence of free sulphuric acid their solubility in water is but little augmented. (Dumas, *Tr.*) The bi- or tersulphates ($M O, 2 S O_3$, and $M O, 3 S O_3$) are either soluble in water, or they are resolved by it into free sulphuric acid and a normal salt. The basic sulphates are usually insoluble in water, but soluble in dilute chlorhydric acid. Alkaline sulphates crystallize partially from aqueous solutions of cane-sugar when they are present in large quantity, but a portion remains with the sugar as a slimy mass. (Hochstetter, *J. pr. Ch.*, 1843, **29.** 29.)

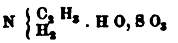
SULPHATE OF ACEDIAMIN. Easily soluble in



$N_2\left\{\begin{matrix} C_4 H_3''' \\ H_3 \end{matrix}\right. . H O, S O_3$

water. Sparingly soluble in boiling ordinary alcohol. (Strecker, *Ann. Ch. u. Pharm.*, **103.** 329.)

SULPHATE OF ACETOSAMIN (Acetoylamin).



$N\left\{\begin{matrix} C_4 H_3 \\ H_2 \end{matrix}\right. . H O, S O_3$

Soluble in water. Sparingly soluble, or insoluble, in alcohol.

SULPHATE OF AGROSTEMMIN. Easily soluble in boiling water; still more soluble in alcohol.

SULPHATE OF ALANIN. Very soluble in water. [Sparingly ?] soluble in alcohol. It is precipitated as a syrup on the addition of a mixture of alcohol and ether to its solutions.

SULPHATE OF ALUMINA.

I.) *normal.* Permanent. Soluble in 2 pts. of cold water, the saturated solution containing 33.33% of it. (Berzelius.) Deliquescent. Soluble in less than 1 pt. of water. (Dumas, *Tr.*) The salt is not at all deliquescent, but after having been pulverized will not remain in this condition, undergoing "regelation," as it were. (Ordway.)

$Al_2 O_3, 3 S O_3 + 18 Aq$

100 pts. of water at °C	Dissolve pts. of the anhydr. salt, $Al_2 O_3, 3 S O_3$.	 pts. of the cryst. salt, $Al_2 O_3, 3 S O_3 + 18 Aq.$
0°	31.30	86.85
10°	33.50	95.80
20°	36.15	107.35
30°	40.36	127.63
40°	45.73	167.65
50°	52.13	201.36
60°	59.09	262.63
70°	66.23	348.18
80°	73.14	467.30
90°	80.83	678.81
100°	89.11	1131.98

(Poggiale, *Ann. Ch. et Phys.*, (3.) **8.** 467.)

Scarcely at all soluble, or insoluble, in alcohol. (Berzelius.) Sulphate of alumina may be completely precipitated from its aqueous solution by adding a suitable quantity of glacial acetic acid. (Persoz, *Ann. Ch. et Phys.*, 1836. (2.) **63.** 444).

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Crystallizes from its solution in chlorhydric acid. (Kane.)

II.) *monobasic.* Nearly insoluble in water.
$Al_2O_3, SO_3 + 9 Aq$
Easily soluble in chlorhydric acid. It occurs also native, as Aluminite.

III.) *bibasic.* Insoluble in water. While moist
$2 Al_2O_3, SO_3 + 10 Aq$
it is soluble in cold acetic acid, as well as in the mineral acids. (Crum, *Ann. Ch. u. Pharm.*, **89.** 174.)

Ordway (*Am. J. Sci.*, (2.) **26.** 203) obtained a "bibasic" sulphate of alumina soluble in water. According to him all the compounds which contain more base than this are insoluble in water. The "terbasic" sulphate is soluble in acetic acid, this solution being the "red-mordant" of calico printers. (*loc. cit.*, p. 204.)

IV.) *biacid.* Soluble in water. Decomposed
$Al_2O_3, 2 SO_3$
by much water, or by boiling the aqueous solution, to an insoluble basic sulphate and ordinary tersulphate which remains dissolved.

V.) Soluble in a small quantity of water, but,
$2 Al_2O_3, 3 SO_3$
like No. IV. [and all the soluble compounds containing less acid than the normal salt ($Al_2O_3, 3 SO_3$)], it is decomposed by a large quantity of water, or by boiling its aqueous solution. (Maus.)

VI.) Soluble in 144 pts. of cold, and in 30.8
$3 Al_2O_3, 4 SO_3 + 30 Aq$
pts. of boiling water. Easily soluble in chlorhydric and nitric acids. (Rammelsberg.)

When hydrate of alumina is dissolved in moderately dilute sulphuric acid, and this solution diluted with water, a muddy basic salt deposits itself continually for months, and the filtrate from this will deposit still more if it be heated. (Phillips; Gay-Lussac.)

SULPHATE OF ALUMINA & OF AMMONIA.

I.) Equally soluble with potash alum, in water.
(*Ammonia Alum.*)
$NH_4O, SO_3; Al_2O_3, 3 SO_3 + 24 Aq$
(Pelouze & Fremy.) Somewhat more soluble than potash alum in water. (Otto Graham.) Soluble in 11.444 pts. of water at 17.5°; or, 100 pts. of water dissolve 8.738 pts. of it at 17.5°. (Pohl, *Wien. Akad. Bericht*, **6.** 597.)

Its solubility is less at all temperatures than that of either of its component salts. (Poggiale, *loc. inf., cit.*)

100 pts. of water at °C.	Dissolve of the anhydrous alum, pts.	Dissolve of the crystallized alum, pts.
0°	2.62	5.22
10°	4.50	9.16
20°	6.57	13.66
30°	9.05	19.29
40°	12.35	27.27
50°	15.90	36.51
60°	21.09	51.29
70°	26.95	71.97
80°	35.19	103.08
90°	50.30	187.82
100°	70.83	421.90

(Poggiale, *Ann. Ch. et Phys.*, (3.) **8.** 467.)

100 pts. of water at 15.5° dissolve 9.37 pts. of the crystallized alum; but it is much more soluble in boiling water. (Thomson's *System of Chem.*, London, 1831, **2.** 752.)

II.) *basic.* When ammonia-water is added by small portions to an aqueous solution of ammonia-alum the precipitate which at first forms is redissolved until the solution contains 2 (NH_4O, SO_3); 2 Al_2O_3, 3 SO_3, but the solution is decomposed by boiling, and when diluted with much water. If ammonia be added until a permanent precipitate is formed this is composed (according to Riffault) of $NH_4O, SO_3; 3(Al_2O_3, SO_3) + 9 Aq$. (Berzelius's *Lehrb.*)

SULPHATE OF ALUMINA, OF AMMONIA, & OF CHROMIUM.
$Al_2O_3, 3 SO_3; Cr_2O_3, 3 SO_3; 2 (NH_4O, SO_3) + 48 Aq$
Soluble in water, the solution undergoing decomposition when boiled. (Vohl, *Ann. Ch. u. Pharm.*, **94.** 71.)

SULPHATE OF ALUMINA, OF CHROMIUM, & OF POTASH.
$Al_2O_3, 3 SO_3; Cr_2O_3, 3 SO_3; 2 (KO, SO_3) + 48 Aq$
Soluble in water, the solution undergoing decomposition when boiled. (Vohl, *Ann. Ch. u. Pharm.*, **94.** 70.)

SULPHATE OF ALUMINA & OF CONIIN.

SULPHATE OF ALUMINA & OF ETHYLAMIN.
$N\left\{\begin{matrix}C_4H_5\\H_2\end{matrix}\right. . HO, SO_3; Al_2O_3, 3 SO_3 + 24 Aq$
Soluble in 6.89 pts. of water at 25°. (Stenner & Kaumer.)

SULPHATE OF ALUMINA & *of protoxide* OF IRON.

I.) Soluble in water. (Klauer.)
$FeO, SO_3; Al_2O_3, 3 SO_3 + 24 Aq$

II.) Soluble in water. (Berthier.)
$2 (FeO, SO_3); Al_2O_3, 3 SO_3 + 27 Aq$

III.) Easily soluble in water. (Phillips.)
$6 (FeO, SO_3); Al_2O_3, 2 SO_3 + 48 Aq$

SULPHATE OF ALUMINA & *of sesquioxide* OF IRON.

I.) *basic.* Easily soluble in cold dilute sulphuric acid, difficultly soluble in cold dilute nitric or chlorhydric acids. (Anthon.)

SULPHATE OF ALUMINA, *of protoxide* OF IRON, & OF MAGNESIA.
$FeO, SO_3; MgO, SO_3; Al_2O_3, SO_3 + 15 Aq$

SULPHATE OF ALUMINA, OF IRON, & OF POTASH.
$Al_2O_3, 3 SO_3; 12 (FeO, SO_3); 2 (KO, SO_3) + 25 Aq$
Difficultly soluble in water. Permanent. (Dufresnoy.)

SULPHATE OF ALUMINA & OF LITHIA.
$LiO, SO_3; Al_2O_3, 3 SO_3 + 24 Aq$
Permanent. Soluble in 24 pts. of cold, and in 0.87 pt. of hot water. (Kralovansky.)

[Rammelsberg doubts the existence of this salt. Neither Arfvedson nor C. Gmelin could obtain a Lithia alum.]

SULPHATE OF ALUMINA, OF LITHIA, & OF POTASH. Soluble in water, from which it crystallizes readily when the hot solution is cooled. (Joss, *J. pr. Ch.*, 1834, **1.** 142, *note.*)

SULPHATE OF ALUMINA & OF MAGNESIA.
(*Magnesia Alum.*)

I.) $MgO, SO_3; Al_2O_3, 3 SO_3 + 25 Aq$

II.) $3 (MgO, SO_3); Al_2O_3, 3 SO_3 + 36 Aq$

SULPHATE OF ALUMINA, OF MAGNESIA, & OF MANGANESE.
$MgO, SO_3; MnO, SO_3; Al_2O_3, 3 SO_3 + 25 Aq$
As soluble as common potash alum. (Apjohn; Kane.)

A sample examined by Lawrence Smith (*Am. J. Sci.*, 1854, (2.) **18.** 379, of composition (Mg, Mn) $O, SO_3; Al_2O_3, 3 SO_3 + 24 Aq$, was "very readily soluble in water; in fact, so soluble

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that it was difficult to decide the amount of water requisite for its complete solution."

SULPHATE OF ALUMINA & OF MANGANESE.
$Mn\,O, S\,O_3;\ Al_2\,O_3, 3\,S\,O_3 + 25\,Aq$ As soluble as common potash alum. (Apjohn, *Rep. Br. Assoc.*, 1837, p. 49.) Easily soluble in water. (Berzelius, *Lehrb.*)

SULPHATE OF ALUMINA & OF METHYLAMIN.
$N\left\{\begin{matrix}C_2\,H_3\\ H_2\end{matrix}\right. .\ H\,O, S\,O_3;\ Al_2\,O_3, 3\,S\,O_3 + 24\,Aq$ Soluble in water. (v. Alth.)

SULPHATE OF ALUMINA & OF *tri*METHYLAMIN.
$N\left\{(C_2\,H_3)_3\right. .\ H\,O, S\,O_3;\ Al_2\,O_3, 3\,S\,O_3 + 24\,Aq$ Very soluble in water.

SULPHATE OF ALUMINA & *of binoxide* OF PLATINUM. Insoluble in water, or cold mineral acids. Very slightly soluble in hot acids. (E. Davy.)

SULPHATE OF ALUMINA & OF POTASH.
(*Potash Alum. Common Alum.*)

I.) *normal.* Permanent, or slightly efflorescent.
$K\,O, S\,O_3;\ Al_2\,O_3, 3\,S\,O_3 + 24\,Aq$ Very slowly soluble in cold water. Burnt (*i. e.* dehydrated) alum dissolves very slowly: — if thrown into water immediately after having been dried and cooled, it will remain undissolved for months, but if it is exposed to the air for a fortnight before being treated with water, it will dissolve readily. (Geiger, *Mag. Pharm.*, **8.** 199.) 100 pts. of the saturated aqueous solution contain at the boiling point (104.4°) 52 pts. of dry alum, *i. e.* 100 pts. of water dissolve 108.33 pts. of it at 104.4°; or, in other words, 1 pt. of dry alum is soluble in 0.923 pt. of water at 104.4°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.)

100 pts. of water at °C.	Dissolve of anhydrous potash alum, pts.	Dissolve of crystallized potash alum, pts.
0°	2.10	3.90
10°	4.99	9.52
20°	7.74	15.13
30°	10.94	22.01
40°	14.88	30.92
50°	20.09	44.11
60°	26.70	66.65
70°	35.11	90.67
80°	45.66	134.47
90°	58.68	209.31
100°	74.53	357.48

(Poggiale, *Ann. Ch. et Phys.*, (3.) **8.** 467.)

The solubility of potash alum is at all temperatures less than that of its component salts. (Poggiale, *loc. cit.*)

Soluble in	13.286	pts. of water at	12.5°
"	8.2	"	21.25°
"	4.5	"	25°
"	2.2	"	37.5°
"	2.01	"	50°
"	0.4	"	62.5°
"	0.11	"	75°
"	0.06	"	87.5°

Or, 100 pts. of water at °C.	Dissolve pts. of $K\,O, S\,O_3;\ Al_2\,O_3, 3\,S\,O_3 + 24\,Aq$.
12.5°	7.6
21.25°	10.4
25°	22.
37.5°	44.1
50°	46.7 [*not* "41."]
62.5°	230.
75°	920.
87.5°	1566.6

Or, the aqueous solution saturated at °C.	Contains percent of $K\,O, S\,O_3;\ Al_2\,O_3, 3\,S\,O_3 + 24\,Aq$.
12.5°	7.
21.25°	9.5
25°	18.
37.5°	31.
50°	31.84
62.5°	70.
75°	90.2
87.5°	94.

When heated, alum begins to melt, in its water of crystallization, at 87.5°, and is completely liquid at 92.5° @ 93.75°, hence the statements of previous observers, that it requires for its solution 0.75 pt., or, as some say, 2 pts. of water at the temperature of boiling, must be erroneous. (R. Brandes, *Brandes's Archiv.*, 1822, **2.** 339 and fig.)

[Most of Brandes's determinations were probably made upon *supersaturated* solutions, since his method of preparing the latter was favorable for the development of this phenomenon, for which he makes no allowance.] Soluble in 18 pts. of cold, and in 1.6 pts. of boiling water (Fourcroy); in 14.12 pts. of water at a moderate heat, and in 0.75 pt. of boiling water. (Bergman, *Essays*, **1.** pp. 350, 366, 368, 181.) [On page 181 of B.'s *Essays* is printed, apparently by error, "1 pt. of alum requires [for its solution] 30 pts. of water in a moderate heat."] Crystallized alum is soluble in 15 pts. of water at the ordinary temperature, and in 0.75 pt. of boiling water. (Dumas, *Tr.*) Soluble in 18.363 pts. of cold, and in 0.75 pt. of boiling water, the saturated cold solution containing 5.16% of it, and the boiling saturated solution 57.14%. (M. R. & P.) Soluble in 11.7 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 76.)

100 pts. of water at °C.	Dissolve of crystallised potash alum, pts.
15.56°	14.79
100°	133.33 [T.]
15.56°	8.7
100°	75. (?)

(Ure's *Dict.*)

The aqueous solution saturated at 15° is of 1.048774 sp. gr., and contains dissolved in every 100 pts. of water at least 10.939 pts. of alum. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.) The aqueous solution saturated "in the cold" contains 5.2% of it (Fourcroy); at 38° (of B's therm.) 6.7% (Bœrhave); at 10° (C.) 25.8(?)% (Eller); and at 12.5° 5.5% (Hassenfratz, *Ann. de Chim.*, **28.** 291.)

Warm solutions of alum are liable to become supersaturated on cooling. (Coxe.) Solutions of alum not too highly charged with the salt may be preserved for a long time in a supersaturated state, if they are allowed to cool in close vessels out of contact with the air [or in vessels loosely stopped with cotton-wool, so that the air may be filtered. (Schrœder, *Ann. Ch. u. Pharm.*, 1859, **109.** 45.)]. If such solutions be exposed to cold of +5° @ —3° they usually crystallize as ordinary alum, but sometimes in rhombohedrons, or in tables. This tabular variety has a very great solubility. Mother liquors, from which it had been deposited, contained, at 0°, 180 pts. of ordinary alum in 100 pts. of water. When heated to 100° in a closed tube, alum dissolves completely in its water of crystallization. (Lœwel, *Ann. Ch. et Phys.*, (3.) **43.** 414.) Ordinary alum melts in its water of crystallization when heated to 92°, and on cooling this solution it remains liquid for a long time before solidifying. (Berzelius, *Lehrb.*) Insoluble in spirit of 0.905, or less, sp. gr. (Anthon, *J. pr. Ch.*, **14.** 125.) Nearly insoluble in an aqueous solution of tersulphate of alumina. (Geiger.) Insoluble in a saturated aqueous solution of tersulphate of alumina. (W. Crum, *Ann. Ch. u. Pharm.*, **89.** 156.) The aqueous solution saturated at 8° is of 1.045 sp. gr. (Anthon, *Ann. der Pharm.*, 1837, **24.** 210.)

An aqueous solution of sp. gr., at 12.5°	Contains percent of alum.
1.0047	1
1.0094	2
1.0142	3
1.0189	4
1.0236	5

(Hassenfratz, *Ann. de Chim.*, **28.** 296.)

When a solution of alum is treated with a large excess of concentrated sulphuric acid, this combines with the water, and acicular crystals of alum separate out. (Baron, 1744, cited in Bergman's *Essays*, **1.** 378.) But in dilute sulphuric or other acid it is more readily soluble than in water. (Bergman, *Ibid.*, p. 379.) When boiled with a saturated aqueous solution of chloride of potassium, chlorhydric acid is formed, and a subsulphate of alumina falls down; this occurs only to a small extent with chloride of sodium, and still less with chloride of ammonium. (Ure's *Dict.*)

II.) *basic.* Insoluble in water, but after having been gently ignited water removes ordinary alum, while the excess of alumina remains undissolved.

$K O, S O_3; 3 (Al_2 O_3, S O_3) + 9 Aq$

Sulphate of Alumina & of Soda. When pure it is permanent, but effloresces on the surface when impure. (Thompson.) Soluble in 2.14 pts. of water at 13°, and in 1 pt. of boiling water. (Zellner.) Soluble in 0.909 pt. of water at 16°, the saturated solution containing 52.38% of it. (Berzelius, *Lehrb.*) 100 pts. of water at 15.5° dissolve 327.6 pts. of it. (Thomson, in his *System of Chem.*, London, 1831, **2.** 766.) 100 pts. of water at 15.5° dissolve 110 pts. of it, forming a liquor of 1.296 sp. gr. (Ure.) Insoluble in absolute alcohol. (Zellner.)

(*Soda-Alum.*)
$Na O, S O_3; Al_2 O_3, 3 S O_3 + 24 Aq$

Sulphate of Alumina & of Zinc.
(*Zinc-Alum.*)
$Zn O, S O_3; Al_2 O_3, 3 S O_3 + 24 Aq$

Sulphate of Amarin. Soluble in alcohol.

Sulphate of AmidoBenzoic Acid. *Vid.* Sulphate of Benzamic Acid.

Sulphate of *bi*AmidoBenzoic Acid. Readily soluble in water; somewhat less soluble in alcohol. Both of these solutions are easily decomposed. (Voit.)

$N_2 C_{14} H_8 O_4, 2 H O, 2 S O_3$

Sulphate of *bi*AmidoBenzylene. *Vid.* SulphoBenzamid.

Sulphate of Ammolin (of Unverdorben). Very readily soluble in water, and alcohol. Insoluble in ether.

"Sulphate of Ammon," &c. *Vid.* Sulphamid.
(Compounds of $N H_3$ & $S O_3$)

Sulphate of Ammonia.

I.) *normal.* Somewhat hygroscopic. Soluble in 1.3 pts. of water at the ordinary temperature. (A. Vogel, Jr.) Soluble in 1.31 pts. of water at 19°, or 100 pts. of water at 19° dissolve 76.1 pts. of it, or the aqueous solution saturated at 19° contains 43.2% of it, and is of 1.2491 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.) Soluble in 2 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht, für* 1854, p. 76.) Soluble in 2 pts. of water at 15.5°, and in 1 pt. of boiling water (Fourcroy), the solution saturated at 15.5° containing 33.33% of it; that saturated at 10° containing 30.4% of it (Eller), and the boiling saturated solution 50% of it. 100 pts. of water at 62.6° dissolve 78 pts. of it. (Wenzel, p. 309 [T.].) The aqueous solution saturated at 15° is of 1.248215 sp. gr., and contains dissolved in every 100 pts. of water at least 66.739 pts. of it. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.) When treated with boiling water a small quantity of ammonia is evolved, and the solution obtained exhibits an acid reaction. (Emmet, *Am. J. Sci.*, (1.) **18.** pp. 255, 256.)

$N H_4 O, S O_3$

An aqueous solution of sp. gr. (at 19°).	Contains (by experiment) percent of $N H_4 O, S O_3$.
1.2491	43.19
1.1655	28.81
1.1100	19.20
1.0829	14.40
1.0556	9.60
1.0275	4.80

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 337.)

From these results Schiff calculates the following table by means of the formula: $D = 1 + 0.005757\,p - 0.00000148\,p^2 + 0.0000000391\,p^3$, in which D = the sp. gr. of the solution, and p the percentage of substance in the solution.

Sp. gr. (at 19°).	Percent of $N H_4 O, S O_3$.	Sp. gr. (at 19°).	Percent of $N H_4 O, S O_3$.
1.0057	1	1.1496	26
1.0115	2	1.1554	27
1.0172	3	1.1612	28
1.0230	4	1.1670	29
1.0287	5	1.1724	30
1.0345	6	1.1780	31
1.0403	7	1.1836	32
1.0460	8	1.1892	33
1.0518	9	1.1948	34
1.0575	10	1.2004	35
1.0632	11	1.2060	36
1.0690	12	1.2116	37
1.0747	13	1.2172	38
1.0805	14	1.2228	39
1.0862	15	1.2284	40
1.0920	16	1.2343	41
1.0977	17	1.2402	42
1.1035	18	1.2462	43
1.1092	19	1.2522	44
1.1149	20	1.2583	45
1.1207	21	1.2644	46
1.1265	22	1.2705	47
1.1323	23	1.2766	48
1.1381	24	1.2828	49
1.1439	25	1.2890	50

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 74.)

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Tolerably soluble in alcohol, the sp. gr. of which is greater than 0.860. Insoluble in alcohol of sp. gr. less than 0.850. (Berzelius.) 1000 pts. of alcohol, of 0.872 sp. gr., dissolve 6 pts. of the salt, and that of 0.905 sp. gr. 11 pts. (Berzelius, *Lehrb.*, **3.** 297.) Soluble in 217.4 pts. of alcohol of 66.8% at 24.3°; or 100 pts. of this alcohol dissolve 0.46 pt. of the salt at 24.3°. (Pohl, *Wien. Akad. Bericht*, **6.** 599.) 500 pts. of alcohol of 0.872 dissolve 1 pt.; and 1000 pts. of spirit of 0.905 dissolve 16 pts. of it. (Anthon, from *Buckner's Repert.*, **2.** pp. 13, 18; in *J. pr. Ch.*, **14.** 125.) Soluble, with decomposition, in chlorhydric acid.

II.) *bi.* Deliquescent. Soluble in 1 pt. of cold water. (Link.) Very sparingly soluble in alcohol. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **20.** 255.)
$NH_4O, HO, 2SO_3$

III.) *sesqui.* Very easily soluble in water. (Berzelius, *Lehrb.*, **3.** 297.)
$3NH_4O, HO, 2SO_3$

SULPHATE OF AMMONIA & OF CADMIUM.
$NH_4O, SO_3; CdO, SO_3 + 6Aq$

SULPHATE OF AMMONIA & *of protoxide* OF CERIUM. Easily soluble in pure water. (Beringer.)

SULPHATE OF AMMONIA & *of sesquioxide* OF CHROMIUM.

a = violet modif. Superficially efflorescent. Soluble in water, from which it is precipitated on the addition of alcohol. (Schrœtter.)
(*Ammonia Chrome Alum.*)
$NH_4O, SO_3; Cr_2O_3, 3SO_3 + 24Aq$

Less soluble in water than the potash-salt, and is consequently much more easily crystallized. From a concentrated aqueous solution of violet sulphate of sesquioxide of chromium, ammonia-chrome alum is precipitated on the addition of a concentrated solution of sulphate of ammonia. When the aqueous solution is heated to 75° the green modification (compare Sulphate of Chromium & of Potash) is produced. Melts in its water of crystallization at 100°. (Berzelius's *Lehrb.*, **3.** 1083.)

b = green modif.

I.) *anhydrous.*

II.) *hydrated.* Soluble in water, and alcohol. When the aqueous solution is allowed to stand for 10 @ 12 days it changes to the violet modification.
$NH_4O, SO_3; Cr_2O_3, 3SO_3 + 6Aq$

SULPHATE OF AMMONIA & OF COBALT.
$NH_4O, SO_3; CoO, SO_3 + 6Aq$

100 pts. of water at °C.	Dissolve of the anhydrous salt, pts.
0°	8.9
10°	11.6
18°	15.2
23°	17.1
35°	19.6
40°	22.3
45°	25.0
50°	28.7
60°	34.5
75°	43.3

(Tobler, *Ann. Ch. u. Pharm.*, **95.** 198, and fig.)

Considerably more soluble in water than the corresponding nickel salt. The aqueous solution saturated (slightly supersaturated), at

20° contains 14.927% of the anhyd. salt.
40° " 20.782 " "
60° " 25.579 " "
80° " 32.988 " "

(C. v. Hauer, *J. pr. Ch.*, 1858, **74.** 434.)

Alcohol precipitates it from the aqueous solution. (H. Schiff, *Ann. Ch. u. Pharm.*, **107.** 76.)

SULPHATE OF AMMONIA, OF COBALT, & OF COPPER.
$2(NH_4O, SO_3); CoO, SO_3; CuO, SO_3 + 12Aq$

Tolerably easily soluble in boiling water, but after the solution has been boiled for a long time a difficultly soluble basic salt is deposited. (Vohl, *Ann. Ch. u. Pharm.*, **94.** 58.)

SULPHATE OF AMMONIA, OF COBALT, & OF IRON.
$2(NH_4O, SO_3); CoO, SO_3; FeO, SO_3 + 12Aq$

SULPHATE OF AMMONIA, OF COBALT, & OF MAGNESIA.
$2(NH_4O, SO_3); CoO, SO_3; MgO, SO_3 + 12Aq$

SULPHATE OF AMMONIA, OF COBALT, & OF MANGANÈSE.
$2(NH_4O, SO_3); CoO, SO_3; MnO, SO_3 + 12Aq$

SULPHATE OF AMMONIA, OF COBALT, & OF NICKEL.
$2(NH_4O, SO_3); CoO, SO_3; NiO, SO_3 + 12Aq$

SULPHATE OF AMMONIA, OF COBALT, & OF ZINC.
$2(NH_4O, SO_3); CoO, SO_3; ZnO, SO_3 + 12Aq$

SULPHATE OF AMMONIA & OF COPPER. Effloresces in warm dry air. Soluble in 1.5 pt. of boiling water. Very sparingly soluble in cold water. (A. Vogel.) Soluble in 3.76 pts. of water at 19°; or 100 pts. of water at 19° dissolve 26.6 pts. of it; or an aqueous solution saturated at 19° contains 21% of it, or 14.4% of the anhydrous salt, and is of 1.1336 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.) Soluble in 1.55 pt. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht, für* 1854, p. 76.)
$NH_4O, SO_3; CuO, SO_3 + 6Aq$

SULPHATE OF AMMONIA, OF COPPER, & OF IRON. Soluble, without decomposition, in water which is free from air. (Vohl, *Ann. Ch. u. Pharm.*, **94.** 61.)
$2(NH_4O, SO_3); CuO, SO_3; FeO, SO_3 + 12Aq$

SULPHATE OF AMMONIA, OF COPPER, & OF MAGNESIA.
$2(NH_4O, SO_3); CuO, SO_3; MgO, SO_3 + 12Aq$

SULPHATE OF AMMONIA, OF COPPER, & OF MANGANESE.
$2(NH_4O, SO_3); CuO, SO_3; MnO, SO_3 + 12Aq$

SULPHATE OF AMMONIA, OF COPPER, & OF NICKEL.
$2(NH_4O, SO_3); CuO, SO_3; NiO, SO_3 + 12Aq$

SULPHATE OF AMMONIA. OF COPPER, & OF ZINC.
$2(NH_4O, SO_3); CuO, SO_3; ZnO, SO_3 + 12Aq$

SULPHATE OF AMMONIUM & CUPR(*ic*)AMMONIUM. Soluble in 1.5 pt. of cold water. (Kuehn.) When the aqueous solution is exposed to the air (Kuehn), or largely diluted with water, tetra-sulphate of copper ($4CuO, SO_3$) is precipitated. Insoluble in alcohol.
$N\left\{\begin{matrix}H_3\\Cu\end{matrix}\right. O, NH_4O, SO_3$

SULPHATE OF AMMONIA & OF DIDYMIUM. Soluble in 18 pts. of water; it is a little less soluble in a saturated solution of sulphate of ammonia. (Marignac, *Ann. Ch. et Phys.*, (3.) **38.** 171.)
$NH_4O, SO_3; 3(DiO, SO_3) + 8Aq$

SULPHATE OF AMMONIA & *of protoxide* OF IRON. Much less soluble in water than protosulphate of iron ($FeO, SO_3 + 7Aq$). (Vogel.)
$NH_4O, SO_3; FeO, SO_3 + 6Aq$

100 pts. of water at °C.	Dissolve of the anhydrous salt, pts.
at 0°	12.2
12°	17.5
20°	21.6
30°	28.1
36°	31.8
45°	36.2
55°	40.3
60°	44.6
65°	49.8
75°	56.7

(Tobler, *Ann. Ch. u. Pharm.*, **95.** 198, and fig.)

1 pt. of the 6 Aq salt is soluble in 2.80 pts. of water at 16.5°; or, 100 pts. of water at 16.5° dissolve 35.9 pts. of it; or the aqueous solution saturated at 16.5° contains 26.4% of it, or 19.1% of the anhydrous salt, and is of 1.1666 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.)

An aqueous solution of sp. gr. (at 16.5°).	Contains (by experiment) percent of $NH_4O, SO_3; FeO, SO_3 + 6$ Aq.
1.1666	26.40
1.1083	17.60
1.0708	11.74
1.0530	8.80
1.0354	5.87

For calculating other values Schiff proposes the formula: $D = 1 + 0.005918\,p + 0.00001083\,p^2 + 0.0000001715\,p^3$; in which D = the sp. gr. of the solution, and p the percentage of substance in the solution. (H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 337.)

Sulphate of Ammonia & *of sesquioxide* of Iron.

I.) *normal.* (*Ammonia Iron Alum.*) $NH_4O, SO_3; Fe_2O_3, 3SO_3 + 24$ Aq. More permanent, more soluble in water, and more easily crystallized than the corresponding potash salt. Soluble in 3 pts. of water at 15°. (Forchammer.)

II.) *basic.* Soluble in 2.4 pts. of cold water. $2(NH_4O, SO_3); Fe_2O_3, 2SO_3 + 6$ Aq (Maus.)

III.) *polybasic.* Very sparingly soluble in concentrated chlorhydric acid. (Berzelius.)

Sulphate of Ammonia, of Iron, & of Magnesia. $2(NH_4O, SO_3); FeO, SO_3; MgO, SO_3 + 12$ Aq

Sulphate of Ammonia, of Iron, & of Manganese. $2(NH_4O, SO_3); FeO, SO_3; MnO, SO_3 + 12$ Aq. Tolerably easily soluble in water. (Vohl, *Ann. Ch. u. Pharm.*, **94.** 67.)

Sulphate of Ammonia, of Iron, & of Nickel. $2(NH_4O, SO_3); FeO, SO_3; NiO, SO_3 + 12$ Aq

Sulphate of Ammonia, of Iron(*protoxide*), & of Zinc. $2(NH_4O, SO_3); FeO, SO_3; ZnO, SO_3 + 12$ Aq. Tolerably readily soluble in water. (Tassaert, *Ann. Ch. et Phys.*, **24.** 100 [T.].)

Sulphate of Ammonia, of Iron(*sesquioxide*), & of Zinc.

Sulphate of Ammonia & of Lead. $NH_4O, SO_3; PbO, SO_3$ Decomposed by water, which abstracts sulphate of ammonia. (Wœhler.)

Sulphate of Ammonia & of Lithia. $NH_4O, SO_3; LiO, SO_3$ Easily soluble in water. (Arfvedson.)

Sulphate of Ammonia & of Magnesia. $NH_4O, SO_3; MgO, SO_3 + 6$ Aq. Permanent. Less soluble in water than either of the salts of which it is composed. (Graham.)

100 pts. of water at °C.	Dissolve of the anhydrous salt, pts.
at 0°	9.0
10°	14.2
15°	15.7
20°	17.9
30°	19.1
45°	25.6
50°	30.0
55°	31.9
60°	36.1
75°	45.3

(Tobler, *Ann. Ch. u. Pharm.*, **95.** 198, and fig.)

It is liable to form supersaturated solutions. (Ogden.)

Sulphate of Ammonia, of Magnesia, & of Manganese. $2(NH_4O, SO_3); MgO, SO_3; MnO, SO_3 + 12$ Aq

Sulphate of Ammonia, of Magnesia, & of Nickel. $2(NH_4O, SO_3); MgO, SO_3; NiO, SO_3 + 12$ Aq

Sulphate of Ammonia, of Magnesia, & of Zinc. $2(NH_4O, SO_3); MgO, SO_3; ZnO, SO_3 + 12$ Aq

Sulphate of Ammonia, & *of protoxide* of Manganese. $NH_4O, SO_3; MnO, SO_3 + 6$ Aq. Deliquesces in moist air. Readily soluble in water. (John.)

Sulphate of Ammonia, & *of sesquioxide* of Manganese. $NH_4O, SO_3; Mn_2O_3, 3SO_3 + 24$ Aq. Soluble in water, with subsequent decomposition. (Mitscherlich.)

Sulphate of Ammonia, *of protoxide* of Manganese, & of Nickel. $2(NH_4O, SO_3); MnO, SO_3; NiO, SO_3 + 12$ Aq

Sulphate of Ammonia, of Manganese, & of Zinc. $2(NH_4O, SO_3); MnO, SO_3; ZnO, SO_3 + 12$ Aq

Sulphate of Ammonia, & *of protoxide* of Mercury. $NH_4O, SO_3; HgO, SO_3$ Difficultly soluble in water. Easily soluble in ammonia-water.

Sulphate of Ammonia & of Nickel. $NH_4O, SO_3; NiO, SO_3 + 6$ Aq. Soluble in 1.5 pts. of water. (Wittstein's *Handw.*) Soluble in 4 pts. of cold water. (Link, *Crell's Ann.*, 1796, **1.** 32. [Gm.].) Soluble in 4 pts. of water at 12.5°. (Tupputi, *Ann. de Chim.*, 1811, **78.** 166.)

100 pts. of water at °C.	Dissolve of the anhydrous salt, pts.
at 3.5°	1.8
10°	3.2
16°	5.8
20°	5.9
30°	8 3
40°	11.5
50°	14.4
59°	16.7
68°	18.8
85°	28.6

(Tobler, *Ann. Ch. u. Pharm.*, **95.** 198, and fig.)

Considerably less soluble in water than the corresponding cobalt salt. The aqueous solution saturated (slightly supersaturated), at

20° contains 9.395% of the anhyd. salt.
40° " 13.153 " "
60° " 18.622 " "
80° " 23.094 " "

(C. v. Hauer, *J. pr. Ch.*, 1858, **74.** 434.)

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Sulphate of Ammonia & Nickelammonium. Easily soluble in cold water, the solution undergoing decomposition when boiled. (Erdmann.)

$N\left\{\begin{matrix}H_3\\Ni\end{matrix}\right. O, NH_4O, SO_3 + Aq$

Sulphate of Ammonia, of Nickel, & of Zinc.

$2(NH_4O, SO_3); NiO, SO_3; ZnO, SO_3 + 12 Aq$

Sulphate of Ammonia & *of sesquioxide* of Osmium. Soluble in water. (Berzelius.)

Sulphate of Ammonia & *of binoxide* of Platinum.

I.) *basic.* Insoluble in water. Soluble in warm sulphuric and chlorhydric acids. Decomposed by a boiling solution of caustic potash. (E. Davy.)

Sulphate of Ammonia & of Potash. Permanent. 100 pts. of water at 16° dissolve 13.68 pts. of it. (Thomson's *System of Chem.*, London, 1831, **2**. 750.)

$NH_4O, SO_3; KO, SO_3 + 4 Aq$

Sulphate of Ammonia & of Soda. Permanent. Soluble in water.

$NH_4O, SO_3; NaO, SO_3 + 5 Aq$

Sulphate of Ammonia & *of protoxide* of Uranium. Easily soluble in water. (Rammelsberg.) More readily soluble than the potash salt. On heating the aqueous solution a basic salt separates.

$NH_4O, SO_3; UrO, SO_3 + Aq$

Sulphate of Ammonia & *of sesquioxide* of Uranium. Permanent. Readily soluble in water. (Arfvedson.) Rather sparingly soluble in water. (Péligot, *Ann. Ch. et Phys.*, (3.) **5**. 43.)

$NH_4O, SO_3; Ur_2O_3, SO_3 + 2 Aq$

Sulphate of Ammonia & of Zinc. Efflorescent. Very soluble in water.

$NH_4O, SO_3; ZnO, SO_3 + 6 Aq$

100 pts. of water at °C.	Dissolve of the anhydrous salt, pts.
0°	7.3
10°	8.8
13°	10.0
15°	12.5
20°	12.6
30°	16.5
45°	21.7
60°	29.7
75°	37.8
85°	46.2

(Tobler, *Ann. Ch. u. Pharm.*, **95**. 198, and fig.)

Sulphate of Ammonia & Zincammonium. Efflorescent. Soluble in ammonia-water. (Kane.)

$N\left\{\begin{matrix}H_3\\Zn\end{matrix}\right. O, NH_4O, SO_3 + 2 Aq$

Sulphate of Ammonia & of Zirconia. Soluble in hot, and in cold water; more soluble in water than the corresponding potash salt. Also soluble in acids.

$NH_4O, SO_3; Zr_2O_3, 3SO_3$

Sulphate of AmmonioIridium. Soluble in water. (Claus, *Beiträge*, p. 92.)

$5NH_3 . Ir_2O_3, 3SO_3$

Sulphate of AmmonioRhodium. (Claus, *Beiträge*, p. 89.)

$5NH_3 . Rh_2O_3, 3SO_3 + 3 Aq$

Sulphate of Ammonium ChlorPlatin(*ous*) Ammonium. Difficultly soluble in cold, tolerably easily soluble in hot water. Decomposed by chlorhydric and nitric acids. (Gros, *Ann. der Pharm.*, 1838, **27**. 251.)

(*Sulphate of Gros's Base.*
Bi Chlorhydrosulfate de diplatinamine.)

$N_2H_6PtClO, SO_3 = N\left\{\begin{matrix}H_2\\NH_4\\PtCl\end{matrix}\right. . O, SO_3$

Sulphate of Amylamin.

Sulphate of *tetra*Amylammonium.

Sulphate of *di*AmylAnilin. Nearly insoluble in water, or dilute sulphuric acid.

Sulphate of Anilin. Largely soluble in water, especially when this is boiling. The aqueous solution saturated at the boiling temperature becomes solid on cooling. Sparingly soluble in cold, somewhat more soluble in boiling, absolute alcohol. Tolerably readily soluble in dilute alcohol. Insoluble in ether. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9**. 149.)

$N\left\{\begin{matrix}C_{12}H_5\\H_2\end{matrix}\right. . HO, SO_3$

Sulphate of Anilin & of Copper. Decomposed by boiling water.

$N\left\{\begin{matrix}C_{12}H_5\\H\\Cu\end{matrix}\right. . HO, SO_3$

Sulphate of Animin (of Unverdorben). Soluble in water. On boiling the aqueous solution an acid salt is formed, which is soluble in all proportions in water, and alcohol.

Sulphate of Anisamate of Ethyl. Soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **53**. 346.)

Sulphate of Anisamic Acid. Easily soluble in water. Very easily soluble in boiling alcohol, from which it separates as the solution cools. (Cahours, *Ann. Ch. et Phys.*, (3.) **53**. 344.)

$N\left\{\begin{matrix}C_{16}H_7O_4 . O_2\\H_2\end{matrix}\right., HO, SO_3$

Sulphate of Anthranilic Acid.

$N\left\{\begin{matrix}C_2O_2''\\C_{12}H_5\end{matrix}\right. . HO, SO_3 + 2 Aq$

Sulphate of Antimonous Acid.

I.) *di.* Insoluble in warm water. (Péligot.)

$2SbO_3, SO_3$

II.) *mono.* Insoluble in water (Dumas, *Tr.*), or alcohol. (Brandes.) The sulphuric acid may all be abstracted from this salt by boiling water. (Berzelius, *Lehrb.*)

SbO_3, SO_3

III.) *bi.* Decomposed by warm water. Soluble in strong sulphuric acid. (Péligot.)

$SbO_3, 2SO_3$

IV.) *ter.* Soluble in sulphuric acid. Decomposed by water to an insoluble basic, and a soluble acid salt.

$SbO_3, 3SO_3$

V.) *quadri.* Decomposed by warm water. Soluble in strong sulphuric acid. (Péligot, *Ann. Ch. et Phys.*, (3.) **20**. 287.)

$SbO_3, 4SO_3$

Sulphate of Argentammonium. Completely soluble in water. (H. Rose.)

$N\left\{\begin{matrix}H_3\\Ag\end{matrix}\right. . O, SO_3$

Sulphate of Argent*bi*amin. Tolerably permanent. Soluble in warm concentrated ammonia-water, crystallizing out as the solution cools. (Mitscherlich.)

$N_2\left\{H_6\right. . AgO, SO_3$

Sulphate of Aricin.

I.) *normal.* Soluble in boiling water, and in alcohol.

II.) *acid.* Soluble in water.

$\dot{N}_2\left\{C_{46}H_{26}O_8^{VI}\right. . HO, HO, 2SO_3$

Sulphate of Arsen*di*Ethyl.

Sulphate of ArsenEthylium. Readily soluble in water, and spirit. Sparingly sol-

$As\left\{(C_4H_5)_4\right. . O, HO, 2SO_3$

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uble in ether. (Landolt, *Ann. Ch. u. Pharm.*, **89.** 333.)

Sulphate of Arsen*di*MethylAmylium. $As\left\{\begin{matrix}(C_2H_3)_2\\(C_{10}H_{11})_2\end{matrix}\right. . O, SO_3$

Sulphate of Arsen*di*MethylEthylium. $As\left\{\begin{matrix}(C_2H_3)_2\\(C_4H_5)_2\end{matrix}\right. . O, SO_3$ Very deliquescent. Soluble in water. (Cahours & Riche.)

Sulphate of ArsenMethylium. $As\left\{(C_2H_3)_4\right. . O, SO_3$ Deliquescent. Very soluble in water. (Cahours & Riche.)

Sulphate of Asparagin. Soluble in water, and alcohol. (Dessaignes, *Ann. Ch. et Phys.*, (3.) **84.** 152.)

Sulphate of Aspartic Acid. $C_8H_7NO_8, 2(HO, SO_3)$ Insoluble, or very sparingly soluble, in alcohol.

Sulphate of Atropin. $C_{34}H_{23}NO_6, HO, SO_3$ Readily soluble in water, and alcohol. Difficultly soluble in ether. (v. Planta.)

Sulphate of AzoNaphtylamin. $N_2\left\{\begin{matrix}C_{20}H_6''\\H_4\end{matrix}\right. . HO, HO, 2SO_3$ Permanent. Sparingly soluble, with partial decomposition, in water, and alcohol. Much less soluble in water than free naphtylamin.

Sulphate of AzoPhenylamin. Almost insoluble in water, alcohol, or ether. (Zinin.)

Sulphate of Baryta. BaO, SO_3 Permanent. Soluble in 43000 pts. of cold water. (Kirwan, *Min.*, **1.** 136 [T.].) Soluble in 200000 pts. of water. (Margueritte, *C. R.*, **38.** 308.) 100 pts. of cold water dissolve 0.002 pt. of it. (Ure's *Dict.*) Not absolutely insoluble in water. (Mulder, *Die Silberprobirmethode*, p. 12; Fresenius.) A solution of chloride of barium containing 1 pt. of Ba O in 71000 pts. of water, when treated with sulphuric acid becomes turbid after the lapse of half an hour. (Harting, *J. pr. Chem.*, **22.** 50.) A solution of nitrate of baryta containing one pt. of Ba O in 25000 pts. of water gives a distinct cloud when treated with sulphuric acid, or a solution of sulphate of soda; with 50000 @ 100000 pts. of water a slight turbidity is produced; with 200000 @ 400000 pts. of water the mixture becomes turbid after the lapse of some minutes; while with 800000 pts. of water the reaction ceases. (Lassaigne, *J. Chim. Méd.*, **8.** 526.)

Somewhat soluble in dilute acids, as chlorhydric and nitric acids. (Piria, *Il Cimento*, 1847, **5.** 257, cited by Siegle, who corroborates the observation, *J. pr. Ch.*, 1856, **69.** 142.)

Insoluble in hot or cold water. Cold dilute acids dissolve small quantities of it, and cold concentrated acids considerably more. Boiling chlorhydric acid takes up a considerable amount of it. Of all the acids, acetic acid dissolves the least, as has been shown by Siegle. (Fresenius, *Quant.*, p. 125.)

Precipitated sulphate of baryta, washed with water and dilute nitric acid until the last traces of chloride of barium had been removed, being treated with dilute acids, gave the following results: — 0.577 grm. of Ba O, S O_3 being boiled during about 5 minutes in 168 c.c. of chlorhydric acid of 1.03 sp. gr., the solution filtered after it had become cold, was found to contain 0.0075 grm. of sulphate of baryta; 0.679 grm. of Ba O, S O_3 being boiled for about a quarter of an hour with 230 c.c. of chlorhydric acid of 1.02 sp. gr., the solution, filtered while still warm, was found to contain 0.048 grm. of sulphate of baryta; — 0.4 grm. of Ba O, S O_3 being heated, during a quarter of an hour, with 150 c.c. of nitric acid of 1.02 sp. gr., the solution was found to contain 0.165 grm. of sulphate of baryta; — 0.4 grm. of Ba O, S O_3 being heated during a quarter of an hour with 80 c.c. of acetic acid of 1.02 sp. gr. the fluid was found to contain in solution 0.002 grm. of sulphate of baryta. Since the small portions of chloride of barium, which always contaminate precipitated sulphate of baryta, cannot be removed by washing with water alone, and hence necessitate the employment of some dilute acid, it is worthy of note that acetic acid is to be recommended for this purpose, rather than nitric or chlorhydric acid, for, as is indicated above, it dissolves less sulphate of baryta than either of the other acids. (Siegle, *J. pr. Ch.*, 1856, **69.** pp. 146, 147.)

500 pts. of nitric acid, of 1.167 sp. gr., can dissolve 1 pt. of sulphate of baryta; this is also soluble even in the weakest nitric or chlorhydric acid, thus: — While 0.062 gr. of sulphate of baryta can be held in solution by 1000 grs. of nitric acid of 1.032 sp. gr., the same quantity of the salt requires 50000 grs. of distilled water to dissolve it. This solubility of sulphate of baryta is influenced to a greater extent by the bulk than by the strength of the acid. (Calvert, *Phil. Mag.*, (4.) **11.** 390.) Sparingly soluble in nitric acid, both strong and dilute. (Price; Nicholson; Noad.) Somewhat soluble in chlorhydric acid when a large bulk of this acid is present; this solubility is much less marked, however, in presence of an excess of chloride of barium. (Noad.)

When treated with chlorhydric or nitric acid at the ordinary temperature it is not in the least attacked at first, and after the lapse of several days only a faint trace is dissolved, but if sulphate of baryta is boiled with chlorhydric or nitric acid a trace of it is dissolved at once; the addition of either a dilute solution of chloride of barium or of dilute sulphuric acid causing the formation of a precipitate. Mere dilution with water will not reprecipitate the dissolved sulphate of baryta. (H. Rose, *Pogg. Ann.*, **95.** pp. 104 – 109.)

Soluble in boiling concentrated sulphuric acid, crystallizing out as the solution cools; it is completely precipitated from this solution on the addition of water. (Withering; Hume, *Phil. Mag.*, **14.** 357 [T.]; Berzelius's *Lehrb.*)

The solubility of sulphate of baryta in water is also increased by the presence of several salts, especially by chloride of magnesium. (Fresenius, *Quant.*, p. 125.) Soluble to a notable extent in presence of salts of cerium. (Marignac, *Ann. Ch. et Phys.*, (3.) **27.** 217.) Soluble in considerable quantity in an aqueous solution of nitrate of ammonia; — in experiments upon this point it was found that the largest quantities of sulphate of baryta were dissolved when boiling solutions of sulphate of soda and chloride of barium, which had previously been mixed with nitrate of ammonia, were added by alternate drops to a boiling solution of nitrate of ammonia. A solution of 6.889 grms. of anhydrous sulphate of soda in 100 c.c. of water, of which 1 c.c. was capable of forming 0.1 grm. of sulphate of baryta, having been prepared, and another of chloride of barium, of which 1c.c. was equivalent to 0.37 grm. of sulphate of baryta, portions of these were added to a boiling solution of nitrate of ammonia as follows (the amount of the liquid last named being 230c.c. of cold saturated solution): — ½ c.c. of the solution of chloride of barium, then 2 c.c. of the solution of sulphate of soda, then ½ c.c. of the chloride

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of barium, and again 2 c.c. of sulphate of soda, but no precipitate ensued, although 0.28 grm. of sulphate of baryta was contained in the liquid, until on the further addition of $\frac{1}{2}$ c.c. of chloride of barium a slight cloudiness occurred. The experiment being repeated, with the omission of the last half c.c. of chloride of barium solution, the perfectly clear solution obtained exhibited the following reactions: — Treated with concentrated solutions of sulphate of soda, sulphate of ammonia, acetate of baryta, and chloride of barium, considerable precipitates were immediately produced, but concentrated solutions of the chlorides of calcium, ammonium, potassium, and strontium occasioned no precipitates, nor was any precipitate produced by the addition of much water to the original solution, an excess of a sulphate or of a baryta salt being alone capable of causing precipitation. The solubility, or rather non-precipitation of sulphate of baryta is much more considerable when the solution of nitrate of ammonia is acidulated with chlorhydric acid, even so much as 2 grms. of sulphate of baryta having been obtained dissolved in a boiling solution of 500 c.c. of a saturated solution of nitrate of ammonia mixed with 50 c.c. of chlorhydric acid; as the solution cooled a portion of the sulphate of baryta separated with the crystals of nitrate of ammonia, but a considerable quantity of it still remained dissolved. But in this case, according to Erdmann, the great solubility of the sulphate of baryta is due to the presence of free chlorine, and should not be attributed to the ammonia salt; for in a mixture of 100 c.c. of a solution of nitrate of ammonia and 100 c.c. of a concentrated solution of chloride of ammonium not so much as 0.08 grm. of sulphate of baryta could be obtained dissolved. (Mittentzwey, *J. pr. Ch.*, 1858, **75.** 214.) Sulphate of baryta cannot be precipitated from solutions which contain free chlorine. (Erdmann, *J. pr. Ch.*, **75.** 215.) Nor is it precipitated from solutions containing normal soluble citrates, except on boiling, but citric acid alone exerts no such solvent influence. (Spiller, *J. Ch. Soc.*, **10.** 110.) In presence of tartaric acid the precipitation is retarded to a small extent, and also slightly by racemic acid. (Spiller.) The presence of metaphosphate of soda also prevents the precipitation of sulphate of baryta: — If to a solution of metaphosphate of soda a large quantity of dilute chlorhydric acid be added, and then a solution of chloride of barium be stirred in drop by drop, a clear solution is obtained, in which no immediate precipitate is produced on the addition of very dilute sulphuric acid, the liquid beginning to become cloudy on standing only after the lapse of several hours, or even days; a precipitate soon occurs, however, on boiling the solution. For the success of the above experiment, it is necessary that the sulphuric acid shall be sufficiently dilute and not be added in too great excess. Neither ordinary (*c*) phosphoric acid, nor pyro (*b*) phosphoric acid prevent the precipitation of sulphate of baryta. (Scheerer, *J. pr. Ch.*, 1858, **75.** 114.) Following up Scheerer's observations, Rube has corroborated them in a number of quantitative experiments, which may be found in *J. pr. Ch.*, 1858, **75.** 115. Rube found that the precipitates finally produced were mixtures of phosphate and sulphate of baryta.

Chloride of ammonium has far less solvent power over sulphate of baryta than nitrate of ammonia: — 0.006 grm. of anhydrous sulphate of soda was dissolved in 137 c.c. of a concentrated solution of chloride of ammonium, 1 c.c. of a concentrated solution of chloride of barium was added, and the whole allowed to cool; a faint cloudiness was perceptible at the end of half an hour, and after 24 hours a crystalline precipitate had fallen, which weighed 0.0092 grm., instead of 0.0098 grm., which was required by theory. Hence it follows, that at most only 1 part of sulphate of baryta was dissolved in 230000 pts. of the solution of chloride of ammonium; but it must be observed, that the precipitate does not form immediately, and that the sulphate of baryta separates out completely only after a long time. In experiments with solutions of various strengths, which were not completely saturated, it was found that the precipitate occurred so much the sooner in proportion as the solution was more dilute, but in all the experiments the sulphate of baryta had separated completely at the end of 24 hours. (Mittentzwey, *J. pr. Ch.*, 1858, **75.** 216.) Unlike the sulphates of lime and lead, it is insoluble in a warm, concentrated solution of hyposulphite of soda. (Diehl, *J. pr. Ch.*, 1860, **79.** 431.) Soluble to a slight extent in an aqueous solution of acetate of "baryta" [? ammonia], at temperatures approaching the boiling point; the filtered solution, while yet hot, gives precipitates when treated with chloride of barium, with sulphuric acid, or carbonate of soda. (Weppen, from *Arch. d. Pharm.*, (2.) **9.** 236; in *J. pr. Ch.*, 1837, **11.** 181.) Insoluble in aqueous solutions of chloride of ammonium or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 96.) Unlike the sulphates of lime and strontia, which dissolve, it is completely insoluble in an aqueous solution of chloride of sodium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 316.) Insoluble in an aqueous solution of hyposulphite of soda. (Lœwe.) Decomposed when boiled with an aqueous solution of carbonate of potash, or carbonate of soda. (Dulong, *Ann. de Chim.*, **82.** 279.) Decomposed when boiled with an aqueous solution of carbonate of potash. (Marggraf, Kirchof, Klaproth, cited by H. Rose, *Pogg. Ann.*, **94.** 482.)

When sulphate of baryta is mixed with a dilute or concentrated solution of carbonate or bicarbonate of potash or of soda, and the mixture allowed to stand during a couple of days no decomposition occurs. After standing a longer time, a very slight decomposition ensues. If, however, the mixture of sulphate of baryta and carbonated alkali be boiled, some decomposition occurs at once, and by the repeated application of fresh portions of the solution of alkaline carbonate, the whole of the sulphate of baryta may be decomposed. In presence of a certain amount of sulphate of potash or sulphate of soda, however, this decomposition ceases: — thus, sulphate of baryta is not decomposed when boiled with a solution which contains equal weights of carbonate of potash and sulphate of potash (or of carbonate of soda and sulphate of soda). Nor is it completely decomposed when boiled in a solution containing 10 equivalents of carbonate of potash or carbonate of soda in 100 times as much water; only when 15 equivalents or more of the alkaline carbonate is present are the last traces of sulphate of baryta decomposed. (H. Rose, *Pogg. Ann.*, **94.** 484, *et seq.*)

No decomposition occurs when a mixture of sulphate of baryta, sulphate of potash, and carbonate of potash is boiled. (Dulong.) After boiling during four hours a mixture of $\frac{1}{5}$ of an equivalent of BaO, CO_2, $\frac{4}{5}$ of an equivalent of BaO, SO_3, $\frac{1}{5}$ of an equivalent of NaO, SO_3, and $\frac{4}{5}$ of an equivalent of NaO, CO_2, it did not appear that the relative proportions of the four salts had changed sensibly. But one equivalent of sulphate

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of baryta may be decomposed by boiling it at once with six equivalents of carbonate of soda. (Malaguti, *Ann. Ch. et Phys.*, (3.) 51. pp. 337, 338.) When one equivalent of $Ba O, S O_3$ is boiled with one equivalent of $K O, C O_2$, in aqueous solution, $\frac{22.17}{100}$ of it may be decomposed; when boiled with an equivalent of $Na O, C O_2$ $\frac{18.78}{100}$ of it may be decomposed. On the other hand, when an equivalent of $Ba O, C O_2$ is boiled with one of $K O, S O_3$ $\frac{60}{100}$ of it may be decomposed, and when boiled with an equivalent of $Na O, S O_3$ $\frac{71.82}{100}$ of it may be decomposed. These reactions may be disturbed by several influences, notably by the new insoluble salt which is formed tending to cover the original substance, and to protect it from further action, also by the cohesion of the original insoluble salt being increased by ebullition. Thus an equivalent of artificial $Ba O, S O_3$ having been boiled during two hours in water which contained an equivalent of $Na O, C O_2$, $\frac{17.47}{100}$ of it were decomposed. In a second experiment similar to this, excepting that the $Ba O, S O_3$ employed had been used in a previous experiment, which lasted four hours, and was consequently covered with carbonate of baryta, only $\frac{15.94}{100}$ of the $Ba O, S O_3$ were decomposed; while in a third experiment upon sulphate of baryta, like the last, from which the covering of carbonate had been removed by means of dilute nitric acid, $\frac{16.84}{100}$ of the $Ba O, S O_3$ were decomposed. These disturbing influences were rendered still more evident by the following set of experiments, in which all the conditions were identical, excepting the time of boiling, which varied from thirty minutes, in the shortest, to sixteen hours, in the longest.

No. of hours during which the mixture of $Ba O, S O_3$ and $Na O, C O_2$ was boiled.	Percent of $Ba O, S O_3$ decomposed.
0h. 30m.	12.94
1 0	16.78
2 0	17.47
4 0	18.73
6 0	15.79
8 0	16.26
10 0	17.88
12 0	19.00
14 0	18.42
16 0	16.84

(Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** pp. 339–344, 348, 358. Compare Carbonate of Baryta.)

When powdered $Ba O, S O_3$ is digested for some time with a solution of carbonate of potash, there is a double decomposition; combinations of sulphuric acid and potash, and carbonic acid and baryta, being formed. (H. Davy, *Elements Chemical Philosophy*, p. 103.) Powdered sulphate of baryta being boiled with a solution of two or three times its weight of carbonate of potash decomposition occurs, the carbonic acid passing to the baryta and the sulphuric to the potash. (Henry, *Elements of Experimental Chemistry*, **2.** 331.) 300 grains of powdered $Ba O, S O_3$ having been boiled with 600 grains of carbonate of potash and water, evaporated to dryness, again diffused in water and a second time evaporated, being subsequently diluted [washed ?] with water and the precipitate treated with chlorhydric acid, this dissolved with effervescence, leaving a residue of 18 grains. (Klaproth's *Analytical Essays*, **2.** 228.) To 100 pts. [qu. grains ?] of precipitated (washed and dried) $Ba O, S O_3$, 59 pts. of dry $K O, C O_2$ were added, and the whole boiled during two hours in about four ounces of water, the solution was not **evaporated to dryness, water being occasionally added to supply what was lost by evaporation. The precipitate was then washed with water, the $Ba O, C O_2$ dissolved by dilute nitric acid, and the insoluble residue washed and dried. Its weight was equal to 77 pts.; consequently 23 of the sulphate of baryta were decomposed by the carbonate of potash and converted into 19.5 of carbonate of baryta. On the other hand, quantities equivalent** to those used above, of carbonate of baryta and sulphate of potash, viz., 85 pts. of $Ba O, C O_2$ and 74 pts. of $K O, S O_3$, were boiled in water as in the preceding experiment, the solution containing carbonate of potash was poured off, the precipitate washed with water, and the undecomposed carbonate of baryta dissolved in dilute nitric acid. The sulphate of baryta weighed 67 pts.; consequently 57 pts. of carbonate of baryta were decomposed by the sulphate of potash. In the first experiment 23 pts. of $Ba O, S O_3$ were decomposed, hence the 100 pts. of $Ba O, S O_3$ and 59 pts. of $K O, C O_2$ employed, became nearly as follows: 77 $Ba O, S O_3$, — 45.5 $K O, C O_2$, — 17 $K O, S O_3$, — 19.5 $Ba O, C O_2$. In the second experiment 57 of $Ba O, C O_2$ were converted into sulphate, hence the 85 pts. of $Ba O, C O_2$ and 74 of $K O, S O_3$ gave about 67 $Ba O, S O_3$, — 39.5 $K O, C O_2$, — 24.5 $K O, S O_3$, — 28 $Ba O, C O_2$. The decompositions, in both these cases, are very considerable; but as the quantities of the salts which result from the action of the same proportions of similar acids and bases are not equal, it is probable that the decomposition was not in either case complete, on account of the mixtures not having been sufficiently digested and evaporated to dryness. Supposing the insolubility of the sulphate of baryta in the first experiment to have prevented the complete action of the carbonate of potash, we must also suppose the same cause to have prevented that of the sulphate of potash on the carbonate of baryta in the second experiment; and allowing this cause to have operated equally in both cases, the mean of the quantities stated will probably express the result which would have been obtained by carrying each experiment to its utmost limit. On referring back to the quantities of salts used in each experiment, it will be seen [by Wollaston's scale] that they consisted of acids and bases in nearly the following proportions: — 34 pts. $S O_3$, 19 pts. $C O_2$, 66 pts. $Ba O$, 40 pts. $K O$; and these combined so as to give the mean of the two experiments, will stand thus: —

$$\begin{array}{lll}
24.5\ S O_3 + 47.5\ Ba O & = & 72\ Ba O, S O_3 \\
13.75\ C O_2 + 28.75\ K O & = & 42.5\ K O, C O_2, \\
9.5\ S O_3 + 11.25\ K O & = & 20.75\ K O, S O_3, \\
5.25\ C O_2 + 18.50\ Ba O & = & 23.75\ Ba O, C O_2.
\end{array}$$

That these numbers express the quantities which would result from the perfect action of the salts upon each other will appear probable by examining the results of Klaproth's experiment. He found that 600 pts. of $K O, C O_2$ decomposed 282 pts. of $K O, S O_3$, consequently 59, the quantity employed in the experiment described above, should decompose 27.6, which is within 4 of the stated average. We may then safely infer that not more than 72 out of 100 pts. of $Ba O, S O_3$ can be decomposed by carbonate of potash, whilst the latter salt is exposed to the counteraction of the sulphate of potash formed by the decomposition of the 72 pts., and it would appear that the power of the latter is sufficient to prevent the action of almost any quantity of carbonate of potash however large, upon the smallest quantity of sulphate of

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baryta. In Klaproth's experiment not more than 165 pts. of carbonate of potash could have been decomposed by 282 pts. of sulphate of baryta and the sulphate of potash formed, amounting to 209 pts., by its power of reproducing sulphate of baryta, appears to have prevented the remaining 435 of carbonate of potash from decomposing 18 of sulphate of baryta, although it contained at least 30 times more carbonic acid than the baryta could have combined with. To try how far these inferences would be strengthened by experiment, 72 pts. of $Ba\,O,\ S\,O_3$, 42.5 of $K\,O,\ C\,O_2$, 20.75 of $K\,O,\ S\,O_3$, and 23.75 of $Ba\,O,\ C\,O_2$ were boiled together in water for about two hours. The result did not prove that the quantities are precisely those which prevent the reciprocal action, but they showed that the error is not very considerable; an increase of about 3.75 of $Ba\,O,\ S\,O_3$ having been found. The result of this experiment is sufficient to show that the decomposition of sulphate of baryta by carbonate of potash is prevented from taking place by the power which sulphate of potash and carbonate of baryta possess of reproducing it, and *vice versa*, that the power of sulphate of potash and carbonate of baryta of effecting mutual decomposition is equally destroyed from the corresponding power of reproduction belonging to sulphate of baryta and carbonate of potash. (Richard Phillips, *Journ. of Royal Inst. of Gt. Br.*, 1816, **1.** 80. [Here given somewhat literally, in view of the neglect which the article has hitherto received.].)

Sulphate of baryta is not decomposed like sulphate of lime when digested with an aqueous solution of carbonate of ammonia. (Weppen, *Arch. d. Pharm.* (2.) **9.** 236; in *J. pr. Ch.*, 1837, **11.** 183.) Unacted upon by a boiling aqueous solution of caustic potash, if carbonic acid be excluded. It is not decomposed by an aqueous solution of carbonate of ammonia at the ordinary temperature, or, at least, no more than by solutions of the fixed alkaline carbonates; even on boiling the decomposition is but slight. (H. Rose, *Pogg. Ann.*, **95.** pp. 104 – 109.)

On being exposed to a temperature of about 250° in a closed tube, during 60 hours, with an aqueous solution of bicarbonate of soda, a notable quantity of sulphate of baryta was dissolved, and subsequently crystallized on the sides of the tube; larger crystals were obtained when chlorhydric acid was used instead of the bicarbonate of soda. No sensible solution of the sulphate of baryta was observed when pure water or solutions of alkaline sulphides were used instead of the chlorhydric acid, or bicarbonate of soda. (De Senarmont, *Ann. Ch. et Phys.*, (3.) **32.** 155.)

***Bi*Sulphate of Baryta.** Both of these compounds absorb water from the air, with decomposition.
$a = Ba\,O,\ H\,O,\ 2\,S\,O_3$
$b = Ba\,O,\ H\,O,\ 2\,S\,O_3 + 2\,Aq$
They are instantly decomposed by water, but are soluble in concentrated sulphuric acid, the more readily in proportion as this is warmer. (Berzelius, in his *Lehrb.*, **3.** 359.)

Sulphate of Baryta & of Lime. Occurs as the mineral *Dreelite.* Decomposed by chlorhydric acid, with partial solution. (Dufrénoy.)
$3\,(Ba\,O,\ S\,O_3);\ Ca\,O,\ S\,O_3$

Sulphate of Baryta & *of binoxide* of Platinum.

I.) *basic.* Insoluble in water. Readily soluble in boiling concentrated chlorhydric acid; and is slightly decomposed by aqua-regia. Not attacked by boiling nitric, sulphuric, phosphoric, or acetic acid; or by ammonia-water. (E. Davy.)

Sulphate of Baryta & of Soda.

Sulphate of Baryta & of Toluenyl. Soluble in water. (Cahours.)
(*SulphAnisolate of Baryta.*)
$C_{14}\,H_7\,O,\ Ba\,O,\ 2\,S\,O_3 + Aq$

Sulphate of Bebeerin. Readily soluble in acidulated water. (Parrish's *Pharm.*, p. 413.)

Sulphate of Benzamic Acid. Permanent. Soluble in boiling, less soluble in cold water, and alcohol. Gradually decomposed by hot water. (Gerland.)
$N\,C_{14}\,H_7\,O_4,\ H\,O,\ S\,O_3 + 2\,Aq$

Sulphate of Benzidin. Almost insoluble in boiling water, or in alcohol.
$N_2 \left\{ \begin{matrix} C_{12}\,H_4{}'' \\ C_{12}\,H_5 \\ H_3 \end{matrix} \right. .\ H\,O,\ H\,O,\ 2\,S\,O_3$

Sulphate of Benzol.
$C_{14}\,H_6\,O_2{}'',\ 2\,S\,O_3$

Sulphate of Berberin. Sparingly soluble in cold water.
$N \left\{ C_{42}\,H_{19}\,O_{10}{}''' \right. .\ H\,O,\ H\,O,\ 2\,S\,O_3$

Sulphate of Bismuth.

I.) *mono.* Insoluble in water. Soluble in concentrated sulphuric acid. (Heintz; Dumas.) Soluble in nitric and chlorhydric acids.
$Bi\,O_3,\ S\,O_3$

II.) *bi.* Decomposed by water. (Heintz.) Soluble in nitric, chlorhydric, and warm dilute sulphuric acid.
$Bi\,O_3,\ 2\,S\,O_3 + 3\,Aq$

III.) *ter.* Decomposed by water. Soluble in dilute sulphuric acid.
$Bi\,O_3,\ 3\,S\,O_3$

IV.) *peracid.* Deliquescent.

V.) *tri.* Insoluble in water. (Dumas, *Tr.*)
$3\,Bi\,O_3,\ S\,O_3$

According to Laurent, there are two sulphates of bismuth, the one soluble, the other insoluble, in water. When bismuth is dissolved in boiling nitric acid, and the solution treated with sulphuric acid, there is sometimes no precipitate whatever produced, and at other times a very abundant one. If a few drops of water are poured upon this precipitate it sometimes dissolves suddenly, and at other times remains perfectly insoluble, however large an amount of water be added. These phenomena are explained by the facts, that if sulphuric acid is added to the cold solution of the nitrate, care being taken to operate upon a sufficiently small quantity, so that the mixture may not become heated, there will be no precipitate produced; if too much sulphuric acid be added, there will be deposited a sulphate of bismuth, crystallized in needles, which is scarcely soluble in sulphuric acid, but extremely soluble in water; if upon this crystalline sulphate water be poured it will dissolve immediately, but if the solution be heated, whether the quantity of water present be large or small, a sulphate of bismuth will gradually be precipitated, which is insoluble either in hot or cold water, and which will not dissolve even on the addition of a considerable quantity of sulphuric acid. (Laurent, in his *Chemical Method* (Cavendish Soc. Ed.), p. 163.)

Sulphate of Bismuth & of Potash. Ppt. Decomposed by water. Insoluble in a saturated aqueous solution of sulphate of potash. (Heintz.)
$Bi\,O_3,\ 3\,S\,O_3;\ 3\,(K\,O,\ S\,O_3)$

Sulphate of Bismuth Ethyl.

Sulphate of *bi*BromAllylamin. Soluble in water.

Sulphate of Brucin.

I.) *normal.* Readily soluble in water. Sparingly soluble in alcohol.
$N_2\left\{C_{46}H_{26}O_3^{vi}\right. . HO, SO_3 + 7 Aq$

II.) *acid.* May be washed with ether.

SULPHATE OF BUTYL. *Vid*, ButylSulphuric Acid.

SULPHATE OF CACODYL. Very deliquescent.

SULPHATE OF CACOPLATYL. Permanent.
$As\left\{\begin{matrix}C_2H_3\\C_2H_2Pt\end{matrix}\right. . O, SO_3 + 2 Aq$

SULPHATE OF CACOTHELIN. Decomposed by water. Insoluble in alcohol. Soluble in sulphuric acid. (Strecker.)

SULPHATE OF CADMIUM.

I.) Efflorescent. Easily soluble in water. (Stromeyer.) Soluble in 1.04 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht für* 1854, p. 76.)
$CdO, SO_3 + 4 Aq$

II.) Sparingly soluble in water. (Stromeyer.)
$2 CdO, SO_3 + Aq$

SULPHATE OF CADMIUM & OF MAGNESIA. Easily soluble in water. (Schiff.)
$CdO, SO_3; MgO, SO_3 + 6 Aq$

SULPHATE OF CADMIUM & OF POTASH. Easily efflorescent.
$CdO, SO_3; KO, SO_3 + 6 Aq$

SULPHATE OF CADMIUM & OF SODA.
$CdO, SO_3; NaO, SO_3 + 2 Aq$

SULPHATE OF CADMIUM*bi*AMIN. Soluble in water, with partial decomposition. (H. Rose.)
(*Ammonio-Sulphate of Cadmium.*)
$N_2\left\{H_6\right. . CdO, SO_3$

SULPHATE OF CAFFEIN. There is an acid salt, and also a neutral salt; they dissolve more readily in water than in alcohol. (Guenther.) Easily decomposed by water. (Gerhardt, *Tr.*) Caffein is easily soluble in dilute sulphuric acid, but no solid salt can be obtained. (Mulder.) Sparingly soluble in ether. (Herzog.)

SULPHATE OF *tri*CAPROYLAMIN.

SULPHATE OF CAPRYL. *Vid.* OctylSulphuric Acid.

SULPHATE OF CAPRYLAMIN. *Vid.* Sulphate of Octylamin.

SULPHATE OF CARBURETTED HYDROGEN. *Vid.* EthylSulphate of Wine Oil.

"SULPHATE OF CARBYL." *Vid.* Ethionic Acid(Anhydrous).

SULPHATE *of protoxide* OF CERIUM.

a = *anhydrous.* Difficultly soluble in water.
CeO, SO_3

b = *hydrated.* Very soluble in cold water, but on boiling the solution $CeO, SO_3 + 1\frac{1}{2} Aq$ is precipitated. (Otto.) Much more soluble in *cold* than in hot water. (Marignac, *Ann. Ch. et Phys.*, (3.) **27.** 213.) Sulphate of cerium may be completely precipitated from its aqueous solution by adding a suitable quantity of concentrated acetic acid. (Persoz, *Ann. Ch. et Phys.*, 1836, (2.) **63.** 444.)
$CeO, SO_3 + 3 Aq$

SULPHATE *of sesquioxide* OF CERIUM. Efflorescent. Soluble in a small quantity of water. When the aqueous solution is diluted with much water and boiled, a basic salt is precipitated. (Berzelius's *Lehrb.*) Soluble in dilute sulphuric acid. The basic sesquisulphate of ceric oxide (Bunsen's) requires a very large excess of sulphuric acid for its solution. (Ordway.)
$Ce_2O_3, 3 SO_3$

SULPHATE *of prot- & of sesquioxide* OF CERIUM.
(*Cereso Ceric Sulphate.*)

I.) *normal.* Completely soluble in a small quantity of water, but on adding a larger quantity of water a basic salt is precipitated, while sulphate of the protoxide is dissolved. When treated with warm chlorhydric acid it is readily transformed into protochloride, chlorine being evolved. (H. Rose, *Tr.*) Easily soluble in water acidulated with nitric or sulphuric acid. When this solution is diluted with a large excess of water a basic salt (No. 2) is precipitated. (Marignac, *Ann. Ch. et Phys.*, (3.) **27.** 212.)

II.) *basic.* Almost entirely insoluble in pure water. Very sparingly soluble in cold dilute nitric or sulphuric acid. Easily soluble, with decomposition, in boiling acids. (Marignac, *loc. cit.*, pp. 212, 221.) Soluble in 2500 pts. of water. (Mosander.) Soluble in chlorhydric acid, from which it is reprecipitated on the addition of alkalies.
(*Ceroso Ceric sub Sulphate.*)
$3 CeO, 2 Ce_2O_3, 4 SO_3 + 7 Aq$

SULPHATE *of protoxide* OF CERIUM & OF POTASH. Only slightly soluble in cold, but rather freely soluble in boiling water. Completely insoluble in a saturated aqueous solution of sulphate of potash. (Berzelius.) Less soluble than the sulphate of potash and of yttria. (Gahn & Berzelius.) This precipitate forms even in solutions which contain a small quantity of free acid, and is not soluble in dilute acids. (H. Rose, *Tr.*) Slightly soluble in dilute sulphuric acid. (Hisinger & Berzelius.)
$KO, SO_3; CeO, SO_3$

SULPHATE *of sesquioxide* OF CERIUM & OF POTASH. Difficultly soluble in water. Completely insoluble in a saturated aqueous solution of sulphate of potash. (Berzelius & Hisinger.)
$KO, SO_3; Ce_2O_3, 3 SO_3$

SULPHATE *of protoxide* OF CERIUM & OF SODA. Much more soluble in water than the corresponding potash salt. (Beringer.)
$2 (CeO, SO_3); NaO, SO_3$

SULPHATE OF CERYL. Entirely soluble in water, especially if this be mixed with a little alcohol. Soluble in ether.
$C_{54}H_{55}O, HO, SO_3$

SULPHATE OF CETYLANILIN. Is the most soluble of the salts of cetylanilin. It is soluble in alcohol, from which it is completely precipitated on the addition of water.

SULPHATE OF CHELIDONIN. Permanent. Very readily soluble in water, spirit, and absolute alcohol. Insoluble in ether. (Probst, *Ann. der Pharm.*, **29.** 127.)

SULPHATE OF CHLORANILIN. Soluble in boiling, less soluble in cold water. Less soluble in alcohol than in water. (Hofmann.)
$N\left\{\begin{matrix}C_{12}H_4Cl\\H_2\end{matrix}\right. . HO, SO_3$

SULPHATE OF *di*CHLORIDE OF MERCURY.

SULPHATE OF *penta*CHLORIDE OF PHOSPHORUS.

$\left.\begin{matrix}\text{I.)}\ PCl_5, SO_3\\\text{II).}\ PCl_5, 2 SO_3\end{matrix}\right\}$ Decomposed by water.

SULPHATE OF CHLORIDE OF SELENIUM. Deliquescent. Readily soluble, with decomposition, in water.
$2 (Se_2Cl_3), 5 SO_3$ (?)

SULPHATE OF *bi*CHLORIDE OF SULPHUR. Decomposed by water, and alcohol. (Millon.)
SCl_2, SO_3

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*Bi*Sulphate of *ter*Chloride of Sulphur. (*ChloroSulphuric Acid. Sulphobiaci Chloride.*) $S\,Cl\,O_2$ or $S\,Cl_3 + 2\,S\,O_3$ Decomposed by water, with great evolution of heat. (Regnault.) Also decomposed by alcohol, and more difficultly by ether.

*Quinqui*Sulphate of *ter*Chloride of Sulphur. $S\,Cl_3, 5\,S\,O_3$ Slowly decomposed by water. When first put into water it sinks to the bottom, and does not dissolve for several hours, even when stirred. It appears to be converted into a hydrate before it dissolves. Also decomposed by alcohol, and ether.

Sulphate of *bi*Chloride of Tin. Slowly soluble in water, with decomposition.

Sulphate of ChloroBenzene. *Vid.* ChloroPhenylSulphurous Acid.

Sulphate of ChloroBenzylene. *Vid.* Chloride of SulphoBenzoyl.

Sulphate of *bi*ChloroBenzylene. *Vid.* ChloroSulphoBenzoic Acid.

Sulphate of ChloroCodein. $N \left\{ \begin{matrix} C_{36} H_{19} Cl\,O_6{}'' \\ H \end{matrix} \right. . H\,O, S\,O_3 + 4\,Aq$ Very readily soluble in boiling, less soluble in cold water, and alcohol. (Anderson.)

Sulphate of ChloroNitroHarmalin.

I.) *normal.* Soluble in hot, less soluble in cold alcohol.

II.) *acid.* Soluble in hot, less soluble in cold alcohol.

Sulphate of ChloroStrychnine. $N_2 \left\{ C_{42} H_{21} Cl\,O_4{}^{vi} \right. . H\,O, S\,O_3 + 7\,Aq$ Soluble in water. (Laurent, *Ann. Ch. et Phys.*, (3.) **24.** 313.)

Sulphate *of protoxide* of Chromium. $Cr\,O, S\,O_3 + Aq$ Deliquescent.

Sulphate *of sesquioxide* of Chromium.

I.) *normal* or *ter.*

α = *Blue soluble modification.* $Cr_2\,O_3, 3\,S\,O_3 + 15\,Aq$ Soluble in 0.833 pt. of cold water. Melts in its water of crystallization at 100°, but is transformed at the same time into the green modification (γ). When the aqueous solution is heated to 65° @ 70°, the green modification is produced. Less soluble in spirit than in water. When an aqueous solution of the blue salt is covered with alcohol in such a manner that the two liquids do not mix, the blue solution commences to become green at the top, and the reaction goes on from above downward, until the whole solution has become green. (Schrœtter, in *Berzelius's Lehrb.*)

β = *Insoluble modification.* $Cr_2\,O_3, 3\,S\,O_3$ Insoluble in water, in ammonia-water, or in sulphuric, chlorhydric, or nitric acids, or in aqua-regia. Not decomposed by cold aqueous solutions of the caustic or carbonated alkalies, and only very incompletely by boiling caustic alkalies.

γ = *Green soluble modification.* $Cr_2\,O_3, 3\,S\,O_3 + 5\,Aq$ Readily soluble in water. Soluble in alcohol, and in concentrated sulphuric acid. When a concentrated aqueous solution is allowed to stand, it passes into the blue modification in the course of 3 or 4 weeks. (Schrœtter, in *Berzelius's Lehrb.*)

II.) *bi* (*green*). $Cr_2\,O_3, 2\,S\,O_3$ Soluble in a small quantity of water, but a precipitate of No. 3 is produced in this solution when it is diluted, and so much the more readily in proportion as more water is added. On evaporation, however, this precipitate redissolves. If the dilute solution is filtered off from the precipitate and then heated, it deposits a fresh portion of the basic salt No. 3, but this redissolves when the solution is boiled. A still more abundant precipitate is produced when the dilute solution is heated. Concentrated solutions of 1.219 or more sp. gr. can be boiled without becoming cloudy, but a solution of 1.116 sp. gr. begins to become turbid when heated to 57°; of 1.037 @ 1.031 at 64°; of 1.002 at 45°; and of 1.001 at 55°; a still more dilute solution remains clear even at a boiling heat. (Schrœtter.)

III.) $3\,Cr_2\,O_3, 2\,S\,O_3 + 14\,Aq$ (*Green.*) Insoluble in water. Soluble in acids, readily when moist, and more difficultly in proportion as it has been more strongly dried or heated. Slowly, but completely, decomposed by boiling aqueous solutions of the caustic or carbonated alkalies.

IV.) $2\,Cr_2\,O_3, 3\,S\,O_3$ (*Rose-red.*) Insoluble in water. Soluble in acids. (Krueger.)

Sulphate *of protoxide* of Chromium & of Potash. $Cr\,O, S\,O_3 ; K\,O, S\,O_3 + 6\,Aq$ Soluble in water; less soluble in alcohol. (Peligot, *Ann. Ch. et Phys.*, (3.) **12.** 546.)

Sulphate *of sesquioxide* of Chromium & of Potash.

I.) *anhydrous.* Insoluble in water.

$K\,O, S\,O_3 ; Cr_2\,O_3, 3\,S\,O_3$

Modif. α (*not decomposed by water*). Unacted upon by ammonia-water, or by sulphuric, chlorhydric, or nitric acid, even when boiled with them. Decomposed by long boiling with a solution of caustic potash. (Hertwig; Hilgard, *Am. J. Sci.*, (2.) **24.** 390.)

Modif. β (*Decomposed by boiling water*). Unacted upon by cold, decomposed by long-continued boiling with water. (Hertwig; Hilgard, *loc. cit.*)

II.) *bihydrated* (*green*). $Cr_2\,O_3, 3\,S\,O_3 ; K\,O, S\,O_3 + 2\,Aq$ Dissolves after long-continued boiling with water, more rapidly if acid be present; but neither water nor dilute chlorhydric or sulphuric acid have any action upon it at the ordinary temperature; at least none in the course of several days. (Hertwig.)

III.) *bihydrated, with* 24 *equivalents of water.* (*Potash Chrome Alum.*) $Cr_2\,O_3, 3\,S\,O_3 ; K\,O, S\,O_3 + 24\,Aq$ Permanent. Effloresces in warm air. Soluble in 5 @ 6 pts. of cold water. When the solution is heated to 50° @ 70° partial decomposition occurs, a quantity of the green modification of sulphate of chromium being formed.

If chrome alum be dissolved in 2 or 3 pts. of hot water, and this solution boiled during 20 or 30 minutes, or even only heated to 60° @ 70°, the 24 Aq salt is converted to a green compound containing only 6 @ 7 equivalents of water of crystallization, which is more soluble in water than the original alum; hence the boiled solution does not deposit crystals on cooling. After the lapse of several days a portion of the original salt, with 24 equivalents of Aq, is reproduced and deposited, but this change is extremely slow: after two months only 50 or 60% of the salt originally dissolved was deposited; and if boiled solutions be kept out of contact with the air, they may be pre-

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served for an indefinite length of time without crystallizing. This change of the salt containing 24 Aq to others less hydrated may also be effected by heating it to 100°, at which temperature the crystals melt in their water of crystallization; *aqueous fusion* is in every case necessary to produce this change. When all the water of crystallization has been expelled from chrome alum by heating it at temperatures from 300° @ 350°, it still dissolves when boiled for a few minutes in water, but if it is heated beyond 350° a change ensues, and the compound becomes entirely insoluble in boiling water. (Lœwel, *Ann. Ch. et Phys.*, (3.) **44.** 313.) Insoluble in alcohol, by which it may be precipitated from the aqueous solution. (Berzelius's *Lehrb.*)

III.) Completely insoluble in water or in dilute acids. (Wittstein.)
$2\,(Cr_2\,O_3, 2\,S\,O_3)\,;\ K\,O, S\,O_3$

SULPHATE *of sesquioxide* OF CHROMIUM & OF SODA.

a = *violet modif.* Efflorescent. Soluble in water.
(*Soda Chrome Alum.*)
$Cr_2\,O_3, 3\,S\,O_3\,;\ Na\,O, S\,O_3 + 24\,Aq$

b = *green modif.*
$Cr_2\,O_3, 3\,S\,O_3\,;\ Na\,O, S\,O_3 + 8\,Aq$

I.) SULPHATE OF CINCHONIDIN (of Wittstein).

a = *normal.*
$N_2 \left\{ C_{38}\,H_{20}\,O_2^{VI}, H\,O, S\,O_3 + 8\,Aq \right.$

Soluble in 95 pts. of water at 10°.
" 1 pt. " boiling.
" 48 pts. of alcohol at 10°.
" 0.5 pt. " boiling.
" 18 pts. of ether at 10°.

b = *acid.* Easily soluble in water.

II.) SULPHATE OF CINCHONIDIN (of Pasteur).
a = *normal.* Soluble in 130 pts. of water at 17°, and in 16 pts. of water at 100°. Very easily soluble in alcohol. Almost insoluble in ether. (Leers, *Ann. Ch. u. Pharm.*, **82.** 153.) Soluble in 30 @ 32 pts. of cold absolute alcohol, and in 7 pts. of cold alcohol of 90%. (Bussy & Guibourt, *Journ. de Pharm. et Chim.*, 1852, (3.) **22.** 414.)
$N_2 \left\{ C_{40}\,H_{24}\,O_2^{VI}\,.\,H\,O, S\,O_3 \right.$

As regards solubility in water, spirit, and ether, it is not to be distinguished from sulphate of quinine. (Winckler, from *Buchn. Rep.*, (2.) **49.** 1, in *Pharm., Central B.*, 1848, **19.** 310.)

b = *acid.* Easily soluble in water. (Leers, *loc. cit.*, p. 154.)

SULPHATE OF *a*CINCHONIN. Permanent.
I.) *normal.* Soluble in about 54 pts. of water at the ordinary temperature. Soluble in 11.5 pts. of absolute alcohol at 13°, and in 6.5 pts. of alcohol of 0.85 sp. gr., at 13°. Insoluble in ether. (Baup, *Ann. Ch. et Phys.*, 1824, (2.) **27.** 326.) 1 pt. of "sulphate of cinchonin" is soluble in 53.33 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht, für* 1854, p. 75.) 100 pts. of chloroform dissolve 3 pts. of it. (Schlimpert, *Kopp & Will's J. B., für* 1859, p. 405.) "Sulphate of huanokin" is scarcely at all soluble in water. Easily soluble in an excess of sulphuric acid. Difficultly soluble in alcohol, and ether. (A. Erdmann.)
(" *Basic.*")
$N_2 \left\{ C_{40}\,H_{24}\,O_2^{VI}\,.\,H\,O, S\,O_3 + 2\,Aq \right.$

II.) *acid.* Permanent, or slightly efflorescent if the air be dry. Soluble in 0.46 pt. of water at 14°, the saturated solution containing 68.49% of it; very soluble in boiling water. Soluble in 0.9 pt. of alcohol, of 0.85 sp. gr., at 14°, and in 1 pt. of absolute alcohol, at 14°. Insoluble in ether. (Baup, *loc. cit.*, p. 325.)
(" *Neutral.*")
$N_2 \left\{ C_{40}\,H_{24}\,O_2^{VI}\,.\,H\,O, H\,O, 2\,S\,O_3 + 6\,Aq \right.$

SULPHATE OF *β*CINCHONIN. Soluble in 75 pts. of cold, and in 14 pts. of hot water; in 13.6 pts. of cold, and in 1.5 pt. of hot alcohol, of 80%. Insoluble in ether. (W. Schwabe, *Kopp & Will's J. B., für* 1860, p. 364.)
$N_2 \left\{ C_{40}\,H_{24}\,O_2^{VI}\,.\,H\,O, S\,O_3 + 2\,Aq \right.$

SULPHATE OF COBALT.
I.) *mono.*

a = *anhydrous.* Somewhat difficultly soluble in cold, more readily soluble in hot water. (Fresenius, *Quant.*, p. 138.)
$Co\,O, S\,O_3$

100 pts. of water at °C.	Dissolve of the salt, calculated as anhydrous, pts.
3°	26.2
10°	30.5
20°	36.4
24°	38.9
29°	40.0
35°	46.3
44°	50.4
50°	55.2
60°	60.4
70°	65.7

(Tobler, *Ann. Ch. u. Pharm.*, **95.** 198, and fig.)

b = *hydrated.* Efflorescent. 100 pts. of water at 15.5° dissolve 6 pts. of the crystallized salt. (Ure's *Dict.*) Soluble in 24 pts. of water at 10°. Insoluble in alcohol.
$Co\,O, S\,O_3 + 7\,Aq$

Calculated as anhydrous salt, from Persoz's observation it is soluble in 44.33 pts. of water. (Kremers.) Sulphate of cobalt is completely precipitated from its aqueous solution on the addition of glacial acetic acid. (Persoz, *Chim. Moléc.*, p. 346; also *Ann. Ch. et Phys.*, 1836, (2.) **63.** 444.)

II.) *basic.* Insoluble in water. (Berzelius.)

SULPHATE OF COBALT & OF COPPER. Easily soluble in water. (Liebig.)
$2\,(Co\,O, S\,O_3)\,;\ Cu\,O, S\,O_3 + 36\,Aq$

SULPHATE OF COBALT, OF COPPER, OF MAGNESIA, OF POTASH, & OF ZINC.
$Co\,O, S\,O_3\,;\ Cu\,O, S\,O_3\,;\ Mg\,O, S\,O_3\,;\ 4\,(K\,O, S\,O_3)\,;\ Zn\,O, S\,O_3 + 24\,Aq$

SULPHATE OF COBALT, OF COPPER, & OF POTASH. Soluble in water. (Vohl, *Ann. Ch. u. Pharm.*, **94.** 59.)
$Co\,O, S\,O_3\,;\ Cu\,O, S\,O_3\,;\ 2\,(K\,O, S\,O_3) + 12\,Aq$

SULPHATE OF COBALT, OF IRON, & OF POTASH.
$Co\,O, S\,O_3\,;\ Fe\,O, S\,O_3\,;\ 2\,(K\,O, S\,O_3) + 12\,Aq$

SULPHATE OF COBALT & OF MAGNESIA. Easily soluble in water. (Winkelblech.)
$3\,Co\,O, S\,O_3\,;\ Mg\,O, S\,O_3 + 28\,Aq$

SULPHATE OF COBALT, OF MAGNESIA, & OF POTASH.
$Co\,O, S\,O_3\,;\ Mg\,O, S\,O_3\,;\ 2\,(K\,O, S\,O_3) + 12\,Aq$

SULPHATE OF COBALT, OF MANGANESE, & OF POTASH.
$Co\,O, S\,O_3\,;\ Mn\,O, S\,O_3\,;\ 2\,(K\,O, S\,O_3) + 12\,Aq$

SULPHATE OF COBALT, OF NICKEL, & OF POTASH.
$Co\,O, S\,O_3\,;\ Ni\,O, S\,O_3\,;\ 2\,(K\,O, S\,O_3) + 12\,Aq$

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SULPHATE OF COBALT & OF POTASH. Somewhat less soluble in water than sulphate of cobalt. (Proust; Guignet, *C. R.*, **49.** 454.)

$CoO, SO_3; KO, SO_3 + 6 Aq$

100 pts. of water at °C.	Dissolve of the anhydrous salt, pts.
0°	19.1
12°	30.0
15°	32.5
20°	39.4
25°	45.3
30°	51.9
35°	55.4
40°	64.6
49°	81.3

(Tobler, *Ann. Ch. u. Pharm.*, **95.** 198, and fig.)

Considerably more soluble in water than the corresponding nickel salt. The aqueous solution saturated (slightly supersaturated) at

20°	contains	13.968%	of the	anhydr. salt.
40°	"	19.539	"	"
60°	"	24.372	"	"
80°	"	31.816	"	"

(C. v. Hauer, *J. pr. Ch.*, 1858, **74.** 434.)

SULPHATE OF COBALT, OF POTASH, & OF ZINC.

$CoO, SO_3; 2(KO, SO_3); ZnO, SO_3 + 12 Aq$

SULPHATE OF COBALT & OF ZINC. Efflorescent. Very soluble in water. (Ure's *Dict.*)

SULPHATE OF COBALT*ter*AMIN. (*Ammonio Sulphate of Cobalt.*) Partially soluble, with decomposition, in water, while basic sulphate of cobalt remains undissolved. (H. Rose.) Appears to be very soluble in ammonia-water; but this solution deposits an insoluble subsalt when diluted with much water. Alcohol produces a precipitate in this solution, but the salt is thereby decomposed. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 269.)

$N_3\left\{H_9\right. . CoO, SO_3$

SULPHATE OF CODEIN. Soluble in 30 pts. of cold water. Very soluble in warm water.

$N\left\{\begin{matrix}C_{36}H_{20}O_6\\H\end{matrix}\right. . HO, SO_3 + 5 Aq$

SULPHATE OF CONIIN. Deliquescent. Soluble in water in all proportions. Also soluble in a mixture of alcohol and ether. (Geiger.) Very easily soluble in water. (Blyth, *J. Ch. Soc.*, **1.** 354.) Soluble in all proportions in alcohol. (Charland & Henry.)

SULPHATE *of dinoxide* OF COPPER? Insoluble in water or in concentrated sulphuric acid. Soluble, with decomposition, in nitric acid. (Berzelius, *Lehrb.*, **3.** 800.)

Cu_2O, SO_3

SULPHATE *of protoxide* OF COPPER.

I.) *mono.*

a = *anhydrous.* Combines with water with great evolution of heat. (Graham.) 100 pts. of water at 0° dissolve 15.107 pts. of it. (Pfaff, *Ann. Ch. u. Pharm.*, **99.** 226.)

CuO, SO_3

b = $CuO, SO_3 + Aq$ (*Green Sulphate of Copper.*) Permanent. Soluble in water.

c = $CuO, SO_3 + 2 Aq$

d = $CuO, SO_3 + 5 Aq$ (*Blue Vitriol. Copper Vitriol.*) Effloresces on the surface. Soluble in 2.34 pts. of water at 18°; or 100 pts. of water at 18° dissolve 42.7 pts. of it; or the aqueous solution saturated at 18° contains 29.8% of it, or 19.1% of the anhydrous salt, and is of 1.2147 sp. gr. (H. Schiff, *Ann. Ch u. Pharm.*, 1859, **109.** 326. See also his alcohol table below.)

1 pt. of the crystallized salt is soluble in

[3.32	pts. of	water at	4° (cited in Gm.)]
2.70	"	"	18.75°
1.85	"	"	31.25°
1.70	"	"	37.50°
1.14	"	"	50°
1.28	"	"	62.5°
1.09	"	"	75°
0.78	"	"	87.5°
0.55	"	"	100°
0.49	"	"	103.7° (boiling point of the saturated aqueous solution).

Or 100 pts. of water at

18.75°	dissolve	37	pts. of the cryst. salt.
31.25°	"	54	"
37.50°	"	59	"
50°	"	87	"
62.5°	"	78	"
75°	"	92	"
87.5°	"	129	"
100°	"	181	"
103.7°	"	209	"

(Brandes & Gruner, from *Trommsdorff's N. Journ. der Pharm.*, 1826, vol. **12,** in *Brandes's Archiv.*, 1827, **22.** 169.)

100 pts. of water at °C.	Dissolve pts. of the anhyd. salt, CuO, SO_3.	pts. of the cryst. salt, $CuO, SO_3 + 5 Aq$.
0° . . .	18.20	31.61
10°	20.92	36.95
20°	23.55	42.31
30°	26.63	48.81
40°	30.29	56.90
50°	34.14	65.83
60°	38.83	77.39
70°	45.06	94.00
80°	53.15	118.03
90°	64.23	156.44
100° . . .	75.35	203.32

(Poggiale, *Ann. Ch. et Phys.*, (3.) **8.** 467.)

0° . . .	17.
20°	24.3
35°	28.6
54° . . .	36.1

(Tobler, *Ann. Ch. u. Pharm.*, **95.** 198, and fig.)

15.5° . . .	45.352

[T.]

100 pts. of the aqueous solution saturated at its boiling point (102.2°) contain 45 pts. of the dry salt; or 100 pts. of water, at 102.2°, dissolve 81.82 pts. of it; or 1 pt. of the dry salt is soluble in 1.222 pts. of water at 102.2°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) The aqueous solution saturated at 17.5° is of 1.182 sp. gr., it contains 29.3% of the salt; or 100 pts. of water at 17.5° dissolve 41.45 pts. of the hydrated salt; or 1 pt. of the salt is soluble in 2.412 pts. of water at 17.5. (Karsten, *Berlin Abhandl.*, 1840, p. 101.) Soluble in somewhat less than 4 pts. of water at a moderate heat, but much more soluble in boiling water. (Bergman, *Essays*, **1.** 183.) Soluble in 4 pts. of cold, and in 2 pts. of boiling water, the saturated cold solution containing 20% of it, and the saturated boiling solution 33.33%. (Schubarth, *Tech. Chem.*, & M. R. & P.) The aqueous solution saturated at 15° is of 1.185913 sp. gr., and contains dissolved in every 100 pts. of water at least 33.103 pts. of the crystallized salt. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.)

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The aqueous solution saturated
at ? contains 5.5% of it (Mussembrock);
at 10° " 52.9 " (Eller); and
at 12.5° " 25 " (Hassenfratz, *Ann. de Chim.*, **28.** 291.)

When strongly heated it melts in its water of crystallization. The hot aqueous solution is liable to become supersaturated on cooling. (Fischer, *Schw.*, **12.** 187 [*Gm.*]; Coxe.) The aqueous solution saturated at 8° is of 1.17 sp. gr. (Anthon, *Ann. der Pharm.*, 1837, **24.** 210.)

A solution of sp. gr. at 12.5°.	Contains percent of sulphate of copper.
1.0141	2
1.0280	4
1.0413	6
1.0539	8
1.0660	10
1.0795	12
1.0938	14
1.1083	16
1.1230	18
1.1380	20
1.1513	22
1.1747	24

(Hassenfratz, *Ann. de Chim.*, **28.** 297.)

An aqueous solution of sp. gr. (at 18°).	Contains (by experiment) percent of $CuO, SO_3 + 5 Aq$.
1.2147	29.89
1.1355	19.97
1.0649	9.96
1.0423	6.64
1.0210	3.32

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 335.)

From these results Schiff calculates the following table by means of the formula: $D = 1 + 0.0063 p + 0.000014 p^2 + 0.000000483 p^3$; in which D = the sp. gr. of the solution, and p the percentage of substance in the solution.

Sp. gr. (at 18°).	Percent of $CuO, SO_3 + 5 Aq$.	Percent of anhydr. CuO, SO_3
1.0063	1	0.637
1.0126	2	1.275
1.0190	3	1.912
1.0254	4	2.550
1.0319	5	3.187
1.0384	6	3.825
1.0450	7	4.462
1.0516	8	5.100
1.0582	9	5.737
1.0649	10	6.375
1.0716	11	7.012
1.0785	12	7.650
1 0854	13	8.287
1.0923	14	8.925
1.0993	15	9.562
1.1063	16	10.200
1.1135	17	10.837
1.1208	18	11.474
1.1281	19	12.111
1.1354	20	12.750
1.1427	21	13.387
1.1501	22	14.025
1.1585	23	14.662
1.1659	24	15.300
1.1738	25	15.938
1.1817	26	16.574
1.1898	27	17.211
1.1980	28	17.848
1.2063	29	18.486
1.2146	30	19.125

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 71.)

It begins to be insoluble in spirit of 0.905 sp. gr., so that 4000 pts. of this spirit scarcely dissolve 1 pt. of it. (Anthon, *J. pr. Ch.*, **14.** 125.)

A solution (saturated at 15°) in alcohol of sp. gr.	percent by weight.	Contains percent of $CuO, SO_3 + 5 Aq$.
1.000	0	27.2
0.986	10	13.3
0.972	20	3.1
0.939	40	0.25

(H. Schiff, *Ann. Ch. u. Pharm.*, 1861, **118.** 365.)

Soluble in glycerin (Pelouze); and in picolin (Unverdorben). Soluble in chlorhydric acid, with reduction of temperature. (Kane.) Sulphate of copper is completely precipitated from its aqueous solution on the addition of glacial acetic acid. (Persoz, *Chim. Moléc.*, p. 346; also *Ann. Ch. et Phys.*, 1836, (2.) **63.** 444.)

Sulphate of copper is soluble in a saturated aqueous solution of sulphate of soda. (Karsten, *loc. cit.*) When an excess of a mixture of sulphate of copper and sulphate of soda is treated with water at 0°, 100 pts. of the latter dissolve 14.349 pts. of anhydrous mixed salt, viz., 8.038 pts. of CuO, SO_3; and 6.311 pts. of NaO, SO_3; relations very different from these, however, obtain when the water is present in excess. (Pfaff, *Ann. Ch. u. Pharm.*, **99.** 227.)

Sulphate of copper is slowly and sparingly soluble in a saturated aqueous solution of sulphate of magnesia, but if this solution is evaporated the two salts separate out almost simultaneously. (Karsten, *loc. cit.*, p. 125.) When an excess of a mixture of sulphate of copper and sulphate of magnesia is treated with water at 0°, 100 pts. of the latter dissolve 30.473 pts. of the anhydrous mixed salts, viz. 6.559 pts. of CuO, SO_3, and 23.914 pts. of MgO, SO_3. When an excess of water is employed relations very different from these are obtained. (Pfaff, *loc. cit.*) When an excess of a mixture of sulphate of copper, sulphate of magnesia, and sulphate of soda is treated with water at 0°, 100 pts. of the latter dissolve 35.318 pts. of anhydrous mixed salt, viz. 7.169 pts. of CuO, SO_3, 21.319 pts. of MgO, SO_3, and 6 830 pts. of NaO, SO_3. Very different relations are obtained, however, when an excess of water is employed. (Pfaff, *loc. cit.*)

Sulphate of copper is tolerably rapidly soluble in a saturated aqueous solution of sulphate of potash, but only to form a double salt, which separates out. (Karsten, *loc. cit.*, p. 127.) It is exceedingly slowly soluble in a saturated aqueous solution of sulphate of zinc, with formation of a double salt, which separates out. (Karsten, *loc. cit.*)

Soluble in a saturated aqueous solution of chloride of sodium; difficultly soluble in a saturated solution of chloride of ammonium, a double sulphate of copper and ammonia meanwhile separating out. (Karsten, *loc. cit.*, p. 128.)

Slowly soluble in a saturated solution of nitrate of potash, with formation of a double sulphate, which separates out; very slowly soluble in a saturated solution of nitrate of soda, with separation of a double sulphate. (Karsten, *loc. cit.*, pp. 129, 130.)

II.) *di.* Insoluble in water. (Thomson.)

III.) *tri.* Insoluble in water. (Berzelius.)
$3 CuO, SO_3 + 3 Aq$

IV.) *tetra.* Insoluble in water. (Proust.) Soluble, with considerable facility, in an aqueous solution of sulphate of ammonia, and also, though perhaps not
$4 CuO, SO_3 + 4 Aq$

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to so great an extent, in solutions of chloride of ammonium and of nitrate of ammonia, the more readily as these are more concentrated. (Lea, *Am. J. Sci.*, (2.) **31.** 190.) The native compound (*Brochantite*, = $4\,Cu\,O, S\,O_3 + 3\,Aq$) is insoluble in water, but soluble in acids.

V.) *penta.* Ppt.
$5\,Cu\,O, S\,O_3 + 5\,Aq$

VI.) *octo.* Ppt.
$8\,Cu\,O, S\,O_3 + 12\,Aq$

Sulphate of Copper & of Cuprammonium.
$Cu\,O, S\,O_3 ; N\left\{\begin{matrix}H_3\\Cu\end{matrix}\right. . O, S\,O_3$

Sulphate of Copper & of Ethylamin.

Sulphate of Copper & *of protoxide* of Iron. 100 pts. of water at 15.5° dissolve 75.91 pts. of it. (Thomson, in his *System of Chem.*, London, 1831, **2.** 770.)
$4\,(Cu\,O, S\,O_3) ; Fe\,O, S\,O_3 + 34\,Aq$

Other compounds of the two salts have been described, as $Cu\,O, S\,O_3 ; 2\,(Fe\,O, S\,O_3) + 20\,Aq$ (Volland); $Cu\,O, S\,O_3 ; 3\,(Fe\,O, S\,O_3) + 28\,Aq$ (Lefort), &c., &c. They are all soluble in water.

Sulphate of Copper & *of sesquioxide* of Iron. Soluble in water. (Bastick.)
$Cu\,O, S\,O_3 ; Fe_2\,O_3, 3\,S\,O_3 + 24\,Aq$

Sulphate of Copper, *of protoxide* of Iron, & of Nickel. Efflorescent. (Link.)

Sulphate of Copper, of Iron, & of Potash. Soluble, without decomposition, in water free from air. (Vohl, *Ann. Ch. u. Pharm.*, **94.** 61.)
$Cu\,O, S\,O_3 ; Fe\,O, S\,O_3 ; 2\,(K\,O, S\,O_3) + 12\,Aq$

Sulphate of Copper & of Magnesia. The 2 Aq salt is permanent (Arrot); but the 14 Aq salt is efflorescent. Soluble in water. (Scacchi.) If the aqueous solution is allowed to evaporate spontaneously, the component salts always crystallize apart, the double salt being entirely decomposed, but if the solution, — or any mixed solution of $Cu\,O, S\,O_3$, and $Mg\,O, S\,O_3$, — be evaporated at a temperature above 38°, the salt $Cu\,O, S\,O_3 ; Mg\,O, S\,O_3 + 2\,Aq$ is deposited as a crystalline crust. On boiling the aqueous solution a basic (with Cu O) salt is precipitated. (Arrot, *Phil. Mag.*, 1844, (3.) **24.** 502.)
$Cu\,O, S\,O_3 : Mg\,O, S\,O_3 + 2\,Aq\ \&\ 6\,Aq\ \&\ 14\,Aq$

Sulphate of Copper, of Magnesia, of Manganese, & of Potash.
$Cu\,O, S\,O_3 ; Mg\,O, S\,O_3 ; Mn\,O, S\,O_3 ; 3\,(K\,O, S\,O_3) + 18\,Aq$

Sulphate of Copper, of Magnesia, & of Potash.
$Cu\,O, S\,O_3 ; Mg\,O, S\,O_3 ; 2\,(K\,O, S\,O_3) + 12\,Aq$

Sulphate of Copper, of Magnesia, of Potash, & of Zinc. Soluble in water. (Vohl, *Ann. Ch. u. Pharm.*, **94.** 71.)
$Cu\,O, S\,O_3 ; Mg\,O, S\,O_3 ; 3\,(K\,O, S\,O_3) ; Zn\,O, S\,O_3 + 18\,Aq$

Sulphate of Copper, of Manganese, & of Potash.
$Cu\,O, S\,O_3 ; Mn\,O, S\,O_3 ; 2\,(K\,O, S\,O_3) + 12\,Aq$

Sulphate of Copper & of Nickel. Soluble in water.
$Cu\,O, S\,O_3 ; Ni\,O, S\,O_3 + 7\,Aq$

Sulphate of Copper, of Nickel, & of Potash. Permanent. Soluble in 4 pts. of water. Insoluble in alcohol. (Bette.)
$Cu\,O, S\,O_3 ; Ni\,O, S\,O_3 ; 2\,(K\,O, S\,O_3) + 12\,Aq$

Sulphate of Copper & of Potash.

I.) Permanent. Readily soluble in water. Less soluble in water than bisulphate of potash. When the salt is pure its solution may be boiled, or repeatedly crystallized, without decomposition, but if an excess of sulphate of potash or of salt No. II. be present, the solution will be decomposed when heated to 60°, with deposition of the difficultly soluble double salt No. II. (Persoz, *Ann. Ch. et Phys.*, (3.) **25.** 272.) 100 pts. of the aqueous solution saturated at its boiling point (102.8°) contains 40 pts. of the dry salt; or 100 pts. of water at 102.8 dissolve 66.666 pts. of it; or 1 pt. of the dry salt is soluble in 1.5 pt. of water at 102.8°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) Much more soluble in hot than in cold water. (Pierre, *Ann. Ch. et Phys.*, (3.) **16.** 251.) Easily soluble in water. (A. Vogel.)
$Cu\,O, S\,O_3 ; K\,O, S\,O_3 + 6\,Aq$

II.) Very sparingly soluble in cold water. (Persoz, *Ann. Ch. et Phys.*, (3.) **25.** 271.) Decomposed by washing with water. (Graham.)
$4\,(Cu\,O, S\,O_3) ; K\,O, S\,O_3 + 4\,Aq$

III.) When boiled with water the normal double salt (No. 1) is dissolved out, while basic sulphate of copper remains. (Brunner.)
$3\,(Cu\,O, S\,O_3) ; K\,O, S\,O_3 ; Cu\,O + 4\,Aq$

Sulphate of Copper, of Potash, & of Zinc. Permanent.
$Cu\,O, S\,O_3 ; 2\,(K\,O, S\,O_3) ; Zn\,O, S\,O_3 + 12\,Aq$

Sulphate of Copper & of Soda. Deliquescent. Decomposed by water. (Graham.) Permanent. Soluble in water. When the aqueous solution is evaporated at 55° the salt crystallizes out as such. At 100° it is decomposed, an insoluble basic salt being precipitated. When the solution is allowed to evaporate spontaneously the component salts crystallize out separately. (Arrot.) Very easily soluble in water. (Karsten, *Berlin Abhandl.*, 1840, p. 120.)
$Cu\,O, S\,O_3 ; Na\,O, S\,O_3 + 2\,Aq$

Sulphate of Copper & of Strychnine.

Sulphate of Copper & of Zinc. Efflorescent. 100 pts. of water at 8° dissolve 80 pts. of it; it is soluble in all proportions in boiling water. (Lefort, *Ann. Ch. et Phys.*, (3.) **23.** 102.)
$Cu\,O, S\,O_3 ; 3\,Zn\,O, S\,O_3 + 28\,Aq$

Sulphate of Corydalin. Readily soluble in water.

Sulphate of Creatin. Permanent. Soluble in water. (Dessaignes.)
$N_3\left\{\begin{matrix}(C_2\,O_2'')_2\\C_4\,H_5\\H_4\end{matrix}\right. . H\,O, S\,O_3$

Sulphate of Creatinin. Readily soluble in warm alcohol.

Sulphate of Cumidin. Slightly soluble in water; more soluble in alcohol. (Nicholson, *J. Ch. Soc.*, **1.** 6.)
$N\left\{\begin{matrix}C_{18}\,H_{11}\\H_2\end{matrix}\right. . H\,O, S\,O_3$

Sulphate of Cupr(*ic*)ammonium. Decomposed by water, with precipitation of $4\,Cu\,O, S\,O_3$. (Kane.)
$N\left\{\begin{matrix}H_3\\Cu\end{matrix}\right. . O, S\,O_3$

Sulphate of Cuminamate of Ethyl. Easily soluble in water, and alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 340.)

Sulphate of Cuminamic Acid. Sparingly soluble in cold, easily soluble in boiling water. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 337.)
$N\left\{\begin{matrix}C_{20}\,H_{11}\,O_2\\H_2\end{matrix}\right. . O, H\,O, S\,O_3$

Sulphate of Cupr(*ic*)Anilin. Decomposed by boiling water, but may be washed with cold water.
$N\left\{\begin{matrix}C_{12}H_5\\H_2.Cu\end{matrix}\right. .O,SO_3$

Sulphate of Curarin.

Sulphate of CyanAnilin. Extremely soluble in water. The solution is decomposed by evaporation. (Hofmann, *J. Ch. Soc.*, **1.** 166.)

Sulphate of Cyanethin. Very soluble in water. Soluble in alcohol. (Kolbe & Frankland, *J. Ch. Soc.*, **1.** 72.)

Sulphate of Cyanetholin. Soluble in water.

Sulphate of CyanhydroHarmalin. Soluble in water acidulated with sulphuric acid.

Sulphate of CyanoCodein. Sparingly soluble in water. The solution is easily decomposed.

Sulphate of Cymidin. Soluble in water. (Barlow.)

Sulphate of Cystin.

Sulphate of Delphin. Soluble in water.

Sulphate of Didymium.

I.) *normal.*

a = *anhydrous.* Quickly soluble in water, when it is added to the water by small portions and agitated. When the cold saturated solution is heated to 53° the hydrated salt separates out in large quantity, and the more readily as the temperature is elevated, so that 1 pt. of the salt requires 50.5 pts. of boiling water to retain it in solution.
DiO,SO_3

b = *hydrated.* Rather slowly, but abundantly, soluble in cold water. Soluble in about 5 pts. of water at 15° @ 18°. (Mosander, in *Berzelius's Lehrb.*, **3.** 530.) Very readily soluble in 5 @ 6 pts. of water, but is precipitated again if the aqueous solution is heated above 30° @ 35°. (Marignac (citing Mosander), *Ann. Ch. et Phys.*, (3.) **27.** 224.) "The solubility of sulphate of didymium is different according as one dissolves the anhydrous salt, or one of the hydrates."

100 pts. of water dissolve of anhydrous sulphate of didymium,

At °C.	When anhydrous sulphate, DiO, SO_3, is used, pts.	When $DiO, SO_3 + 2Aq$ is used, pts.	When $DiO, SO_3 + 8Aq$ is used, pts.
12°	43.1		
14°	39.3*		
18°	25.8	16.4	
19°			11.7
25°	20.6		
38°	13.0		
40°			8.8
50°	11.0		6.5
100°			1.7

The sulphate with two equivalents of water attains its maximum solubility only after the lapse of a very long space of time. Thus, at the temperature of 18°, 13 pts. were dissolved in 100 pts. of water after 24 hours, and 16.4 pts. after standing a second day. On evaporating this solution in a vacuum, until the greater part of the salt had crystallized,† the mother liquor was found to contain 34 pts. of sulphate for 100 pts. of water. It appears thus to attain the solubility of the anhydrous salt. (Marignac, *loc. inf. cit.*)

Sulphate of didymium is more soluble than sulphate of lanthanum in a neutral solution, but is less soluble than the latter in an acid solution. (Watts, *J. Ch. Soc.*, **2.** 145.)

II.) *basic.* Completely insoluble either in cold or in boiling water. Difficultly soluble in dilute chlorhydric acid, even when this is boiling. (Marignac, *Ann. Ch. et Phys.*, (3.) **38.** 170.)
$3DiO,SO_3$

Sulphate of Didymium & of Potash. Soluble in 63 pts. of water. (Marignac, *loc. cit.*, p. 174.) Totally insoluble in a saturated aqueous solution of sulphate of potash [?]. (Mosander.) Oxide of didymium cannot be completely precipitated by sulphate of potash. The precipitated double salt is not soluble in cold chlorhydric acid, but is slightly soluble in boiling chlorhydric acid. (H. Rose, *Tr.*)
$3(DiO,SO_3); KO,SO_3 + 2Aq$

Sulphate of Didymium & of Soda. Soluble in about 200 pts. of water; still less soluble in an aqueous solution of sulphate of soda. (Marignac, *Ann. Ch. et Phys.*, (3.) **38.** 173.)
$3(DiO,SO_3); NaO,SO_3$

Sulphate of Etherin. *Vid.* EthylSulphate of Wine-Oil.

Sulphate of Ethyl.

I.) *Vid.* EthylSulphuric Acid.
$C_4H_5O, HO, 2SO_3$

II.) *Vid.* EthylSulphate of Ethyl.
$2C_4H_5O, SO_3$

III.) *tris.* Decomposed by water. (Blondeau.)
"$3C_4H_5O, SO_3$"

Sulphate of Ethyl & of Carburetted Hydrogen. *Vid.* EthylSulphate of Wine-Oil.

Sulphate of Ethyl & of Etherol. *Vid.* EthylSulphate of Wine-Oil.

Sulphate of Ethylamin. Deliquescent. Very soluble in alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 484.)
$N\left\{\begin{matrix}C_4H_5\\H_2\end{matrix}\right. .HO,SO_3$

Sulphate of Ethylamin & of Magnesia. Soluble in water. (E. Meyer.)
$N\left\{\begin{matrix}C_4H_5\\H_2\end{matrix}\right. .HO,SO_3; MgO,SO_3 + 7Aq$

Sulphate of *tetra*Ethylammonium. Deliquescent.
$N\left\{(C_4H_5)_4\right. .O,SO_3$

Sulphate of *di*EthylAmylamin. Deliquescent.

Sulphate of *tri*EthylAmylamin.

Sulphate of EthylAnilin. Readily soluble in water, and alcohol.

Sulphate of EthylChlorAnilin. More soluble than the salts of chlor-anilin.

Sulphate of EthylCyanAnilin. Soluble in water.

Sulphate of EthylNicotin. Soluble in water. (v. Planta & Kekulè, *Ann. Ch. u. Pharm.*, **87.** 6.)

Sulphate of *tri*EthylPhenylammonium.

Sulphate of *tetra*EthylPhosphonium. Deliquescent. Soluble in water, and alcohol. Insoluble in ether.

Sulphate of *di*EthylPlatin*bi*ammonium. (Corresponding to the 1st Base of Reiset.) Soluble in water, from which it is precipitated
$N_2\left\{\begin{matrix}(C_4H_5)_2\\Pt\\H_3\end{matrix}\right. .HO,SO_3$

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* "This number must be too high, since the solution was maintained at this temperature only half an hour." (Marignac, *Ann. Ch. et Phys.*, (3.) 38. 170.)

† These crystals were those of the $\frac{8}{3}$ hydrate.

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on the addition of alcohol. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 487.)

Sulphate of EthylQuinine.

I.) *normal.* Much less soluble in water, but $N_2\left\{C_{40}H_{22}(C_4H_5)O_4^{vi}\right. . HO, SO_3 + 8Aq$ more soluble in alcohol than the acid salt.

II.) *acid.* Very easily soluble in water. $N_2\left\{C_{40}H_{22}(C_4H_5)O_4^{vi}\right. . HO, HO, 2SO_3 + 4Aq$ Sparingly soluble in alcohol. (Strecker.)

Sulphate of EthylStrychnine. Less soluble than the chlorhydrate in water.

Sulphate of Fluoride of Boron. BFl_3SO_3 Insoluble in water. (J. Davy.)

Sulphate of Furfurin.

I.) *normal.*

II.) *acid.* Efflorescent. Readily soluble in water, less soluble in alcohol or ether, and still less soluble in water acidulated with sulphuric acid. (Svanberg & Bergstrand.)

Sulphate of FuscoCobalt(*iaque*). $4NH_3 . Co_2O_3, 2SO_3 + 4Aq$ Soluble in water. Insoluble in ammonia-water. Alcohol precipitates it from the aqueous solution. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 290.)

Sulphate of Glaucin. Readily soluble in water, and alcohol. Insoluble in ether.

Sulphate of Glaucopicrin.

Sulphate of Glucina.

I.) *normal.* Easily soluble in water. $Gl_2O_3, 3SO_3 + 12Aq$ Less readily soluble in acidulated water, from which it crystallizes more easily than from pure water. Insoluble in alcohol. (Berzelius, in his *Lehrb.*, **3.** 493.) Easily soluble in water. Insoluble in absolute alcohol. (Weeren.) Soluble in about 1 pt. of water at 14°; the solubility increases with the temperature, and boiling water dissolves it in almost all proportions. The presence of sulphuric acid renders it less soluble in cold water. Tolerably soluble in alcohol, unless this is absolute, though much less soluble in alcohol than in water. (Debray, *Ann. Ch. et Phys.*, (3.) **44.** 25.) Sulphate of glucina may be completely precipitated from its aqueous solution by adding a suitable quantity of concentrated acetic acid. (Persoz, *Ann. Ch. et Phys.*, 1836, (2.) **63.** 444.) The crystals effloresce in warm air, and melt in their water of crystallization when heated.

II.) *mono.* Insoluble in water, after it has been Gl_2O_3, SO_3 ignited. (Berzelius.) Soluble in water, but the concentrated aqueous solution is decomposed on the addition of much water. (Debray, *loc. cit.*) An aqueous solution of sulphate of glucina may be rendered nearly tribasic by the addition of an alkali, but the product will not bear large dilution with water. (Ordway, *Am. J. Sci.*, (2.) **26.** 207.)

Sulphate of Glucina & of Potash. $3(KO, SO_3); Gl_2O_3, 3SO_3 + 6Aq$ Sparingly soluble in cold, much more, though still slowly, soluble in hot water. (Debray, *Ann. Ch. et Phys.*, (3.) **44.** 29.) It dissolves very slowly, though in considerable quantity, in water. (Awdejew.)

Sulphate of Glycocoll.

I.) Permanent. Soluble in water, and in warm $N\left\{\begin{matrix}C_2HO_2\\C_2H_3\\H\end{matrix}\right. . HO, SO_3$ dilute spirit. Insoluble in absolute alcohol, or in ether. (Horsford, *Am. J. Sci.*, (2.) **4.** 58.)

II.) *Several basic compounds.* (See Horsford's Memoir, *loc. cit.*)

Sulphate of Glycocoll & of Potash. "$C_4H_4NO_3, SO_3; C_4H_4NO_3, KO, SO_3$" Soluble in water, from which it is precipitated by cold alcohol. Soluble in warm dilute alcohol. (Horsford, *loc. cit.*, p. 69.)

Sulphate *of teroxide* of Gold. Known only in sulphuric acid solution; this is decomposed, with separation of metallic gold, on the addition of water. (Pelletier, *Ann. Ch. et Phys.*, (2.) **15.** 12.)

Sulphate of Guanin. Decomposed by $N_3\left\{\begin{matrix}C_6O_2''\\(C_2N)_2\\H_5\end{matrix}\right. . HO, SO_3$ much water. Insoluble in alcohol.

Sulphate of Guanin & of Silver. Ppt.

Sulphate of Harmalin.

I.) *peracid.* Very soluble in water.

Sulphate of Harmin.

I.) *normal.*

$N_2\left\{C_{26}H_{12}O_2^{vi}\right. . HO, SO_3 + 2Aq$

II.) *bi.* Soluble in boiling alcohol.

$N_2\left\{C_{26}H_{12}O_2^{vi}\right. . HO, HO, 2SO_3$

Sulphate of Igasurin. Much less soluble than the chlorhydrate in water. Soluble in about 4 pts. of boiling, and in about 10 pts. of cold water.

Sulphate of Indigo. *Vid.* SulphIndigotic Acid.

Sulphate of IodAnilin. Only slightly soluble in cold, somewhat $N\left\{\begin{matrix}C_{12}H_4I\\H_2\end{matrix}\right. . HO, SO_3$ more soluble in hot water. It appears to undergo partial decomposition when the aqueous solution is boiled. Soluble in alcohol. Insoluble in ether. (Hofmann, *J. Ch. Soc.*, **1.** 277.)

Sulphate of IodoCinchonicin. Soluble in spirit. (W. B. Herapath, *Phil. Mag.*, (4.) **16.** 65.)

I.) Sulphate of IodoCinchonidin (of Wittstein). (Herapath, *Phil. Mag.*, (4.) **16.** pp. 56, 64.)

II.) Sulphate of IodoCinchonidin (of Pasteur).

a = active. Soluble in boiling, less soluble in "$C_{37}H_{22}N_2O_5I_3, HO, 2SO_3 + 5Aq$" cold spirit. When crystals of this salt are allowed to remain in their mother liquor with an excess of less than 1% of sulphuric acid they undergo transformation, the salt with 9 Aq being formed.

b = silky needles, feebly active. Soluble in boil- "$C_{37}H_{22}N_2O_5I_3, HO, 2SO_3 + 9Aq$" ing spirit, but as this solution cools, the active, 5 Aq, salt separates out.

c = olive colored. Soluble in boiling spirit, but "$C_{37}H_{22}N_2O_5I_3, HO, 2SO_3 + 8Aq$" as this solution cools, the active, 5 Aq, salt separates out. (W. B. Herapath, *Phil. Mag.*, (4.) **16.** 59.)

As a class, the iodo-salts [sulphates] of the cinchona alkaloids all agree in being more or less soluble in spirit, from which they are precipitated on the addition of water; they are only slightly

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soluble in dilute spirit, and scarcely at all soluble in water, ether, oil of turpentine, or chloroform. Acetic, dilute sulphuric, or chlorhydric acids have but little action upon them, whilst nitric acid and concentrated sulphuric and chlorhydric acid, and alkaline solutions, decompose them. (Herapath, *loc. cit.*, **16.** 56.)

Sulphate of IodoCinchonin. $C_{38} H_{19} N_2 O_2 I, H O, S O_3 + 6 Aq$ Far more soluble in spirit than the corresponding compounds of quinine, quinidin, or cinchonidin. (Herapath, *Phil. Mag.*, (4.) **16.** pp. 64, 63.)

As a class, the iodo-salts [sulphates] of the cinchona alkaloids all agree in being more or less soluble in spirit, from which they are precipitated on the addition of water; they are only slightly soluble in dilute spirit, and scarcely at all soluble in water, ether, oil of turpentine, or chloroform. Acetic, dilute sulphuric, or chlorhydric acids have but little action upon them, whilst nitric acid and concentrated sulphuric or chlorhydric acid, and alkaline solutions, decompose them.

The cinchonin and quinidin salts dissolve with more difficulty [than the others], in consequence of their greater thickness and less extent of surface. (Herapath, *loc. cit.*, **16.** 56.)

Sulphate of IodoQuinicin. Very soluble in spirit, from which it is readily precipitated on the addition of water. (W. B. Herapath, *Phil. Mag.*, (4.) **16.** 65.)

Sulphate of IodoQuinidin. $C_{35} H_{19} N_2 O_4 I_2, H O, S O_3 + 5 Aq$ Soluble in 121 pts. of spirit at 16.67°, and in 31 pts. of boiling spirit. Water precipitates it from the alcoholic solution. (W. B. Herapath, *Phil. Mag.*, (4.) **16.** 62; and (4.) **14.** 225.)

As a class, the iodo-salts [sulphates] of the cinchona alkaloids all agree in being more or less soluble in spirit, from which they are precipitated on the addition of water; they are only slightly soluble in dilute spirit, and scarcely at all soluble in water, ether, oil of turpentine, or chloroform. Acetic, dilute sulphuric, or chlorhydric acids have but little action upon them, whilst nitric acid, and concentrated sulphuric or chlorhydric acid, and alkaline solutions, decompose them.

The quinidin and cinchonin salts dissolve with more difficulty [than the others], in consequence of their greater thickness and less extent of surface. (Herapath, *loc. cit.*, **16.** 56.)

Sulphate of IodoQuinine. (*Herapathite.*)
"$C_{57} H_{33} N_2 O_5 I_2, H O, 2 S O_3 + 5 Aq$"
(Herapath's later analysis)
$N_2 \left\{ C_{40} H_{24} O_4^{VI} \cdot I_2, O, H O, 2 S O_3 + 10 Aq \right.$
(Herapath's earlier analysis.)

Soluble in about 1000 pts. of boiling water. Very sparingly soluble in water, ether, or oil of turpentine, and does not appear to be any more soluble in boiling ether or oil of turpentine; requiring, in any case, about 2000 pts. of either of these liquids for its solution. Insoluble in chloroform. Soluble in 650 pts. of alcohol, of 0.837, at 13.8°, and in 50 pts. of the same alcohol at boiling. Soluble in 750 pts. of acetic acid, of 1.042 sp. gr., at 15.5°, and in 60 pts. of the same acid when boiling, with partial decomposition after a time. Insoluble in cold, easily soluble in hot dilute sulphuric acid of 1.0682 sp. gr. Readily soluble in sulphuric acid of 1.845 sp. gr. Scarcely at all acted upon by dilute, but is decomposed by concentrated chlorhydric acid. Decomposed by alkaline solutions, and by nitric acid, even in the cold. (W. B. Herapath, *Phil. Mag.*, (4.) **9.** 366.)

As a class, the iodo-salts [sulphates] of the cinchona alkaloids all agree in being more or less soluble in spirit, from which they are precipitated on the addition of water; they are only slightly soluble in dilute spirit, and scarcely at all soluble in water, ether, oil of turpentine, or chloroform. Acetic, dilute sulphuric, or chlorhydric acids have but little action upon them, whilst nitric acid and concentrated sulphuric or chlorhydric acid, and alkaline solutions, decompose them. (Herapath, *Phil. Mag.*, (4.) **16.** 56.)

Sulphate *of protoxide* of Iridium. $Ir O, S O_3$ Soluble in water. (Berzelius.)

Sulphate *of sesquioxide* of Iridium. Soluble in nitric acid.

Sulphate *of binoxide* of Iridium. $Ir O_2, 2 S O_3$ Easily soluble in water, and alcohol. (Berzelius.)

Sulphate *of protoxide* of Iron.

I.) *mono.*

$a = Fe O, S O_3$

100 pts. of water at °C	Dissolve of the anhydrous salt, $Fe O, S O_3$, pts.
0°	15.8
10°	19.9
12°	21.3
20°	26.0
21°	27.4
30°	32.6
37°	36.5
45°	42.9
55°	47.0
70°	56.5

(Tobler, *Ann. Ch. u. Pharm.*, **95.** 198, and fig.)

The aqueous solution saturated at its boiling point (102.2°) contains 64% of the dry salt; or 100 pts. of water at 102.2° dissolve 177.778 pts. of it; or 1 pt. of the dry salt is soluble in 0.5625 pt. of water at 102.2°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.)

When sulphate of protoxide of iron is slightly calcined, it is rendered, not less soluble, but less easily soluble in water. (Barreswil, *C. R.*, **20.** 1366.)

$b = Fe O, S O_3 + Aq$

$c = Fe O, S O_3 + 2 Aq$ As sparingly soluble as gypsum. (Mitscherlich.)

$d = Fe O, S O_3 + 3 Aq$ Soluble in water. (Kane.)

$e = Fe O, S O_3 + 4 Aq$ Separates from concentrated aqueous solutions at 80°.

$f = Fe O, S O_3 + 7 Aq$ (*Ordinary commercial Sulphate of Iron. Green Vitriol. Copperas.*) Pure compact crystals, thoroughly freed from mother liquor and well dried, remain permanent for a long time in dry air, and for a tolerably long time in damp air.

Soluble in 1.66 pt. of water at 17°; or 100 pts. of water at 17° dissolve 60.0 pts. of it; or the aqueous solution saturated at 17° contains 37.5% of it, or 20.4% of the anhydrous salt, and is of 1.2232 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.)

Soluble in	1.642	pt. of water at	10°
"	1.432	" "	15°
"	0.868	" "	25°
"	0.655	" "	32.5°
"	0.440	" "	46.25°
"	0.376	" "	60°
"	0.394	" "	70°
"	0.375	" "	83.75°
"	0.270	" "	90°
"	0.300	" "	*100°

Or 100 parts of water

at 10°	dissolve	60.8	pts. of $Fe O S O_3$ [+ 7 Aq
15°	"	69.8	"
25°	"	115.1	"
32.5°	"	152.2	"
46.25°	"	227.1	"
60°	"	265.9	"
70°	"	253.4	"
83.75°	"	269.8	"
90°	"	370.3	"
*100°	"	332.9	"

Or the aqueous solution saturated at °C	Contains percent of $Fe O, S O_3 + 7 Aq$
10°	37.84
15°	41.11
25°	53.51
32.5°	60.35
46.25.	69.43
60°	72.67
70°	71.71
83.75°	72.96
90°	78.74
*100°	76.89

(R. & W. Brandes, *Brandes's Archiv.*, 1824, **7.** 83, and fig.) When the 7 Aq salt is boiled with an amount of water insufficient to dissolve the whole of it, a new white hydrate is formed and separates out. In this respect sulphate of iron resembles sulphate of soda (with 10 Aq), and, as is the case with the latter, the slow increase and final decrease of its solubility as the temperature rises may be regarded as due to a change of composition. (R. & W. Brandes, *loc. cit.*) An aqueous solution saturated at 15° contains 37.2% of it. (H. Schiff, *Ann. Ch. u. Pharm.*, 1861, **118.** 365.) Like sulphate of protoxide of manganese, its solubility in water increases with the temperature up to a certain point, 87.5°, and then diminishes as the temperature is increased, although in spite of this it is much more soluble at 100° than at 15°. (Brandes, *Pogg. Ann.*, 1830, **20.** 581, citing his earlier memoir, in the *Archiv.*, **7.** 88.)

Soluble in 2 pts. of cold, and in 1 pt. of boiling water (Fourcroy); in 2 pts. of water at 18.75° (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201; in Canstatt's *Jahresbericht für* 1854, p. 76); in 6 pts. of water at a moderate heat, and in 0.75 pt. of boiling water. (Bergman, *Essays*, **1.** 184.) 100 pts. of water at 15.5° dissolve 45 @ 50 pts. of it. (Ure's *Dict.*) The aqueous solution saturated at 10° contains 51.5% of it (Eller); in the cold, 33.33% (Fourcroy); at 12.5°, 33.5%. (Hassenfratz, *Ann. de Chim.*, **28.** 291.)

After a warm aqueous solution has deposited crystals on cooling, a fresh quantity of the latter may generally be produced by opening the vessel and shaking it, a certain amount of supersaturation being liable to occur. (Coxe.) The crystals melt in their water of crystallization when heated, and when this solution is evaporated to dryness a white powder is obtained (*b* ?), which dissolves in water very slowly. (Berzelius, *Lehrb.*)

An aqueous solution of sp. gr. (at 12.5°)	Contains percent of the [crystallized] salt.
1.0096	2
1.0203	4
1.0314	6
1.0436	8
1.0560	10
1.0696	12
1.0829	14
1.0961	16
1.1095	18
1.1220	20
1.1358	22
1.1498	24
1.1638	26
1.1781	28
1.1920	30
1.12031	32

(Hassenfratz, *Ann. de Chim.*, **28.** 297.)

An aqueous solution of sp. gr. (at 17.2°)	Contains (by experiment) percent of $Fe O, S O_3 + 7 Aq$
1.2332	37.50
1.1473	25.00
1.0943	16.67
1.0693	12.50
1.0450	8.34
1.0220	4.17

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 335.) From these results Schiff calculates the following table by means of the formula: $D = 1 + 0.005175\ p + 0.00003043\ p^2 - 0.0000000682\ p^3$; in which D = the sp. gr. of the solution, and p the percentage of substance in the solution.

Sp. gr. (at 17.2°).	Percent of $Fe O, S O_3 + 7 Aq$	Percent of Anhydr. $Fe O, S O_3$.
1.0052	1	0.547
1.0105	2	1.094
1.0158	3	1.641
1.0212	4	2.188
1.0266	5	2.735
1.0321	6	3.282
1.0377	7	3.829
1.0433	8	4.376
1.0490	9	4.923
1.0547	10	5.470
1.0605	11	6.017
1.0664	12	6.564
1.0723	13	7.111
1.0782	14	7.658
1.0842	15	8.205
1.0903	16	8.752
1.0964	17	9.299
1.1026	18	9.846
1.1088	19	10.393
1.1151	20	10.940
1.1214	21	11.487
1.1278	22	12.034
1.1343	23	12.581
1.1408	24	13.128
1.1473	25	13.675
1.1539	26	14.222
1.1606	27	14.769
1.1673	28	15 316
1.1740	29	15.863
1.1808	30	16.410
1.1876	31	16.957
1.1945	32	17.504
1.2014	33	18.051
1.2084	34	18.598

* When the solution saturated at 87.5° is heated to 100° it becomes covered with a crystalline crust. In determining the solubility at 100° considerable difficulty is consequently experienced in obtaining a clear liquid. In attempting to do this, in the recorded instance, the temperature of the solution fell to 91.25°, at which it was quite clear; this was again heated to 100°, at which temperature another portion of the salt separated out, and a part of the liquid was decanted for the experiment above given.

Sp. gr. at 17.2°)	Percent of $FeO, SO_3 + 7 Aq$	Percent of Anhydr. FeO, SO_3.
1.2154	35	19.145
1.2225	36	10.692
1.2296	37	20.239
1.2368	38	20.786
1.2440	39	21.333
1.2513	40	21.880

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 73.) A solution in alcohol of 40% by weight, or 0.939 sp. gr., saturated at 15°, contains 0.3% of it. (H. Schiff, *Ann. Ch. u. Pharm.*, 1861, **118.** 365.) Insoluble in spirit of 0.905, or less, sp. gr. (Anthon, *J. pr. Ch.*, **14.** 125.) When boiled with alcohol, the quadri-hydrated salt (*e*) is deposited. (Mitscherlich.) From the aqueous solution, strong alcohol precipitates one of the lower hydrates. But the 7-hydrated salt crystallizes from dilute spirit acidulated with sulphuric acid. (Berthemot.) Concentrated sulphuric acid also precipitates one of the lower hydrates from the aqueous solution.

Sulphate of protoxide of iron may be completely precipitated from its aqueous solution by adding a suitable quantity of concentrated acetic acid (Persoz, *Ann. Ch. et Phys.*, 1836, (2.) **63.** 444), so completely that no trace of it is left in the liquid. (Persoz, *Chim. Moléc.*, pp. 346, 348.) The aqueous solution becomes turbid when exposed to the air, a basic salt of the sesquioxide being deposited. After a certain quantity of this sediment has separated out, the solution undergoes scarcely any further change. When tolerably dilute, it will be found to contain only an insignificant amount of sesquioxide; hence all of this oxide which forms must be separated as a basic salt. (Otto-Graham.) Soluble in hot chlorhydric acid, the solution yielding crystals both of the 7 hydrated and also of the terhydrated salt (*d*), on cooling. (Kane.) Somewhat soluble in concentrated sulphuric acid. (Bussy & Lecanu.)

II.) *sesqui.* Sparingly soluble in water.
$2 FeO, 3 SO_3 + 7 Aq$ (Bonnsdorff.)

SULPHATE *of sesquioxide* OF IRON.

I.) *normal* or *ter.*

a = *anhydrous.* Very slowly soluble in water,
$Fe_2O_3, 3SO_3$ being frequently as difficultly soluble as burnt alum.

Rapidly soluble in an aqueous solution of sulphate of protoxide of iron, not only in tolerably strong solutions, but also in solutions which contain only a very small quantity of the protoxide salt, the reaction being analogous to that which occurs between the two chlorides of chromium. (Barreswil, *C. R.*, 1845, **20.** 1366.)

b = $Fe_2O_3, 3SO_3 + 9 Aq$ Deliquescent, soluble in water.

The concentrated aqueous solution does not become turbid on boiling, but diluted solutions are decomposed by ebullition, with separation of an insoluble basic salt, and this decomposition is more complete in proportion as the solution is more dilute. If the solution is exceedingly dilute, the basic salt will separate at temperatures below that of ebullition. (Scheerer; H. Rose, *Pogg. Ann.*, **83.** 147.) A solution of 1 pt. of the salt in 100 pts. of water becomes cloudy when heated to 76°; in 200 pts. of water, at 56°; in 400 pts., at 47°; in 800 pts., at 40°; in 1000 pts., at 38°; and in 10000 pts., at 14°. If one pt. of the salt be dissolved in 200 pts. of water, one half of the oxide of iron is precipitated on boiling, if in 400 pts. then $\frac{3}{4}$ of the oxide of iron is precipitated, if in 800 pts. then $\frac{7}{8}$ of it is precipitated, if in 1000 pts. then about $\frac{9}{10}$ of it is precipitated. (Scheerer.) [This precipitation occurs even in acid solutions, if they are sufficiently dilute.]

Largely soluble in alcohol. (Wenzel, in his *Verwandtschaft*, p. 300 [T.].) Readily soluble in spirit. (Bergman, *Essays*, **1.** 184.) Being the only metallic sulphate, with the exception of that of binoxide of platinum, which is readily soluble in alcohol. (L. Gmelin.) Completely insoluble in concentrated sulphuric acid.

Sulphate of sesquioxide of iron may be completely precipitated from its aqueous solution by the addition of a suitable quantity of concentrated acetic acid. (Persoz, *Ann. Ch. et Phys.*, 1836, (2.) **63.** 444.)

An aqueous solution of sesquisulphate of iron, especially if it contains a little free acid, is capable of dissolving most of the metals, from silver down to those which have the greatest affinity for oxygen, when these are digested or boiled with it, the sesquioxide being meanwhile reduced to protoxide. (Berzelius, *Lehrb.*, **3.** 614.)

II.) *bi.*

a = $Fe_2O_3, 2SO_3$ Soluble in water, but the solution soon decomposes, especially when boiled, or diluted with much water. (Maus; Berzelius, in his *Jahresbericht*, **14.** 201.)

b = $Fe_2O_3, 2SO_3 + 10 Aq$ Occurs as the mineral *Stypticite.* Decomposed by cold water, with separation of a basic salt. (H. Rose.)

Compounds as basic as $Fe_2O_3, 2SO_3$ may be obtained completely dissolved in water. (Ordway, *Am. J. Sci.*, 1858, (2.) **26.** 202.)

III.) *sesquibasic.* The native compound (*fibroferrite*) is partially soluble in cold, more readily soluble in boiling water. (Prideaux.)
$2 Fe_2O_3, 3 SO_3 + 18 Aq$

IV.) *mono.* Ppt.
$Fe_2O_3, SO_3 + 3 Aq$

V.) *di.* When precipitated from cold solutions it is soluble in a concentrated solution of $Fe_2O_3, 3SO_3$, but is insoluble therein when it has been precipitated from hot solutions. (Maus.)
$2Fe_2O_3, SO_3 + 6 Aq$

VI.) *tri.* Insoluble in water, tolerably soluble in acids. (Th. Scheerer.)
$3 Fe_2O_3, SO_3 + 4 Aq$

VII.) *hexa.* Insoluble in water. Slowly soluble in warm chlorhydric acid. (Th. Scheerer.)
$6 Fe_2O_3, SO_3 + 10 Aq$

SULPHATE *of protoxide & of sesquioxide* OF IRON.

I.) Soluble in water. (Berzelius, *Lehrb.*)
$FeO, SO_3; Fe_2O_3, 3SO_3$

II.) Absorbs moisture and oxidizes in the air. Soluble in water acidulated with sulphuric acid. Insoluble in alcohol. (Abich.)
$3(FeO, SO_3); 2(Fe_2O_3, 3SO_3) + 4 Aq$

III.) (Poumarède.)
$FeO, SO_3; 6 Fe_2O_3, 3SO_3 + 10 Aq$

IV.) Soluble in water. (Berzelius, *Lehrb.*, **3.** 621.)
$3 FeO, 2SO_3; 3(Fe_2O_3, 2SO_3) + 36 Aq$

SULPHATE *of protoxide* OF IRON & OF MAGNESIA. Permanent. Soluble in water; if the solution is allowed to evaporate spontaneously, the component salts always crystallize apart, the double salt being entirely decomposed, but if the solution, — or any mixed solution of FeO, SO_3 and MgO, SO_3, — be evaporated at a temperature above 38°, the salt
$FeO, SO_3; MgO, SO_3 + 4 Aq$ & $14 Aq$

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$FeO, SO_3; MgO, SO_3 + 4\,Aq$ crystallizes out. (Arrott, *Phil. Mag.*, 1844, (3.) **24.** 502.)

Sulphate *of protoxide* **of Iron, of Magnesia, & of Potash.**
$FeO, SO_3; MgO, SO_3; 2(KO, SO_3) + 12\,Aq$

Sulphate *of protoxide* **of Iron, of Manganese, & of Potash.**
$FeO, SO_3; MnO, SO_3; 2(KO, SO_3) + 12\,Aq$
Tolerably easily soluble in water. (Vohl, *Ann. Ch. u. Pharm.*, **94.** 67.)

Sulphate *of protoxide* **of Iron, & of Nickel.** Efflorescent.

Sulphate *of protoxide* **of Iron, of Nickel, & of Potash.**
$FeO, SO_3; NiO, SO_3; 2(KO, SO_3) + 12\,Aq$

Sulphate *of protoxide* **of Iron, & of Potash.**
$FeO, SO_3; KO, SO_3 + 6\,Aq$
Less soluble in water than protosulphate of iron. (Link.)

100 pts. of water at °C.	Dissolve of the anhydrous salt, pts.
0°	19.6
10°	25.4
14.5°	29.1
16°	30.9
25°	36.5
35°	41.0
40°	45.0
55°	56.1
65°	59.3
70°	64.2

(Tobler, *Ann. Ch. u. Pharm.*, **95.** 198 and fig.)

Sulphate *of sesquioxide* **of Iron, & of Potash.**

I.) *normal.*

$a = Fe_2O_3, 3SO_3; KO, SO_3 + Aq$

$b = Fe_2O_3, 3SO_3; KO, SO_3 + 3\,Aq$

$c = Fe_2O_3, 3SO_3; KO, SO_3 + 24\,Aq$
(Potash Iron Alum.)
Soluble in 5 pts. of water at 12.5°. (Anthon.) The salt is decomposed to No. 4 when heated above 80°, and a similar decomposition occurs when the aqueous solution is heated to 80°. When the aqueous solution is mixed with sulphuric acid, and evaporated on the water-bath, the terhydrated salt (*b*) separates out as soon as a certain degree of concentration has been attained, and as the acid becomes more concentrated the monohydrated salt (*a*) is precipitated. (Berzelius, *Lehrb.*) Insoluble in alcohol. (Dumas, *Tr.*)

II.) Insoluble in water, by which, however, it
$2(Fe_2O_3, 3SO_3); KO, SO_3$
is gradually decomposed. (Grimm & Ramdohr, *Ann. Ch. u. Pharm.*, **98.** 131.)

III.) Soluble in a neutral solution of potash
$Fe_2O_3, 2SO_3; KO, SO_3 + 3\,Aq$
iron alum, but is decomposed by water. (Dumas, *Tr.*, **7.** 85.)

IV.) Soluble in 6 pts. of cold water, with
$Fe_2O_3, 2SO_3; 2(KO, SO_3) + 6\,Aq$
subsequent decomposition. (Maus.) Soluble in 12.75 pts. of water at 10°; but the solution is decomposed on boiling. (Anthon.)

V.) While yet moist it is soluble in water, but
$3(Fe_2O_3, 2SO_3); 2(KO, SO_3) + 20\,Aq$
after having become dry it is decomposed by water. The aqueous solution is decomposed on standing, or quickly by boiling. Insoluble in alcohol. (Soubeiran.)

VI.) Insoluble in water.
$3(2Fe_2O_3, 3SO_3); KO, SO_3 + 18\,Aq$

VII.) Insoluble in boiling water. Slightly sol-
$4(Fe_2O_3, SO_3); KO, SO_3 + 9\,Aq$
uble in chlorhydric acid, more readily soluble in aqua-regia. (Rammelsberg.)

Sulphate *of protoxide* **of Iron, of Potash, & of Zinc.**
$FeO, SO_3; 2(KO, SO_3); ZnO, SO_3 + 12\,Aq$

Sulphate *of sesquioxide* **of Iron, & of Quinine.** Nearly insoluble in water. (Parrish's *Pharm.*, p. 509.) Soluble in water, and alcohol.

Sulphate of Iron & of Silver.

I.) Ppt.
$2Fe_2O_3, SO_3; 7(2AgO, SO_3)$

II.) Soluble in 1000 pts. of water. (Lavini.)
$2Fe_2O_3, SO_3; 18(2AgO, SO_3)$

Sulphate *of protoxide* **of Iron & of Soda.**
$FeO, SO_3; NaO, SO_3 + 4\,Aq$
Permanent. Soluble in water. It crystallizes out as such when the aqueous solution is evaporated at 55°; but when the solution is allowed to evaporate spontaneously the component salts crystallize out separately. (Arrott.)

Sulphate *of sesquioxide* **of Iron & of Soda.**
$4(Fe_2O_3, SO_3); NaO, SO_3 + 9\,Aq$
Insoluble in water. Sparingly soluble in chlorhydric acid. (Th. Scheerer.)

Sulphate *of protoxide* **of Iron & of Zinc.**
$FeO, SO_3; ZnO, SO_3 + 14\,Aq$
Permanent. As soluble as sulphate of zinc. (Thomson.)

Sulphate of Jervin. Very sparingly soluble in water, and the mineral acids. Soluble in alcohol.

Sulphate of Lanthanum.

I.) *normal.*

a = anhydrous. Much less soluble in *warm* than in cold water. When the anhydrous salt in fine powder is added by small portions to water, the temperature of which is 2° @ 3°, and agitated therewith while the vessel which contains the mixture is cooled so that the temperature shall not rise above 13°, 1 pt. of the salt dissolves in less than 6 pts. of water, and so long as the temperature is no higher than 13° this solution may be preserved unchanged. But if the solution be heated to 30° a 3-hydrated salt begins to separate out, and in the course of a few minutes the solution will have become almost completely solid. Even when the solution is cooled, as soon as the crystallization has commenced, this will not be retarded, but goes on as before, until completed; and when a solution is heated to 12° @ 14° at a single point, the crystallization spreads at once through the portions of the solution which have not been warmed. (Mosander, in Berzelius's *Lehrb.*, **3.** 528.)

b = hydrated. Soluble in 42.5 pts. of water at
? $+ 3\,Aq$
23°, and 115 pts. of water at 100°. (Mosander, Berzelius's *Lehrb.*) The anhydrous salt is easily soluble in water at 5° @ 6°, but at higher temperatures the solution is readily precipitated, even when heated to less than 30°. (Marignac (citing Mosander), *Ann. Ch. et Phys.*, (3.) **27.** 224.) Sulphate of lanthanum is less soluble than sulphate of didymium in a neutral solution, but is more soluble than the latter in an acid solution. (Watts, *J. Ch. Soc.*, **2.** 145.) At a strong red heat sulphate of lanthanum is converted into an insoluble basic salt, half of its acid being expelled.

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Sulphate of Lanthanum & of Potash. Sparingly soluble in water. Almost insoluble in a saturated aqueous solution of sulphate of potash. (Mosander.)

Sulphate of Lead. PbO, SO_3 Soluble in 13000 pts. of water at 15°. (Kremers, *Pogg. Ann.*, **85.** 247.) More soluble than sulphate of baryta, less soluble than sulphate of strontia in water. Soluble in 22816 pts. of water at 11°, and in 36504 pts. of water acidulated with sulphuric acid. Much more soluble in solutions of ammoniacal salts, from which, however, it is reprecipitated on adding an excess of sulphuric acid, so that in a solution containing a considerable quantity of nitrate of ammonia, and some acetate of ammonia which had been strongly acidulated with sulphuric acid, scarcely any more of it was found dissolved than if the ammonia salts had not been present. (Fresenius, *Ann. Ch. u. Pharm.*, 1846, **59.** 125.) Soluble in 1200 pts. of water, but is more soluble in water containing nitric acid. (Kirwan, in his *Mineralogy*, **2.** 211 [T.].) Scarcely at all soluble in water or acetic acid. (Bergman, *Essays*, **1.** 140.) No more soluble in water acidulated with acetic acid than in pure water. (G. Bischof, *Schweigger's Journ. für Ch. u. Phys.*, 1827, **51.** 230.) 1 pt. of ignited sulphate of lead dissolves, at 12.5°, in 172 pts. of dilute nitric acid of 1.144 sp. gr. On adding to 1054 grains of this solution 12 ounces of water, by small portions, no precipitate was produced at any time; the dilute solution thus obtained afforded a precipitate when treated with free sulphuric acid. (G. Bischof, *Schweigger's Journ. für Ch. u. Phys.*, 1827, **51.** pp. 233 – 237.)

Insoluble, or almost insoluble, in absolute alcohol, and in spirit. Of the ammonia salts, the nitrate, acetate, and tartrate are especially well fitted to serve as solvents of sulphate of lead, the two last named should be made strongly alkaline by adding ammonia before they are used. (Wackenroder.) Soluble in hot concentrated chlorhydric acid. Soluble in nitric acid, the more readily in proportion as this is more concentrated or warmer. It is not reprecipitated from the nitric acid solution by the addition of water, but is precipitated by dilute sulphuric acid when this is added in sufficient quantity. Sparingly soluble in concentrated sulphuric acid, from which it is partially precipitated by diluting with water, or completely by adding alcohol. Easily soluble in hot potash, or soda-lye. (Fresenius, *Quant.*, p. 143.)

Difficultly, but completely, soluble, and in no inconsiderable quantity, in dilute nitric acid. From this solution it may be reprecipitated by adding a sufficient quantity of dilute sulphuric acid, but not by solutions of alkaline sulphates, or at least only incompletely, nor is any precipitate produced by chlorhydric or phosphoric acids. Tartaric acid, on the other hand, when added in sufficient quantity, occasions a precipitate. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** pp. 319, 320.) Slightly soluble in warm nitric acid, but not when the acid is dilute. (H. Rose, *Tr.*)

Concentrated sulphuric acid dissolves 0.005 pt. of sulphate of lead. (Ure, *Quar. J. Sci.*, 1817, **4.** 118.) More soluble in the oil of vitriol of commerce than in a more concentrated acid, but below this it is less soluble the more dilute the acid is. (Hayes.) Soluble in a warm solution of caustic ammonia, separating out on cooling. (Wittstein.)

When recently precipitated it is somewhat soluble even in a cold aqueous solution of chloride of ammonium, but may be completely reprecipitated by adding an excess of caustic ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 96, 99.) Soluble in an aqueous solution of chloride of ammonium at 12.5° @ 25°, the filtered solution deposits crystals of chloride of lead. (Weppen, from *Arch. d. Pharm.*, (2.) **9.** 236; in *J. pr. Ch.*, 1837, **11.** 183.) Readily soluble in aqueous solutions of chloride of ammonium and of nitrate of ammonia. (Bolley, *Ann. Ch. u. Pharm.*, **91.** 115.) Soluble in aqueous solutions of acetate and nitrate of ammonia; 1 pt. of the ignited salt dissolving at 12.5° in 47 pts. of a solution of acetate of ammonia of 1.036 sp. gr.; and in 969 pts. of a concentrated solution of nitrate of ammonia of 1.29 sp. gr. From the solution in acetate of ammonia the sulphate of lead may be reprecipitated, for the most part, by adding an excess of free sulphuric acid, or sulphate of potash; from the solution in nitrate of ammonia an excess of sulphate of potash precipitates the sulphate of lead almost entirely, but free sulphuric acid occasions no precipitate. (G. Bischof, *Schweigger's Journ. für Ch. u. Phys.*, 1827, **51.** pp. 231 – 233, 236.) Soluble in an aqueous solution of acetate of ammonia at 18.8° @ 25°, and is not precipitated by a small quantity of sulphuric acid from a solution of acetate of lead mixed with acetate of ammonia. When the solution of sulphate of lead in acetate of ammonia is evaporated to dryness at a gentle heat, the residue may be completely redissolved by a small quantity of water. (Weppen, from *Arch. d. Pharm.*, (2.) **9.** 236; in *J. pr. Ch.*, 1837, **11.** 182.) Soluble in an aqueous solution of sulphate of ammonia. (H. Rose, *Tr.*) Also soluble in a hot solution of succinate of ammonia. (Wittstein.) Easily soluble in aqueous solutions of the acetates of ammonia, soda, potash, lime, alumina, and magnesia. (Mercer, *Rep. Br. Assoc.*, 1844, p. 32.) Very easily and abundantly soluble in an aqueous solution of normal tartrate of ammonia, a concentrated solution coagulating, after a time, to a stiff jelly. (Wœhler, *Ann. Ch. u. Pharm.*, 1840, **34.** 235.) Even when in its native crystalline condition, it is readily soluble in an aqueous solution of citrate of ammonia. (J. Lawrence Smith, *Proc. Amer. Assoc.*, and *Am. J. Sci.*, (2.) **20.** 244.) Slightly decomposed by a solution of chloride of sodium. (Bley.) 1 litre of water saturated with chloride of sodium, marking 25° B., dissolves about 0.66 grm. of sulphate of lead; on being left to itself this solution deposits crystals of a double compound of chloride and sulphate of lead in the course of several days. (Becquerel, *C. R.*, 1845, **20.** 1523.) Completely soluble in a tolerably concentrated aqueous solution of hyposulphite of soda, especially if this be heated to 30° @ 36°, but at the temperature of boiling, and at the ordinary temperature after a time, a certain amount of decomposition ensues. (Lœwe, *J. pr. Ch.*, 1858, **74.** 348.) Insoluble in a solution of acetate of lead. (J. Lawrence Smith, *Am. J. Sci.*, (2.) **16.** 54.) Not precipitated from solutions containing the normal tartrates, or acetate of soda. (Spiller.)

Sparingly soluble in hot chlorhydric acid. (Hayes.) Tolerably abundantly soluble in concentrated chlorhydric acid, especially when this is hot: crystals of chloride of lead separate from this solution as it cools. (Berzelius, *Lehrb.*) It does not dissolve in cold dilute chlorhydric acid. (H. Rose, *Tr.*) Soluble in 172 pts. of nitric acid, of 1.144 sp. gr., at 12.5°. (Bischof.) Water does not render this solution turbid, but sulphuric acid precipitates it completely; it is likewise precipitated by carbonate of ammonia. (Bischof.) Dilute nitric acid also dissolves it, though slowly;

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the solution is not precipitated by phosphoric or chlorhydric acid, and but very slightly, if at all, by alkaline sulphates; it is precipitated, however, by tartaric acid, and more especially by dilute sulphuric acid. (Wackenroder, *Ann. Pharm.*, **41.** 319.) Soluble in nitric acid, from which nitrate of lead precipitates a portion of it. (Gladstone.) Slightly soluble in warm concentrated acids, from which it is precipitated in part by water.

No more soluble in a solution of sulphate of zinc acidulated with sulphuric acid than it is in the latter by itself. (Eliot & Storer, *Mem. Amer. Acad.*, 1860 (N. S.), **8.** 61.)

Decomposed when boiled with aqueous solutions of the carbonates of potash, soda, and ammonia, with formation of insoluble carbonate of lead. (Persoz, *Chim. Moléc.*, p. 384.) Decomposed by an aqueous solution of carbonate of ammonia. (Weppen, from *Arch. d. Pharm.*, (2.) **9.** 236; in *J. pr. Ch.*, 1837, **11.** 183.) Decomposed by long-continued boiling with solutions of those alkaline salts the acids of which form sparingly soluble compounds with lead, as, for example, the alkaline carbonates, oxalates, and chromates, but it is not easy to attain complete decomposition in this manner. (Berzelius, *Lehrb.*, **3.** 720.) Completely decomposed, even at ordinary temperatures, by solutions of the mono and bicarbonates of the alkalies. The former dissolve some oxide of lead in this case, the latter none. (H. Rose, *Pogg. Ann.*, **95.** 426.) An equivalent of sulphate of lead may be completely decomposed by an equivalent of an alkaline carbonate in aqueous solution. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 347.) About equally soluble with carbonate of lead in water, but much more soluble than the latter in alkaline solutions. (Dulong, *Ann. de Chim.*, **82.** 290.) More soluble than chloride of lead in alkaline solutions. (Berthollet.) 1 pt. of nitrate of lead still gives a precipitate with sulphuric acid in presence of 20000 pts. of water (Pfaff; Harting); and with sulphate of soda in 25000 pts. of water. (Lassaigne.)

SULPHATE OF LEAD & OF POTASH. Slowly decomposed by water. (Trommsdorff.)

SULPHATE OF LEAD & OF SODA.

SULPHATE OF LEUCIN. Soluble in concentrated sulphuric acid; less soluble, or insoluble, in absolute alcohol.

SULPHATE OF LIME.

I.) *anhydrous.* Units with water very slowly. $Ca\,O, S\,O_3$ Totally insoluble in water at about 150°. (Cousté, *Ann. des Mines*, 1854, (5.) **5.** 144, *note* [see also under No. 3]; Sullivan, *Rep. Br. Assoc.*, 1857, p. 59.) Sulphate of lime is precipitated in the anhydrous state from superheated liquors. (De Senarmont, *Ann. Ch. et Phys.*, 1850, (3.) **30.** 145.) Anhydrite is soluble in 492.2 pts. of water at 15° @ 20°. (Tipp.)

II.) Less soluble than ordinary gypsum in water. $2\,(Ca\,O, S\,O_3) + Aq$ [Has been studied by Johnston; also by Millon, *Ann. Ch. et Phys.*, (3.) **19.** 221; compare Cousté, *inf.*]

III.) Permanent.
(*Gypsum.*)
$Ca\,O, S\,O_3 + 2\,Aq$

100 pts. of water at °C.	Dissolve of the anhydrous salt, pts.
0°	0.205
5°	0.219
12°	0.233
20°	0.241
30°	0.249
35°	0.254
40°	0.252
50°	0.251
60°	0.248
70°	0.244
80°	0.239
90°	0.231
100°	0.217

(Poggiale, *Ann. Ch. et Phys.*, (3.) **8.** pp. 469, 471.)

When a solution of sulphate of lime, even if very dilute, is heated to 100° or higher, a considerable precipitate will be formed. (Graham, *Phil. Mag.*, 1827, (2.) **2.** 23; see also No. I.) Soluble in 388.3 pts. of water at 15° @ 20°, whether gypsum or anhydrite are taken for the experiment. (Tipp, cited in Wittstein's *Handw.*)

Soluble in 380 pts. of cold, and 388 pts. of boiling water (Giese); in 500 pts. of water, either hot or cold (Fourcroy); in 500 pts. of water at a moderate heat, and in 450 pts. of boiling water (Bergman, *Essays*, **1.** 180); in 461 pts. of water at the ordinary temperature, and in from 458 to 461.4 pts. of boiling water, i e. it is equally soluble at the ordinary temperature and at boiling, as is also proved by the fact that the hot aqueous solution deposits nothing on cooling. (Bucholz, *Gehlen's Neues all. Journ. der Chemie*, 1805, **5.** 164.) Soluble in 332 pts. of water at all temperatures (Lassaigne); this statement has been contradicted by Poggiale (*vid. supra*), who asserts that the maximum solubility is at +35°, at which temperature 1 pt. of the salt dissolves in 393 pts. of water; the solubility decreases on elevating or depressing the temperature, so that at 0° 1 pt. of the salt is soluble in 488 pts. of water, and at 100° 1 pt. is soluble in 460 pts. of water.

Soluble in 438 pts. of water. (Anthon, *Pharm. Centrallblatt*, 1847, p. 827.) 100 pts. of water at 15.5° dissolve 0.2 pt. of it, and at 100°, 0.22 pt. (Ure's *Dict.*) Soluble in 250 @ 300 pts. of water (Dumas, *Tr.*, **6.** 276); more soluble in water acidulated with sulphuric, chlorhydric, or nitric acids.

More soluble in aqueous solutions of chloride of ammonium than in pure water. (A. Vogel.) When a solution of sulphate of lime in chloride of ammonium is evaporated and then set aside to cool, or when the solution is allowed to evaporate spontaneously, a quantity of the sulphate of lime separates out, pure and in well-formed crystals. (Storer.) More soluble in an aqueous solution of chloride of sodium than in pure water. (Trommsdorff.) Very easily soluble in an aqueous solution of chloride of sodium, and is not reprecipitated on the addition of dilute sulphuric acid. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 316.) Soluble in 122 pts. of a saturated aqueous solution of chloride of sodium. (Anthon.) Insoluble in concentrated aqueous solutions of chloride of sodium, but is, nevertheless, more soluble in dilute solutions than it is in pure water. (Dumas, *Tr.*, **6.** 153.) The maximum solubility of sulphate of lime in saline water (at least in that of the saline at Moutiers) is in that of 1.033 sp. gr.

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In a liquor marking °B.	Are dissolved pts. of sulphate of lime.
0°	0.0033
2°	0.0043
5°	0.00605 (maximum)
15°	0.0043
27°	0.0000

(Berthier, cited by Dumas, *Tr.*, **6.** 335.)

Less soluble in hot than in cold water, or sea-water. At temperatures superior to 100° the solubility of sulphate of lime in sea-water diminishes very nearly proportionally to the augmentation of temperature.

Solubility of Sulphate of Lime in Sea-water at Temperatures above 103°.

At °C.	Under a pressure of atmospheres.	Sea-water saturated with $Ca\,O, S\,O_3$ Marks °B. (at 15° C).	Contains in solution percent of $Ca\,O, S\,O_3$.
103.00°	1	12.5°	0.500
103.80°	1	12°	0.477
105.15°	1	11°	0.432
108.60°	1.25	10°	0.395
111.00°	1.25	9°	0.355
113.20°	1.25	8°	0.310
115.80°	1.50	7°	0.267
118.50°	1.50	6°	0.226
121.20°	1.50	5°	0.183
124.00°	2	4°	0.140
127.90°	2	3°	0.097
130.00°	2.5	2°	0.060
133.30°	2.5	1°	0.023

This table expresses, for example, the fact that when sea-water is boiled under a pressure of 1 atmosphere, or at 103°, it will become saturated with sulphate of lime when its density has been elevated to 12.5° B., and will then contain 0.5% of the sulphate; at 1.25 atmosphere, or 108.6°, the water will be saturated with sulphate when it marks 10° B., and will then contain 0.395% of this salt; at a pressure of 2 atmospheres, or 124°, sea-water, in its natural state, and without having been subjected to any concentration, is very near the point at which saturation occurs, for this natural water marks 3° @ 3.5° B., and in the cited case saturation occurs at a concentration of 4°. (Cousté, *loc. infra cit.*) Sulphate of lime becomes completely insoluble, either in fresh or sea-water, at temperatures between 140° and 150°. If a solution of it be exposed to these temperatures the whole of the sulphate will be precipitated either in small crystals or very thin films, according as it is more or less abundant in the solution.* The sulphate thus precipitated redissolves after the solution has cooled, but so much the more slowly in proportion as the temperature at which it was precipitated is more elevated. That which has been precipitated at 150° requires several (5 @ 6) days in order to redissolve, and this even when the proportion of the precipitate is very small as compared with that of the water. (Cousté, *Ann. des Mines*, 1854, (5.) **5.** pp. 80, 140 - 144.)

All that has been said concerning the solubility of sulphate of lime in sea-water at temperatures above 130° applies as well to fresh water. (Cousté, *loc. cit.*, p. 144.)

Since sulphate of lime is not deposited from its solution in sea-water until this has arrived at a certain degree of concentration, i. e. 12° @ 13° B., when the ebullition is effected in free air, it would seem as if all incrustation of steam-boilers fed with sea-water might be prevented by maintaining the water in the boiler at a state of concentration inferior to the degree which corresponds to its saturation with sulphate of lime. A result which would be attained by evacuating the water of the boiler, in such proportion, relatively to the water injected, that the quantity of sulphate of lime thrown out shall be at least equal to the quantity of sulphate introduced in the feed-water. That is to say, P being the weight of the water injected in a given time, p that of the water evacuated in the same time; n the proportion of the sulphate of lime contained in the feed-water, N the analogous proportion in water concentrated to such an extent as to be saturated with sulphate of lime; it would be sufficient to make $p > \frac{n}{N} P$.

In order that this principle may be applicable it is evidently necessary that $\frac{n}{N}$ must be a small fraction. A condition which is tolerably well fulfilled by sea-water, for, admitting all the lime to be in the state of sulphate, natural sea-water, or that at 3° B. contains 0.097 percent of sulphate of lime, and this same water, brought to a state of saturation as regards the sulphate, by boiling down in free air, i. e. to 12.5° B., contains 0.5 percent of sulphate of lime. In this case, then, $\frac{n}{N} = \frac{0{\cdot}097}{0{\cdot}500}$ or $< \frac{1}{5}$.

But N diminishes rapidly in proportion as the temperature, or pressure, at which the ebullition takes place is increased. Its value is still tolerably large when the ebullition occurs under a pressure of 1.25 atmosphere (109°), which is the case with low-pressure boilers, but for pressures above 2 @ 3 atmospheres (121° and 135°) the values of N are inferior to those of n.

As for fresh waters, the principle of evacuation is inapplicable to them, because, on the one hand, they dissolve very little sulphate of lime (less than 0.003 percent in the cold), and, on the other, they always contain carbonate of lime, against which evacuation is of no service.

It is therefore necessary to conclude that the principle of evacuation is only applicable to boilers fed with sea-water, and even then only to those which are worked at low pressures. But in practice this theoretical assumption is not completely efficacious, it being found that, while evacuation hinders incrustation of those parts of the boiler which are *indirectly* heated, i.e. heated only by the contact of smoke and gaseous products of combustion, it is powerless to prevent the incrustation of the surface which is heated *directly*, by the radiant heat of the fire and contact of the flame; for the heat being very intense in the latter case, the layer of water next in contact with the walls of this portion of the boiler is heated above the limit of concentration, and deposits some of its sulphate. (Cousté, *Ann. des Mines*, 1854, (5.) **5.** pp. 82, *et seq.*, 145 - 147.)

[A remarkable feature in the precipitation of sulphate of lime from its solutions when these are heated, and which appears to have been overlooked by previous observers, is the fact that, when once the precipitation has been commenced by the application of heat, *it will continue long after the source of heat has been removed and the temperature has fallen to that of ordinary air.* Thus, in one of many experiments, a quantity of brine from the salt-works at Syracuse, N. Y., was heated in a small close boiler during five minutes to 143°. On allowing the liquor to flow out at this temperature it was very cloudy, like milk, from suspended sulphate of lime. One portion of it was filtered hot, another portion after it had become cold, and in

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* In experimenting upon the point at which sulphate of lime is completely insoluble Cousté added to 100 cc. of distilled water 2 drops of sea-water (natural), marking 4.25° B., each drop forming 0.068 cc., and the two drops consequently containing $2 \times 0.068 \times 0.0015 = 0.0002$ cc. of sulphate of lime; the mixture therefore containing 0.000002 of this salt. A portion of this mixture being exposed in a sealed tube to a temperature of 140° during 15 minutes, a deposit of exceedingly thin films of sulphate of lime could be detected floating in the liquid.

A similar experiment was made with a mixture of 100 cc. of distilled water and 2 drops of another mixture containing $\frac{1}{40}$ of sea-water. The mixture employed consequently contained a proportion of sulphate of lime expressed by the equation $\frac{0.068 \times \frac{2}{40} \times 0.0015}{100} = 0.0000005.$ At the end of 30 minutes the presence of minute pellicles, like those of the previous experiment, was detected.

Sulphate of lime may consequently be considered as totally insoluble in sea-water, and *à fortiori*, in fresh water, at temperatures between 140° and 150°. When a solution of carbonate of lime in an aqueous solution of sulphate of ammonia, or of sulphate of soda, potash, or magnesia, is gradually heated to 130° @ 140°, crystals of sulphate of lime separate out, and the liquid becomes alkaline. (Cousté, *loc. cit.*, pp. 143, 144.)

both instances the clear filtrate became blue in the course of a few minutes, and at the end of 24 hours had deposited a large quantity of an amorphous powder. The bearing of this point upon the question of evacuating steam-boilers is obvious. (Storer, unpublished experiments made in 1857.).]

More soluble in solutions of sulphate of soda (O. Henry), and succinate of ammonia (Wittstein), than in pure water. Soluble to a very considerable extent in an aqueous solution of acetate of ammonia at 18.8° @ 25°, especially when recently precipitated. An ounce of the solution of acetate of ammonia (*Liquor ammonii acetici* of the Prussian pharmacopœa) dissolves nearly 10 grains of sulphate of lime. (Weppen, from *Arch. d. Pharm.*, (2.) **9.** 236, in *J. pr. Ch.*, 1837, **11.** 182.) Also much more abundantly soluble in a solution of chloride of ammonium at 12.5° @ 25° than in pure water, but is less soluble therein than in a solution of acetate of ammonia. (Weppen, *Ibid.*, *J. pr. Ch.*, p. 183.) When recently precipitated it dissolves in an aqueous solution of chloride of ammonium, though less speedily and perhaps less completely than carbonate or phosphate of lime. A solution of nitrate of ammonia acts much in the same way as that of chloride of ammonium. (Brett, *Phil. Mag.*, 1837, (3.) **11.** 96.) Slightly soluble in an aqueous solution of sulphate of magnesia (but not readily soluble, as in a solution of sulphate of soda). (Bergman, *Essays*, **1.** pp. 395, 442.) No more soluble in an aqueous solution of carbonic acid than in pure water. (J. Davy.)

[In view of a statement by Risler, in Gasparin's *Agronomie*, to the effect that sulphate of lime is much more soluble in the extract of garden earth, which he had studied in connection with Verdeil, than in pure water, I was led several years since to make the following approximative experiments, hoping thereby to arrive at some conclusion which might be interesting in an agricultural point of view. It will be observed that Risler's statement was not corroborated.*

When mixed at the temperature of 15° @ 20° with a solution of	1 pt. of $Ca O, S O_3$ was dissolved by pts. of the solution.	The solution contained percent of $Ca O, S O_3$.
Distilled water . .	446.9 . . .	0.224
Extract of earth	485.5	0.205
Cane-sugar (containing a little lime)	300.1	0.333
$Fe O, S O_3$	393.6	0.253
Putrid urine . . .	480.2 . . .	0.208

A sample of crude sulphate of ammonia liquor (containing $N H_4 S$; $N H_4 Cy$, &c.), prepared in the large way at a manufactory by mixing gypsum with the ammoniacal liquor of gas-works, contained 0.232% of $Ca O, S O_3$, i. e. 1 pt. of $Ca O, S O_3$ was soluble in 430.7 pts. of the solution of impure sulphate of ammonia. (F. H. S.)]

More freely soluble in a concentrated aqueous solution of sulphate of ammonia (1 pt. salt to 4 pts. of water) than in pure water. Such a solution produces no precipitate in a solution of a lime salt, neither in the cold nor on boiling. (H. Rose.) More freely soluble in aqueous solutions of sesquichloride of iron, sesquichloride of chromium, protochloride of copper and chloride of zinc, than in pure water; but no more soluble in a solution of chloride of calcium than in water. (Gladstone.) When neutral aqueous solutions of hyposulphite of lime and sulphate of alumina are mixed a somewhat copious precipitate of sulphate of lime subsides, but at the same time a portion of each of the mixed salts remains undecomposed in the solution. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 22.) Rather easily and completely soluble at the ordinary temperature in a saturated aqueous solution of hyposulphite of soda, and more readily at the temperature of boiling. On the addition of alcohol to this solution all the lime is precipitated as a double hyposulphite. On adding crystals of hyposulphite of soda to a mixture of water and sulphate of lime it was found that more than ten times as much of the latter was dissolved as could have been taken up by the water alone. (Diehl, *J. pr. Ch.*, 1860, **79.** 430.)

Sulphate of lime is not precipitated at ordinary temperatures when dilute solutions of chloride of calcium and sulphate of magnesia are mixed, but precipitation takes place when the mixed solutions are heated. Even in tolerably concentrated solutions some time elapses before precipitation commences at the ordinary temperature. (R. Brandes, *Schweigger's Journ.*, 1825, **43.** 157.) If a solution containing 7⅓ pts. of chloride of calcium in 100 pts. of water be mixed with a solution containing 7⅓ pts. of sulphate of magnesia in 100 pts. of water, no precipitate of sulphate of lime will be formed, although 5.75 pts. of $Ca O, S O_3$ are present in the 200 pts. of water, and, as has just been stated, more than 400 pts. of water are required to dissolve 1 pt. of it at the ordinary temperature. (Brandes, cited by Mulder, in his *Silberprobirmethode*, p. 14.) No precipitate is formed when aqueous solutions of nitrate of lime and dilute sulphate of soda are mixed at the ordinary temperature, but on heating an abundant precipitate of sulphate of lime is formed. (Persoz, *Chim. Moléc.*, p. 382.) Soluble in an aqueous solution of acetate of soda. (Mulder, *loc. cit.*) More soluble in a solution of chloride of potassium than in water. (Mulder, *loc. cit.*, p. 16.)

Decomposed, with separation of carbonate of lime, when treated with aqueous solutions of the fixed alkaline carbonates. (Bergman, *Essays*, **1.** 223.) An equivalent of sulphate of lime is completely decomposed by an equivalent of an alkaline carbonate in aqueous solution. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 347.) Like sulphate of baryta, its precipitation is very much hindered by the presence of metaphosphate of soda. (Rube, *J. pr. Ch.*, 1858, **75.** 116.)

Insoluble in alcohol, the sp. gr. of which is 0.905, or less. (Anthon, *J. pr. Ch.*, **14.** 125.) Soluble in alcoholic solutions, — the alcohol being dilute, — of the nitrates of ammonia, potash, and soda, and the chlorides of ammonium, potassium, and sodium. (Marguerritte, *C. R.*, **38.** 308.)

1 equivalent of sulphate of lime is soluble in 3 equivalents of chlorhydric acid, — somewhat diluted, — at the ordinary temperature: on the addition of sulphuric acid to this solution a precipitate is produced. (Gladstone.) When sulphate of lime is treated with chlorhydric acid at the ordinary temperature it soon begins to be dissolved: in the solution thus obtained sulphuric acid produces a precipitate, but none is produced on the addition of a solution of chloride of calcium. If the acid and sulphate of lime are boiled together the latter is more completely dissolved, sulphuric acid producing a more abundant precipitate than before, but chloride of calcium still pro-

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* To obtain the solutions, sulphate of lime was mixed with an excess of the materials named, excepting the salts, of which only a single equivalent was employed in each case; the mixtures placed in small bottles which were nearly filled with water, and the whole shaken several times daily during a month. The temperature of the laboratory ranging meanwhile from 15° @ 20°. Portions were then filtered off into beaker-glasses, the weight of solution taken determined, and the lime precipitated as oxalate.

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duces none. "Sulphate of lime is consequently much more difficultly soluble in dilute sulphuric than in chlorhydric acid; nevertheless a concentrated aqueous solution of sulphate of lime affords no precipitate or cloudiness when treated with sulphuric acid." (H. Rose, *Pogg. Ann.*, **95.** 109.) Sulphate of lime is not taken up by very concentrated chlorhydric acid to nearly the same extent as when the acid is dilute, hence a saturated solution of the salt in the latter is copiously precipitated by the addition of fuming chlorhydric acid as well as by that of water. (S. W. Johnson, *Am. J. Sci.*, (2.) **35.** 283.)

When anhydrous sulphate of lime is treated with concentrated sulphuric acid at a temperature of from 80° @ 100° it is converted into bisulphate, a portion of which dissolves in the excess of acid. (Berzelius, *Lehrb.*)

*Bi*SULPHATE OF LIME. Somewhat soluble in concentrated sulphuric acid at a temperature of 80° @ 100°, separating out again as the solution cools. Instantly decomposed by water. Also decomposes gradually when exposed to the air. (Berzelius, *Lehrb.*, **3.** 403.)
$Ca\,O, H\,O, 2\,S\,O_3$

SULPHATE OF LIME, OF MAGNESIA, & OF POTASH. Occurs as the mineral *Polyhalite.* Slowly decomposed, with partial solution, by water.
$2\,(Ca\,O, S\,O_3); Mg\,O, S\,O_3; K\,O, S\,O_3 + 2\,Aq$

SULPHATE OF LIME & OF POTASH. Sparingly soluble in water. Easily soluble in dilute chlorhydric acid. (J. A. Phillips, *J. Ch. Soc.*, **3.** 352.)
$Ca\,O, S\,O_3; K\,O, S\,O_3 + Aq$

SULPHATE OF LIME & OF SODA.

I.) Occurs as the mineral *Glauberite.* Decomposed, with partial solution, by a small quantity of water; completely soluble in much water.
$Ca\,O, S\,O_3; Na\,O, S\,O_3$

II.) Is not decomposed by water, but is sparingly soluble in water. (Reithner.)
$3\,(Ca\,O, S\,O_3); Na\,O, S\,O_3$

SULPHATE OF LIME & OF URANIUM. Occurs as the mineral *Medjidite.* Insoluble in water, but dissolves readily in the smallest quantity of dilute chlorhydric acid. (Lawrence Smith, *Am. J. Sci.*, (2.) **5.** 336.)
$Ca\,O, S\,O_3; Ur_2\,O_3, S\,O_3 + 15\,Aq$

SULPHATE OF LITHIA. Very slightly hygroscopic. (Kremers.) Very soluble in water. Not perceptibly soluble to a greater extent in hot than in cold water. (Hermann.) 1 pt. of the anhydrous salt is soluble in 2.89 pts. of water at 18°; or 100 pts. of water at 18° dissolve 34.6 pts. of it (Berzelius, *Lehrb.*, **3.** 269.) Less soluble in warm water than in water at the ordinary temperature. (Troost.) Soluble in 2.33 pts. of cold or hot water. (Wittstein's *Handw.*)
$Li\,O, S\,O_3 + Aq$

1 pt. of the anhydrous salt is soluble in		
2.83 pts. of water at		0°
2.91	"	20°
3.06	"	45°
3.30	"	65°
3.42	"	100°

(Kremers, *Pogg. Ann.*, **95.** 469.)

The saturated aqueous solution boils at 105°. (Kremers, *Pogg. Ann.*, **99.** 43.) Sparingly soluble in alcohol. (Berzelius, *Lehrb.*) Very sparingly soluble in alcohol. (Wittstein's *Handw.*) Easily soluble in alcohol. (Hermann.)

II.) *bi.* Soluble in water.
Has no existence. (Troost.),

SULPHATE OF LITHIA & OF POTASH.
$Li\,O, S\,O_3; 2\,(K\,O, S\,O_3)$

SULPHATE OF LOBELIN.

SULPHATE OF LOPHIN. Efflorescent. Soluble in water, with partial decomposition; it is even possible to remove nearly all the sulphuric acid by repeatedly crystallizing it from water. Also soluble in alcohol, with similar partial decomposition. Soluble in sulphuric acid. (Atkinson & Gœssmann, *Ann. Ch. u. Pharm.*, **97.** 290.) More soluble in alcohol than in water. (Laurent.)
$N_2\left\{\begin{matrix} C_{28}\,H_5'' \\ C_{14}\,H_6'' \\ H_2 \end{matrix}\right. . H\,O, S\,O_3$

SULPHATE OF LUTEOCOBALT. Effloresces in dry air. Rather insoluble in cold, but freely soluble in hot water. The solution is not readily decomposed by boiling. (Gibbs & Genth, *Smithson. Contrib.*, vol. **9.** pp. 40–44, of the memoir.) Sparingly soluble in cold, more soluble in hot water. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 283.)
(*Sulphate of LuteoCobaltiaque.*)
$6\,N\,H_3 . Co_2\,O_3, 3\,S\,O_3 + 5\,Aq$

SULPHATE OF MAGNESIA.

x = *anhydrous.* Quickly deliquesces. Easily soluble in water. Soluble in 2.961 pts. of water at 15°. (Gerlach's determination. See his table of sp. grs., below.) 100 pts. of water at 0° dissolve 25.76 pts. of it. (Otto-Graham.)
$Mg\,O, S\,O_3$

As good as insoluble in absolute alcohol. Slightly soluble in dilute spirit. (Fresenius, *Quant.*, p. 129.) [See also under *e.*] 100 pts. of alcohol of from 0.872 to 0.900 sp. gr. dissolve 1 pt. of sulphate of magnesia; but alcohol of from 0.817 to 0 848 sp. gr. dissolves none of it. (Kirwan, *On Mineral Waters*, p. 274 [T.].)

$b = Mg\,O, S\,O_3 + Aq$

$c = Mg\,O, S\,O_3 + 2\,Aq$

$d = Mg\,O, S\,O_3 + 6\,Aq$ *Vid. inf.* p. 610, col. 2.

$e = Mg\,O, S\,O_3 + 7\,Aq$ Efflorescent in warm air. Ignited sulphate of magnesia dissolves very slowly in water, but the crystals are rapidly soluble.
(*Epsom Salts.*)

100 pts. of water at °C.	Dissolve pts. of the anhydrous salt $Mg\,O, S\,O_3$.	Dissolve pts. of the cryst. salt $Mg\,O. S\,O_3 + 7\,Aq$.
14.58°	32.76	103.69
39.86°	45.05	178.34
49.08°	49.18	212.61
64.35°	56.75	295.13
97.03°	72.30	644.44

(Gay-Lussac, *Ann. Ch. et Phys.*, (2.) **11.** 311.)

The curve of the solubility of the crystallized salt is a straight line, of which the equation is $y = 0.47816\ x^\circ + 25.76$. (Gay-Lussac, *loc. cit.*)

100 pts. of water at °C.	Dissolve pts. of the anhydrous salt. Gay-Lussac.	Tobler.
0°	25.8	24.7
10°	30.5	
20°	35.0	
25°		37.1
30°	39.8	
40°	45.2	47.0
50°	49.7	
55°		52.8
60°	55.9	
70°	60.4	
80°	65.1	
90°	70.3	

(Tobler, *Ann. Ch. u. Pharm.*, **95.** 198, and fig.)

100 pts. of water at 0° dissolve 25.76 pts. of the anhydrous salt, and 0.47816 pts. for every degree, centigrade, above this. (Gay-Lussac, cited by Gmelin.) 100 pts. of water at 0° dissolve 28.067 pts. of the anhydrous salt. (Pfaff, *Ann. Ch. u. Pharm.*, **99.** 226.) 100 pts. of the saturated aqueous solution contain, at the boiling point (105.5°), 57.5 pts. of the dry salt; or 100 pts. of water at 105.5° dissolve 135.52 pts. of it; or 1 pt. of the dry salt is soluble in 0.7391 pts. of water at 105.5°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) The aqueous solution saturated at 17.5° is of 1.2932 sp. gr., it contains 55.57% of the crystallized salt (Mg O, S O_3 + 7 Aq); or 100 pts. of water dissolve 125.06 pts. of the crystallized, or 60 pts. of the anhydrous salt at 17.5°. (Karsten, *Berlin Abhandl.*, 1840, p. 101.) 1 pt. of the crystallized salt is soluble in 0.799 pt. of water at 18.75°, forming a liquor of 1.2932 sp. gr.

The solution saturated at 8° is of 1.267 sp. gr. (Anthon, *Ann. der Pharm.*, 1837, **24.** 210.) 100 pts. of water at 0° dissolve 53.8 pts. of it, and at the ordinary temperature 125 pts. (Otto-Graham.) Soluble in 2 pts. of cold, and in less than 1 pt. of boiling water. Insoluble in alcohol. (Wittstein's *Handw.*) Soluble in 2 pts. of cold, and in 0.5 pt. of boiling water. (Fourcroy.) Soluble in 2 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201; in *Canstatt's Jahresbericht, für* 1854, p. 76.) Soluble in 4 pts. of water at 0°, in 3 pts. at 15°, and in 1.4 pts. at 97°. (Schubarth's *Tech.*)

1 pt. of the anhydrous salt is soluble in pts. of water.	1 pt. of the crystallized salt is soluble in pts. of water.	at °C.	100 pts. of the saturated solution contain pts. Of the anhydrous salt.	100 pts. of the saturated solution contain pts. Of the crystallized salt.
3.05	0.96	14.4	24.67	50.90
1.38	0.155	97.2	41.96	86.56

(M. R. & P.)

The aqueous solution saturated at
10° contains 33.3% of the salt (Eller);
in the cold " 33.3% " (Fourcroy);
at 38° (of B.'s therm.) " 43.6% " (Bœrhave);
at 12.5° " 53.3% " (Hassenfratz, *Ann. de Chim.*, **28.** 291.)

100 pts. of water at 15.5° dissolve 100 pts. of the crystallized salt, and at 100°, 130 @ 150 pts. (Ure's *Dict.*) The aqueous solution saturated at 15° is of 1.275211 sp. gr., and contains dissolved n every 100 pts. of water at least 92.217 pts. of the crystallized salt. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.) Soluble in 1 pt. of water at a moderate heat, and in scarce 0.66 pt. of boiling water. Insoluble in rectified spirit. (Bergman, *Essays*, **1.** pp. 181, 438, 457.)

1 pt. of the 7 Aq salt is soluble in 0.933 pts. of water at 15° (Gerlach's determination, see his table of sp. grs., below); in 0.92 pt. of water at 23°; or 100 pts. of water at 23° dissolve 108.3 pts. of it; or the aqueous solution saturated at 23° contains 52% of it, or 24.4% of the anhydrous salt, and is of 1.2863 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.)

Boiling aqueous solutions of sulphate of magnesia, which are not too highly charged with the salt, do not crystallize when they are cooled in closed vessels out of contact with atmospheric air [or in vessels loosely stopped with pledgets of cotton-wool, by which the air is filtered (Schrœder, *Ann. Ch. u. Pharm.*, **109.** 45)], phenomena of supersaturation like those exhibited by sulphate and carbonate of soda being manifested. This behavior is owing to the formation of a six-hydrated salt, which is much more soluble in water than the seven-hydrated salt, and also to the formation of an isomeric modification (β) of the seven-hydrated salt, crystallizing in tables, which is less soluble than the six-hydrated salt, but more soluble than the ordinary (α) seven-hydrated needles. Thus, the saturated aqueous solution of the six-hydrated salt (Mg O, S O_3 + 6 Aq) [mother liquor, from which crystals have been deposited] contains at

0°, 40.75 pts. of anhydrous Mg O, S O_3 in 100 pts. of water.
10°, 42.23 " " "
20°, 43.87 " " "

while the mother liquor, from which crystals of the tabular seven-hydrated salt (Mg O, S O_3 + 7 Aq (β)) had separated, contains at

0°, 34.67 pts. of anhydrous Mg O, S O_3 in 100 pts. of water.
10°, 38.71 " " "
20°, 42.84 " " "

This salt (Mg O, S O_3 + 7 Aq (β)) does not crystallize at temperatures above 21° @ 22°. At 25° @ 30° crystals of the six-hydrated salt are formed. (Lœwel, *Ann. Ch. et Phys.*, (3.) **43.** 405; compare Schrœder, *Ann. Ch. u. Pharm.*, **109.** 51.)

The relations appear to better advantage in the following table.

At °C.	A saturated aqueous solution of Mg O, S O_3 + 7 Aq (α) contains		A saturated aqueous solution of Mg O, S O_3 + 7 Aq(β) contains		A saturated aqueous solution of Mg O, S O_3 + 6 Aq contains		
	Anhydrous Mg O, S O_3 dissolved by 100 pts. of water.	7 Aq(α) salt dissolved by 100 pts. of water.	Anhydrous Mg O, S O_3 dissolved by 100 pts. of water.	7 Aq (β) salt dissolved by 100 pts. of water.	Anhydrous Mg O, S O_3 dissolved by 100 pts. of water.	6 Aq salt dissolved by 100 pts. of water.	7 Aq salt dissolved by 100 pts. of water.
0°	26.0	73.31	34.67	111.74	40.75	122.22	146.02
10°	30.9	93.75	38.71	133.67	42.23	129.44	155.53
20°	35.6	116.54	42.84	159.61	43.87	137.72	167.97

(Lœwel, *loc. cit.*, p. 413.)

Percentage of Sulphate of Magnesia in aqueous Solutions of known Specific Gravity.

Sp. gr. (at 15°).	Percent of Mg O, S O_3 + 7 Aq.
1.006	0.99
1.010	1.96
1.016	2.91
1.020	3.84
1.024	4.76
1.029	5.66
1.034	6.54
1.039	7.41
1.043	8.25
1.046	9.09
1.050	9.91
1.055	10.71
1.059	11.50
1.064	12.28
1.068	13.04
1.072	13.79
1.075	14.52
1.080	15.25

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Sp. gr. (at 15°).	Percent of Mg O, S O_3 + 7 Aq.
1.084	15.96
1.088	16.66
1.091	17.35
1.095	18.03
1.098	18.69
1.101	19.35
1.104	20.00
1.107	20.63
1.111	21.26
1.114	21.87
1.117	22.48
1.120	23.07
1.124	23.66
1.128	24.24
1.131	24.81
1.134	25.37
1.137	25.92
1.140	26.47
1.143	27.01
1.145	27.53
1.147	28.05
1.150	28.57
1.153	29.07
1.155	29.57
1.158	30.06
1.161	30.55
1.164	31.03
1.166	31.51
1.168	31.97
1.170	32.43
1.172	32.88
1.174	33.33
1.207	37.50
1.230	41.17
1.250	44.44
1.270	47.36
1.282 (at 27.5°)	50.00
1.294 (at 32.5°)	52.38
1.304 (at 37.5°)	54.54

(Anthon, *J. pr. Ch.*, **7.** 71; **9.** 3; and *Gmelin's Handbook*, **3.** 239.)

From Anthon's table, Schiff calculates the following table for the anhydrous salt, by means of the formula: $D = 1 + 0.011\,p - 0{,}00003\,p^2 + 0.00000084\,p^3$; in which D = the sp. gr. of the solution, and p the percentage of substance in the solution.

Sp. gr. (at 15°).	Percent of anhydr. Mg O, S O_3.	Sp. gr. (at 15°).	Percent of anhydr. Mg O, S O_3.
1.054	5	1.326	30
1.108	10	1.384	35
1.161	15	1.446	40
1.215	20	1.511	45
1.269	25	1.580	50

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **107.** 303.)

Sp. gr. (at 15°).	Percent of Mg O, S O_3.	Percent of Mg O, S O_3 + 7 Aq.
1.01031	1	2.049
1.02062	2	4.097
1.03092	3	6.146
1.04123	4	8.195
1.05154	5	10.244
1.06229	6	12.292
1.07304	7	14.341
1.08379	8	16.390
1.09454	9	18.439
1.10529	10	20.487
1.11668	11	22.536
1.12806	12	24.585
1.13945	13	26.634
1.15083	14	28.682
1.16222	15	30.731
1.17420	16	32.780
1.18618	17	34.828
1.19816	18	36.877
1.21014	19	38.926
1.22212	20	40.975
1.23465	21	43.023
1.24718	22	45.072
1.25972	23	47.121
1.27225	24	49.170
1.28478	25	51.218
1.28802	25.248	51.726 *

(* Saturated solution.)

(Gerlach, *Sp Gew. der Salzlœsungen*, p. 22.) See also a table of the sp. gr. of a 20% solution for each degree of temperature from 0° to 50°, on p. 124 of Gerlach's work.

An aqueous solution of sp. gr. (at 23°).	Contains (by experiment) percent of Mg O, S O_3 + 7 Aq.
1.2863	52.23
1.1806	34.82
1.1162	23.21
1.0862	17.36
1.0569	11.60
1.0273	5.80

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 336.)

From these results Schiff calculates the following table by means of the formula: $D = 1 + 0.004776\,p + 0.00000846\,p^2 + 0.000000098\,p^3$; in which D = the sp. gr. of the solution, and p the percentage of substance in the solution.

Sp. gr. (at 23°).	Percent of Mg O, S O_3 + 7 Aq.	Percent of anhydr. Mg O, S O_3.
1.0048	1	0.488
1.0096	2	0.975
1.0144	3	1.463
1.0193	4	1.951
1.0242	5	2.439
1.0290	6	2.928
1.0339	7	3.416
1.0387	8	3.904
1.0437	9	4.392
1.0487	10	4.878
1.0537	11	5.366
1.0587	12	5.854
1.0637	13	6.342
1.0688	14	6.830
1.0739	15	7.318
1.0790	16	7.806
1.0842	17	8.294
1.0894	18	8.782
1.0945	19	9.270
1.0997	20	9.756
1.1050	21	10.244
1.1103	22	10.732
1.1156	23	11.220
1.1209	24	11.708
1.1262	25	12.196
1.1316	26	12.684
1.1371	27	13.172
1.1426	28	13.660
1.1481	29	14.148
1.1536	30	14.634
1.1592	31	15.122
1.1648	32	15.610
1.1704	33	16.098
1.1760	34	16.586
1.1817	35	17.074
1.1875	36	17.562
1.1933	37	18.050
1.1991	38	18.538
1.2049	39	19.026
1.2108	40	19.512

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Sp. gr. (at 23°).	Percent of $Mg O, S O_3 + 7 Aq$.	Percent of anhydr. $Mg O, S O_3$.
1.2168	41	20.000
1.2228	42	20.488
1.2288	43	20.976
1.2349	44	21.464
1.2410	45	21.952
1.2472	46	22.440
1.2534	47	22.928
1.2596	48	23.416
1.2659	49	23.904
1.2722	50	24.390
1.2786	51	24.878
1.2850	52	25.366
1.2915	53	25.854
1.2980	54	26.341

(H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 185.)

A solution of sp. gr. at 12.5°.	Contains percent of sulphate of magnesia.
1.0096	2
1.0192	4
1.0286	6
1.0379	8
1.0470	10
1.0555	12
1.0646	14
1.0711	16
1.0771	18
1.0860	20
1.0976	22
1.1092	24
1.1178	26
1.1324	28
1.1440	30
1.1557	32
1.1675	34
1.1789	36
1.1905	38
1.2122	40
1.2262	42
1.2302	44
1.2432	46
1.2562	48
1.2683	50
1.2833	52
1.2973	54

(Hassenfratz, *Ann. de Chim.*, **28.** 297.)

Sp. gr.	Percent of $Mg O, S O_3$.
1.50	44.4
1.42	39
1.30	30

The solution of 1.50 sp. gr. is the strongest liquid obtainable by boiling; that of 1.30 sp. gr. is the saturated solution at 15.56°. (Dalton, in his *New System*, Pt. **2.** 517.)

Insoluble in alcohol; tolerably soluble in spirit.

A solution (saturated at 15°) in alcohol of Sp. gr.	Percent by weight.	Contains percent of $Mg O, S O_3 + 7 Aq$.
1.000	0	50.8
0.986	10	39.3
0.972	20	21.3
0.939	40	1.62

(H. Schiff, *Ann. Ch. u. Pharm.*, 1861, **118.** 365.)

Sulphate of magnesia may be completely precipitated from its aqueous solution by adding a suitable quantity of concentrated acetic acid. (Persoz, *Ann. Ch. et Phys.*, 1836, (2.) **63.** 444.) Much more readily soluble in chlorhydric acid than in water, and this without decomposition. (Richter.)

Soluble in saturated aqueous solutions of sulphate of soda (*vid. inf.*), and of sulphate of potash (*vid. inf.*). (Karsten.) When an excess of a mixture of sulphate of magnesia and sulphate of soda is treated with water, 100 pts. of the latter at 0° dissolve 28.392 pts. of the mixed salts, viz. 15.306 pts. of $Mg O, S O_3$, and 13.086 pts. of $Na O, S O_3$. When an excess of water is employed, other relations than these must, of course, obtain. (Pfaff, *Ann. Ch. u. Pharm.*, **99.** 226.)

Rapidly soluble in a saturated solution of sulphate of copper: when this has become saturated with it, crystals of a double salt separate out; and if one continues to add sulphate of magnesia, nearly all the sulphate of copper may thus be removed from the solution. (Karsten, *Berlin Abhandl.*, 1840, p. 125.) Slowly soluble in a saturated solution of sulphate of zinc without occasioning any precipitation, until the solution has become saturated with it, when crystals of a double salt separate out. (Karsten, *loc. cit.*) Soluble in a saturated solution of chloride of sodium, without any precipitation of the latter. (Karsten, *loc. cit.*, p. 115.) Rapidly soluble in considerable quantity in a saturated solution of chloride of potassium, sulphate of potash separating out meanwhile. (Karsten, *loc. cit.*, p. 130.) Somewhat soluble in a saturated solution of chloride of ammonium, with separation of a double sulphate of ammonia and magnesia. (Karsten, *loc. cit*, p. 123.) Readily soluble in a saturated solution of nitrate of potash without causing any precipitation. (Karsten, *loc. cit.*, p. 124.)

When one equivalent of $Mg O, S O_3$, in aqueous solution, is mixed with a solution of an equivalent of chloride of potassium ($K Cl$) $\frac{56}{100}$ of it are decomposed to sulphate of potash, which may be precipitated by adding alcohol, while $\frac{44}{100}$ of it remain unchanged; when mixed with a solution of an equivalent of chloride of sodium ($Na Cl$), $\frac{545}{1000}$ of it are decomposed as before, while $\frac{455}{1000}$ of it remain unchanged. (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.)

Soluble in a saturated solution of nitrate of soda, without causing any precipitation of the latter. The sp. gr. of the solution thus obtained is the same as that of a solution prepared at the same temperature, by treating a mixture of the two salts with water. (Karsten, *loc. cit.*, p. 115.)

SULPHATE OF MAGNESIA & OF MANGANESE. $Mg O, S O_3 ; Mn O, S O_3 + 2 Aq$ Permanent. Soluble in water; if the solution is allowed to evaporate spontaneously the component salts always crystallize apart, the double salt being entirely decomposed; but if the solution — or any mixed solution of $Mg O, S O_3$ and $Mn O, S O_3$ — be evaporated at a temperature above 38° the double salt crystallizes out as such. (Arrott, *Phil. Mag.*, 1844, (3.) **24.** 502.)

SULPHATE OF MAGNESIA, OF MANGANESE, & OF POTASH. $Mg O, S O_3 ; Mn O, S O_3 ; 2 (K O, S O_3) + 12 Aq$

SULPHATE OF MAGNESIA, OF MANGANESE, & OF ZINC. $Mg O, S O_3 ; Mn O, S O_3 ; Zn O, S O_3 + (?) Aq$

SULPHATE OF MAGNESIA, OF NICKEL, & OF POTASH. $Mg O, S O_3 ; Ni O, S O_3 ; 2 (K O, S O_3) + 12 Aq$

SULPHATE OF MAGNESIA & OF POTASH. $Mg O, S O_3 ; K O, S O_3 + 6 Aq$ Permanent. This compound does not

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separate either from a solution of sulphate of potash in a saturated aqueous solution of sulphate of magnesia, or from a solution of sulphate of magnesia in a saturated solution of sulphate of potash, until these are slowly evaporated. (Karsten, *Berlin Abhandl.*, 1840, p. 121.)

100 pts. of water at °C.	Dissolve of the anhydrous salt, pts.
0°	14.1
10°	19.6
20°	25.0
30°	30.4
35°	33.2
45°	40.5
55°	47.0
60°	50.2
65°	53.0
75°	59.8

(Tobler, *Ann. Ch. u. Pharm.*, **95.** 198, and fig.)

1 pt. of the 6 Aq salt is soluble in 3.7 pts. of water at 15°; or 100 pts. of water at 15° dissolve 27 pts. of it; or an aqueous solution saturated at 15° contains 21.1% of it, or 15.4% of the anhydrous salt, and is of 1.1467 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 350.)

An aqueous solution of sp. gr. (at 15°).	Contains (by experiment) percent of $Mg O, S O_3; K O, S O_3 + 6 Aq$.
1.0150	2.35
1.0303	4.69
1.0464	7.03
1.0620	9.38
1.0954	14.06
1.1467	21.09

From these results Schiff deduces the formula: $D = 1 + 0.006415\,p + 0.00002632\,p^2$, in which D = the sp. gr. of the solution, and p the percentage of substance contained in it, by means of which Ott has calculated the following table.

Sp. gr. (at 15°).	Percent of $Mg O, S O_3; K O, S O_3 + 6 Aq$.	Percent of anhydr. $Mg O, S O_3; K O, S O_3$.
1.0064	1	0.732
1.0129	2	0.463
1.0195	3	2.195
1.0261	4	2.926
1.0327	5	3.658
1.0394	6	4.390
1.0462	7	5.121
1.0530	8	5.853
1.0599	9	6.584
1.0668	10	7.316
1.0737	11	8.048
1.0808	12	8.779
1.0878	13	9.511
1.0950	14	10.242
1.1021	15	10.974
1.1094	16	11.706
1.1167	17	12.437
1.1240	18	13.169
1.1314	19	13.900
1.1388	20	14.632
1.1463	21	15.364
1.1539	22	16.095

(H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 198.)

SULPHATE OF MAGNESIA, OF POTASH, & OF ZINC.

$Mg O, S O_3; 2 (K O, S O_3); Zn O, S O_3 + 12 Aq$

SULPHATE OF MAGNESIA & OF SODA.

I.) *anhydrous.*

$Mg O, S O_3; Na O, S O_3$

II.) *hydrated.* Permanent. The 6 Aq salt is soluble in about 3 pts. of water at 15.5°. (Murray, *Edinburgh Trans.*, **8.** 233 [T.].) Soluble in water; if the solution is allowed to evaporate spontaneously the component salts always crystallize apart, the double salt being entirely decomposed, but if the solution, — or any mixed solution of $Mg O, S O_3$, and $Na O, S O_3$, — is evaporated at a temperature above 38° the salt $Mg O, S O_3; Na O, S O_3 + 4 Aq$ crystallizes out. (Arrot, *Phil. Mag.*, 1844, (3.) **24.** 502.)

$Mg O, S O_3; Na O, S O_3 + 4 Aq$ & 6 Aq

SULPHATE OF MAGNESIA & OF ZINC. Soluble in water. (Karsten.) Permanent. If the aqueous solution is allowed to evaporate spontaneously, the component salts always crystallize apart, the double salt being entirely decomposed, but if the solution, — or any mixed solution of $Mg O, S O_3$ and $Zn O, S O_3$, — is evaporated at a temperature above 38° the salt $Mg O, S O_3; Zn O, S O_3 + 4 Aq$ crystallizes out. (Arrott, *Phil. Mag.*, 1844, (3.) **24.** 502.)

$Mg O, S O_3; Zn O, S O_3 + 4 Aq$ & 10 Aq & 14 Aq

SULPHATE OF MANGANBIAMIN.

(*AmmonioSulphate of Manganese.*)

$\left.N_2\right\} H_6 . Mn O, S O_3$

SULPHATE *of protoxide* OF MANGANESE.

a = *anhydrous.* Absorbs water from the air to form the terhydrate (*d*).

$Mn O, S O_3$

1 pt. of the anhydrous salt is
soluble in 1.770 pts. of water at 6.25° C.
“ 1.631 “ 10°
“ 1.667 “ 18.75°
“ 1.457 “ 37.5°
“ 1.494 “ 75°
$\left.\begin{array}{l}I. = 1.941\\ II. = 2.121\end{array}\right\}$ mean = 2.031 “ 101.25°

Or

100 pts. of water at 6.25° dissolve 56.49 pts. of it.
“ 10° “ 61.29 “
“ 18.75° “ 60.00 “
“ 37.5° “ 68.63 “
“ 75° “ 66.95 “
101.25° $\left.\begin{array}{l}I. = 47.143\\ II. = 51.515\end{array}\right\}$ mean 49.33 “

Or the aqueous solution
saturated at 6.25° contains 36.1% of it.
“ 10° “ 38 “
“ 18.75° “ 37.5 “
“ 37.5° “ 40.7 “
“ 75° “ 40.1 “
101.25° $\left.\begin{array}{l}I. = 32.04\\ II. = 34.00\end{array}\right\}$ mean = 33.02% of it.

(Brandes, *Pogg. Ann.*, 1830, **20.** pp. 575 – 581.)
[See also under *e.*]

The anhydrous, ignited salt is soluble in 2.5 pts. of water at 18.75°; at first it combines with the water with great avidity, and hardens like burnt gypsum, and is then dissolved with difficulty at the ordinary temperature, unless the mass is powdered. At 62.5° it is difficult to dissolve 1 pt. of it in 3 pts. of water. The assertion that the clear solution saturated at 62.5° becomes cloudy on being heated, and clears up again when allowed to cool, was not corroborated; on the other hand, it was found that the higher the temperature so much the more of the salt was dissolved. (Fr. Jahn, *Ann. der Pharm.*, 1838, **28.** 110.) *Vid. inf.*

Insoluble in absolute alcohol; but soluble to a slight extent in weak spirit. A quantity of the 7 Aq

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(*g*) salt having been boiled with alcohol of 55%, "50° grains of the hot decanted fluid were evaporated, and left 1 grain of anhydrous salt. Dilute spirit consequently takes up some of the salt, but only an insignificant quantity, hardly 0.2 percent." (Brandes, *loc. cit.*, p. 588.) [The manifest disagreement between the figures in the preceding paragraph seems at first sight to be explained by the degree mark after the 50 having been placed instead of a large 0, but Schiff (*Ann. Ch. u. Pharm.*, 1861, **118.** 366), having found, by experiment, that a saturated solution, in alcohol of 50%, contains 2% of the 4 Aq salt, asserts that Brandes really meant to print 50, and not 500, in the paragraph above cited.] For Schiff's results see the 4 Aq salt (*e*). Insoluble in spirit of 0.83 @ 0.85. 1000 pts. of spirit of 0.872 dissolve 6.3 pts. of it; and 1000 pts. of spirit of 0.905 dissolve about 11 pts. of it. (Anthon, from *Buchner's Repert.*, **2.** pp. 13, 18; in *J. pr. Ch.*, **14.** 125.) Insoluble in absolute ether, or in boiling oil of turpentine. (Brandes.)

$b = MnO, SO_3 + Aq$ Separates out when a concentrated aqueous solution of *e* is treated with sulphuric acid. (Kuehn.) Is precipitated when a solution of sulphate of manganese with excess of acid is rapidly boiled. (Kuehn & Ohlmann, *Schweigger's J. für Phys. u. Ch.*, **61.** 239 [*Gm.*].) Also on boiling a neutral solution. (Graham.)

$c = MnO, SO_3 + 2\,Aq$ Separates out on melting the 7 Aq salt in its water of crystallization, and on heating it to 81° with spirit of 55%. (Brandes, *Pogg. Ann.*, 1830, **20.** pp. 583, 586.)

$d = MnO, SO_3 + 3\,Aq$ Found at the bottoms of the vessels in which the 4 Aq salt has crystallized, also mixed with the crystals of the latter. May also be prepared by exposing the anhydrous salt to the air, and by removing 1 Aq from the 4 Aq salt by boiling alcohol, &c., &c. (Brandes.)

$d = MnO, SO_3 + 3\,Aq$ Rather difficultly soluble in water [T.]. Brandes remarks that he cannot agree with Thomson in considering it as "difficultly soluble," and that T.'s statement is improbable, since when this hydrate is treated with a sufficient amount of water it is soon converted into the 4-hydrated salt, which is very readily soluble. (Brandes, *Pogg. Ann.*, 1830, **20.** 567.)

$e = MnO, SO_3 + 4\,Aq$ (*Common Sulphate of Manganese.*) Permanent. Crystallizes out at ordinary temperatures. This hydrate is present in the aqueous solution at temperatures between 20° and 30°. (Mitscherlich.) Less soluble in boiling than in cold water. (Brandes.) 100 pts. of water at 4.4° dissolve 31 pts. of the salt previously dried at 65.5°. Insoluble in alcohol. (John, *Ann. Phil.*, **2.** 103 [T.].)

Soluble in	0.833 *pts.	of water at	6.25°
"	0.790	"	10°
"	0.820	"	18·75°
"	0.670	"	37.50°
"	0 690	"	75°
"	1.070	"	101.25°

Or

100 pts. of water at	6.25°	dissolve	113.22	pts. of it.
"	10°	"	123	"
"	18.75°	"	122	"
"	37.50°	"	149	"
"	75°	"	144	"
"	101.25°	"	93	"

Or the aqueous solution

saturated at	6.25°	contains	53.1%	of it.
"	10°	"	56	"
"	18.75°	"	55	"
"	37.50°	"	59.9	"
"	75°	"	59	"
"	101.25°	"	48.4	"

(Brandes, *Pogg. Ann.*, 1830, **20.** pp. 575 – 581.)

In the same connection Brandes insists that the statements of previous observers are incorrect, and that the figures given in the text-books of his time, indicating that 1 pt. of this salt requires 2.5 pts. of cold water for its solution must be erroneous. It is, however, very probable that some of B.'s solutions were supersaturated. See below.

The salt does not melt in its water of crystallization. A solution saturated at 6.25° being heated, while new portions of the salt were gradually added, remained clear until the temperature had risen to 92.5°. When it began to lose its transparence, at 93.75°, a crust of salt formed on top, and the whole of the liquid became cloudy, at 97.5° the bottom of the dish was covered with a crust of salt, and at 100° the entire liquid was thick, cloudy, and gelatinous. At 102.1° the constant boiling point was attained. On now allowing this liquid to cool it gradually became clearer and clearer, the crusts of salt disappeared, and when the temperature had fallen to 21.25° the salt had entirely redissolved. On heating to boiling a clear solution saturated at 6.25°, in such a manner that little or no water could be lost by evaporation, it became cloudy, and finally quite white and opaque, but on allowing it to cool it gradually became again perfectly clear; on trial it was found that 1% of the salt crystallized out on boiling for a few minutes, and a larger quantity when the ebullition was longer continued. The salt thus separated still contains 4 equivs. of Aq. (Brandes, *loc. cit.*) When the solution saturated at 50° is heated, a portion of the salt is deposited, but on cooling to 50° this precipitate redissolves. (Berzelius's *Lehrb.*) A portion of the 4 Aq salt having been left in contact with water during several days, and frequently agitated, contained of the anhydrous salt at 6.25° C., 31.85 pts.,* i. e. 1 pt. of the salt (calculated as anhydrous) dissolves in 2.14 pts. of water at 6.25°; or 100 pts. of water at 6.25° dissolve 46.74 pts. of it. On cooling to 6.25° a boiling saturated aqueous solution of the salt, it was found that the solution then contained 35.07% of the anhydrous salt, i. e. 1 pt. of the anhydrous salt remains dissolved in 1.852 pts. of water at 6.25°; or 100 pts. of water at 6.25° dissolve 54.00 pts. of it. In a repetition of the last experiment 36.1% of the anhydrous salt were found in the solution at 6.25°; and the author "takes this experiment as the more accurate, since in it the largest quantity of salt was dissolved." This number 36.1 does not agree with the other figures of the determination, but the error appears to be purely typographical: from it Brandes deduces

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* See below, for method of determining the solubility in this case. As a control, another experiment was made at 6.25°, in which known portions of the 4 Aq salt were added, finally a grain at a time, to a determined quantity of water, until no more could be dissolved, even after standing a week The solution thus obtained contained 55 percent of the 4 Aq salt. The author considers the results given in the text as the most reliable.

* In another experiment, made for the purpose of controlling this, Brandes gives the percentage of anhydrous salt as "33.1," but this does not agree with the other figures of his determination, which indicate 35.71 percent of the anhydrous salt. F. H S

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the solubility of the 4-hydrated salt (for temperature 6.25°) as given above. Compare foot-note on page 614.

Insoluble in absolute alcohol. At 12.5° absolute alcohol does not remove any of its water of crystallization, but abstracts one equivalent of it at the temperature of boiling. (Brandes, *loc. cit.*, p. 573.)

A solution (saturated at 15°) in alcohol of		
Sp. gr.	Percent by weight.	Contains percent of $MnO, SO_3 + 4$ Aq.
1.000	0	56.25
0.986	10	51.40
0.917	50	2.00
0.895	60	0.66

(H. Schiff, *Ann. Ch. u. Pharm.*, 1861, **118.** 365.)

When the salt is dissolved at the ordinary temperature in alcohol of from 10 to 50% a curious phenomenon occurs as soon as the solution has become saturated; two layers of liquid being formed, the lower containing less alcohol and more salt than the upper, which contains but little of the salt. By direct experiment it was found that this separation did not occur when alcohol of less than 15%, or more than 50% was employed, at the ordinary temperature. On heating, a similar separation occured in solutions in alcohol of 13, 14, and 60%, but on solutions in alcohol of 10 @ 12% warming had no influence. [For the details of experiments on this point, see Schiff's memoir, *loc. cit.*, p. 370.]

Insoluble in absolute ether, and this does not remove any of its water of crystallization, at least at the ordinary temperature. (Brandes, *loc. cit.*) Insoluble in boiling oil of turpentine, but this removes one equivalent of its water. (Brandes, *loc. cit.*, p. 574.)

$f = MnO, SO_3 + 5$ Aq Crystallizes from solutions evaporated at temperatures between 7° and 20°. (Regnault, *Ann. Ch. et Phys.*, **76.** 200 [*Gm.*].) Soluble in water. Insoluble in absolute alcohol. (Brandes, *Pogg. Ann.*, 1830, **20.** 583.) The 5 Aq salt is soluble in 1 pt. of water at 18.75°. (Fr. Jahn, *Ann. der Pharm.*, 1838, **28.** 110.)

$g = MnO, SO_3 + 7$ Aq Crystallizes from solutions evaporated at temperatures between —4° and +5°. Efflorescent. Melts very quickly in its water of crystallization, becoming soft at 12.5°, and softer as the temperature rises, being tolerably fluid at 38°, though at no time can a complete solution be thus obtained, the same opaque, sirupy condition existing at 75°, and even on boiling. This behavior appears to depend upon the separation of the bihydrate, which remains disseminated in the melted quinthydrate. When heated with absolute alcohol it becomes soft at 15°, but no more so than if it were heated by itself to this temperature, and gives up some of its water, so that at 18.75° it becomes hard again, and at 25° has become completely converted into the 4 Aq salt. On boiling with absolute alcohol still more water is removed, and the 3 Aq salt formed, but none of the salt itself is dissolved by absolute alcohol. On heating another portion of the salt in alcohol of 55% it became soft at 11.25°, fell to a fine crystalline meal at 12.5°, soft at 15°, a portion becoming tolerably fluid at 17.5°, and more fluid as the temperature was elevated, being tolerably limpid at 37.5°, and still more so up to 75°, when the mass again began to become sirupy and suddenly solidified at 81.25°, from separation of the 2 Aq salt. On boiling the salt with spirit of 55%, and examining the decanted solution, it was found to contain 0.2% of the anhydrous salt, hence 1 pt. of anhydrous MnO, SO_3 is soluble in 499 pts. of boiling alcohol of 0.55%. Insoluble in absolute ether at temperatures between 5° and 7°, and none of its water is removed by the ether. (Brandes, *Pogg. Ann.*, 1830, **20.** pp. 568, 582, 584 - 588.)

The 7 Aq salt requires hardly 0.5 pt. of water to dissolve it at 18.75°. (Fr. Jahn, *Ann. der Pharm.*, 1838, **28.** 110.) Sulphate of manganese may be completely precipitated from its aqueous solution by adding a suitable quantity of concentrated acetic acid. (Persoz, *Ann. Ch. et Phys.*, 1836, (2.) **63.** 444.)

When one equivalent of MnO, SO_3, in aqueous solution, is mixed with a solution of an equivalent of chloride of potassium (KCl) $\frac{58}{100}$ of it are decomposed to sulphate of potash, which may be precipitated by adding alcohol, while $\frac{42}{100}$ of it remain unchanged. (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.)

SULPHATE *of sesquioxide* OF MANGANESE. $Mn_2O_3, 3SO_3$ Exceedingly hygroscopic. Decomposed by water with evolution of heat, also by dilute acids, by spirit at once, and by absolute alcohol after a time. As good as insoluble in concentrated sulphuric acid; and is not acted upon by it at temperatures lower than that of ebullition, but when boiled with strong sulphuric acid it is gradually decomposed. Soluble in concentrated chlorhydric acid, with evolution of chlorine when the solution is heated. Insoluble in concentrated nitric acid, which has no action upon it at temperatures below 100°. (Carius, *Ann. Ch. u. Pharm.*, **98.** 64.)

SULPHATE *of protoxide* OF MANGANESE, OF NICKEL, & OF POTASH. $MnO, SO_3; NiO, SO_3; 2(KO, SO_3) + 12$ Aq

SULPHATE *of protoxide* OF MANGANESE & OF POTASH. $MnO, SO_3; KO, SO_3 + 4$ Aq Permanent. Tolerably soluble in cold, much more soluble in boiling water. (Pierre, *Ann. Ch. et Phys.*, (3.) **16.** 254.)

SULPHATE *of sesquioxide* OF MANGANESE & OF POTASH. (*Potash Manganese Alum.*) $Mn_2O_3, 3SO_3; KO, SO_3 + 24$ Aq Soluble, with decomposition, in water. (Mitscherlich.)

SULPHATE *of protoxide* OF MANGANESE, OF POTASH, & OF ZINC. $MnO, SO_3; 2(KO, SO_3); ZnO, SO_3 + 12$ Aq

SULPHATE *of protoxide* OF MANGANESE & OF SODA.

I.) Permanent. More soluble in water than $MnO, SO_3; NaO, SO_3 + 2$ Aq the 6-hydrated salt (No. 2). The aqueous solution is not decomposed at 100°, and on evaporating it at 55° the double salt crystallizes out as such, but when the solution is allowed to evaporate spontaneously the component salts crystallize out separately. (Arrott.)

II.) Deliquesces in moist, but effloresces in $MnO, SO_3; NaO, SO_3 + 6$ Aq warm air. Soluble in 1.2 pts. of boiling water. (Geiger.)

SULPHATE OF MELAMIN. Sparingly soluble in cold, much more soluble in warm water.

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Sulphate of MelAnilin. Somewhat difficultly soluble in cold, much more easily soluble in boiling water. Soluble in alcohol, and ether. (Hofmann, *J. Ch. Soc.*, **1.** 291.)

$N_2 \left\{ \begin{matrix} C_{12}\ H_4\ (C_2\ N) \\ C_{12}\ H_5 \\ H_4 \end{matrix} \right. . H\ O, S\ O_3$

Sulphate of MeNaphthalamin. Tolerably soluble in alcohol, and ether.

Sulphate of Menispermin.

Sulphate of Mercur(*ic*)ammonium.

$N \left\{ \begin{matrix} H_3 \\ Hg \end{matrix} \right. . O, S\ O_3$

Sulphate of Mercur(*ic*)ammonium with *protoxide* of Mercury.

I.) $N \left\{ \begin{matrix} H_3 \\ Hg \end{matrix} \right. O, S\ O_3 ; Hg\ O$

II.) $N \left\{ \begin{matrix} H_3 \\ Hg \end{matrix} \right. O, S\ O_3 ; 2\ Hg\ O$

III.) $N \left\{ \begin{matrix} H_2 \\ 2\ Hg \end{matrix} \right. O, S\ O_3 ; 2\ Hg\ O$

All these bodies are decomposed by water. (Millon, *Ann. Ch. et Phys.*, (3.) **18.** 402.) The last is only very slightly soluble in water; but soluble in chlorhydric, and nitric acids. (Kane.)

Sulphate of *di*Mercur(*ous*)ammonium.

$N \left\{ \begin{matrix} H_2 \\ 2\ Hg_2 \end{matrix} \right. . O, S\ O_3$

Sulphate of *di*Mercur(*ous*)ammonium with *dinOxide of* Mercury.

$N \left\{ \begin{matrix} H_2 \\ 2\ Hg_2 \end{matrix} \right. . O, S\ O_3 ; 2\ Hg_2\ O$

Sulphate of Mercur(*ous*)Ethyl. Soluble in alcohol. (Duenhaupt.)

(*Sulphate of HydrargEthyl.*)
$C_4\ H_5\ Hg_2\ O, S\ O_3$

Sulphate *of dinoxide* of Mercury. Very sparingly soluble in cold, decomposed by boiling water, with formation of an insoluble basic and a soluble acid salt of the protoxide. (H. Rose.) Soluble in 500 pts. of cold, and in 300 pts. of boiling water. Easily soluble in hot, less soluble in cold dilute sulphuric acid. (Berzelius's *Lehrb.*) Only soluble to an insignificant extent in free acids. Its best solvents are dilute sulphuric acid and aqueous solutions of the sulphates of potash and soda. (H. Rose, *Tr.*) Soluble in dilute nitric acid, from which solution it may be almost entirely precipitated on the addition of dilute sulphuric acid. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 319.) Somewhat more soluble in boiling than in cold weak nitric acid. (Stædeler, *Ann. Ch. u. Pharm.*, **87.** 133.) Abundantly soluble in hot concentrated sulphuric acid.

$Hg_2\ O, S\ O_3$

When treated with aqueous solutions of the alkaline chlorides, and especially if these are hot, a certain amount of bichloride of mercury forms and is dissolved. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 179.)

Sulphate *of protoxide* of Mercury.

I.) *mono.* Decomposed by water, even in the cold, but more quickly when this is warm, to the trisulphate ($3\ Hg\ O, S\ O_3$) and free sulphuric acid containing a little protoxide of mercury in solution. No acid salt is formed. (H. Rose, *Pogg. Ann.*, **83.** 141.) Soluble, with decomposition to protochloride of mercury, in an aqueous solution of chloride of sodium. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 182.) Completely insoluble in strong alcohol. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 182.) Soluble in dilute sulphuric acid. (Geiseler.) Decomposed by all of the hydrogen acids, free sulphuric acid remaining in solution. (Berzelius, *Lehrb.*)

$Hg\ O, S\ O_3$

II.) *tri.* Soluble in 2000 pts. of cold, and in 600 pts. of boiling water. (Fourcroy.) Sparingly soluble in warm dilute sulphuric acid. (H. Rose, *Pogg. Ann.*, **83.** 141.) Readily decomposed to protochloride of mercury (Hg Cl) and dissolved by aqueous solutions of the alkaline chlorides, especially when the solutions are hot. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 182.)

(*Turpeth mineral.*)
$3\ Hg\ O, S\ O_3$

III.) "*acid.*" Has no existence. (H. Rose, *loc. cit.*, pp. 140, 141.)

Sulphate *of dinoxide & of protoxide* of Mercury. Insoluble in cold water. Not decomposed by boiling water. (Brooke.)

$2\ Hg_2\ O, S\ O_3 ; 4\ Hg\ O, S\ O_3$

Sulphate *of protoxide* of Mercury & of Potash.

$3\ (Hg\ O, S\ O_3) ; K\ O, S\ O_3 + 2\ Aq$

Sulphate of Mercury with Sulphide of Mercury. Insoluble in water. (H. Rose.)

$Hg\ O, S\ O_3 ; 2\ Hg\ S$

Sulphate of Methyl.

I.) *acid.* *Vid.* MethylSulphuric Acid.

$C_2\ H_3\ O, H\ O, 2\ S\ O_3$

II.) *normal.* Slowly decomposed by cold, rapidly by boiling water. Rapidly decomposed by wood-spirit. (Dumas & Péligot.)

(*Methylic Sulphate. Sulphuric Methylether. Sulphate of Methylene.*)
$C_2\ H_3\ O, S\ O_3$

Sulphate of Methylamin. Very soluble in water. Insoluble in alcohol. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 460.)

"***Bi*Sulphate of Methylene.**" *Vid.* MethylSulphuric Acid.

Sulphate of Methyl*di*EthylAmylAmmonium.

Sulphate of MethylEthylConiin. Deliquescent. Readily soluble in water. (v. Planta & Kekulè, *Ann Ch. u. Pharm.*, **89.** 139.)

Sulphate of MethylNicotin. Soluble in water.

Sulphate of MethylPhenidin.

Sulphate of MethylNitroPhenidin. Easily soluble in water, especially when this is acidulated with sulphuric acid. (Cahours, *Ann. Ch. et Phys.*, (3.) **27.** 449.)

$N \left\{ \begin{matrix} C_{12}\ H_4\ (N\ O_4) \\ C_2\ H_3 \\ H \end{matrix} \right. . H\ O, S\ O_3$

Sulphate of MethylTungsten. Very deliquescent and soluble in water. Easily soluble in alcohol of 40°. Sparingly soluble in ether. (Riche, *Ann. Ch. et Phys.*, (3.) **50.** 75.)

Sulphate *of protoxide* of Molybdenum.

I.) *normal.* Decomposed by water into the following basic and acid salts.

$Mo\ O, S\ O_3$

II.) *basic.* Insoluble in water.

III.) *acid.* Soluble in water. (Berzelius.)

Sulphate *of binoxide* of Molybdenum. Soluble in water.

$Mo\ O_2, 2\ S\ O_3$

Sulphate of Molybdic Acid.

I.) *normal.* Deliquescent. Partially soluble in water. (Anderson, in Berzelius's *Lehrb.*)

$Mo\ O_3, 3\ S\ O_3 + 2\ Aq$

II.) *basic.* Sparingly soluble in water. Insoluble in alcohol. (Berzelius.)

Sulphate *of binoxide* of Molybdenum & of Potash. Readily soluble in water. (Berzelius.)

Sulphate of Morphine.

I.) *normal.* Very readily soluble in water, and alcohol. Soluble in 2 pts. of cold water, the

$N \left\{ \begin{matrix} C_{34}\ H_{18}\ O_6 \\ H \end{matrix} \right. . H\ O, S\ O_3 + 5\ Aq$

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aqueous solution containing 33.33% of it. (M. R. & P.) Soluble in 2 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, 8. 201, in Canstatt's *Jahresbericht für* 1854, p. 76.)

II.) *acid.*

Sulphate of Naphtylamin. Soluble in water. Easily soluble in water acidulated with chlorhydric acid. Sparingly soluble in cold alcohol of 86%, more soluble in boiling alcohol. (Béchamp, *Ann. Ch. et Phys.*, (3.) 42. 189.) Difficultly soluble in cold water or alcohol; slowly but rather abundantly soluble in boiling alcohol, so that the saturated boiling solution becomes completely solid on cooling. (Zinin.) Less soluble in water than sulphate of phthalamin. (Schuetzenberger & Willm.)

(*Sulphate of Naphtalidam. Sulphate of Naphtalidin.*)

$N\begin{cases}C_{20}H_{8}''\\H\end{cases}.\,H\,O,\,S\,O_3$

Sulphate of Narcein. Sparingly soluble in cold, readily soluble in boiling water.

Sulphate of Narcotin. Soluble in water.

Sulphate of Nickel.

I.) *normal.*

a = anhydrous. 100 pts. of the aqueous solution saturated at its boiling point (112.5°) contain 65 pts. of the dry salt; or 100 pts. of water at 112.5° dissolve 185.71 pts. of it; or 1 pt. of the dry salt is soluble in 0.5384 pt. of water at 112.5°. (T. Griffiths, *Quar. J. Sci.*, 1825, 18. 90.)

100 pts. of water at °C.	Dissolve of the anhydrous salt, pts.
2°	30.4
16°	37.4
20°	39.7
23°	41.0
31°	45.3
41°	49.1
50°	52.0
53°	54.4
60°	57.2
70°	61.9

(Tobler, *Ann. Ch. u. Pharm.*, 95. 198, and fig.)

b = hydrated. Efflorescent. Soluble in 3 pts. of water at 12.5°. Insoluble in alcohol or ether. Alcohol precipitates it from the aqueous solution. (Tupputi, *Ann. de Chim.*, 1811, 78. pp. 153, 154.) 100 pts. of water at 15.5° dissolve 75.6 pts. of the crystallized salt. [T.] Easily soluble in alcohol, and ether. [?] (Berzelius, *Lehrb.*, 3. 663.)

$Ni\,O,\,S\,O_3+7\,Aq$

Sulphate of nickel may be completely precipitated from its aqueous solution by adding a suitable quantity of concentrated acetic acid. (Persoz, *Ann. Ch. et Phys.*, 1836, (2.) 63. 444; also in his *Chim. Moléc.*, p. 346.) It crystallizes from its solution in chlorhydric acid.

II.) *basic.* Very slightly soluble in water. (Berzelius.) Incompletely soluble in water, and the portion insoluble in water is only slightly soluble in ammonia-water. (Tupputi, *Ann. de Chim.*, 1811, 78. 153.)

Sulphate of Nickel & of Potash. Permanent. Sparingly soluble in water. (Proust.) Permanent. Soluble in 8 @ 10 pts. of water at 12.5°. (Tupputi, *Ann. de Chim.*, 1811, 78. 166.)

$Ni\,O,\,S\,O_3;\ K\,O,\,S\,O_3+6\,Aq$

100 pts. of water at °C.	Dissolve pts. of the anhydrous salt.
0°	5.3
10°	8.9
14°	10.5
20°	13.8
30°	18.6
36°	20.4
49°	27.7
55°	32.4
60°	35.4
75°	45.6

(Tobler, *Ann. Ch. u. Pharm.*, 95. 198, and fig.)

Considerably less soluble in water than the corresponding cobalt salt. The aqueous solution saturated (slightly supersaturated), at

20° contains 8.729% of the anhyd. salt.
40° " 12.270 " "
60° " 17.555 " "
80° " 22.021 " "

(C. v. Hauer, *J. pr. Ch.*, 1858, 74. 435.)

Sulphate of Nickel, of Potash, & of Zinc.

$Ni\,O,\,S\,O_3;\ 2(K\,O,\,S\,O_3);\ Zn\,O,\,S\,O_3+12\,Aq$

Sulphate of Nickel & of Zinc. Very efflorescent. Soluble [the 6 Aq salt?] in 3 @ 4 pts. of water at 12.5°. Insoluble in alcohol. Completely soluble in ammonia-water, the solution subsequently undergoing decomposition. (Tupputi, *Ann. de Chim.*, 1811, 78. pp. 168, 150, 174.)

$Ni\,O,\,S\,O_3;\ Zn\,O,\,S\,O_3+6\,Aq\ \&\ +13\,Aq$

Sulphate of Nickel*ter*amin. Decomposed by water. (H. Rose.)

(*AmmonioSulphate of Nickel.*)

$N_3\begin{cases}H_9\end{cases}.\,Ni\,O,\,S\,O_3$

Sulphate of Nicotin. Readily soluble in water, and alcohol.

$N_2\begin{cases}(C_{10}H_7''')_2\end{cases}.\,H\,O,\,S\,O_3$

Sulphate of NiNaphthylamin. Soluble in water. (C. S. Wood.)

$C_{20}H_8N_2O_2,\,H\,O,\,S\,O$

Sulphate of (α)NitrAnilin. Soluble in water. (Arppe.)

Sulphate of (β)NitrAnilin.

I.) *normal.* Permanent. Decomposed by water. (Arppe, *Ann. Ch. u. Pharm.*, 93. 364.)

II.) *acid.*

$N\begin{cases}C_{12}H_4(N\,O_4)\\H_2\end{cases}.\,H\,O,\,H\,O,\,2\,S\,O_3$

Sulphate of Nitrous Acid.

(*Sulphate of Nitric Oxide* ($N\,O_2,\ 2\,S\,O_3$) of Rose.)

a = $N\,O_3,\ 2\,S\,O_3$ (Bruening, *Ann. Ch. u. Pharm.*, 98. 382.) Deliquescent. Rapidly soluble in water, with decomposition; also soluble in aqueous solutions of caustic alkalies and of salts. Abundantly soluble in cold concentrated sulphuric acid. (H. Rose.) Insoluble in cold, and but slowly soluble, with decomposition, in hot concentrated sulphuric acid. (Prevostaye.) Slowly soluble in cold concentrated sulphuric acid.

b = Ditto with Sulphuric Acid. Deliquescent. Rapidly soluble in water, with rise of temperature. (W. Henry.)

" $N\,O_2,\ 2\,S\,O_3;\ 2\,H\,O,\,S\,O_3$ "

Sulphate of NitrAzoPhenylamin. Decomposed by water, but is soluble in water acidulated with sulphuric acid.

$N_2\begin{cases}C_{12}H_3(N\,O_4)''\\H_4\end{cases}.\,H\,O,\,S\,O_3$

Sulphate of NitroCodein. Very soluble in boiling water.

$N\begin{cases}C_{36}H_{19}(N\,O_4)\,O_6'\\H\end{cases}.\,H\,O,\,S\,O_3$

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Sulphate of NitroCumidin. Soluble in water.
$N\left\{\begin{matrix}C_{18}H_{10}(NO_4)\\H_2\end{matrix}\right. . HO, SO_3 + 2\,Aq$

Sulphate of NitroHarmalin.

I.) *normal.* Soluble in water acidulated with sulphuric acid.

II.) *bi.* Sparingly soluble in cold water.
$N_2\left\{C_{26}H_{13}(NO_4)O_2{}^{vi}\right. . HO, HO, 2SO_3$

Sulphate of NitroHarmin.

I.) *normal.*

II.) *bi.*

Sulphate of NitroMelanilin. Very readily soluble in water. (Hofmann, *J. Ch. Soc.*, **1.** 308.)

Sulphate of NitroMesidin. Decomposed by water. Soluble in water acidulated with sulphuric acid. Soluble in alcohol. (Maule, *J. Ch. Soc.*, **2.** 120.)

Sulphate of NitroPapaverin. Sparingly soluble in water.

Sulphate of NitroTyrosin. Soluble in water.
$2\,C_{18}H_{10}(NO_4)NO_6, 2\,HO, S_2O_6$

Sulphate of Octyl. *Vid.* OctylSulphuric Acid.

Sulphate of Octylamin. Easily soluble in water. (Cahours.)
(*Sulphate of Caprylamin.*)
$N\left\{\begin{matrix}C_{16}H_{17}\\H_2\end{matrix}\right. . HO, SO_3$

Sulphate *of protoxide* **of Osmium.** Easily soluble in water, and alcohol.
OsO, SO_3

Sulphate *of the blue oxide* **of Osmium.** Insoluble in water. Before drying, it is soluble in aqueous solutions of the caustic and carbonated alkalies.

Sulphate *of binoxide* **of Osmium.** Soluble in water.
$OsO_2, 2\,SO_3$

Sulphate of Oxycanthin.

Sulphate of "OxyCobaltiaque" (of Fremy). Permanent. Soluble, without decomposition, in an ammoniacal liquor. Immediately decomposed by water. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 277.)
$5\,NH_3 . Co_2O_4, 2SO_3 + 3\,Aq$

Sulphate of Pallad*bi*amin. Soluble in warm, less soluble in cold ammonia-water.
$N_2\left\{H_6\right. . PdO, SO_3 + Aq$

Sulphate of Palladammonium. Easily soluble in boiling, very sparingly soluble in cold water. (Kane, *Phil. Trans.*, 1842, p. 292.)
$N\left\{\begin{matrix}H_3\\Pd\end{matrix}\right. . O, SO_3$

Sulphate of Palladium.

I.) *mono.*

a = anhydrous. Absorbs one equivalent of water from the air without becoming damp. If the air be very damp it subsequently deliquesces completely. (Kane, *Phil. Trans.*, 1842, p. 288.) Decomposed by water, even in the cold, with separation of a basic salt. The water retains sulphuric acid in solution, and this contains traces of oxide of palladium, but no acid salt is formed. (H. Rose, *Pogg. Ann.*, **83.** pp. 143, 140.)
PdO, SO_3

b = hydrated. Deliquesces in damp air. Very soluble in water. (Kane, *Phil. Trans.*, 1842, p. 287.) Soluble in water. (Fischer, Berzelius.) When a strong aqueous solution is mixed with much water it is decomposed, a basic salt separating. This precipitation may be prevented by acidulating the solution with sulphuric acid. (Kane, *loc. cit.*, p. 288.)
$PdO, SO_3 + 2\,Aq$

II.) *basic.* Insoluble in water. Easily soluble in chlorhydric acid. (Kane, *Phil. Trans.*, 1842, pp. 288–291.) Soluble in ammonia-water.
$8\,PdO, SO_3 + 6\,Aq\ \&\ + 10\,Aq$

Sulphate of Palladium & of Potash.

Sulphate of Papaverin.

Sulphate of *di*Phenin. Insoluble in cold water, or in alcohol. Soluble in boiling water acidulated with chlorhydric acid. (Laurent & Gerhardt.)

Sulphate of Phenyl. *Vid.* PhenylSulphuric Acid.

Sulphate of PhenylAcetosamin. Soluble in water, and alcohol.
(*Sulphate of AcetylAnilin.*)

Sulphate of PhenylCarbamic Acid.
$N\left\{\begin{matrix}C_2O_2{}''\\C_{12}H_5\\H\end{matrix}\right. . HO, HO, SO_3$

Sulphate of Phloramin. Soluble in water.
$C_{12}H_7NO_4, HO, SO_3$

Sulphate of Phthalamin. Soluble in water. More soluble in water than sulphate of naphthylamin. (Schuetzenberger & Willm.)
$NC_{16}H_9O_4, HO, SO_3$

Sulphate of Phthalidin. Much less soluble in water than the chlorhydrate or nitrate. (Dusart.)
$N\left\{\begin{matrix}C_{16}H_8{}''\\H\end{matrix}\right. . HO, SO_3$

Sulphate of Picolin.

I.) *normal.* Decomposed to an acid salt by boiling with water. Insoluble in an excess of picolin. (Unverdorben.)

II.) *bi.* Readily deliquescent. Very soluble in alcohol. Insoluble in ether. (Anderson.)
$N\left\{C_{12}H_7{}'''\right. . HO, HO, SO_3$

Sulphate of Piperidin. Deliquescent. Very soluble in water. (Cahours, *Ann. Ch. et Phys.*, (3.) **38.** 84.)
$N\left\{\begin{matrix}C_{10}H_{10}{}''\\H\end{matrix}\right. . HO, SO_3$

***Bi*Sulphate of Platin(*ic*)ammonium.** Tolerably easily soluble in warm water. Insoluble in alcohol. (Gerhardt.)
(*Sulphate of Platinamin.*)
$N\left\{\begin{matrix}H_3\\Pt''\end{matrix}\right. . O_2, 2SO_3$

Sulphate of Platin(*ous*)*bi*amin. Soluble in 32 pts. of water at 16 . 5°; and more readily in boiling water. (Reiset, *Ann., Ch. et Phys.*, (3.) **11.** 422.) Soluble in 50 @ 60 pts. of boiling water, and much less soluble in cold water. Almost insoluble in ordinary alcohol. Soluble in dilute sulphuric acid, separating out as the liquor becomes more concentrated, and decomposing after a certain degree of concentration is reached. (Peyrone, *Ann. Ch. et Phys.*, (3.) **12.** pp. 202, 207.)
(*Sulphate of diPlatosamine.*
AmmonioSulphate of protoxide of Platinum.)
$N_2\left\{H_6\right. . PtO, SO_3$

Sulphate of Platin(*ous*)ammonium. Sparingly soluble in cold, more soluble in hot water. (Reiset, *Ann. Ch. et Phys.*, (3.) **11.** 427.) Soluble in ammonia-water with combination. (*Ibid.*, p. 431.)
$N\left\{\begin{matrix}H_3\\Pt\end{matrix}\right. O, HO, SO_3$

Sulphate of PlatinoPyridin. Readily soluble in water.

Sulphate *of protoxide* **of Platinum.** Deliquescent. Soluble in water. (Vauquelin.)
PtO, SO_3

Sulphate *of binoxide* **of Platinum.** Deliquescent. Soluble in water, alcohol, and ether (E. Davy); being the only
$PtO_2, 2\,SO_3$

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metallic sulphate, except tersulphate of iron, which is readily soluble in alcohol (Gmelin). Also soluble in phosphoric, chlorhydric, and nitric acids. (E. Davy.)

SULPHATE *of binoxide* **OF PLATINUM & OF POTASH.**

I.) *basic.* Insoluble in water. Readily soluble in aqua-regia, and in boiling chlorhydric acid, but is not attacked by boiling nitric, sulphuric, phosphoric, or acetic acids, or by ammonia-water, or caustic potash. (E. Davy.)

SULPHATE *of binoxide* **OF PLATINUM & OF SODA.** Resembles the potash salt.

SULPHATE OF PLATOSAMMONIUM. *Vid.* Sulphate of Platin(*ous*)amin.

SULPHATE OF PLATOSOPYRIDIN.

SULPHATE OF *bi***PLUMBIC***tri***ETHYL.** (*Sulphate of ⅔ PlombEthyl.*) $Pb_2(C_4H_5)_3O, SO_3$ Soluble in water, and in alcohol. (Buckton.) Nearly insoluble in water, absolute alcohol, or ether. But readily soluble in water or alcohol when these are acidulated with sulphuric or chlorhydric acid.

SULPHATE OF POTASH. KO, SO_3 Permanent. Soluble in water, with slight reduction of temperature.

100 pts. of water at	0°	dissolve	8.36	pts. of it.
"	12.72°	"	10.57	"
"	49.08°	"	16.91	"
"	63.90°	"	19.29	"
"	101.50°	"	26.33	"

(Gay-Lussac, *Ann. Ch. et Phys.*, (2.) **11.** 311.) The curve of solubility of sulphate of potash is,

$$y = 0.1741x^{\circ} + 8.36.$$

(Gay-Lussac, *loc. cit.*)

Or 100 pts. of water dissolve pts. =

$$8.36 + 0.1741\ T^{\circ}.$$

(H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 261.)

That is to say, 100 pts. of water at 0° dissolve 8.36 pts. of it, and for every degree above 0° 0.1741 pt.

By direct experiment Kopp found that 100 pts. of water at 15.1° dissolved 10.2 pts. of the salt; according to the above formula 11 pts. should have been dissolved.

Soluble in	9.96	pts. of water at	12.5°
"	9.6	"	15°
"	6.8	"	31.25°
"	5.84	"	37.5°
"	4.0	"	50°
"	4.4	"	56.25°
"	4.5	"	68.75°
"	4.0	"	87.5°
"	3.7	"	100°

Or 100 pts. of water

at 12.5°	dissolve	10	pts. of it.
" 15°	"	10.38	"
" 31.25°	"	14	"
" 37.5°	"	17	"
" 50°	"	25	"
" 56.25°	"	22	"
" 68.75°	"	21.95	"
" 87.5°	"	25	"
" 100°	"	26	"

Or the aqueous solution saturated at °C.	Contains percent of it.
12.5°	9.125
15°	9.400
31.25°	12.812
37.5°	14.600
50°	20.000
56.25°	18.500
68.75°	18.000
87.5°	20.000
100°	21.100

(R. Brandes & Firnhaber, from *Stoltze's Berl. Jahrb.*, *Jahrg.* 2. *Abth.*, 68 – 74, in *Brandes's Archiv.*, 1823, **5.** 91.)

The saturated aqueous solution boils at 103°. (Kremers, *Pogg. Ann.*, **99.** 43.) 100 pts. of the aqueous solution saturated at the boiling point (101.7°), contain 17.5 pts. of the dry salt; or 100 pts. of water at 101.7 dissolve 21.212 pts. of it; or 1 pt. of the salt is soluble in 4.714 pts. of water at 101.7°. (Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) 100 pts. of water at 102.8° dissolve 29 pts. of it. (Penny, *Phil. Mag.*, (4.) **10.** 406.) The aqueous solution saturated at 18.75° is of 1.0798 sp. gr.; it contains 9.71% of the salt; or 100 pts. of water at 18.75° dissolve 10.74 pts. of it; or, in other words, 1 pt. of the salt is soluble in 9.3 pts. of water at 18.75°. (Karsten, *Berlin Abhandl.*, 1840, p. 101. The aqueous solution saturated at 12.5° contains 6.4% of it. (Hassenfratz, *Ann. de Chim.*, **28.** 291.) The cold saturated aqueous solution contains 5.2% of it (Fourcroy); when saturated at 10° it contains 15.7%. (Eller, cited by Hassenfratz.) 100 pts. of water at 15.5° dissolve 7.3 @ 6.25 pts. of it, and at 100°, 20 pts. (Ure's *Dict.*) 100 pts. of boiling water dissolve 24.2 pts. of it. (Wenzel, *Verwandtschaft*, p. 310 [T.].)

Soluble in 9.081 pts. of water at 15°. (Gerlach's determination, see his table of sp. grs., below.) Soluble in 16 pts. of water at 15°, and in 5 pts. of boiling water. More readily soluble in acidulated than in pure water. (Bergman, *Essays*, **1.** pp. 177, 34, 378.) Soluble in 18 pts. of cold, and in 4 pts. of boiling water (Fourcroy); in 15 pts. of cold and 5 pts. of hot water (Reid); in 12 pts. of water at 0°, and in 4 pts. at boiling; in 9.41 pts. of water at 12.2°, and in 3.8 pts. at boiling the solution saturated at 12.2° containing 9.56% of it, and that saturated at boiling 20.8%. (M. R. & P.) Soluble in 12 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht für* 1854, p. 76.) According to Redwood, powdered sulphate of potash is more soluble in water than the crystallized salt. The aqueous solution saturated at 15° is of 1.077443 sp. gr., and contains dissolved in every 100 pts. of water at least 10.055 pts. of the salt. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.)

An aqueous solution of sp. gr., at 19.5° (sp. gr. of water at 19.5° = 1).	Contains Percent of KO, SO_3.	Pts. of KO, SO_3 dissolved in 100 pts. of water.
1.0193	2.401	2.46
1.0385	4.744	4.98
1.0568	6.968	7.49
1.0763	9.264	10.21
1.0909	10.945	12.29

(Kremer's *Pogg. Ann.*, **95.** 120. The second column is from Gerlach's *Sp. Gew. der Salzlœsungen*, p. 34.)

An aqueous solution of sp. gr. at 15° (sp. gr. of water at 15° = 1).	Contains percent of KO, SO_3.
1.00820	1
1.01635	2
1.02450	3
1.03277	4
1.04105	5
1.04947	6
1.05790	7
1.06644	8
1.07499	9
1.08305	9.92*

(Th. Gerlach, *Sp. Gew. der Salzlœsungen*, 1859, p. 21.)

* Saturated solution.

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A solution of sp. gr. at 12.5°.	Contains of KO, SO_3 percent.
1.0086	1
1.0171	2
1.0257	3
1.0343	4
1.0429	5
1.0515	6

(Hassenfratz, *Ann. de Chim.*, **28.** 296.)

An aqueous solution of sp. gr. at 12.5°	Contains for every 100 pts. of water, pts. of KO, SO_3	Boils at °C.
1.00795	1	100.38°
1.01510	2	100.63°
1.02310	3	100.75°
1.03050	4	100.88°
1.03905	5	101°
1.04555	6	101.12°
1.05240	7	101.25°
1.05990	8	101.25°
1.06760	9	101.38°
1.07350	10	100.5°

The most concentrated solution boils at 102.88°. (R. Brandes & Gruner, *Brandes's Archiv.*, 1827, **22.** 147.) An aqueous solution saturated at 8° is of 1.072 sp. gr. (Anthon, *Ann. der Pharm.*, 1837, **24.** 211.) An aqueous solution containing 9% of KO, SO_3 boils at 100.3°. (Gerlach, *loc. cit.*, p. 105.)

A solution (saturated at 15°) in alcohol of Sp. gr.	Percent, by weight	Contains percent of KO, SO_3
1.000	0	10.4
0.986	10	3.9
0.972	20	1.46
0.958	30	0.55
0.939	40	0.21

(H. Schiff, *Ann. Ch. u. Pharm.*, 1861, **118.** 365.) Sulphate of potash is more soluble in aqueous solutions of other salts, as the sulphates of soda, magnesia, and copper, than in pure water. (Pfaff, *Ann. Ch. u. Pharm.*, **99.** 227.) Soluble in saturated aqueous solutions of the sulphates of soda, and of magnesia, and of chloride of sodium; in a saturated solution of sulphate of zinc or of copper it is slowly converted into a double salt. (Karsten, *Berlin Abhandl.*, 1840, p. 127.) Sparingly soluble in a saturated solution of chloride of potassium without occasioning any precipitation. The solution thus obtained contains at 18.75° 25.78% of mixed salt: or 100 pts. of water dissolve 34.75 pts. of mixed salt, viz. 32.96 pts. of KCl, and 1.79 pts. of KO, SO_3. A solution identical with this is obtained when an excess of a mixture of the two salts is treated with water. (Karsten, *loc. cit.*, p. 112. See also Chloride of Potassium.) Soluble in a saturated solution of chloride of ammonium. A solution thus prepared at 18.75° contains 33.88% of mixed salt. 100 pts. of water consequently dissolve 51.2 pts. of mixed salt, viz. 37.97 pts. of NH_4Cl, and 13.26 pts. of KO, SO_3. This solution is not of very different composition from that prepared by treating an excess of a mixture of the two salts with water at the same temperature, this last contains 32.86% of mixed salt; 100 pts. of water dissolving 51.2 pts. of mixed salt, viz. 13.28 pts. of KO, SO_3 and 37.92 pts. of NH_4Cl. (Karsten, *loc. cit.*, p. 120.)

Sparingly soluble in a saturated solution of nitrate of potash without causing any precipitation of the latter. The solution thus obtained contains 25.1% of mixed salt, or 100 pts. of water at 18.75° dissolve 33.51 pts. of mixed salt, viz. 29.48 pts. of KO, NO_5, and 4.03 pts. of KO, SO_3. A solution identical with this is obtained when an excess of a mixture of the two salts is treated with water. (Karsten, *loc. cit.*, p. 112. See also Nitrate of Potash.) Soluble in a saturated solution of nitrate of soda, forming a clear solution at first, but this soon becomes cloudy from separation of KO, NO_5. (Karsten, *loc. cit.*, p. 124.) Soluble in a saturated solution of nitrate of soda, from which solution the sulphate of potash is not displaced by salts which would precipitate it from its solution in pure water. (Margueritte, *C. R.*, **38.** 307.)

On mixing a very concentrated solution of sulphate of ammonia with a strong solution of acetate of potash a considerable quantity of sulphate of potash falls as a precipitate. (G. Bischof, *Schweigger's Journ. für Ch. u. Phys.*, 1827, **51.** 232.) When one equivalent of KO, SO_3, in aqueous solution, is mixed with a solution of an equivalent of chloride of zinc ($ZnCl$) $\frac{176}{1000}$ of it are decomposed to sulphate of zinc, which may be precipitated by adding alcohol, while $\frac{824}{1000}$ of it remain unchanged; when mixed with a solution of an equivalent of chloride of manganese ($MnCl$), $\frac{425}{1000}$ of it are decomposed as before, while $\frac{575}{1000}$ of it remain unchanged; when mixed with a solution of an equivalent of chloride of magnesium ($MgCl$), $\frac{43}{100}$ of it are decomposed, while $\frac{57}{100}$ of it remain unchanged; when mixed with a solution of an equivalent of acetate of soda ($C_4H_3NaO_4$), $\frac{365}{1000}$ of it are decomposed, while $\frac{635}{1000}$ of it remain unchanged. (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.)

Sulphate of potash is precipitated from concentrated aqueous solutions on the addition of ammonia-water. (Sullivan, *Rep. Br. Assoc.*, 1859, p. 302.)

It is insoluble in an aqueous solution of caustic potash, the sp. gr. of which equals 1.35. (Liebig, *Ann. Pharm.*, **11.** 262.)

Insoluble in alcohol, the sp. gr. of which equals 0.905. (Anthon, *J. pr. Ch.*, **14.** 125.) Almost completely insoluble in absolute alcohol; somewhat more, though still exceedingly sparingly, soluble in absolute alcohol which has been acidulated with sulphuric acid. (Fresenius, *Quant.*, p. 751.)

Glacial acetic acid produces no precipitate when added to the aqueous solution. (Persoz, *Ann. Ch. et Phys.*, 1836, (2.) **63.** 443.) Soluble in acetic acid, without decomposition; in chlorhydric acid, with formation of $KO, 2SO_3$ and KCl; in warm strong nitric acid to $KO, 2SO_3$, KO, NO_5, and (KO, SO_3; HO, NO_5) [see Nitrate of Sulphate of Potash]; in phosphoric acid, with formation of (KO, SO_3; $3HO, PO_5$) [see Phosphate of Sulphate of Potash]; and in the strong acids generally. (Berzelius, *Lehrb.*, **3.** 118.)

Soluble in glycerin. (Pelouze.)

II.) *bi.*

a = anhydrous. Effloresces slightly upon its surface. Soluble in 6 pts. of water at 16° (Dumas, *Tr.*, **6.** 219); in 5 pts of water at 15.6° [Y.]; in 2 pts. of cold, and in 0.5 pt. of boiling water. (Schubarth's *Tech. Ch.*)

$KO, 2SO_3$

1 pt. of the anhydrous salt is soluble in

pts. of water	at
2.95	0°
2.08	20°
1.59	40°
0.68	100°

(Kremers, *Pogg. Ann.*, **92.** 499.)

Soluble in 2 pts. of cold, and in less than 1 pt.

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of boiling water. Alcohol precipitates the monosulphate when added to the aqueous solution. (Berzelius, *Lehrb.*) The saturated aqueous solution boils at 108° (Kremers, *loc. cit.*); at 105.5°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) It is soluble in hot water without decomposition so long as the quantity of water used is less than sufficient to dissolve all of the salt which is present; but as soon as sufficient hot water to entirely dissolve the salt is added partial decomposition ensues, a portion of the sulphuric acid being abstracted by the water. (H. Rose, *Pogg. Ann.*, **82.** 549.) Soluble in about half its weight of boiling water, the solution solidifying on cooling. From a solution in a larger quantity of hot water a considerable quantity of the monosulphate crystallizes out on cooling, leaving free acid in the solution, and this in proportion to the amount of water employed, up to a certain limit. (Geiger.) When much water is present, the addition of even a large quantity of sulphuric acid cannot prevent the simple sulphate from crystallizing out. (Graham.) When the water is in large excess its affinity for the sulphuric acid overcomes that of the sulphate of potash for the latter. Cold water extracts from the salt a large quantity of sulphuric acid and but little potash, leaving monosulphate of potash. Boiling alcohol also extracts from the crystals scarcely anything but sulphuric acid. (Geiger, *et al.* See *Gmelin's Handbook*, **3.** 42.) Bisulphate of potash is liable to form supersaturated solutions. (Ogden.)

b = hydrated. Soluble in water.
$K O, H O, 2 S O_3$

III.) *mixtures, as*
$2 (K O, S O_3); H O, S O_3$ (of Phillips, and of Jacquelain).
$4 (K O, S O_3); H O, S O_3$ (of Mitscherlich), &c., &c.

Obtained by dissolving mixtures of $K O, S O_3$ and $K O, 2 S O_3$ in water, and crystallizing. These compounds are decomposed by a small quantity of water, which dissolves out the bisalt in preference to the monosalt, but if sufficient water be added the latter is of course also dissolved.

SULPHATE OF POTASH & OF RHODIUM.

I.) $K O, S O_3; Rh_2 O_3, 3 S O_3$ Almost insoluble in water. Very sparingly soluble in sulphuric acid. (Berzelius's *Lehrb.*)

II.) ? Very slowly soluble in cold, quickly soluble in boiling water. (Berzelius's *Lehrb.*)

SULPHATE OF POTASH & OF SILVER.

SULPHATE OF POTASH & OF SODA.

I.) Soluble in water.
$K O, S O_3; Na O, S O_3$

II.) 100 pts. of water at 103° dissolve nearly 40.8 pts. of this salt. (Penny, *Phil. Mag.*, (4.) **10.** 406.)
$3 (K O, S O_3); Na O, S O_3$
(Plate Sulphate of Potash.)

III.) $5 (K O, S O_3); Na O, S O_3$

1000 pts. of water at 100° dissolve 250 pts. of it.
" " 12.7° " 101 "
" " 4.4° " 92 "
(Gladstone, *J. Ch. Soc.*, **6.** 111.)

SULPHATE OF POTASH & OF STRONTIA.
$K O, S O_3; Sr O, S O_3$

SULPHATE OF POTASH & OF THORIA. Permanent. Slowly soluble in cold, but easily and abundantly soluble in hot water. Completely insoluble in a saturated cold solution of sulphate of potash. Insoluble in alcohol. On boiling the aqueous solution slight decomposition occurs after some time, a basic salt, insoluble in water, but easily soluble in acids, being deposited. This decomposition, however, cannot be carried beyond a certain point. (Berzelius, *Pogg. Ann.*, 1829, **16.** pp. 410, 400, 390.)
$K O, S O_3; Th O, S O_3 + Aq$

SULPHATE OF POTASH & OF TITANIUM. Decomposed by water.

SULPHATE OF POTASH & *of protoxide* **OF URANIUM.** Very difficultly soluble in water. (Rammelsberg.)
$K O, S O_3; 2 (Ur O, S O_3) + Aq$

SULPHATE OF POTASH & *of sesquioxide* **OF URANIUM.**

I.) Permanent. 100 pts. of water dissolve 11 pts. of it at 22°, and 196 pts. at 100°; or 1 pt. of the salt is soluble in 9.09 pts. of water at 22°, and in 0.51 pt. at 100°. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** 211.) Rather sparingly soluble in water. (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** 43.)
$K O, S O_3; Ur_2 O_3, S O_3 + 2 Aq$

Ebelmen could not prepare the salts described by Berzelius.

II.) Completely soluble in water. Insoluble in alcohol, which abstracts ⅓ of the $Ur_2 O_3, S O_3$, and converts it into No. 1. (Berzelius's *Lehrb.*, **3.** 1109.) Insoluble in alcohol. (Berzelius.)
$2 (K O, S O_3); 3 (Ur_2 O_3, S O_3) + Aq$

SULPHATE OF POTASH & OF URANOSOURANIC OXIDE. Nearly or quite insoluble in water. (Berzelius.)

SULPHATE OF POTASH & *of binoxide* **OF VANADIUM.** Soluble in water. Insoluble in alcohol.
$K O, S O_3; V O_2, 2 S O_3$

SULPHATE OF POTASH & OF VANADIC ACID. Very sparingly soluble in water. Insoluble in alcohol.
$K O, S O_3; V O_3, 3 S O_3$

SULPHATE OF POTASH & OF YTTRIA. Completely, though very slowly, soluble in a large proportion of water.
$K O, S O_3; Y O, S O_3$

Less soluble than sulphate of yttria (Gahn), but more soluble than the sulphate of potash and of cerium. (Gahn & Berzelius.) Soluble in 16 pts. of cold water, and in 10 pts. of water saturated with sulphate of potash, and in still less of the latter if it likewise contains an ammoniacal salt or free acid. (Berlin.)

SULPHATE OF POTASH & OF ZINC. Permanent. Soluble in 5 pts. of cold water. (Bucholz, Jr.)
$K O, S O_3; Zn O, S O_3 + 6 Aq$

100 pts. of water at °C	Dissolve pts. of the anhydrous salt.
at 0°	12.6
10°	18.7
15°	22.5
25°	28.8
36°	39.9
45°	51.2
50°	54.0
58°	67.6
65°	81.3
70°	87.9

(Tobler, *Ann. Ch. u. Pharm.*, **95.** 198, and fig.)

1 pt. of the 6 Aq salt is soluble in 6.76 pts. of water at 15°, or 100 pts. of water at 15° dissolve 14.8 pts. of it; or the aqueous solution saturated at 15° contains 12.9% of it, or 9.9% of the anhy-

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drous salt, and is of 1.0939 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.)

Pierre describes a salt to which he attributes the composition ($KO, SO_3; ZnO, SO_3 + 7 Aq$), soluble in 2.5 pts. of boiling water, and much less soluble in cold water. (Pierre, *Ann. Ch. et Phys.*, (3.) **16.** 243.)

Sulphate of Potash & of Zirconia. Very sparingly soluble in water. Entirely insoluble in an aqueous solution of sulphate of potash. Soluble in solutions of carbonate of ammonia and carbonate of potash. Tolerably soluble in acids. When only slightly washed it dissolves readily in water, but after having been thoroughly washed or boiled with water a basic salt is formed, which is insoluble in water, and insoluble, or very nearly so, in acids, a large quantity of concentrated acid being required to dissolve it. (Berzelius.)

Sulphate of PurpureoCobalt.

I.) *acid*. Very soluble in water. (Gibbs & Genth, *Smithson. Contrib.*, vol. **9.**)

$5 NH_3 . Co_2O_3, 4 SO_3 + 5 Aq$

Sulphate of Quinidin.

I.) *normal*. Soluble in 350 pts. of water at 10°, and in 25 pts. of boiling water. Soluble in 32 pts. of absolute alcohol at 10°. Almost insoluble in ether.

$N_2 \} C_{40} H_{24} O_4^{VI} . HO, SO_3 + 6 Aq$

Soluble in 340 pts. of water at 12.7°. (Herapath, *Phil. Mag.*, (4.) **6.** 174.)

II.) *acid*. Soluble in 73 pts. of cold, and in 4.2 pts. of boiling water. (Howard.)

Sulphate of Quinine.

I.) *normal*. Efflorescent. Less soluble in water than the bisulphate, and less soluble in cold water than the normal sulphate of cinchonine. Soluble in 740 pts. of water at 13° (the saturated cold solution containing 0.136% of it); and in about 30 pts. of water at 100° (the boiling saturated solution containing 3.25% of it). (Van Heijningen.) Quickly efflorescent. Soluble in 740 pts. of water at 13°, and in about 30 pts. at 100°. Soluble in about 60 pts. of alcohol, of 0.85 sp. gr., at the ordinary temperature, but much more soluble in boiling alcohol. (Baup, *Ann. Ch. et Phys.*, 1824, (2.) **27.** 329.) Soluble in 740 pts. of water at 15.5°; also soluble in acetic acid. (Herapath, *Phil. Mag.*, (4.) **6.** 174.) Soluble in 719.98 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht für* 1854, p. 75.) The saturated cold solution contains 0.136% of it, and the boiling saturated solution 3.25%.

Improperly called "basic."

$N_2 \} C_{40} H_{24} O_4^{VI} . HO, SO_3 + 7 Aq$

According to Howard, 1 pt. of sulphate of quinine does not dissolve completely in 24 pts. of boiling water, but dissolves when the water is increased to 33.5 pts. On being cooled and allowed to stand for 24 hours, 90% of the sulphate crystallizes out, only 10% of it remaining dissolved; i. e. 1 pt. of crystallized sulphate of quinine is soluble in 335 pts. of cold, and in 33.5 pts. of boiling water. (Cited by Bussy & Guibourt, *Journ. de Pharm. et Chim.*, 1852, (3.) **22.** pp. 406, 404, note.) On repeating Howard's experiment, it was found that 1 pt. of the crystallized sulphate is soluble in 265 pts. of water at 15°, and in 24 pts. of boiling water. (Bussy & Guibourt, *loc. cit.*, and p. 414.)

When 2 grms. of sulphate of quinine are treated with 15 grms. of cold alcohol of 90% the salt does not appear to dissolve sensibly; on heating the alcohol to boiling, the salt dissolves completely, crystallizing out again for the most part as the solution cools. (Bussy & Guibourt, *loc. cit.*, p. 407.)

Freely soluble in glycerin. (Parrish's *Pharm.*, p. 236.) Easily soluble in water acidulated with sulphuric acid, a solution of 1 pt. of the salt in 11 pts. of liquid being readily obtained at the ordinary temperature. It is less easily dissolved by an alcoholic solution of sulphuric acid, a very much larger excess of the acid being required in this case in order to obtain a solution as strong as that mentioned above. (Bouchardat, *Ann. Ch. et Phys.*, (3.) **9.** 240.) Soluble in 57 pts. of cold absolute alcohol, and in 63 pts. of cold alcohol of 90%. (Bussy & Guibourt, *Journ. de Pharm. et Chim.*, 1852, (3.) **22.** 414.) Almost insoluble in ether.

The dissolution of sulphate of quinine in water is remarkably favored in the presence of nitrate of potash, chloride of sodium, and especially of chloride of ammonium. (Calloud, *Bull. de Thérap.*, **58.** 307.)

Tincture of perchloride of iron is one of the best solvents of sulphate of quinine. (Parrish's *Pharm.*, p. 511.) Insoluble in chloroform. (Schlimpert, *Kopp & Will's J. B. für* 1859, p. 405.)

II.) *acid* or *bi*. Permanent. Much more soluble in water than the normal salt. Soluble in 11 pts. of water at 13°, and in 8 pts. at 22°. It melts in its water of crystallization at 100°. Easily soluble in alcohol, being much more soluble in warm than in cold alcohol, either weak or strong. (Baup, *Ann. Ch. et Phys.*, 1824, (2.) **27.** 330.) Soluble in concentrated acetic acid.

(Improperly called "neutral.")

$N_2 \{ C_{40} H_{24} O_4^{VI} . HO, HO, 2 SO_3 + 14 Aq$

Sulphate of Quinolein (or Chinolin). Very deliquescent. Soluble in water, and alcohol. Insoluble, or nearly insoluble, in ether. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 171.) Easily soluble in water, and alcohol. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **7.** 252.)

Sulphate of Retinin. Slightly deliquescent. Very readily soluble in water.

Sulphate *of protoxide* of Rhodium. Insoluble in water, or acids. Half its acid is extracted by potash-lye. (Berzelius.)

Sulphate *of sesquioxide* of Rhodium.

$Rh_2O_3, 3 SO_3$

a = anhydrous. Deliquescent. Very slowly soluble in water, at first sight appearing to be insoluble. (Berzelius, *Lehrb.*)

b = hydrated. Easily soluble in water. (Berzelius.)

Sulphate of RoseoCobalt.

I.) *normal*. Nearly insoluble in cold, sparingly soluble in boiling water. Neutral solutions are easily decomposed by boiling. Soluble in dilute ammonia-water. (Gibbs & Genth, *Smithson. Contrib.*, vol. **9.** p. 13 of the memoir.) Very sparingly soluble in water. (Fremy, *Ann. Ch. et Phys.*, (3.) **35.** 300.)

$5 NH_3 . Co_2O_3, 3 SO_3 + 5 Aq$

II.) *acid*. Very soluble in water, without decomposition. Decomposed by boiling with ammonia-water. (Fremy, *loc. cit.*, p. 298.) This "acid salt" has no real existence. (Gibbs & Genth, *loc. cit.*, p. 12.)

$5 NH_3 . Co_2O_3, 5 SO_3 + 5 Aq$

Sulphate *of binoxide* of Ruthenium. Deliquescent. Readily soluble in water. (Claus.)

$RuO_2, 2 SO_3$

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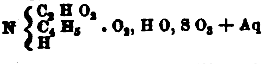
Sulphate of Sanguinarin. Permanent. (Probst.) Soluble in water, and alcohol. Insoluble in ether. (Schiel, *Am. J. Sci.*, (2.) **20.** 220.) Easily soluble in water, and ordinary alcohol; more difficultly soluble in absolute alcohol. Insoluble in ether. (Probst, *Ann. der Pharm.*, 1839, **29.** 121.)

Sulphate of Sarcin. Decomposed by water.

Sulphate of Sarcosin. Very easily soluble in water. Difficultly soluble in cold, but soluble in 10 @ 12 pts. of boiling alcohol. (Liebig.)



$$N \left\{ \begin{matrix} C_2\,H\,O_2 \\ C_4\,H_5 \\ H \end{matrix} \right. . O_2, H\,O, S\,O_3 + Aq$$

Sulphate of Silver. $Ag\,O, S\,O_3$ Soluble in 200 pts. of cold, and in less than 100 pts. of boiling water. Insoluble in alcohol. (Wittstein's *Handw.*) Nearly insoluble in cold water. Soluble in 88 pts. of boiling water, the saturated solution containing 1.2% of it. (Schnaubart.) Soluble in 87.25 pts. of water. (Wenzel [T.].) Soluble in 68.85 pts. of water at 100°. The saturated aqueous solution boils at 100°. (Kremers, *Pogg. Ann.*, **92.** 499.) 100 pts. of water at 15.5° dissolve 1.15 pts. of it. (Ure's *Dict.*) Soluble in 160 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht für* 1854, p. 75.) More soluble in water acidulated with sulphuric acid than in pure water; still more soluble in nitric acid, and yet more abundantly in concentrated sulphuric acid, from which it is precipitated on the addition of water. (Schnaubart.) Abundantly soluble in a hot mixture of concentrated sulphuric acid and monobromobenzin, less soluble in cold ditto. (Couper, *Ann. Ch. et Phys.*, (3.) **52.** 311.) Soluble in nitric acid, without decomposition. (Klaproth [T.].) Decomposed by aqueous solutions of the soluble hyposulphites, with formation of sulphide of silver. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 397.) Soluble in an aqueous solution of carbonate of ammonia.

Sulphate of Sinapin.

I.) *normal.* Extremely soluble in water. (v. Babo & Hirschbrunn.)

II.) *acid.* $N \left\{ C_{32}\,H_{23}\,O_{10}, 2\,H\,O, 2\,S\,O_3 + 4\,Aq \right.$ Easily soluble in water, and in boiling alcohol. Almost insoluble in ether. (v. Babo & Hirschbrunn.) Almost insoluble in water. Insoluble, or very sparingly soluble, in cold, soluble in boiling absolute alcohol.

Sulphate of Sinkalin. Deliquescent. Soluble in water. (v. Babo & Hirschbrunn.)

Sulphate of Soda.

a = *anhydrous.* $Na\,O, S\,O_3$ The anhydrous salt separates from solutions which are evaporated at temperatures approaching 100°.

A solution saturated at 33° deposits crystals of the anhydrous salt at 100°. (Faraday.)

It crystallizes from saturated solutions maintained at a temperature from 33° to 40°. (Berzelius, *Lehrb.*) [This statement does not seem to be in accordance with the experiments of Brandes & Firnhaber. See below.]

1 pt. of the anhydrous salt is soluble in 7.367 pts. of water at 15° (Gerlach's determination, see his table of sp. grs., below); in 8.52 pts. of water at 13.3° (Poggendorff, cited by Kremers, *Pogg. Ann.*, **85.** 247); in 10 pts. of cold water. (Schubarth's *Tech Ch.*) 1 pt. of the pulverized ignited salt is soluble in 3.3 pts. of water at 62.2°. (Wenzel, *Verwandtschaft*, p. 309 [T.].) 100 pts. of water at 0° dissolve 5.155 pts. of the anhydrous salt (Pfaff, *Ann. Ch. u. Pharm.*, **99.** 226); and at 13.8°, 10.58 pts. [T.].) An aqueous solution saturated at the temperature of boiling, 100.6°, contains 31.5% of the dry salt; or 100 pts. of water at 100.6° dissolve 45.985 pts. of it; or 1 pt. of the dry salt is soluble in 2.174 pts. of water at 100.6°. In this experiment crystals of the 10 Aq salt were liquefied by heat and this solution boiled. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.)

The saturated aqueous solution boils at 105°. (Kremers, *Pogg. Ann.*, **99.** 43.) An aqueous solution containing 5% of $Na\,O, S\,O_3$ boils at 100.3°; one of 10% at 100.8°. (Gerlach's *Sp. Gew. der Salzlœsungen*, p. 104.)

(See also under *c.*)

b = $Na\,O, S\,O_3 + 7\,Aq$ According to Lœwel, this hydrate contains only 7 equivalents of water, and not 8, as was supposed by Faraday & Ziz, and by Lœwel himself, in his earlier memoirs. Efflorescent. Insoluble in alcohol. (Lœwel, *Ann. Ch. et Phys.*, (3.) **33.** pp. 334, 335.) It crystallizes out from the fused 10-hydrated salt at a temperature of 12°; and from a solution of this salt in half its own weight of water at 7°, and above that temperature if the fluid remains undisturbed in a covered vessel. (Ziz.)

(See also under *c.*)

c = $Na\,O, S\,O_3 + 10\,Aq$ (*Glauber's Salt. Common crystallized Sulphate of Soda.*) Effloresces completely to anhydrous $Na\,O, S\,O_3$. (Brandes & Firnhaber, *Brandes's Archiv.*, 1824, **7.** 172.)

Soluble in 2.33 pts. of water at 19°; or 100 pts. of water at 19° dissolve 42.8 pts. of it; or the aqueous solution saturated at 19° contains 29.9% of it, or 13.2% of the anhydrous salt, and is of 1.1222 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.)

100 pts. of water at °C.	Dissolve of the anhyd. salt, $Na\,O, S\,O_3$, pts.	 of the cryst. salt, $Na\,O, S\,O_3 + 10\,Aq$, pts.
0° . . .	5.02	12.17
11.67°	10.12	26.38
13.30°	11.74	31.33
17.91°	16.73	48.28
25.05°	28.11	99.48
28.76°	37.35	161.53
30.75°	43.05	215.77
31.84°	47.37	270.22
32.73°	50.65	322.12
33.88°	50.04	312.11
40.15°	48.78	291.44
45.04°	47.81	276.91
50.40°	46.82 . . .	262.35
59.79°	45.42	
70.61°	44.35	
84.42°	42.96	
103.17° . . .	42.65	

(Gay-Lussac, *Ann. Ch. et Phys.*, (2.) **11.** 312.)

The solubility of sulphate of soda increases rapidly with the temperature below 30°; above 40° it slowly decreases; and the two curves thus formed cannot be united as one. The body which dissolves at temperatures below 30° must consequently be different from that which occurs in solution above 40°. The maximum point of solubility is not a property of one of these curves, but is formed by their meeting each other, and lies at the point of decomposition. From the observations (Gay-Lussac's) under 30° the formula of this curve is: 100 pts. of water dissolve of the salt, pts., $= 5.02 + 0.30594\ T° - 0.000410\ T^2$

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$+ 0.0009977\ T^3$. From the observations (Gay-Lussac's) above 40° the formula of tho other curve is: 100 pts. of water dissolve of the salt, pts. $= 58.50 - 0.27783\ T^\circ + 0.0006900\ T^2 + 0.0000049802\ T^3$. At the point of intersection of the curves the two formulæ are equivalent. $0.00009927\ T^3 + 0.001100\ T^2 - 0.58377\ T + 5348 = 0$, which equation affords $T = 32.93$. Thus the decomposition occurs at 33°, as has also been shown by direct experiment. At this temperature the crystallized sulphate of soda, whether in water, or by itself, passes into the anhydrous state. (H. Kopp, *Ann. Ch. u. Pharm.*, 1840, **34.** 271.)

1 pt. of the 10 Aq salt is soluble in

8.7666	pts. of water at	2.5°
6.1034	"	7.5°
3.4438	"	12.5°
1.4123	"	18.75°
0.6974	"	25°
0.2083	"	31.25°
0.3401	"	37.5°
0.3831	"	43.75°
0.3875	"	50°
0.4030	"	56.25°
0.4500	"	62.5°
0.4117	"	68.75°
0.4173	"	75°
0.4603	"	81.25°
0.4532	"	87.5°
0.4435	"	93.75°
0.4137	"	100°

Or 100 pts. of water at °C.	Dissolve of $NaO, SO_3 + 10 Aq$, pts.
2.5°	11.39
7.5°	16.38
12.5°	29.03
18.75°	70.78
25°	143.38
31.25°	479.97
37.50°	294.04
43.75°	261.04
50°	285.06
56.25°	248.11
62.5°	222.22
68.75°	242.88
75°	241.68
81.25°	217.20
87.50°	220.65
93.75°	225.46
100°	241.69

Or the aqueous solution saturated at °C.	Contains percent of $NaO, SO_3 + 10 Aq$
2.5°	10.239
7.5°	14.078
12.5°	22.503
18.75°	41.454
25°	58.913
31.25°	82.758
37.50°	74.622
43.75°	73.302
50°	72.072
56.25°	71.274
62.5°	68.965
68.75°	70.836
75°	70.733
81.25°	68 475
87.5°	68.813
93.75°	69.275
100°	70.734

"These results prove that the capacity of solution of the water decreases from 37.5° to 100°, and that oscillations occur in the capacities at the intermediate degrees of temperature. Thus, at 68.75°, for example, the capacity of solution of the water is greater than at 75°, 81.25°, or 62.5°. In general, however, the differences of the capacities between 37.5° and 100° are very small, and the largest capacity of solution appears to be at 31.25°." (B. & F. *loc. inf. cit.*, p. 159.) The determinations for temperatures between 2.5° and 18.75° were made with solutions prepared by agitating a large excess of the 10-Aq salt with water at the given temperatures. Those for temperatures between 25° and 100° were made with solutions obtained by adding powdered salt to water, maintained at the given temperatures, until a "very perceptible" portion of the salt remained undissolved [hence, probably, the formation of supersaturated solutions, by which these results appear to have been vitiated?]. In the experiment at 31.25° a portion of the salt separated out in hard lumps. So also when the 10 Aq salt is heated by itself, beginning to melt in its water of crystallization at 31.25°, it is completely fluid at 37.5°, but at the same time hard masses separate out from this solution; and these lumps will not redissolve on continuing to heat the solution, even when its temperature is elevated to 100°, and maintained thereat for some time; the addition of a certain amount of water being necessary in order to dissolve the salt which has separated. By direct experiment it was found on melting a portion of the 10 Aq salt, heating to 75° the liquid obtained, and adding water, drop by drop, until the portions of salt which had at first separated were redissolved, that the solution thus obtained at 75° was of almost identical composition with that previously obtained at 75°, and recorded in the table above.

The salt of which these hard lumps are composed is a hydrate containing less water than the ordinary (10 Aq) salt, but its content of water is not constant, the proportion being less according as the temperature at which the salt separated is higher. In six experiments made at various temperatures in order to test this point, the percentage of water varied from 42.65 in the salt separated at 37.5° to 14.5 in the salt which separated at 100° (the percentage of water in the 10 Aq salt being 55.83). Experiments upon the amounts of salt which separated at various temperatures, between 37.5° and 100°, from the melted 10 Aq salt indicated a slight increase in quantity as the temperature rose, though the results were not very regular, owing to unavoidable sources of error.

The results in the following tables are those of a separate set of experiments upon solutions prepared by melting the 10 Aq salt in its water of crystallization, heating the liquid to any determined point, and then quickly decanting off a portion of the fluid, and determining the amount of sulphate of soda contained in it.

100 pts. of water at °C.	Retain in solution (i. e. dissolve) pts. of $NaO, SO_3 + 10 Aq$
37.5°	355
50°	324.9
62.5°	305.3
75°	324.9
87.5°	226.32
100°	212.47

Or 1 pt. of the salt is

soluble in	0.2814	pt. of water at	37.5°
"	0.3493	"	50°
"	0.3262	"	62.5°
"	0.3920	"	75°
"	0.4355	"	87 5°
"	0.4706	"	100°

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Or, the aqueous solution saturated at °C.	Contains percent of $NaO, SO_3 + 10 Aq$.
37.5°	78.022
50°	74.108
62.5°	75.402
75°	71.839
87.5°	69.662
100°	67.997

(R. Brandes & Firnhaber, *Brandes's Archiv.*, 1824, **7.** pp. 154–173, and fig. of curve; compare *Ibid.*, **13.** 119.)

1 pt. of the anhydrous salt is soluble in pts. of water.	1 pt. of the 10-hydrated salt is soluble in pts. of water.	At °C.	The saturated solution containing of the Anhydrous salt per-cent.	The saturated solution containing of the 10-hydrated salt per-cent.
19.92 . .	8.22 . .	0° .	4.78 .	10.84
9.88	3.79	11.1°	9.19	20.87
	2.08	18°		
	1.00	25°		
	0.37	32°		
1.97	0.31	33°	33.62	76.31
	0.38	50.4°		
2.34 . .		. 104.4°	20.90	

(Mohr, Redwood, & Procter's *Pharmacy*, and Gmelin's *Handbook*.)

1 pt. of the 10 Aq salt is soluble in	pts. of water at	
6.1		7.5°
" 3.44	"	12.5°
" 2.41	"	18.75°
" 1.724	"	20°

(Karsten, *Vid. Infra.*)

1 pt. of the 10-hydrated salt is soluble in 2.86 pts. of water at a moderate heat, and in 0.8 pt. of boiling water. (Bergman, *Essays*, **1.** 178.) 1 pt. of the 10-hydrated salt is soluble in 3 pts. of water at the ordinary temperature, and in less than 0.5 pt. of water at 33°. (Wittstein's *Handw.*) 1 pt. of the 10-hydrated salt is soluble in 4 pts. of cold, and in 1 pt. of boiling water, the saturated cold solution containing 20% of it. (Fourcroy.) The solution saturated at 12.5° contains 16.1% of it. (Hassenfratz, *Ann. de Chim.*, **28.** 291.) Soluble in 3 pts. of water at 18.75° (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht für* 1854, p. 76); in 2.75 pts. of water at 15.6°. [Y.] The aqueous solution saturated at 15° is of 1.10847 sp. gr., and contains dissolved in every 100 pts. of water at least 12.494 pts. of the anhydrous, or 35.492 pts. of the 10 Aq salt. (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.) The 10-hydrated salt begins to melt in its water of crystallization at 33°, and is completely fluid at 37.5°, but a portion of the anhydrous salt immediately separates out. (Berzelius, *Lehrb.*)

100 pts. of water at	dissolve	pts. of the cryst. salt.
15.5°	39.4	
" 15.5°	" 37	"
" 100°	" 80	"
" 100°	" 125	"

(Ure's *Dict.*)

100 pts. of water at 15.5° dissolve 48.66 pts. of the crystallized salt. [T.]

Sulphate of soda is much more soluble in warm than in cold water; therefore when a boiling saturated solution of this salt is allowed to cool in an open vessel in contact with the air it deposits a considerable quantity of crystals containing 10 equivalents of water of crystallization. Nevertheless, in certain circumstances, notably when the solution, saturated at its boiling point, is cooled in a vessel hermetically sealed it deposits no crystals at the ordinary temperature of the atmosphere; in this case the water retains in solution a much larger amount of the salt than it could dissolve at that temperature; in this condition the solution is supersaturated. (Lœwel, *Ann. Ch. et Phys.*, (3.) **29.** 63.) Supersaturated solutions may also be obtained by cooling hot solutions of the salt in flasks loosely stopped with cotton wool. (Schrœder, *Ann. Ch. u. Pharm.*, **109.** 45.) Or by covering the vessel containing the hot saturated solution (say of two pts. of the crystallized salt to one pt. of water) with a glass plate, a watch-glass, card, or the like, or by covering the liquid itself with a layer of oil, and then allowing it to cool.

"A hot solution, consisting of equal parts of water and the 10 Aq salt, does not crystallize either on slow cooling or when quickly cooled by immersion in cold water, whether it be contained in a barometer tube freed from air by boiling, or in an exhausted, well-closed vessel, or in an open vessel with a layer of oil of turpentine upon its surface (Gay-Lussac); or in a vessel containing air, either well stopped or merely furnished with a loose cover (Schweigger); or in an open vessel under a bell-jar full of air and closed at the bottom with a water-joint; or in open bottles placed in a quiet situation; or in an open glass enclosed in a stoppered vessel, containing air and some potash to dry it, in which Glauber's salt effloresces and when washed down again does not cause instant crystallization but dissolves. (Ziz.) The crystallization of a solution cooled in this manner is often brought about instantaneously, often, again, after a short time: (1.) By agitation, viz. when the solution has been cooled in an open vessel. (2.) By access of air caused by opening the vessel, the crystallization taking place the more quickly in proportion to the size of the opening; some degree of motion appears also to be necessary. In this case the crystallization begins at the top where the solution, the vessel, and the air come in contact with each other; it is only when a particle of dust falls in on opening the vessel that the crystallization begins a little under the surface. When the solution has been cooled in vacuo, a bubble of air, hydrogen, carbonic acid, or nitrous gas, is sufficient to set up the crystallization. (Gay-Lussac.) (3.) By contact with a solid body (a glass rod, flint, iron wire, crystal of Glauber's salt, or a grain of dust floating in the air). These bodies do not bring about the crystallization when they have been cooled in contact with the hot solution, nor (excepting Glauber's salt) when they are wetted or warmed before contact with the solution. (Ziz.) In these cases crystallization is effected by the action of foreign bodies. If a solution of 8 pts. of Glauber's salt in 9 pts. of water be left to crystallize, the whole then warmed in a flask to between 50° and 55°, till only about $\frac{1}{32}$ of the crystals remain undissolved, and the flask corked up and cooled, it often happens that the remaining crystals, instead of causing the rest to crystallize, are themselves completely dissolved, slowly when the flask is inclined in such a manner as to bring them in contact with the upper strata of the liquid, more quickly on agitation, which, however, is very likely to cause crystallization. If, on the other hand, the solution formed between 50° and 55° be poured off from the crystals into a basin and allowed to crystallize, the mother liquid thus obtained will not dissolve the $\frac{1}{32}$ of the crystals above mentioned. There are, therefore, two solutions to be distinguished, (1.) The *saturated* solution, i. e. the liquid which remains after crystallization of the superabundant quantity of salt, from a hot solution in an open vessel, and, (2.)

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The *supersaturated* solution, i. e. the solution saturated at a high temperature and cooled in a close vessel; this latter can even dissolve an additional quantity of salt, but deposits at a lower temperature crystals of sulphate of soda, containing 1 atom of the salt and 8 [7] atoms of water. (H. Ogden.) A solution of 2 pts. of Glauber's salt and 1 pt. of hot water yields, on cooling in close vessels, hard transparent crystals of sulphate of soda, with 8 [7] atoms of water, which, when the supernatant liquid is made to crystallize by any of the preceding methods immediately become opaque. (Coxe; Ziz.) When 51 pts. of Glauber's salt are dissolved in 49 pts. of water, and the solution, after cooling below 10°, made to crystallize suddenly by any of the preceding methods, nearly $\frac{2}{3}$ of the Glauber's salt is deposited, and the temperature rises to 13°. This is attributed by Thomson to the conversion of liquid water into solid water of crystallization, a supposition agreeing pretty well with calculation (the development of heat consequent on the passage of the salt from the liquid to the solid state must, however, be included in the calculation. Gm.). The assertion of Thénard (*Schw.*, **15.** 257), that after this crystallization there remains a mother liquid, which is no longer saturated with salt at the existing temperature, seems to be erroneous. Thomson, on the contrary, finds that the mother liquor, from its rise of temperature, holds in solution a corresponding quantity of salt, a great part of which crystallizes out when the temperature is brought back to 10°." (Gmelin, in his *Handbook*, **1.** pp. 9, 10.)

Citing Gay-Lussac's experiments, Lœwel (*Ann. Ch. et Phys.*, (3.) **49.** 42) remarks, that this experimenter evidently operated upon anhydrous sulphate of soda, which, as Lœwel finds, unites with water to form the 10-hydrated salt so long as the temperature is not elevated above 32°, but which at a temperature of 33° @ 34° dissolves directly as anhydrous salt. Lœwel's own experiments, given in the table below, were upon the crystallized 10-hydrated salt which comports itself as such up to 34°. This explains the differences between Lœwel's table and that of Gay-Lussac.

100 pts. of water at °C.	Retain in solution pts. of the anhydrous salt.
103.17°*	42.65
84.42°	42.96
70.61°	44.35
59.79°	45.42
50.40°	46.82
45.04°	47.81
40.15°	48.78
36°	49.27
34°	49.53
33°	49.71
30°	50.37
26°	51.31
25°	51.53
20°	52.76
18°	53.25

* Boiling point of the saturated solution.

(Lœwel, *Ann. Ch. et Phys.*, (3.) **49.** 39.)

Below 18° a salt of different molecular constitution (7 Aq), and of different solubility is formed.

The saturated aqueous solution of Na O, S O_3 + 10 Aq contains for every 100 pts. of water

At °C.	Pts. of anhydrous Na O, S O_3	Pts. of Na O, S O_3 + 10 Aq
0°	5.02	12.16
10°	9.00	23.04
15°	13.20	35.96
18°	16.80	48.41
20°	19.40	58.35
25°	28.00	98.48
26°	30.00	109.81
30°	40.00	184.09
33°	50.76	323.13
34°	55.00	412.22

At temperatures above 34° the 10 Aq salt is decomposed by water, a salt of other molecular constitution (anhydrous Na O, S O_3), and different degree of solubility being formed. (Lœwel, *Ann. Ch. et Phys.*, (3.) **49.** 42)

In the solution of Na O, S O_3 + 7 Aq

Saturated at °C.	100 pts. of water retain in solution	
	pts. of anhyd. Na O, S O_3	pts. of Na O, S O_3 + 7 Aq
0°	19.62	44.84
10°	30.49	78.90
15°	37.43	105.79
18°	41.63	124.59
20°	44.73	140.01
25°	52.94	188.46
26°	54.97	202.61

At temperatures above 26° the salt with 7 Aq is transformed to the anhydrous salt, for solubility of which see the proper table. (Lœwel, *Ann. Ch. et Phys.*, (3.) **49.** 48.)

In his second memoir upon the subject, Lœwel says that the table of solubility given in his first memoir (*Ann. Ch. et Phys.*, (3.) **29.** 88, § 15) is incorrect, inasmuch as he then calculated the hydrate, which really contains 7 Aq, as if it had 8 Aq, and publishes the following corrected table. [The incorrect table above mentioned has not been copied into this work.]

	A saturated solution of the 10 Aq salt contains		A saturated solution of the 7 Aq salt, enclosed in tight vessels, contains		
At °C.	Anhydr. Na O, S O_3 dissolved by 100 pts. of water.	Na O, S O_3 + 10 Aq dissolved by 100 pts. of water.	Anhydr. Na O, S O_3 dissolved by 100 pts. of water.	Na O, S O_3 + 7 Aq dissolved by 100 pts. of water.	Na O, S O_3 + 10 Aq dissolved by 100 pts. of water.
0°	5.02	12.11	19.62	44.84	59.23
10°	9.3	23.91	30.49	78.90	112.73
13°	11.2	29.6	34.27	92.94	137.48
16°	14.3	39.61	38.73	111.38	172.6
17°	15.6	44.10	39.99	117.01	184.01
18°	16.8	48.41	41.63	124.59	200.00
19°	18.1	53.41	43.35	132.97	218.34
20°	19.5	58.74	44.73	140.01	234.4
103.17°	42.65	210.67			

(Lœwel, *Ann. Ch. et Phys.*, (3.) **33.** 337.)

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An aqueous solution of sp. gr. at 19.5° (sp. gr. of water at 19.5° = 1).	Contains Percent of $Na\,O, S\,O_3$.	Pts. of $Na\,O, S\,O_3$ dissolved in 100 pts. of water
1.0262	2.894	2.98
1.0509	5.589	5.92
1.0733	7.995	8.69
1.0977	10.538	11.78
1.1162	12.473	14.25

(Kremers, *Pogg. Ann.*, **95.** 120. The second column is from Gerlach's *Sp. Gew. der Salzlœsungen*, p. 34.)

Sp. gr. (at 15°).	Percent of anhyd. $Na\,O, S\,O_3$.
1.00911	1
1.01822	2
1.02736	3
1.03650	4
1.04575	5
1.05500	6
1.06437	7
1.07375	8
1.08325	9
1.09275	10
1.10246	11
1.11170	11.952*

* Saturated solution.

(Gerlach, *Sp. Gew. der Salzlœsungen*, p. 20: On p. 122 of his work Gerlach gives a table of the sp. grs., and corresponding percentages of sulphate of soda solutions for each degree of temperature between 0° and 20°; and on p. 124 a table of the sp. gr. of a 10% solution at each degree of temperature from 0° to 100°.)

Sp. gr.	Percent of $Na\,O, S\,O_3 + 10\,Aq$.
1.005	1.262
1.010	2.522
1.015	3.780
1.020	5.035
1.025	6.288
1.030	7.538
1.035	8.786
1.040	10.030
1.045	11.272
1.050	12.510
1.055	13.744
1.060	14.975
1.065	16.203
1.070	17.426
1.075	18.645
1.080	19.860
1.085	21.071
1.090	22.277
1.095	23.478
1.100	24.674

To obtain the corresponding amount of anhydrous salt, multiply any number in this table by $\frac{890.0}{2015.9}$. (W. Schmidt, *Pogg. Ann.*, 1857, **102.** 132; in *Kopp & Will's J. B.*)

An aqueous solution of sp. gr. (at 19°)	Contains (by experiment) percent of $Na\,O, S\,O_3 + 10\,Aq$
1.1222	30.01
1.0806	20.01
1.0533	13.34
1.0398	10.00
1.0263	6.66
1.0131	3.33

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 335.) From these results Schiff calculates the following table by means of the formula: $D = 1 + 0.00393\,p + 0.0000053\,p^2$; in which D = the sp. gr. of the solution, and p the percentage of substance in the solution.

Sp. gr. (at 19°).	Percent of $Na\,O, S\,O_3 + 10\,Aq$.	Of anhydr. $Na\,O, S\,O_3$.
1.0040	1	0.441
1.0079	2	0.882
1.0118	3	1.323
1.0158	4	1.764
1.0198	5	2.205
1.0238	6	2.646
1.0278	7	3.087
1.0318	8	3.528
1.0358	9	3.969
1.0398	10	4.410
1.0439	11	4.851
1.0479	12	5.292
1.0520	13	5.733
1.0560	14	6.174
1.0601	15	6.615
1.0642	16	7.056
1.0683	17	7.497
1.0725	18	7.938
1.0766	19	8.379
1.0807	20	8.820
1.0849	21	9.261
1.0890	22	9.702
1.0931	23	10.143
1.0973	24	10.584
1.1015	25	11.025
1.1057	26	11.466
1.1100	27	11.907
1.1142	28	12.348
1.1184	29	12.789
1.1226	30	13.230

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 70.)

Sp. gr. (at 12.5°).	Percent of sulphate of soda.
1.0039	1
1.0078	2
1.0116	3
1.0154	4
1.0192	5
1.0230	6
1.0268	7
1.0306	8
1.0344	9
1.0381	10
1.0418	11
1.0455	12
1.0492	13
1.0528	14
1.0564	15
1.0598	16

(Hassenfratz, *Ann. de Chim.*, **28.** 296.)

An aqueous solution of sp. gr. (at 12.5°).	Contains for every 100 pts. of water, pts. of $Na\,O, S\,O_3 + 10\,Aq$.	Boils at °C.
1.005	1	100.5°
1.008	2	100 62°
1.014	3	100.62°
1.020	4	100.75°
1.021	5	100.75°
1.028	6	100.87°
1.030	7	100 87°
1.032	8	101°
1.036	9	101°
1.040	10	101°
1.043	11	101.12°
1.050	12	101.12°
1.055	13	101.25°
1.060	14	101 25°
1.062	15	101.25°
1.064	16	101.25°

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An aqueous solution of sp. gr. (at 12.5°).	Contains for every 100 pts. of water, pts. of Na O, S O$_3$ + 10 Aq.	Boils at °C.
1.067	17	101.25°
1.070	18	101.37°
1.072	19	101.37°
1.074	20	101.37°
1.076	21	101.37°
1.078	22	101.5°
1.080	23	101.5°
1.082	24	101.5°
1.084	25	101.5°
1.090	26	101.5°
1.092	27	101.63°
1.095	28	101.63°
1.098	29	101.63°
1.100	30	101.75°

The most concentrated solution boils at 105.12°. (R. Brandes & Gruner, *Brandes's Archiv.*, 1827, **22.** 148.)

An aqueous solution saturated at 20° is of 1.1259 sp. gr., it contains 36.71% of the 10-hydrated salt, i. e. 100 pts. of water at 20° dissolve 58.02 pts. of the 10-hydrated, or 29 pts. of the anhydrous salt at 20°. (Karsten, *Berlin Abhandl.*, 1840, p. 101.)

Insoluble in alcohol of from 0.817 to 0.90 sp. gr. (Kirwan, *On Mineral Waters*, p. 274 [T.].) 1000 pts. of spirit of 8.872 sp. gr. dissolve 0.7 pt. of Na O, S O$_3$ at 12.5° @ 15°; and 1000 pts. of spirit, of 0.905 sp. gr., dissolve 3.8 pts. of it at this temperature. Insoluble in alcohol of from 0.83 to 0.85 sp. gr. (Anthon, from *Buchner's Repert.*, **2.** pp. 13, 18; in *J. pr. Ch.*, **14.** 125.) Very sparingly soluble in absolute alcohol at ordinary temperatures; somewhat more, though still exceedingly sparingly, soluble in absolute alcohol acidulated with sulphuric acid. (Fresenius, *Quant.*, pp. 121, 751.) The 10 Aq salt is unacted upon by alcohol at the ordinary temperature, its water of crystallization remaining unchanged. The 10 Aq is also precipitated by alcohol from a solution of sulphate of soda saturated at 37.5°. On the other hand, when the 10 Aq salt is mixed with two pts. of alcohol, and then heated to 37.5°, the salt which separates out contains only 32.5% of water, while on heating to 37.5°, without the addition of alcohol, the separated salt contains 42.65% of water; in like manner, on heating a mixture of the 10 Aq salt and alcohol to 62.5° @ 68.75°, the salt which separates out contains 22% of water, which is as little as is contained in the salt separating when the 10 Aq salt is heated by itself to 87.5°. (Brandes & Firnhaber, *Brandes's Archiv.*, 1824, **7.** 170.) When a certain amount of alcohol is added to an aqueous solution of sulphate of soda, a concentrated aqueous solution of the latter is thrown down; but when a larger quantity of alcohol is employed crystals separate. (Ordway, *Am. J. Sci.*, (2.) **33.** 35.)

sp. gr.	A solution (saturated at 15°) in alcohol of percent by weight.	Contains percent of Na O, S O$_3$ + 10 Aq
1.000	0	25.6
0 896	10	14.35
0.972	20	5.6
0.939	40	1.3

(H. Schiff, *Ann. Ch. u. Pharm.*, 1861, **118.** 365.)

Alcohol precipitates it from the cold saturated aqueous solution.

Soluble in glycerin. (Pelouze.) Soluble, with decomposition in chlorhydric acid. Sulphate of soda crystallizes unchanged from its solution in acetic acid. (Persoz, *Chim. Moléc.*, p. 348.)

Difficultly soluble in strong acetic acid. (Ure's *Dict. Arts.*) Glacial acetic acid produces no precipitate when added to an aqueous solution of sulphate of soda. (Persoz, *Ann. Ch. et Phys.*, 1836, (2.) **63.** 443.)

More soluble in aqueous solutions of various salts, as the sulphates of potash, copper, and magnesia, than in pure water. (Pfaff, *Ann. Ch. u. Pharm.*, **99.** 226. Compare Pagenstecher, *J. pr. Ch.*, **42.** 137.) Soluble in saturated solutions of the sulphates of magnesia, potash, and copper, but if more sulphate of soda (effloresced) than can be dissolved is added to the last-named solution, a large quantity of the double salt Na O, S O$_3$; Cu O, S O$_3$ is suddenly deposited. (Karsten, *Berlin Abhandl.*, 1840, p. 121.) Slowly but somewhat abundantly soluble in a saturated solution of sulphate of zinc. After several days, crystals of a double salt separate from this solution. (Karsten, *loc. cit.*, p. 124.)

Soluble in a saturated solution of chloride of ammonium, also rapidly and in considerable quantity in a saturated solution of chloride of potassium, with separation of sulphate of potash. (Karsten, *loc. cit.*, pp. 121, 131.)

Crystallized (10-hydrated) sulphate of soda is soluble in a saturated solution of chloride of sodium without causing any precipitation of the latter. If the effloresced sulphate be used, however, it occasions, while dissolving, a precipitation of Na Cl at first, and subsequently of Na O, S O$_3$ + 10 Aq. A solution of the same sp. gr. as the above is obtained when an excess of a mixture of Na O, S O$_3$ and Na Cl is treated with water at the same temperature. (Karsten, *loc. cit.*, p. 114.) Soluble in a boiling saturated solution of chloride of sodium, while the latter is precipitated. From cold solutions, however, the sulphate of soda separates before the chloride of sodium. (Vauquelin, *Ann. de Chim.*, **13.** 98.) Less soluble in an aqueous solution of chloride of sodium than in pure water. (T. S. Hunt, *Am. J. Sci.*, (2.) **25.** 368.)

Soluble in a saturated solution of nitrate of potash, without occasioning any precipitation until after the lapse of several hours, when some sulphate of potash separates. (Karsten, *loc. cit.*, p. 129.)

Crystallized (10-hydrated) sulphate of soda is soluble in a saturated solution of nitrate of soda, without causing any precipitation of the latter. If, however, effloresced sulphate of soda be employed, a portion of nitrate of soda is precipitated at first, but subsequently this is redissolved, and Na O, S O$_3$ + 7 Aq is deposited. (Karsten, *loc. cit.*, p. 115.)

Soluble in a saturated aqueous solution of nitrate of ammonia, from which solution it is not displaced by salts which would precipitate it from a solution in pure water. (Margueritte, *C. R.*, **38.** 307.)

When one equivalent of Na O, S O$_3$, in aqueous solution, is mixed with a solution of an equivalent of acetate of potash (C$_4$ H$_3$ K O$_4$) $\frac{62}{100}$ of it are decomposed to sulphate of potash, which may be precipitated by adding alcohol, while $\frac{38}{100}$ of it remain unchanged; when mixed with a solution of an equivalent of chloride of zinc (Zn Cl) $\frac{29}{100}$ of it are decomposed as before, while $\frac{71}{100}$ of it remain unchanged; when mixed with a solution of an equivalent of chloride of magnesium (Mg Cl) $\frac{458}{1000}$ of it are decomposed while $\frac{542}{1000}$ of it remain unchanged. (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.)

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II.) *Sesqui*SULPHATE OF SODA. Not efflorescent. 100 pts. of water at 17.2° dissolve about 25 pts. of it. Insoluble in alcohol. (T. Thomson, in his *System of Chem.*, London, 1831, **2.** 446.)

$2NaO, 3SO_3$

III.) *Bi*SULPHATE OF SODA.

$a = NaO, HO, 2SO_3$ & $+ 2Aq$ Deliquescent. Soluble in 2 pts. of water at 0° (Link); and in 1 pt. of boiling water. (Schubarth, *Tech. Chem.*) 100 pts. of water at 15.5° dissolve 92.72 pts. of it. [T.] Soluble in 2 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht für* 1854, p. 76.)

Decomposed by water, and alcohol. On dissolving the salt in 4 pts. of water, and leaving the solution to itself, the normal salt (I.) crystallized out. The bisalt melts more difficultly and becomes less fluid than the normal (10 Aq) salt when heated. (R. Brandes & Firnhaber, *Brandes's Archiv.*, 1824, **7.** pp. 173 - 180.) When the aqueous solution is allowed to evaporate spontaneously it often happens that it is decomposed, the monosulphate crystallizing out. (Arrott, *Phil. Mag.*, 1844, (3.) **24.** 503.)

More readily decomposed by water than the corresponding potash salt; being even decomposed by the moisture of the air, which it gradually absorbs; this is not the case with the potash salt. (Heumann; Wittstein; H. Rose, *Pogg. Ann.*, **82.** 554.)

SULPHATE OF SODA & *of sesquioxide* OF URANIUM. Soluble in water.

SULPHATE OF SODA & OF ZINC.

I.) Deliquesces in moist air. Soluble, with decomposition, in water. (Graham.)

II.) Permanent. Soluble in water. The aqueous solution is not decomposed at 100°; when evaporated at 55° the double salt crystallizes out as such, but when it is allowed to evaporate spontaneously the component salts crystallize out separately. (Arrott.)

$NaO, SO_3; ZnO, SO_3 + 4Aq$

SULPHATE OF SODA & OF ZIRCONIA. Soluble in water.

SULPHATE OF SOLANIN. Readily soluble in water. The solution is decomposed by ebullition, an acid salt separating out.

SULPHATE OF SPARTEIN. Exceedingly soluble in water. (Stenhouse.)

SULPHATE OF STANNAMYL. Insoluble in water or ether. Sparingly soluble in alcohol.

$C_{10}H_{11}SnO, SO_3$

SULPHATE OF *bi*STANNAMYL. Soluble in alcohol, and ether.

SULPHATE OF $\frac{2}{2}$ STANNAMYL. Readily soluble in alcohol, from which it is precipitated on the addition of water.

$(C_{10}H_{11})_2Sn_2 . O, SO_3$

SULPHATE OF $\frac{3}{2}$ STANNAMYL. Easily soluble in alcohol, and ether; water precipitates it from these solutions.

$(C_{10}H_{11})_3, Sn_2 . O, SO_3$

SULPHATE OF $\frac{4}{2}$ STANNAMYL.

SULPHATE OF STANN(*ous*)ETHYL. Soluble in water, and alcohol.

C_4H_5SnO, SO_3

SULPHATE OF *di*STANN*tri*ETHYL. Permanent. Very sparingly soluble in water. Readily soluble in alcohol. Much more soluble in *cold* than in hot water, a clear, cold saturated solution becoming semisolid when heated nearly to the boiling point. (Buckton.)

$(C_4H_5)_3Sn_2O, SO_3$

SULPHATE OF *tetra*STANN*pent*ETHYL. Nearly insoluble in water; and less soluble in alcohol than distanntriethyl.

$(C_4H_5)_5Sn_4O, SO_3$

SULPHATE OF STANNMETHYL.

C_2H_3SnO, SO_3

SULPHATE OF STIB*di*AMYL. Insoluble in water, or dilute alcohol. Easily soluble in absolute alcohol. Very difficultly soluble in ether.

SULPHATE OF STIB*tri*AMYL. Soluble in alcohol. It resembles the nitrate. (Berlé.)

$Sb\left\{(C_{10}H_{11})_3O_2, 2SO_3\right.$

SULPHATE OF STIB*tri*ETHYL.

I.) *normal.* Very deliquescent. Easily soluble in water. (Merck.)

$Sb\left\{(C_4H_5)_3 . O_2, HO, SO_3\right.$

II.) *acid.* Exceedingly easily soluble in water. Tolerably easily soluble in alcohol. Nearly insoluble in ether. (Lœwig & Schweizer.)

$Sb\left\{(C_4H_5)_3O_2, 2SO_3\right.$

SULPHATE OF STIBETHYLIUM. Exceedingly deliquescent. Soluble in water.

$Sb\left\{(C_4H_5)_4O, SO_3\right.$

SULPHATE OF STIB*tri*METHYL.

$Sb\left\{(C_2H_3)_3 . O_2, HO, SO_3\right.$

SULPHATE OF STIBMETHYL*tri*ETHYLIUM. Extremely deliquescent. Soluble in water. (Friedlænder.)

$Sb\left\{\begin{matrix}(C_2H_3)\\(C_4H_5)_3\end{matrix}\right. . O, SO_3$

SULPHATE OF STIBMETHYLIUM.

I.) *normal.* Permanent. Very soluble in water, and alcohol. Insoluble in ether.

$Sb\left\{(C_2H_3)_4O, SO_3 + 5Aq\right.$

II.) *acid.* Easily soluble in water; more difficultly soluble in alcohol. Almost insoluble in ether.

$Sb\left\{(C_2H_3)_4O, HO, 2SO_3\right.$

SULPHATE OF STRONTIA. Permanent. Soluble in 5345 pts. of water at 15° (Kremers, *Pogg. Ann.*, **85.** 247); in 3600 pts. of water at 15.5° [*Gm.*]; in 3600 pts. of boiling water, and remains dissolved as the solution cools. (Berzelius's *Lehrb.*) Soluble in 15029* pts. of water at 11.25°, and in 3544* pts. of boiling water. (R. Brandes & Silber, *Brandes's Archiv.*, 1830, **33.** 61.) Soluble in 3840 pts. of boiling water. (Moretti, cited by Brandes & Silber, *loc. cit.*)

SrO, SO_3

Soluble in 6895 pts. of water at 14°, and in 9638 pts. at 100°. Less soluble in water containing some sulphuric and chlorhydric acids; requiring 11016 @ 11780 pts. of the liquid to dissolve it. In a solution containing a considerable excess of sulphuric acid 12791 pts. were required to dissolve 1 pt. of sulphate of strontia. As a mean, the number 11862 may represent the amount of liquid containing mixed chlorhydric and sulphuric acids [such as would occur in ordinary processes of analysis], which is required to dissolve 1 pt. of the salt. (Fresenius, *Ann. Ch. u. Pharm.*, 1846, **59.** 121.) It is, however, much more soluble in liquors somewhat more strongly acidulated than those just alluded to. Thus, when recently precipitated SrO, SO_3 is digested during 2 days in cold dilute nitric acid (of 4.8%) 1 pt. of it dissolves

[* These numbers, given in the original article, do not agree with the statement of the details of the experiments, which indicate a solubility of one pt. SrO, SO_3 in 25696 pts. of water at 11 25°, and in 3623 pts. of water at boiling.]

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in from 429 @ 435 pts. of the acid (mean = 1 : 432). When digested during 2 days in cold dilute chlorhydric acid (of 8.5%), 1 pt. of it dissolves in from 472 @ 474 pts. of the acid. When digested during 2 days in cold dilute acetic acid (of 15.6% hydrated acid), 1 pt. of it dissolved in 7843 pts. of the acid. (Fresenius, *Ann. Ch. u. Pharm.*, 1858, **106.** 220, also *Quant.*, p. 754.) When left in contact with chlorhydric acid during several hours at the ordinary temperature of the air a portion of it dissolves. In the solution thus obtained dilute sulphuric acid, as well as chloride of strontium, produces a precipitate; that produced by the former being somewhat more distinct than the latter. If the sulphate of strontia be boiled with the chlorhydric acid the solution will be more rapid. (H. Rose, *Pogg. Ann.*, **25.** 109.)

Sensibly more soluble in water than carbonate of strontia. (Dulong, *Ann. de Chim.*, **82.** 290.) Almost absolutely insoluble either in absolute alcohol or in dilute spirit. (Fresenius, *Quant.*)

Slowly but completely soluble in an aqueous solution of chloride of sodium, from which it is reprecipitated when dilute sulphuric acid is added. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 316.) Less freely soluble in an aqueous solution of sulphate of soda than in pure water, and still less soluble in water acidulated with sulphuric acid. (Andrews, *Phil. Mag.*, (4.) **7.** 406.) Completely insoluble in a concentrated aqueous solution of sulphate of ammonia (1 pt. salt to 4 pts. of water), or any other alkaline sulphate. (H. Rose.) It is not precipitated from solutions containing neutral citrates. (Spiller, *J. Ch. Soc.*, **10.** 110.) Like sulphate of baryta, its precipitation is much hindered by the presence of metaphosphate of soda. (Rube, *J. pr. Ch.*, 1858, **75.** 116.) Insoluble in aqueous solutions of chloride of ammonium, or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 96.)

Sulphate of strontia is completely decomposed, even at the ordinary temperature, and more rapidly on boiling, by aqueous solutions of mono or bicarbonate of potash, soda, or ammonia, even when considerable quantities of the alkaline sulphates are present. (H. Rose.) When an equivalent of $Sr\,O, S\,O_3$ is boiled with one of $2\,Na\,O, H\,O, P\,O_5$, in aqueous solution, $\frac{45}{100}$ of it may be decomposed. (Malaguti, *Ann. Ch. et Phys.*, (3.) **51.** 335.) Soluble in concentrated sulphuric acid, especially when this is hot, but is precipitated from this solution on the addition of water. (Hope.)

Sulphate of Strychnine.

I.) *normal.* $N_2\left\{C_{42}H_{22}O_4^{VI}\,.\,H\,O, S\,O_3 + 7\,Aq\right.$ Soluble in 42 pts. of cold, and in 1 pt. of boiling water; in 82 pts. of cold, and in 1 pt. of boiling alcohol. (Wittstein's *Handw.*) Soluble in less than 10 pts. of cold, and more soluble in warm water. (Gerhardt's *Traité.*)

"Sulphate of strychnine" is soluble in about 50 pts. of water at 22° (Bouchardat, *Ann. Ch. et Phys.*, (3.) **9.** 229); in 48 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht für* 1854, p. 76.)

II.) *acid.* Soluble in dilute sulphuric acid.

$N_2\left\{C_{42}H_{22}O_4^{VI}\,.\,H\,O, H\,O, 2\,S\,O_3\right.$

Sulphate of TellurEthyl. $\left.\begin{matrix}C_4\,H_5\,Te\\C_4\,H_5\,Te\end{matrix}\right\}O_2, H\,O, S\,O_3$ Easily soluble in water.

Sulphate *of binoxide* **of Tellurium.**

I.) *basic.* Decomposed by water. Soluble in warm chlorhydric or nitric acid. (Fischer.)

II.) *normal*, or *bi.* $Te\,O_2, 2\,S\,O_3$ Decomposed by water. Soluble in warm chlorhydric and nitric acids, crystallizing out again as the solution cools. (Magnus, cited in Wittstein's *Handw.*)

Sulphate of TellurMethyl. $C_2\,H_3\,Te\,O, S\,O_3$ Easily soluble in water. Insoluble in alcohol. (Wœhler & Dean, *Ann. Ch. u. Pharm.*, **93.** 235.)

Sulphate of Thebain.

Sulphate of Thiacetonin. Sparingly soluble in water. Insoluble in alcohol. (Stædeler.)

Sulphate of Thoria.

I.) *normal.*

a = *anhydrous.*

$Th\,O, S\,O_3$

b = $Th\,O, S\,O_3 + 2\,Aq$ Separates out from dilute solutions of the hydrates *c* and *b* when these are boiled, and from concentrated solutions when these are evaporated at temperatures above 25°.

Slowly soluble in cold water, and with especial difficulty if but little of the latter is present. Very difficultly soluble in hot water. (Berzelius, *Pogg. Ann.*, 1829, **16.** 407.)

It is so much the less soluble in water in proportion as the temperature of this approaches the boiling point, being scarcely at all soluble in boiling water. That which has separated from a hot solution redissolves as the solution cools. When crystallized it is completely, though very slowly, soluble in cold water, dissolving more rapidly when a large excess of water is present, but months are required if one wishes to obtain a saturated solution. (Berzelius's *Lehrb.*, **3.** 514; **2.** pp. 191, 193.)

c = $Th\,O, S\,O_3 + 5\,Aq$ Permanent. Like sulphate of yttria, this salt dissolves so slowly in water that crystals of it may remain therein for a long time without losing the sharpness of their angles. When powdered it dissolves more easily, water finally taking up a great deal of it. Decomposed by boiling water, with formation of the hydrate *b*. When the aqueous solution is heated, or evaporated at temperatures superior to 25°, it is decomposed, the hydrate *b* separating out.

Sulphate of thoria is insoluble in alcohol, by which it may be precipitated from the aqueous solution. From a cold aqueous solution alcohol precipitates the 5 Aq salt (*c*), but from hot solutions only the 2 Aq salt (*b*) is obtained. (Berzelius, *Pogg. Ann.*, 1829, **16.** pp. 406 – 408.)

II.) *acid.* $Th\,O, 2\,S\,O_3$? Quickly and completely soluble in cold water, but when this solution is evaporated the normal salt separates out, leaving an acid mother liquor. (Berzelius.) When treated with an excess of cold water it dissolves immediately, but if so small an amount of water be added that the salt becomes heated thereby it dissolves very much more slowly. (Berzelius, *Pogg. Ann.*, 1829, **16.** pp. 406, 409.)

III.) *basic.* When a solution of the normal sulphate is treated with successive small portions of ammonia basic salts are precipitated; at first these precipitates redissolve, but as they become more basic they are insoluble in water. (Berzelius, *Pogg. Ann.*, 1829, **16.** 409.)

Sulphate *of protoxide* **of Tin.**

I.) *mono.* $Sn\,O, S\,O_3$ Very soluble in water, but the solution soon deposits a basic salt. (Bouquet.)

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II.) *basic*. Insoluble, or very sparingly soluble, in water. Soluble in dilute sulphuric acid.

Sulphate *of binoxide* **of Tin** (α, or of Stannic Acid).

I.) *ordinary*. Soluble in water. The aqueous solution is decomposed by boiling. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 481.) The solution in water acidulated with sulphuric acid yields no precipitate on boiling. (Fremy.) Soluble in a small quantity of water, if left in contact therewith for some time. When a solution of bichloride of tin is diluted with a large quantity of water, and then treated with sulphuric acid, sulphate of tin is precipitated. The sulphuric acid may be separated from this precipitate by washing with a large quantity of water. The precipitate is soluble in chlorhydric acid, if not immediately, at least after a time. (H. Rose, *Tr.*)

$SnO_2, 2SO_3$

II.) *anomalous* (β, or *Sulphate of MetaStannic Acid*). Very soluble in water, and alcohol. The aqueous solution is decomposed by boiling. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 474.)

Sulphate *of sesquioxide* **of Titanium.** Deliquescent. Very soluble in water. The aqueous solution is decomposed on ebullition. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **20.** 393.) Dilute sulphuric acid produces an abundant precipitate of sulphate of tin in a chlorhydric acid solution of oxide of tin (modif. β). On washing the precipitate with water the sulphuric acid may all be removed, especially if the water is warm. (H. Rose, *Tr.*)

Sulphate *of binoxide* **of Titanium.**

I.) $9TiO, SO_3 + 9Aq$ Insoluble in water or alcohol. (H. Rose.)

II.) *normal*. $TiO_2, 2SO_3$ Completely soluble in a small quantity of lukewarm water; but this solution becomes turbid when more water is added, and when the dilute aqueous solution is boiled all the titanic acid is precipitated. Decomposed by alcohol. (H. Rose.)

Sulphate of Toluenyl.

I.) *normal*. (*Sulphanisolid.*) $C_{14}H_7O, SO_3$ Insoluble in water. Readily soluble in alcohol, and ether. Soluble, with combination, in concentrated sulphuric acid. (Cahours, *Ann. Ch. et Phys.*, (3.) **27.** 461.)

II.) *acid*. (*SulphAnisolic Acid*) $C_{14}H_7O, HO, 2SO_3$ Known only in solution. Its compounds with the metallic oxides are soluble in water.

Sulphate of Toluidin (or of Toluenylamin). $N\left\{\begin{matrix}C_{14}H_7\\H_2\end{matrix}\right. . HO, SO_3$ Readily soluble in water. Sparingly soluble in alcohol. Very sparingly soluble, or insoluble, in ether. (Muspratt & Hofmann.)

Sulphate of Tungstic Acid. Soluble in pure water, from which solution it is precipitated on the addition of nitric or sulphuric acid.

Sulphate of Tyrosin. $C_{18}H_{10}NO_5, 2HO, S_2O_6 + Aq$ Easily soluble in water, but the solution soon decomposes.

Sulphate *of protoxide* **of Uranium.**

I.) *mono*.

a = Soluble in water. (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** 33.) Insoluble in alcohol. (Berzelius's *Lehrb.*) Alcohol precipitates a basic salt from the acidulated aqueous solution. (Berzelius's *Lehrb.*)

b = $UrO, SO_3 + 2Aq$ Permanent. Decomposed by water, with formation of an insoluble disalt. Soluble in dilute sulphuric acid, and very easily in dilute chlorhydric acid, but is very sparingly soluble in concentrated acids. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** 215.)

c = $UrO, SO_3 + 4Aq$ Permanent. (Rammelsberg.) Decomposed by water, with formation of a difficultly soluble basic salt. (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** 33.)

II.) *di*. $2UrO, SO_3 + 2Aq$ Insoluble in water. When treated with large quantities of water, and especially if this be hot, sulphuric acid is abstracted from it. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** 217.)

Sulphate *of sesquioxide* **of Uranium.**

I.) *mono*. $Ur_2O_3, SO_3 + 3Aq$ Slightly efflorescent. Easily soluble in water, and alcohol. (Berzelius.) The crystallized salt is soluble in 0.465 pt. of water at 22°, and in 0.289 @ 0.273 pt. of boiling water. Or 100 pts. of water at 22° dissolve 215 pts. of it, and 100 pts. of boiling water dissolve 346 @ 364 pts. of it. Soluble in alcohol. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** 210.) Soluble in 0.6 pt. of cold, and in 0.45 pt. of boiling water (Bucholz); soluble in 4 @ 5 pts. of cold, and in 3 pts. of boiling water. (Wittstein's *Handw.*) 100 pts. of water at 15.5° dissolve 160 pts. of it, and at 100°, 220 pts. (Ure's *Dict.*)

Sulphate of uranium may be completely precipitated from its aqueous solution by adding a suitable quantity of concentrated acetic acid. (Persoz, *Ann. Ch et Phys.*, 1836, (2.) **63.** 444.) Soluble in 25 pts. of cold, and in 20 pts. of boiling alcohol. (Bucholz.)

II.) *bi*. $Ur_2O_3, 2SO_3 + Aq$ Deliquescent. Very soluble in water. (Péligot, *Ann. Ch. et Phys.*, (3.) **12.** 559.)

III.) *ter*. $Ur_2O_3, 3SO_3$ Péligot doubts the existence of a tersulphate. Deliquescent. Soluble in water, but is decomposed thereby, the bisalt separating out when the solution is evaporated. (Berzelius, *Lehrb.*, **3.** 1107.)

IV.) *polybasic*. $3Ur_2O_3, SO_3$ When ammonia is added to an aqueous solution of the sulphate, Ur_2O_3, SO_3, the precipitate, at first formed, continues to redissolve till half the acid is neutralized. The clear liquid thus obtained becomes milky after a while, and finally deposits a whitish sediment, but this is exceedingly small in amount. But if, instead of ammonia, the monosulphate be treated with an excess of carbonate of baryta two thirds of its acid may be removed. The solution of terbasic salt thus obtained may be boiled without change, and the residue obtained by evaporating it to dryness redissolves completely in water. (Ordway, *Am. J. Sci.*, 1858, (2.) **26.** pp. 208, 209.)

Sulphate *of protoxide & of sesquioxide* **of Uranium.** $UrO, SO_3; Ur_2O_3, SO_3$ Soluble in water. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** 213.) Soluble in water. When the aqueous solution is boiled basic sulphate of protoxide of uranium separates out, but dissolves again as the solution cools. Alcohol precipitates all the salt of the protoxide, as a basic salt, when added to the aqueous solution. (Berzelius, *Lehrb.*)

Sulphate of Urea. $C_2H_4N_2O_2, HO, SO_3$ Soluble in water, and alcohol. (Cap & Henry.)

Sulphate of Uric Acid. $C_{10}H_4N_4O_6, 6(HO, SO_3)$ Exceeding hygroscopic, with decomposition. Soluble in

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warm concentrated sulphuric acid, separating out as the solution cools. (Fritzsche.)

SULPHATE *of binoxide* OF VANADIUM.

I.) *normal.* Deliquesces more readily in warm moist air than it dissolves in water at 10°. Very slowly soluble in water at 10°, but rapidly soluble in water at 60°, and still more quickly in boiling water. Very imperfectly soluble in absolute alcohol; easily soluble in alcohol of 0.833 sp. gr. (Berzelius.)

$VO_2, 2SO_3 + 4Aq$

II.) *basic.* Soluble in water.

SULPHATE OF VANADIC ACID.

I.) *basic.* Insoluble in hot water.

II.) *bi.* Deliquescent. Soluble in water. (Berzelius.)

$VO_3, 2SO_3$

III.) *ter*, or *normal.* Very deliquescent. Soluble in water, and alcohol. On boiling the aqueous solution it is decomposed to the basic and the peracid salt.

$VO_3, 3SO_3$

IV.) *peracid.* Soluble in water.

SULPHATE OF VERATRIN. Soluble in water.

$N_2 \} C_{64} H_{52} O_{16}^{VI} . HO, SO_3$

SULPHATE OF *tetra*VINYLIUM.

I.) *normal.* Permanent. Soluble in water. Sparingly soluble in alcohol.

$NC_{16}H_{12}O, SO_3$

II.) *acid.* Soluble in water.

$2NC_{16}H_{12}O, HO, 2SO_3$

SULPHATE OF XANTHOCOBALT. Rather soluble in hot, much less soluble in cold water. Soluble, without decomposition, in a cold aqueous solution of sulphurous acid; this solution is decomposed on boiling. (Gibbs & Genth, *Smithson. Contrib.*, vol. **9.**)

$NO_2 . 5NH_3 . Co_2O_3, 2SO_3 + Aq$

SULPHATE OF XYLIDIN. Sparingly soluble in cold, more soluble in hot water. (Church.)

$N \left\{ \begin{matrix} C_{16}H_9 \\ H_2 \end{matrix} \right. . HO, SO_3$

SULPHATE OF YTTRIA.

I.) *mono.* Permanent. Effloresces at 40°. Very slowly soluble in 25 @ 30 pts. of water (Klaproth); in 50 pts. of cold, and is not much more soluble in hot water. (Vauquelin.) 100 pts. of water dissolve 8 pts. of it at 18.3°. Insoluble in alcohol. (Steele, ?, in Thomson's *System of Chem.*, London, 1831, **2.** 551.)

YO, SO_3

This salt is characterized by the extraordinary slowness with which it dissolves in water, even when this is warm: it even appears at first sight as if it were completely insoluble, but it gradually dissolves completely. The saturated solution contains from $\frac{1}{45}$ @ $\frac{1}{30}$ of its weight of the salt. In presence of an excess of acid it is less easily soluble in water, and crystallizes more readily. (Berzelius, *Lehrb.*, **3.** 499.) Much less soluble in water than the nitrate of yttria.

Sulphate of yttria may be completely precipitated from its aqueous solution by adding a suitable quantity of concentrated acetic acid. (Persoz, *Ann. Ch. et Phys.*, 1836, (2.) **63.** 444.)

II.) *tri.* Insoluble in water. Soluble in acids.

$3YO, SO_3$

SULPHATE OF ZINC.

I.) *normal.*

a = *anhydrous.* Soluble in water, with evolution of heat. (Graham.) Soluble in chlorhydric acid. (Kane.)

ZnO, SO_3

$b = ZnO, SO_3 + Aq$

$c = ZnO, SO_3 + 2Aq$ Insoluble in alcohol. (Kuehn.) This hydrate is precipitated when strong sulphuric acid is mixed with a concentrated aqueous solution of g.

$d = ZnO, SO_3 + 3Aq$ This salt is deposited from very concentrated solutions of the 7-hydrated salt; it is less soluble than the latter in water. (T. Thomson's *System of Chem.*, London, 1831, **2.** 611.)

$e = ZnO, SO_3 + 5Aq$ Insoluble in boiling alcohol of 0.86%. (Kuehn.)

$f = ZnO, SO_3 + 6Aq$ Separates from the aqueous solution when this is evaporated at temperatures above 30°. (Mitscherlich.)

$g = ZnO, SO_3 + 7Aq$ Efflorescent.

The ordinary crystallized salt.
(Zinc Vitriol. White Vitriol.)

100 pts. of water at °C.	Dissolve pts. Of the anhydr. salt.	Dissolve pts. Of the 7-hydrated salt.
0°	43.02	115.22
10°	48.36	138.21
20°	53.13	161.49
30°	58.40	190.90
40°	63.52	224.05
50°	68.75	263.84
60°	74.20	313.48
70°	79.25	369.36
80°	84.60	442.62
90°	89.78	533.02
100°	95.03	653.59

(Poggiale, *Ann. Ch. et Phys.*, (3.) **8.** 467.)

0°	41.3
20°	53.0
25°	54.6
50°	66.9
75°	80.4

(Tobler, *Ann. Ch. u. Pharm.*, **95.** 198, and fig.)

Soluble in 0.61 pt. of water at 20.5°; or 100 pts. of water at 20.5° dissolve 163.2 pts. of it; or the aqueous solution saturated at 20.5° contains 62.1% of it, or 34.8% of the anhydrous salt, and is of 1.4650 sp. gr. (H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **109.** 326.) Soluble in somewhat more than 2 pts. of water [at the ordinary temperature], but much more readily soluble in boiling water. (Bergman, *Essays*, **1.** 184.) 100 pts. of the saturated aqueous solution contain at the boiling point (104.4°) 45 pts. of the dry salt; or 100 pts. of water at 104.4° dissolve 81.81 pts. of it; or 1 pt. of the salt is soluble in 1.2222 pts. of water at 104.4°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) The aqueous solution saturated at 17.5° is of 1.4353 sp. gr., and contains 51.98% of the salt; i. e. 100 pts. of water at 17.5° dissolve 108.26 pts. of the hydrated salt, or 1 pt. thereof is soluble in 0.923 pt. of water at 17.5. (Karsten, *Berlin Abhandl.*, 1840, p. 101.) At ordinary temperatures 100 pts. of water dissolve 140 pts. of the 7-hydrated salt. (Dumas, *Tr.*) Soluble in 2.3 pts. of cold, and in less than 1 pt. of hot water. Soluble in 2.29 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht für* 1854, p. 76.) 100 pts. of water at 15.56° dissolve 140 pts. of it (Ure's *Dict.*); 93.88 pts. of the 7 Aq salt. [T.] The aqueous solution saturated at 10° contains 36% of it (Eller); and at 12.5°, 55.5%. (Hassenfratz, *Ann. de Chim.*, **28.** 291.) The aqueous solution saturated at 15° is of 1 444244 sp. gr., and contains dissolved in every 100 pts. of water at least 140.526 pts. of "sulphate of zinc." (Michel & Krafft, *Ann. Ch. et Phys.*, (3.) **41.** pp. 478, 482.)

Sulphate of zinc is liable to form supersaturated solutions. (Ogden.) When heated it melts in its water of crystallization. The aqueous solution saturated at 8° is of 1.421 sp. gr. (Anthon, *Ann. der Pharm*, 1837, **24.** 210.)

An aqueous solution of sp. gr. at 20.5°.	Contains (by experiment) percent of $ZnO, SO_3 + 7 Aq$.
1.4650	62.12
1.2790	41.41
1.1740	27.61
1.1271	20.70
1.0817	13.80
1.0397	6.90

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **108.** 336.)

From these results Schiff calculates the following table by means of the formula: $D = 1 + .005681\ p + 0.00001812\ p^2 + 0.0000001748\ p^3$; in which D = the sp. gr. of the solution, and p the percentage of substance in the solution.

Sp. gr. (at 20.5°).	Percent of $ZnO, SO_3 + 7 Aq$	Of andr. ZnO, SO_3.
1.0057	1	0.56
1.0115	2	1.12
1.0173	3	1.68
1.0231	4	2.24
1.0289	5	2.80
1.0348	6	3.36
1.0407	7	3.92
1.0467	8	4.48
1.0527	9	5.04
1.0588	10	5.60
1.0649	11	6.16
1.0710	12	6.72
1.0772	13	7.28
1.0835	14	7.84
1.0899	15	8.40
1.0962	16	8.96
1.1026	17	9.52
1.1091	18	10.08
1.1156	19	10.64
1.1222	20	11.20
1.1288	21	11.76
1.1355	22	12.32
1.1423	23	12.88
1.1491	24	13.44
1.1560	25	14.00
1.1629	26	14.56
1.1699	27	15.12
1.1770	28	15.68
1.1842	29	16.24
1.1914	30	16.80
1.1987	31	17.36
1.2060	32	17.92
1.2134	33	18.48
1.2209	34	19.04
1.2285	35	19.60
1.2362	36	20.16
1.2439	37	20.72
1.2517	38	21.28
1.2595	39	21.84
1.2674	40	22.40
1.2754	41	22.96
1.2834	42	23.52
1.2917	43	24.08
1.3000	44	24.64
1.3083	45	25.20
1.3167	46	25.76
1.3252	47	26.32
1.3338	48	26.88
1.3424	49	27.44
1.3511	50	28.00
1.3599	51	28.56
1.3688	52	29.12
1.3779	53	29.68
1.3871	54	30.24
1.3964	55	30.80
1.4057	56	31.36
1.4151	57	31.92
1.4246	58	32.48
1.4342	59	33.04
1.4439	60	33.60

(H. Schiff, *Ann. Ch. u. Pharm.*, 1859, **110.** 72.)

A solution of sp. gr. (at 12.5°).	Contains percent of sulphate of zinc.	A solution of sp. gr. (at 12.5°).	Contains percent of sulphate of zinc.
1.0080	2	1.1550	28
1.0165	4	1.1680	30
1.0255	6	1.1820	32
1.0345	8	1.1960	34
1.0440	10	1.2100	36
1.0540	12	1.2240	38
1.0665	14	1.2380	40
1.0790	16	1.2525	42
1.0915	18	1.2680	44
1.1040	20	1.2855	46
1.1165	22	1.3045	48
1.1290	24	1.3310	50
1.1420	26	1.3485	52
		1.3565	54

(Hassenfratz, *Ann. de Chim.*, **28.** 297.)

Hot alcohol, even absolute, dissolves a trace of it. (Kuehn.) Sulphate of zinc is insoluble in spirit, the sp. gr. of which = 0.880. 1000 pts. of spirit of 0.905 sp. gr. dissolve 2 pts. of it. (Anthon, from *Buchner's Repert.*, II. pp. 13, 18; in *J. pr. Ch.*, **14.** 125.)

A solution (saturated at 15°) in alcohol of Sp. gr.	Percent, by weight.	Contains percent of $ZnO, SO_3 + 7 Aq$.
1.000	0	54.5
0.986	10	51.1
0.972	20	39.0
0.939	40	3.48

(H. Schiff, *Ann. Ch. u. Pharm.*, 1861, **118.** 365.)

Sulphate of zinc may be completely precipitated from its aqueous solution by adding a suitable quantity of concentrated acetic acid. (Persoz, *Ann. Ch. et Phys.*, 1836, (2.) **63.** 444.) When a hot solution of sulphate of zinc is cooled out of contact with the air, or in a vessel loosely stopped with cotton-wool, a supersaturated solution may be obtained, from which a modification (β) of the 7-hydrated salt, more soluble than the ordinary modification (α), crystallizes out after a time, when the solution remains protected by the cotton, but if the supersaturated solution be exposed to the air, or be stirred with a body which has been exposed to the air, ordinary (α) sulphate of zinc crystallizes out at once. (Schrœder, *Ann. Ch. u. Pharm.*, 1859, **109.** 51.)

Very rapidly soluble in a saturated aqueous solution of sulphate of potash, a double salt separating meanwhile as a mealy powder. (Karsten, *Berlin Abhandl.*, 1840, p. 126.) Very rapidly and abundantly soluble in a saturated solution of sulphate of soda. The solution obtained remains clear for days, but on being evaporated deposits crystals of a double salt. If it be strongly heated and then quickly cooled it will deposit sulphate of zinc and sulphate of soda uncombined with each other. (Karsten, *loc. cit.*, p. 124.) Abundantly soluble in a saturated solution of sulphate of copper, at first to a clear solution, but as this becomes nearly saturated a double salt separates out. (Karsten, *loc. cit.*, p. 127.) Slowly soluble in a saturated solution of sulphate of magnesia, without causing any precipitation. Difficultly and slowly soluble in a saturated solution of chloride of ammonium,

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with separation of a double sulphate. (Karsten, *loc. cit.*, p. 128.) Soluble in considerable quantity in a saturated solution of chloride of sodium, without causing any precipitation at first, but as the solution approaches saturation sulphate of soda separates out. No double salt is formed unless the solution is slowly evaporated. (Karsten, *loc. cit.*, p. 128.) Crystallized sulphate of zinc is soluble in a saturated solution of nitrate of soda without causing any precipitation of the latter; after a while, however, a double sulphate separates out. (Karsten, *loc. cit.*, p. 116.) Soluble in a saturated solution of nitrate of potash with formation of a double sulphate, which immediately separates out. (Karsten, *loc. cit.*, p. 130.)

When one equivalent of $Zn\,O, S\,O_3$, in aqueous solution, is mixed with a solution of an equivalent of chloride of potassium ($K\,Cl$), $\frac{84}{100}$ of it are decomposed to sulphate of potash, which may be precipitated by adding alcohol, while $\frac{16}{100}$ of it remain unchanged; when mixed with a solution of an equivalent of chloride of sodium ($Na\,Cl$), $\frac{72}{100}$ of it are decomposed as before, while $\frac{48}{100}$ of it remain unchanged. (Malaguti, *Ann. Ch. et Phys.*, 1853, (3.) **37.** 203.)

II.) *bi.* $Zn\,O, 2\,S\,O_3 + 9\,Aq$ Difficultly soluble in cold, easily soluble in warm water. (v. Kobell.)

III.) *di.* $2\,Zn\,O, S\,O_3$ Soluble in water.

IV.) *tri.* $3\,Zn\,O, S\,O_3$ Insoluble in cold, and only very sparingly soluble in hot water. (Vogel [T.].)

V.) *tetra.* $4\,Zn\,O, S\,O_3 + 2\,Aq$ Insoluble in cold, scarcely at all soluble in boiling water; but soluble in a boiling aqueous solution of sulphate of zinc. (Kuehn.)

VI.) *hexa.* $6\,Zn\,O, S\,O_3 + 10\,Aq$ Insoluble in water. (Kane.)

VII.) *octo.* $8\,Zn\,O, S\,O_3 + 2\,Aq$ Insoluble in water. (Schindler.)

Sulphate of Zinc & Zincammonium.

I.) *basic.* $2\,Zn\,O, 2\,N\left\{\begin{matrix}H_3\\Zn\end{matrix}\right. O\,.\,S\,O_3 + 4\,Aq$ Insoluble in water. (Schindler.)

Sulphate of Zinc*bi*amin. $N_2\left\{H_6\,.\,Zn\,O, S\,O_3 + Aq \,\&\, 2\,Aq \,\&\, 4\,Aq\right.$ Completely soluble in a small quantity of water.

Sulphate of Zincammonium. $N\left\}\begin{matrix}H_3\\Zn\end{matrix}\right.\,.\,O, S\,O_3 \,\&\, + Aq$ Decomposed by water. (Kane.)

Sulphate of Zirconia.

I.) *normal.* $Zr_2\,O_3, 3\,S\,O_3$ Slowly soluble in cold, rapidly soluble in boiling water. Sparingly soluble in alcohol. (Berzelius.) On boiling the aqueous solution it undergoes decomposition, oxide of zirconium being deposited. (H. Rose, *Pogg. Ann.*, **83.** 148.)

II.) *di.* $2\,Zr_2\,O_3, 3\,S\,O_3$ Soluble in a very small quantity of water; but a large quantity of water decomposes it to the tri salt, which separates out, and the normal salt, which remains in solution. (Berzelius.)

III.) $Zr_2\,O_3, S\,O_3$ Insoluble in water or alcohol. Soluble in chlorhydric acid. (Berzelius.)

SulphAuric Acid. *Vid.* *ter*Sulphide of Gold.

SulphAurate of Potassium. Known only in aqueous solution.

SulphAzoticChloride of Nitrogen. *Vid.* Chloride of Nitrogen with *bi*Sulphide of Nitrogen.

SulphAzoticChloride of Sulphur. *Vid.* Chloride of Sulphur with *ter*Sulphide of Nitrogen.

SulphAzotide of Benzene. *Vid.* Hydride of SulphAzoBenzoyl.

Sulphessal. *Vid.* Thionessal.

SulphEthamic Acid. $C_{16}\,H_{23}\,N\,S_4\,O_{16}$ Very easily soluble in water, and alcohol; but these solutions are decomposed by concentration.

SulphEthamate of Ammonia. $C_{16}\,H_{22}\,(N\,H_4)\,N\,S_4\,O_{16}$ Deliquesces in moist air. Easily soluble in water, and alcohol. Insoluble in ether. (Strecker.)

SulphEthamate of Baryta. Very soluble in water.

SulphEthamate of Lead. Very soluble in water, and spirit. Sparingly soluble in absolute alcohol.

***Bi*SulphEtholic Acid.** $C_4\,H_6\,S_4\,O_{12} = C_4\,H_4''\,O_2, 2\,H\,O, S_4\,O_8$ Very deliquescent. Easily soluble in water, and alcohol. (Buff.)

***Bi*SulphEtholate of Ammonia.** $C_4\,H_4\,(N\,H_4)_2\,S_4\,O_{12}$ Easily soluble in water. Scarcely at all soluble in alcohol. Insoluble in ether.

***Bi*SulphEtholate of Baryta.** $C_4\,H_4\,Ba_2\,S_4\,O_{12} + 2\,Aq$ Very soluble in boiling, less soluble in cold water. Almost insoluble in alcohol. Insoluble in concentrated, but soluble in dilute nitric acid. (Buff.)

***Bi*SulphEtholate of Lead.** Very soluble in water.

***Bi*SulphEtholate of Potassium.** $C_4\,H_4\,K_2\,S_4\,O_{12}$ Easily soluble in water, and spirit. (H. L. Buff, *Ann. Ch. u. Pharm.*, **100.** 233.)

***Bi*SulphEtholate of Silver.** (Buckton & Hofmann, *J. Ch. Soc.*, **9.** 252.)

SulphEtheric Acid. *Vid.* Isethionic Acid.

***Bi*SulphEthylic Acid.** *Vid.* EthylSulphurous Acid.

SulphEthylSulphuric Acid. *Vid.* EthylSulphurous Acid.

Sulphides. Among the metallic sulphides those only are soluble in water which correspond to the soluble oxides. (Persoz, *Chim. Molèc.*, p. 462.)

Sulphide of Acetyl. *(Sulphide of Othyl, or of Acetoxyl. Thiacetic Anhydride. Thiacetate of Othyl.)* $C_4\,H_3\,O_2\,S$, or $\left.\begin{matrix}C_4\,H_3\,O_2\\C_4\,H_3\,O_2\end{matrix}\right\}S_2$ Insoluble in water. Slowly decomposed when kept in contact with water. (Kekulè, *Ann. Ch. u. Pharm.*, **90.** 312.)

Sulphide of Allyl. *(Oil of Garlic.)* $C_6\,H_5\,S$, or $\left.\begin{matrix}C_6\,H_5\\C_6\,H_5\end{matrix}\right\}S_2$ Sparingly soluble in water. Easily soluble in alcohol, and ether. (Wertheim.)

Sulphide of Allyl & of Mercury. $\left.\begin{matrix}C_6\,H_5\\Hg\end{matrix}\right\}S_2$ Soluble in boiling, less soluble in cold alcohol. (Cahours & Hofmann.)

Sulphide of Allyl & of Palladium. $2\,C_6\,H_5\,S\,;\,3\,Pd\,S$ Insoluble in water, alcohol, or ether.

Sulphide of Allyl & of Platinum. $C_6\,H_5\,S\,;\,Pt\,S_2$ Insoluble in water, alcohol, or ether. (Wertheim.)

Sulphide of Allyl & of Silver. $C_{12}\,H_{10}\,S_2\,;\,x\,Ag\,S$

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SULPHIDE OF ALUMINUM. Al_2S_3 Decomposed by water. (Fremy, *Ann. Ch. et Phys.*, (3.) **38.** 323.) The compounds of sulphide of aluminum, with other sulphur metals, are all easily decomposed by water. (Berzelius, *Lehrb.*, **2.** 166.)

SULPHIDE OF AMMONIUM.

I.) *mono.* (*MonoHydroSulphate ofAmmonia.*) NH_4S Rapidly decomposes in the air. Soluble in water.

II.) *bi.* NH_4S_2 Known only in aqueous solution. (Berzelius.)

III.) *ter.* NH_4S_3 Soluble in a small quantity of water, but is decomposed by much water. (Berzelius.)

IV.) *quadri.* (*HypohydroSulphate of Ammonia.*) NH_4S_4 Easily soluble in water; the concentrated aqueous solution may be preserved for a long time, but when dilute the solution soon decomposes. Easily soluble in alcohol, but this solution soon decomposes. (Fritzsche.)

V.) *quinqui.* (*HydroSulphite of Ammonia.*) NH_4S_5 Decomposes in the air, especially if this be moist. Decomposed by water, with partial solution. Soluble in alcohol, with subsequent partial decomposition. (Fritzsche.)

VI.) *septi.* (*HypohydroSulphite of Ammonia.*) NH_4S_7 Much more permanent than No. 5. Insoluble in water, but is decomposed thereby, though much more slowly and difficultly than the quinqui sulphide. (Fritzsche.)

SULPHIDE OF AMMONIUM & *biSulphide* OF VANADIUM. Soluble in water.

SULPHIDE OF AMMONIUM & *terSulphide* OF VANADIUM.

SULPHIDE OF AMYL. (*AmylSulphydric Ether.*) $C_{10}H_{11}S$, or $\left.\begin{matrix}C_{10}H_{11}\\C_{10}H_{11}\end{matrix}\right\}S_2$ Insoluble in water. Miscible in all proportions with alcohol, and ether. (Kolbe's *Lehrb.*, **1.** 319.)

***Bi*SULPHIDE OF AMYL.** $C_{10}H_{11}S_2$, or $\left.\begin{matrix}C_{10}H_{11}\\C_{10}H_{11}\end{matrix}\right\}S_4$ Insoluble, or very sparingly soluble, in water. Unacted upon either by hot or cold concentrated chlorhydric acid, or aqua-regia, or by cold sulphuric acid, but is partially decomposed when heated with the latter. Unacted upon by ammonia-water, and scarcely at all by a concentrated aqueous solution of caustic potash. (O. Henry, *Ann. Ch. et Phys.*, (3.) **25.** 247.)

SULPHIDE OF AMYL & OF COPPER. Ppt.

SULPHIDE OF AMYL & OF LEAD. Ppt.

SULPHIDE OF AMYL & OF MERCURY (HgS). Insoluble in water. Unacted upon by boiling potash-lye. Sparingly soluble in boiling alcohol, and ether, and still less so in the cold. (Krutsch.) Insoluble in water or alcohol. Soluble in ether. (Balard.)

SULPHIDE OF AMYL & OF SILVER. Insoluble in water, and in alcohol. Soluble in ether. (Balard.)

***Ter*SULPHIDE OF ANTIMONY.** (*SulphAntimonious Acid*), *q. v.* SbS_3 Insoluble in water or dilute acids. Soluble, with decomposition, in concentrated acids. When boiled with water, or when left for a long time in contact with water and air, it suffers decomposition. Abundantly soluble, with combination, in a boiling solution of acid chlorhydrate of teroxide of antimony. (Liebig.) Soluble in a boiling aqueous solution of trisulphantimoniate of sodium ($3NaS, SbS_5 + 18Aq$).

Soluble in an aqueous solution of sulphydrate of ethylamin. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 484.) Easily soluble in an aqueous solution of sulphide of ammonium.

Soluble in a boiling aqueous solution of sulphydrate of potassium, with evolution of sulphuretted hydrogen, but is redeposited in great part in combination with a small quantity of sulphide of potassium, as the solution cools. (Berzelius's *Lehrb.*, **2.** 299.) Very sparingly soluble in ammonia-water. (Garot.) Partially soluble in solutions of the carbonates of potash and soda. Soluble in solutions of the caustic alkalies, best when these are hot and concentrated, especially when it is moist, i. e. when recently precipitated and not yet dry.

When heated to about 250° in a closed tube, with a solution of bicarbonate of soda, it dissolves, and is subsequently deposited in crystals upon the sides of the tube. (De Senarmont, *Ann. Ch. et Phys.*, (3.) **32.** 159.) Insoluble in sulphurous acid. (Berthier.) Insoluble in aqueous solutions of chloride of ammonium, or carbonate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 99.) Soluble, with decomposition, in boiling concentrated chlorhydric acid. Boiling concentrated sulphuric acid converts it into sulphate of antimony, and concentrated nitric acid oxidizes, but does not dissolve it.

***Quadri*SULPHIDE OF ANTIMONY.** SbS_4 Insoluble in water. Slightly soluble in sulphuretted hydrogen-water. Soluble in ammonia-water. (Capitaine.) Soluble in boiling chlorhydric acid, with decomposition. (Berzelius.)

***Quinqui*SULPHIDE OF ANTIMONY.** (*SulphAntimonic Acid.*) SbS_5 Insoluble in water. Slightly soluble in sulphuretted hydrogen-water. Soluble in 50 pts. of cold dilute ammonia-water. (Geiger.) Easily soluble in aqueous solutions of the alkaline sulphides, and of the caustic alkalies. Insoluble in cold, but soluble in boiling aqueous solutions of the alkaline carbonates. When boiled with liquids capable of dissolving sulphur, like alcohol, ether, bisulphide of carbon, or oil of turpentine, it is decomposed, a portion of its sulphur being dissolved. (Berzelius, *Lehrb.*, **2.** 307.) When heated in a closed tube to about 250°, with an aqueous solution of bicarbonate of soda, it is decomposed, crystals of SbS_3 being deposited, while sulphur separates. (De Senarmont, *Ann. Ch. et Phys.*, (3.) **32.** 159.) Insoluble in acids which have no oxydizing action upon the antimony. Soluble, with decomposition, in hot strong chlorhydric acid. Insoluble in an aqueous solution of tersulphantimoniate of sodium ($3NaS, SbS_5 + 18Aq$).

SULPHIDE OF ARSEN*tri*ETHYL. $As\left\{(C_4H_5)_3, S_2\right.$ Permanent. Readily soluble in warm water, and in alcohol (spirit). Almost insoluble in cold, but readily soluble in warm ether. (Landolt, *Ann. Ch. u. Pharm.*, **89.** 327.)

***Bi*SULPHIDE OF ARSENIC.** (*HypoSulphArsenious Acid. Realgar.*) AsS_2 Insoluble in water. Soluble in aqueous solutions of the alkaline sulphides, and, with decomposition, of the caustic alkalies.

When heated to about 150° in a sealed tube, with an aqueous solution of bicarbonate of soda, it dissolves, and is subsequently deposited in crystals upon the walls of the tube. (De Senarmont, *Ann. Ch. et Phys.*, (3.) **32.** 158.)

The compounds of bisulphide of arsenic, with lower metallic sulphides, are generally difficultly soluble in water. [*Vid.* HypoSulphArsenites.]

*Ter*SULPHIDE OF ARSENIC. (*Orpiment. SulphArsenious Acid.*) $a = As\,S_3$ When prepared in the dry way it is insoluble in water [P. & F.], but when prepared in the moist way, by the action of sulphuretted hydrogen upon an aqueous solution of arsenious acid, it is soluble to a certain extent in water, or, rather, transparent particles of the sulphide are suspended in the water; for on allowing the solution to stand the sulphide of arsenic gradually separates out. (Berzelius, *Lehrb.*, **2.** 269.) Sulphide of arsenic is decomposed to a certain extent, with evolution of sulphuretted hydrogen, when boiled with water. (Pfaff; Huenefeld, *Ann. der Pharm.*, **20.** 224.) Precipitated from its aqueous solution on heating or freezing. (Boutigny; Pfaff.) Very sparingly soluble in warm water, from which it is precipitated by freezing or boiling, or by the addition of acids, in the following order: sulphuric (most readily), chlorhydric, nitric, oxalic, acetic, tartaric, or even carbonic; solutions of several salts produce the same effect: as, of chloride of ammonium, nitrate of potash, sulphate of soda, and sulphate of magnesia. Somewhat soluble in an aqueous solution of sulphuretted hydrogen. (Melsens, *Ann. Ch. et Phys.*, (3.) **33.** 175.) Insoluble in the acids generally. Insoluble in cold, and scarcely attacked by boiling chlorhydric acid. Easily soluble, with decomposition, in nitric acid and aqua-regia. Easily soluble, with decomposition, in aqueous solutions of the caustic and carbonated alkalies; also, with combination, in solutions of the alkaline sulphides.

When heated to about 150° with bicarbonate of soda in a sealed tube, it sometimes behaves like the bisulphide ($As\,S_2$), *q. v.*, but the reaction in the present case appears to occur only at a certain particular temperature, or to depend upon some special state of concentration of the alkaline solution. (De Senarmont, *Ann. Ch. et Phys.*, (3.) **32.** 158.)

$b =$ *hydrated.* $As\,S_3, 3\,H\,O$ Slightly soluble in water. Insoluble in water containing sulphuretted hydrogen. (Berzelius.) Insoluble in water containing sulphuric, nitric, chlorhydric, oxalic, acetic, tartaric, or carbonic acids, or in solutions of chloride of ammonium, nitrate of potash, sulphate of soda, or sulphate of magnesia. (Boutigny, *J. Chim. Méd.*, **8.** 449.) The best means of separating it entirely from its solution is to keep the latter supersaturated with sulphuretted hydrogen, and warm.

Readily soluble in citric acid, and in solutions of the soluble citrates; consequently arsenious acid cannot be precipitated by means of sulphuretted hydrogen from solutions which contain citric acid. (Spiller.)

Insoluble in water, that is to say, 1 pt. of it requires about 1000000 pts. of water to dissolve it. (Fresenius, *Quant.*, p. 156.) Traces of it are dissolved by sulphuretted hydrogen-water. When boiled with water, or kept in contact with cold water during several days, a trace of it is decomposed and dissolved. (Fresenius, *Quant.*, p. 156.)

*Quinqui*SULPHIDE OF ARSENIC. (*SulphArsenic Acid.*) $As\,S_5$ Insoluble in boiling water. Easily soluble, with partial decomposition, in aqueous solutions of the caustic alkalies, and of their sulphides and carbonates. Easily soluble in strong ammonia-water, but dilute ammonia-water decomposes it, with separation of sulphur. Also soluble in solutions of the hydrates of the alkaline earths.

Readily soluble in citric acid, and in solutions of the soluble citrates. (Spiller.) Partially decomposed by alcohol. When the precipitated sulphide is boiled with alcohol, this dissolves out some sulphur. (Berzelius, *Lehrb.*, **2.** 270.)

*Hyper*SULPHIDE OF ARSENIC. $As\,S_{18}$ Soluble in alcohol. (Berzelius.)

SULPHIDE OF ARSENMETHYL. $C_2\,H_3\,As'', S_2$ Permanent. Insoluble in water. Moderately soluble in alcohol, either anhydrous or hydrated. Moderately soluble in ether. Very readily soluble in bisulphide of carbon. (Bæyer.)

SULPHIDE OF ARSEN*tri*METHYL. $As\left\{(C_2\,H_3)_3, S_2\right.$ Soluble in water, and alcohol. (Cahours.)

SULPHIDE OF ARSENMETHYLETHYLIUM.

SULPHIDE OF BARIUM.

I.) *mono.*
(*Sulphuret of Baryta.*)

$a = Ba\,S$ Soluble in cold, more readily in hot water, but is decomposed in either case to hydrate of baryta and sulphydrate of barium, &c. (H. Rose.) The compounds of sulphide of barium, with the higher metallic sulphides, are generally difficultly soluble in water. (Berzelius.)

$b =$ *hydrated.* $Ba\,S + 6\,Aq$ Decomposes in the air. When treated at once with a sufficient quantity of water it dissolves completely; but a smaller amount of water decomposes it; sulphydrate of barium entering into solution while baryta is left undissolved. (H. Rose.)

II.) *ter.*
$Ba\,S_3$

III.) *quinqui* (*hydrated*). $Ba\,S_5 + x\,Aq$ Decomposed by the air. Easily soluble in water, and alcohol.

SULPHIDE OF BARIUM & OF IRON.

SULPHIDE OF BARIUM & OF LEAD. Decomposed by water. (Berthier.)

SULPHIDE OF BARIUM & OF POTASSIUM. Soluble in water, with evolution of heat. (Berthier.)

SULPHIDE OF BARIUM with SULPHOCYANIDE OF ALLYL. $2\,Ba\,S;\,C_8\,H_5\,N\,S_2 + 2\,Aq\ \&\ 6\,Aq$ Soluble in water. Insoluble in alcohol. (Will.)

SULPHIDE OF BENZOL. (*SulphoBenzol. Sulphide of Benzylene.*) $C_{14}\,H_6'', S_2$ Insoluble in water. Tolerably readily soluble in boiling, sparingly soluble in cold alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **23.** 333.)

SULPHIDE OF BENZOYL. $C_{14}\,H_5\,O_2\,S$, or $\left.\begin{matrix}C_{14}\,H_5\,O_2\\C_{14}\,H_5\,O_2\end{matrix}\right\}S_2$ Appears not to be decomposed by water, even when this is boiling. Is not decomposed by alcohol. Only slowly soluble, decomposed by a boiling aqueous solution of caustic potash. (Wœhler & Liebig, *Ann. der Pharm.*, 1832, **3.** 267.)

SULPHIDE OF BISETHYL.
SULPHIDE OF BISMETHYL. } *Vid.* Sulphide of Bismuth-Ethyl.

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Sulphide of Bismuth.

I.) Insoluble in water. Decomposed by acids.
$Bi\,S_2 + 2\,Aq$ (Schneider.)

II. Permanent. Insoluble in water, dilute acids, solutions of alkalies, alkaline sulphides, or cyanide of potassium. Soluble, with decomposition, in warm tolerably concentrated nitric acid. (Fresenius, *Quant.*, p. 150.) Insoluble in aqueous solutions of chloride of ammonium or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 99.)
$Bi\,S_3$

Sulphide of bismuth obtained in the wet way does not dissolve sensibly when heated to about 200° in a sealed tube with an aqueous solution of bicarbonate of soda. It dissolves, however, if an alkaline sulphide be substituted for the $Na\,O\,2\,C\,O_2$, and subsequently crystallizes on the walls of the tube. (De Senarmont, *Ann. Ch. et Phys.*, (3.) **32.** 161.)

Sulphide of Bismuth & of Copper. Soluble, with decomposition, in nitric acid.

Sulphide of Bismuth, of Copper, & of Lead. Soluble, with decomposition, in nitric acid.
$(Bi\,Cu, Pb_2)_2\,S_6$

Sulphide of Bismuth & of Lead.
(*SulphoBismuthate of Lead.*)
$Bi\,S_3\,;\,3\,Pb\,S$

Sulphide of Bismuth & of Nickel. Readily soluble, with decomposition, in strong nitric acid. Decomposed by hot chlorhydric acid. Not decomposed by an aqueous solution of caustic potash.
(*Bismuth Glance.*)
$(Bi\,Ni)\,S$

Sulphide of Bismuth & of Tellurium. Ppt.

Sulphide of Bismuth with Telluride of Bismuth. Readily soluble, with decomposition, in nitric acid.
$Bi\,S_3, 2\,Bi\,Te_3$

Sulphide of BismuthEthyl. Soluble in alcohol.
$Bi\left\}(C_4\,H_5)_3, S_2\,;\,2\,Bi\,S_3\right.$

Sulphide of Boron. Decomposed with violence by water. (Berzelius.) It combines with alcohol, and ether. (Fremy.)
$B\,S_3$

Sulphide of BromoSalicene. Soluble in alcohol, from which solution it is precipitated on the addition of water. Soluble in an aqueous solution of caustic potash.
(*Hydride of BromoSulphoSalicyl. SulphoBromo Salicylous Acid.*)
$C_{14}\,H_5\,Br\,O_2\,S_2$

Sulphide of Butyl & of Lead. Ppt.
(*ButylSulphide of Lead.*)
$C_8\,H_9\,S\,;\,Pb\,S$

Sulphide of Butyl & of Mercury. Soluble in hot, somewhat less soluble in cold alcohol. (Humann, *Ann. Ch. et Phys.*, (3.) **44.** 339.)
$C_8\,H_9\,S\,;\,Hg\,S$

Sulphide of Butyl & of Potassium. Soluble in alcohol.
$C_8\,H_9\,S\,;\,K\,S$

Sulphide of Butyryl & of Lead. Sparingly soluble in hot water, or alcohol, crystallizing out on cooling.
$C_8\,H_7\,O_2\,S\,;\,Pb\,S$

Sulphide of Cacodyl. Almost insoluble in water. Miscible in all proportions with alcohol and ether. Water precipitates it from the alcoholic solution.
$\left.\begin{matrix}(C_2\,H_3)\,As\\(C_2\,H_3)\,As\end{matrix}\right\}S_2$

*Bi*Sulphide of Cacodyl. Permanent. Insoluble in water. Readily soluble in absolute alcohol, and in spirit, from which it is partially precipitated on the addition of water. Sparingly soluble in ether. Soluble in chlorhydric acid, without apparent decomposition. (Bunsen.)
$\left.\begin{matrix}(C_2\,H_3)\,As\\(C_2\,H_3)\,As\end{matrix}\right\}S_4$

Sulphide of Cacodyl & of Copper. Permanent. Soluble in alcohol.
$\left.\begin{matrix}(C_2\,H_3)\,As\\(C_2\,H_3)\,As\end{matrix}\right\}S_2\,;\,6\,Cu\,S$

Sulphide of Cadmium. Insoluble in water, dilute acids, solutions of the alkalies, alkaline sulphides, or of cyanide of potassium. Soluble, with decomposition, in concentrated chlorhydric acid, also in tolerably concentrated nitric acid. (Fresenius, *Quant.*, p. 151.) Difficultly soluble in dilute chlorhydric acid, even when this is warm, but easily soluble, even in cold concentrated chlorhydric acid, also in nitric acid, with decomposition in both instances. Very slightly soluble in ammonia. (Wackenroder.) Very readily soluble in dilute sulphuric acid. (Hofmann.) Insoluble in aqueous solutions of chloride of ammonium, or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 99.)
$Cd\,S$

Sulphide of Calcium.

I.) *mono.* Soluble in 500 pts. of water; but when treated with less water it is decomposed to $Ca\,S, H\,S$ (soluble), and sparingly soluble $Ca\,O, H\,O$. It is also decomposed by boiling water.
$Ca\,S$

1 pt. of *calcaria sulphurata* is soluble in 480 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 210, in *Canstatt's Jahresbericht für* 1854, p. 75.) Freely soluble in glycerin. (Parrish's *Pharm.*, p. 236.) Soluble in acids.

II.) *bi.* Permanent. Soluble in 400 pts. of water at 16°; more soluble in boiling water.
$Ca\,S_2 + 3\,Aq$

III.) *quinqui.*

$a = Ca\,S_5$ Soluble in water, and alcohol.

IV.) *basic.* *Vid.* OxySulphide of Calcium.

Sulphide of Calcium & of Iron.

Sulphide of Calcium & of Sodium.

Sulphide of Capryl. *Vid.* Sulphide of Octyl.

*Bi*Sulphide of Carbon. *Vid.* SulphoCarbonic Acid.

Sulphide of Cerium. Insoluble in water. Soluble, with decomposition, even in the weakest acids.
$Ce\,S$

Sulphide of Cetyl. Scarcely at all soluble in cold water. Easily soluble in ether; somewhat less soluble in boiling, and scarcely at all soluble in cold alcohol.
(*CetylSulphydric Ether.*)
$C_{32}\,H_{33}\,S$, or $\left.\begin{matrix}C_{32}\,H_{33}\\C_{32}\,H_{33}\end{matrix}\right\}S_2$

Sulphide of Cetyl & of Lead. Insoluble in water, alcohol, or ether.

Sulphide of *bi*ChlorEthyl. Insoluble in water.
$\left.\begin{matrix}C_4\,H_3\,Cl_2\\C_4\,H_3\,Cl_2\end{matrix}\right\}S_2$

Sulphide of *ter*ChlorEthyl.
$\left.\begin{matrix}C_4\,H_2\,Cl_3\\C_4\,H_2\,Cl_3\end{matrix}\right\}S_2$

Sulphide of *quadri*ChlorEthyl.
(*QuadriChlorinated Hydrosulphuric Ether. Sulfide d'Ethyle quadriChloré.*)
$\left.\begin{matrix}C_4\,H\,Cl_4\\C_4\,H\,Cl_4\end{matrix}\right\}S_2$

Sulphide of *mono*ChlorMethyl.
(*Sulphide of Methylmonochloré. Ter Chlorinated Methylic Sulphide.*)
$\left.\begin{matrix}C_2\,H_2\,Cl\\C_2\,H_2\,Cl\end{matrix}\right\}S_2$

Sulphide of *bi*ChlorMethyl.
$\left.\begin{matrix}C_2\,H\,Cl_2\\C_2\,H\,Cl_2\end{matrix}\right\}S_2$

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Sulphide of *ter*ChlorMethyl. $\left.\begin{matrix}C_2\,Cl_3\\C_2\,Cl_3\end{matrix}\right\}S_2$ Entirely insoluble in water. Easily soluble in alcohol, and ether. (Riche, *Ann. Ch. et Phys.*, (3.) **43.** 288.)

Sulphide of *bi*ChlorMethylene? $C_2\,Cl_2'',\,S_2$ Unacted upon by water or acids, even fuming nitric acid. Slowly decomposed by potash-lye. (Kolbe.)

***Proto*Sulphide of Chromium.**

***Sesqui*Sulphide of Chromium.** $Cr_2\,S_3$ Insoluble in water. Soluble in nitric acid, and more easily in aqua-regia. Insoluble in aqueous solutions of caustic potash, or of sulphide of potassium. (Berzelius's *Lehrb.*, **2.** 328.)

***Proto*Sulphide of Cobalt.**

a = *anhydrous.* $Co\,S$ When prepared in the dry way, it is not at all attacked by cold dilute chlorhydric acid. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **25.** 94.)

b = *hydrated.* $Co\,S,\,H\,O$ Insoluble in water, or in solutions of the caustic or carbonated alkalies, or of the alkaline sulphides. [Though on adding a solution of persulphide of potassium ($K\ S_5$) to the solution of a neutral cobalt salt no precipitate, but a chocolate-colored solution is obtained. (H. Rose, *Tr.*).] Sparingly soluble in cold dilute mineral acids, more readily soluble, with decomposition, in more concentrated acids; most readily soluble in warm aqua-regia. Scarcely at all soluble in acetic acid. (Wackenroder.) It is not precipitated when sulphydric acid is passed through an acid solution of acetate of cobalt, but this gas precipitates it from a mixture of sulphate of cobalt and acetate of potash or soda [i. e. from a less strongly acidified solution]. (Persoz, *Chim. Moléc.*, p. 387.) Tolerably easily soluble in nitric acid, but is very difficultly decomposed by chlorhydric acid. While still moist it dissolves in an aqueous solution of sulphurous acid.

Insoluble in aqueous solutions of chloride of ammonium and nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 99.) It is not immediately precipitated by sulphuretted hydrogen from neutral solutions of cobalt salts, unless the acids contained in these are very feeble, like acetic acid, and even this hinders the precipitation in a measure, but after some time a minute trace of the sulphide may separate out. If the solution be acidulated, even with acetic acid, no precipitate whatever will occur on passing sulphuretted hydrogen, though, when once precipitated, sulphide of cobalt is insoluble, or rather is scarcely at all soluble in dilute chlorhydric acid. Sulphide of ammonium produces a brown coloration in solutions of cobalt salts, even in presence of 200000 pts. of water. (Pfaff.) Its precipitation by sulphide of ammonium is not hindered by the presence of non-volatile organic substances, like tartaric acid. (H. Rose, *Tr.*)

***Sesqui*Sulphide of Cobalt.** $Co_2\,S_3$ Partially decomposed by chlorhydric acid. Soluble, with decomposition, in nitric acid.

***Bi*Sulphide of Cobalt.** $Co\,S_2$ Unacted upon by acids or alkalies, excepting nitric acid and aqua-regia.

***Di*Sulphide of Copper.** $Cu_2\,S$ Insoluble in an aqueous solution of sulphide of ammonium. Difficultly soluble, with decomposition, in strong boiling chlorhydric and nitric acids. Cold nitric acid removes one equivalent of copper, leaving Cu S.

***Proto*Sulphide of Copper.** $Cu\,S$ As good as insoluble in water, since 950000 pts. of water are required to dissolve 1 pt. of it. (Fresenius, *Quant.*, p. 148.) Easily soluble, with decomposition, in hot nitric acid. Slowly soluble, with decomposition, in hot chlorhydric acid. Insoluble in sulphurous acid. Insoluble in potash-lye, in solution of alkaline sulphides, or in very dilute acids.

Perceptibly soluble in sulphide of ammonium. (Fresenius, *loc. cit.*) Insoluble, or only exceedingly sparingly soluble, in sulphide of ammonium. (H. Rose, *Tr.*) Soluble in noticeable quantity in aqueous solutions of the alkaline sulpharseniates, sulphantimoniates, and sulphostannates. For example, if a dilute solution of a copper salt be dropped into a solution of sulphide of arsenic in sulphide of ammonium, the brown precipitate, which is formed at first, dissolves on agitation, and the liquor becomes clear. Particularly large quantities are dissolved by sulphantimoniate of sodium. This solvent action appears to be less marked when the solutions are warm, and even at the ordinary temperature the sulphide of copper separates out again partially when the solution is allowed to stand. It is probable that many other basic sulphides behave with these solvents similarly to sulphide of copper. (Wœhler, *Ann. Ch. u. Pharm.*, 1840, **34.** 236.) When a mixed precipitate of sulphide of copper and tersulphide of arsenic is treated, while still moist, with an aqueous solution of sulphide of potassium, a portion of the sulphide of copper dissolves as well as the sulphide of arsenic. (W. H. Chandler, Private communication, 1863.)

Easily soluble, with decomposition, in an aqueous solution of cyanide of potassium. (Haidlen & Fresenius.) Soluble in a solution of bicarbonate of potash. (Berzelius.) Insoluble in aqueous solutions of chloride of ammonium or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 99.) Precipitated, by sulphuretted hydrogen or sulphide of ammonium, as a brown coloration, in presence of 100000 pts. of water (Pfaff); 200000 pts. of water (Lassaigne); in presence of 15000 pts. of water, + 7500 pts. of chlorhydric acid, a slight color is produced, but with 40000 pts. of water, + 20000 pts. of chlorhydric acid, this is no longer visible. (Reinsch.)

***Quinqui*Sulphide of Copper.** $Cu\,S_5$ Insoluble in water. When recently precipitated, it is soluble in an aqueous solution of carbonate of potash.

Sulphide of Copper & of Ethyl. $C_4\,H_5\,S,\ Cu\,S$ Insoluble in water. Sparingly soluble in alcohol. Soluble in moderately strong chlorhydric acid.

Sulphide of Copper & of Iron. (*Copper Pyrites.*) $Cu_2\,S,\ Fe_2\,S_3$ Permanent. Insoluble in chlorhydric acid. When heated in a sealed tube, with a solution of sulphuretted hydrogen, a portion of it dissolves, though with difficulty, and is subsequently deposited. (De Senarmont, *Ann. Ch. et Phys.*, (3.) **32.** 168.)

***Proto*Sulphide of Copper & of Phosphorus.**

I.) $2\,Cu\,S;\ P\,S_5$

II.) $8\,Cu\,S;\ P\,S_5$

***Di*Sulphide of Copper & of Silver.** $Cu_2\,S;\ Ag\,S$ Soluble, with decomposition, in nitric acid.

***Di*Sulphide of Copper & of Phosphorus.** $2\,Cu_2\,S;\ P\,S_5$

SULPHIDE OF DIDYMIUM. Insoluble in water. $Di\,S$ Soluble, with decomposition, in acids, even when these are very dilute. (Marignac, *Ann. Ch. et Phys.*, (3.) 38. 159.)

SULPHIDE OF ETHYL. Insoluble, or very (*Sulph Ethyl.*) sparingly soluble, in water. C_4H_5S or $\left.\begin{matrix}C_4H_5\\C_4H_5\end{matrix}\right\}S_2$ Easily soluble in alcohol, and ether.

***Bi*SULPHIDE OF ETHYL.** Very sparingly soluble in water. (*Thialol* (of Zeise).) Very soluble $C_4H_5S_2$ or $\left.\begin{matrix}C_4H_5\\C_4H_5\end{matrix}\right\}S_4$ in alcohol, and ether. Ether removes it completely from the aqueous solution. Very sparingly soluble in an aqueous solution of sulphuric acid, and not at all soluble in cold concentrated sulphuric acid. (Morin.)

***Quinqui*SULPHIDE OF ETHYL.** Very soluble in $C_4H_5S_5$ alcohol. (Lœwig.)

***Ter*SULPHIDE OF ETHYL.** Insoluble in water. $C_4H_5S_3$

SULPHIDE OF ETHYL & OF GOLD. Insoluble $\left.\begin{matrix}C_4H_5\\Au\end{matrix}\right\}S_2$ in water or in cold alcohol. Not decomposed by chlorhydric or concentrated sulphuric acids at the ordinary temperature, nor by boiling potash-lye. (Zeise.)

SULPHIDE OF ETHYL & OF LEAD. Soluble $\left.\begin{matrix}C_4H_5\\Pb\end{matrix}\right\}S_2$ in an alcoholic solution of acetate of lead. (Zeise.)

SULPHIDE OF ETHYL & OF MERCURY. Per- (*Mercaptid.*) manent. Insoluble in water. Solu- $\left.\begin{matrix}C_4H_5\\Hg\end{matrix}\right\}S_2$ ble in 12 @ 15 pts. of boiling alcohol of 80%, separating out again for the most part as the solution cools. (Liebig.) Water precipitates it from the alcoholic solution. (Zeise.) Soluble in boiling ether. More readily soluble in alcohol, which contains bisulphide of ethyl, or in sulphydrate of ethyl, than in ordinary alcohol. (Zeise.) Unacted upon by a boiling aqueous solution of caustic potash. Slowly soluble in warm dilute chlorhydric acid.

SULPHIDE OF ETHYL & OF PLATINUM. In- $\left.\begin{matrix}C_4H_5\\Pt\end{matrix}\right\}S_2$ soluble in alcohol.

SULPHIDE OF ETHYL & OF POTASSIUM. C_4H_5S, KS Quickly and abundantly soluble in water; the solution undergoing decomposition when exposed to the air; less soluble in alcohol than in water. Decomposed by weak chlorhydric or sulphuric acids.

SULPHIDE OF ETHYL & OF SILVER. Insol- C_4H_5S, AgS uble in water or alcohol. (Zeise.)

SULPHIDE OF ETHYL & OF SODIUM. Readily C_4H_5S, NaS soluble in water. (Zeise.)

SULPHIDE OF ETHYL & OF ZINC. Ppt. C_4H_5S, ZnS

***Proto*SULPHIDE OF ETHYLENE.** Insoluble in C_4H_4'', S_2 water. Very sparingly soluble in alcohol. Soluble in ether.

***Quadri*SULPHIDE OF ETHYLENE.** Insoluble C_4H_4'', S_4 in water or alcohol. Very sparingly soluble in strong boiling caustic lye, from which it is deposited on cooling. (Lœwig & Weidmann.)

***Quinqui*SULPHIDE OF ETHYLENE.** Unacted upon by potash-lye. (Lœwig & Weidmann.)

SULPHIDE OF *tri*ETHYLPHOSPHIN. Very $P\left\{(C_4H_5)_3, S_2\right.$ sparingly soluble in cold, much more soluble in hot water. More soluble in alcohol, and ether, than in water; and soluble to almost any extent in bisulphide of carbon. Less soluble in alkaline liquids than in water. More soluble in chlorhydric acid, especially if it is concentrated, than in water. Also soluble in dilute sulphuric and nitric acids, but is decomposed by concentrated nitric acid. (Hofmann & Cahours.)

SULPHIDE OF FORMYL. *Vid.* ThioFormic Acid.

SULPHIDE OF GLUCINUM. Slowly soluble, without decomposition, in water. (Wœhler.) Easily decomposed by acids. With the higher sulphides it forms salts easily soluble in water. (Berzelius.)

***Proto*SULPHIDE OF GOLD.**
$Au\,S$

"*Bi, or black,* **SULPHIDE OF GOLD.**" Levol "$Au\,S_2$" (*Ann. Ch. et Phys.*, 1850, (3.) 359) doubts the existence of either Au S or $Au\,S_2$.

***Ter*SULPHIDE OF GOLD.** Insoluble in water, $Au\,S_3$ or in chlorhydric, or nitric acid. Soluble in nitromuriatic acid. Insoluble in colorless, but almost completely soluble in yellow sulphide of ammonium. Soluble in caustic potash, with decomposition. Completely soluble in yellow sulphide of potassium, or in yellow sulphide of ammonium to which potash has been added. (Fresenius, *Quant.*, p. 152.) When in the nascent state it is soluble in aqueous solutions of the alkaline sulphides. (Dumas, *Tr.*) Soluble in aqueous solutions of the alkaline sulphides, also in a boiling solution of caustic potash, with separation of a certain quantity of metallic gold. (Berzelius, *Lehrb.*) Sparingly soluble in a cold aqueous solution of sulphide of sodium, but the solution is decomposed when boiled, with separation of tersulphide of gold. (Yorke.) It is precipitated even in presence of 2000 pts. of water (Pfaff); a brown color is still evident in presence of 10000 pts. of water, this is fainter with 20000 to 40000, and scarcely perceptible when 80000 pts. of water are used. (Lassaigne.)

SULPHIDE OF GOLD & OF *X*. *Vid.* SulphAurate of *X*.

SULPHIDE OF HYDROGEN. *Vid.* Sulphydric Acid.

***Per*SULPHIDE OF HYDROGEN.** Decomposed (*Hydrosulphurous Acid.*) by water, alcohol, and ether. $H\,S_5$ Ether dissolves it at first, but sulphur soon separates from this solution. Insoluble in dilute chlorhydric acid. Instantly decomposed by alkaline solutions.

SULPHIDE OF HYDROGEN & OF *X*. *Vid.* Sulphydrate of *X*.

***Proto*SULPHIDE OF IRIDIUM.** When prepared $Ir\,S$ in the moist way, by precipitating a solution of an iridium salt with sulphuretted hydrogen, it is slightly soluble in water. Insoluble in an aqueous solution of chloride of ammonium, or in acidulated water. More readily soluble in an aqueous solution of sulphide of potassium than bisulphide of platinum. Soluble in cold nitric acid. (Berzelius.) When prepared by igniting a higher sulphide it is insoluble in nitric acid, and but sparingly soluble in aqua-regia. (Berzelius.) Not at all soluble in aqua-regia. (Bœttger.)

***Sesqui*SULPHIDE OF IRIDIUM.** When pre- Ir_2S_3 pared in the dry way, it is scarcely attacked by aqua-regia. When prepared in the moist way, it is sparingly soluble in water, and soluble in an aqueous solution of sulphide of po-

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tassium, and in nitric acid. Readily soluble in sulphide of ammonium.

***Bi*Sulphide of Iridium.** When obtained $Ir S_2$ in the moist way, by precipitation, it is sparingly soluble in water, but is insoluble in an aqueous solution of chloride of ammonium, or in acidulated water. Soluble in an aqueous solution of sulphide of potassium, and in nitric acid. When prepared by digesting an iridium salt with bisulphide of carbon, it is soluble in aqua-regia, but is not decomposed by boiling aqueous solutions of caustic ammonia, or potash, or of carbonate of soda. (Bœttger.)

***Ter*Sulphide of Iridium.** Sparingly soluble $Ir S_3$ in water. Insoluble in an aqueous solution of chloride of ammonium, or in acidulated water. Soluble in a solution of sulphide of potassium, and in nitric acid. (Berzelius.)

***Proto*Sulphide of Iridium & of Potash.** Partially soluble in water. (Berzelius.)

***Sub*Sulphide of Iron.** Easily soluble in $Fe_8 S$ acids. (Arfvedson.)

***Di*Sulphide of Iron.** Soluble, with decom- $Fe_2 S$ position, in acids. (Arfvedson.)

***Proto*Sulphide of Iron.**

a = $Fe S$ When prepared in the dry way (from $Fe_2 O_3$ & $H S$) it is not soluble in cold dilute chlorhydric acid, and if protosulphide of cobalt is present, it is scarcely soluble in concentrated chlorhydric acid. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **25.** 97.)

b = *hydrated.* Slightly soluble in water, espe- $Fe S, H O$ cially when this is hot, with decomposition. (Berzelius; Vauquelin.) When precipitated from very dilute solutions it remains in suspension for a long while, and appears as if it were a dark-green solution. (Fresenius, *Quant.*, p. 140; H. Rose, *Tr.*) The presence of sulphuretted hydrogen, of sulphide of ammonium, especially when yellow, or of the alkaline sulphides, prevents this solution. (Berzelius; Fresenius, *Quant.*, p. 140.) A very dilute solution of sulphide of ammonium dissolves a trace of it, but deposits it on exposure to the air, or on addition of hydrosulphite of ammonia. (Wackenroder.) Insoluble in a solution of sulphide of ammonium. (H. Rose, *Tr.*) Soluble in acids, even very dilute, excepting carbonic, oxalic, tartaric, and acetic acids, and is somewhat soluble in these. (H. Rose.) Insoluble in aqueous solutions of chloride of ammonium or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 99.) Protosulphide of iron cannot be completely precipitated from solutions which contain citrate of soda. (Spiller.) Contrary to the assertion of Persoz, it is almost completely precipitated from solutions containing pyrophosphate of soda when these are treated with sulphide of ammonium. (H. Rose, *Pogg. Ann.*, 1849, **76.** 18.)

***Sesqui*Sulphide of Iron.** Soluble in dilute $Fe_2 S_3$ sulphuric and chlorhydric acids. (Berzelius, *Lehrb.*, **2.** 723.)

***Bi*Sulphide of Iron.** Unacted upon by di- (*Iron Pyrites.*) $Fe S_2$ lute chlorhydric or sulphuric acids. It is not attacked by acids, excepting nitric acid, aqua-regia, and boiling concentrated sulphuric acid. (Berzelius, *Lehrb.*, **2.** 725.) When heated with a solution of sulphuretted hydrogen in a closed tube, it is partially dissolved, though this is accomplished with difficulty, and is subsequently again deposited. (De Senarmont, *Ann. Ch. et Phys.*, (3.) **32.** 168.)

Sulphide of Iron & of Nickel.
$2 Fe S, Ni S$

Sulphide of Iron & of Phosphorus. In- $2 Fe S, P S_3$ soluble in boiling chlorhydric acid. (Berzelius.)

Sulphide of Iron & of Potassium. Soluble in water. When concentrated, the aqueous solution is decomposed by boiling, but this does not occur when it is dilute. (H. Rose.)

Sulphide of Iron & of Silver.
$2 Fe_2 S_3 ; Ag S$

Sulphide of Iron & of Sodium.

Sulphide of Lanthanum.

***Di*Sulphide of Lead.**

***Proto*Sulphide of Lead.** Permanent. When $Pb S$ prepared by precipitation it is insoluble in water, dilute acids, solutions of alkalies, or of alkaline sulphides. Soluble, with decomposition, in hot concentrated chlorhydric acid, and in warm tolerably concentrated nitric acid. (Fresenius, *Quant.*, p. 145.) Sulphuretted hydrogen does not precipitate lead from solutions which are strongly acid with nitric, chlorhydric, or sulphuric acid; and sulphite of lead which has been precipitated from dilute solutions, with sulphide of ammonium, is completely and not very difficultly redissolved by tolerably concentrated chlorhydric and nitric acids. Sulphuretted hydrogen-gas may be passed through these solutions, particularly through that in chlorhydric acid, without producing any precipitate, but on diluting the liquid with water sulphide of lead will separate out. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 321.) Insoluble in aqueous solutions of chloride of ammonium or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 99.) Soluble, with decomposition, in nitromuriatic acid.

Tolerably soluble in a solution of sulphuretted hydrogen, when heated therewith in a sealed tube. (De Senarmont, *Ann. Ch. et Phys.*, (3.) **32.** 168.) When equal pts. of sulphide of lead, in fine powder, and of sulphate of copper are mixed in presence of 4 or 5 pts. of water they are slowly decomposed, sulphate of lead and sulphide of copper being formed; this decomposition is more rapid when the mixture is heated, or when chloride of sodium has been added to the latter, which occasions the formation of chloride of copper, which in its turn acts upon the sulphide of lead. (Becquerel, *C. R.*, 1845, **20.** pp. 1525 – 1529.)

Sulphide of Lead & of Methyl. Ppt.
$\left.\begin{matrix}Pb\\C_2 H_3\end{matrix}\right\} S_2$ (Gregory.)

Sulphide of Lead & of Silver.

Sulphide of Lead & of Sodium. Decomposed by water. (Berthier.)

Sulphide of Lithium. Considerably more $Li S$ soluble than hydrate of lithia in water, and in alcohol. (Berzelius, *Lehrb.*, **2.** 96.) Very soluble in water. (Troost, *loc. cit.*)

***Bi*Sulphide of Lithium.** Soluble in water. $Li S_2$ (Vauquelin.)

Sulphide of Magnesium. Very sparingly $Mg S$ soluble in cold water. This solution decomposes after a time, when left to itself, or immediately on heating. (Fremy, *Ann. Ch. et Phys.*, (3.) **38.** 324.) Soluble in acids, with decomposition.

Sulphide of Manganese.

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a = *anhydrous*. MnS Insoluble in water. Soluble to a notable extent in water saturated with sulphuretted hydrogen. (Gorgeu, *Ann. Ch. et Phys.*, (3.) **42.** 73.) Decomposed by dilute acids, even by acetic acid.

When prepared in the dry way, it is soluble in cold dilute chlorhydric acid and in warm acetic acid. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **25.** pp. 94, 97.)

b = *hydrated*. MnS, HO Insoluble in water. Slightly soluble in solutions of sulphide of ammonium, which do not contain an excess of sulphur. Insoluble in yellow solutions of sulphide of ammonium (containing an excess of sulphur). (Wackenroder.) Insoluble in a solution of sulphide of ammonium, but not completely insoluble in solutions of ammoniacal salts; at all events, when in presence of the latter it is deposited very slowly. Nor is it completely insoluble in a very large proportion of water, even when this contains some sulphide of ammonium; hence it sometimes happens that one cannot precipitate it, by means of this reagent, from solutions which contain traces of protoxide of manganese, especially if the sulphide has been recently prepared and is colorless. Very easily soluble in chlorhydric acid, and in dilute acids generally. (H. Rose, *Tr.*) Insoluble in aqueous solutions of chloride of ammonium, or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 99.) Soluble in sulphuric, chlorhydric, nitric, sulphurous, and acetic acids, with decomposition. Not precipitated from solutions containing citrate of soda (it is even readily soluble in the alkaline citrates), or any of the normal tartrates, or grape-sugar, in the cold. Neither cane nor milk-sugar prevent its precipitation, however. (Spiller.) As a general rule, non-volatile organic substances do not prevent its precipitation by sulphide of ammonium. (H. Rose, *Tr.*) Not precipitated by sulphide of ammonium from the solution of a manganese salt in an excess of pyrophosphate of soda. (H. Rose, *Tr.*) With sulphur acids it forms salts, which are generally sparingly soluble in water. (Berzelius, *Lehrb.*)

SULPHIDE OF MANGANESE & OF PHOSPHORUS. MnS, PS Soluble, with decomposition, in chlorhydric acid. (Berzelius.)

SULPHIDE OF MANGANESE & OF POTASSIUM. $3MnS; KS$ Decomposed by acids, and by water containing air. Insoluble in water, alcohol, or ether.

SULPHIDE OF MANGANESE & OF SODIUM. $3MnS; NaS$ Decomposed by water containing air.

SULPHIDE OF MERCURETHYL. $\left.\begin{matrix}C_4H_5Hg_2\\C_4H_5Hg_2\end{matrix}\right\}S_2$ Soluble in cold alcohol, and ether. Easily soluble in an aqueous solution of sulphide of ammonium. (Duenhaupt.)

***Di*SULPHIDE OF MERCURY.** Hg_2S Insoluble in cold water, or dilute nitric acid, or in hot aqueous solutions of caustic ammonia, or sulphide of ammonium. Soluble, with separation of metallic mercury, in a solution of caustic potash. (H. Rose.) Insoluble in aqueous solutions of chloride of ammonium, or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 99.)

***Proto*SULPHIDE OF MERCURY.** HgS There are two allotropic modifications: —

Modif. I.) (*Cinnabar. Red Sulphide.*) Insoluble in water, alcohol, dilute acid, or alkaline solutions. Decomposed by hot dilute nitric acid. Unacted upon by boiling water, alkaline solutions, or chlorhydric acid. Nitric acid acts upon it but feebly, but aqua-regia decomposes it at once. It is also decomposed by boiling sulphuric acid.

Readily soluble in a boiling concentrated solution of protochloride of copper ($Cu'Cl$), no dichloride of copper or combination of sulphur, with hydrogen or oxygen, being formed. (Karsten, *Berlin Abhandl.*, 1828, p. 23.)

Modif. II.) (*Black Sulphide.*) Permanent. When prepared in the moist way, it is insoluble in water, and in dilute chlorhydric or nitric acid. Scarcely at all acted upon by hot concentrated nitric acid, and not at all by boiling chlorhydric. Easily soluble, with decomposition, in nitromuriatic acid. Absolutely insoluble in caustic potash-lye, even boiling, or in cyanide of potassium, or sulphide of ammonium. Easily soluble in a solution of sulphide of potassium which contains free alkali. (Fresenius, *Quant.*, pp. 146, 763.) Decomposed, with partial solution, by hot nitric acid. (Berzelius, *Lehrb.*, **2.** 535.) Slightly soluble in a solution of sulphide of barium. (Rammelsberg.) Insoluble in a solution of cyanide of potassium. (Haidlen & Fresenius.) Soluble in a potash solution containing sulphide of ammonium. (H. Rose.) Insoluble in aqueous solutions of chloride of ammonium, or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 99.) Precipitated as a brown coloration in presence of 20000 pts. of water; as a slight green coloration in presence of 40000 pts. of water. (Lassaigne.)

SULPHIDE OF MERCURY & OF METHYL. $\left.\begin{matrix}C_2H_3\\Hg\end{matrix}\right\}S_2$ Soluble in hot, less soluble in cold alcohol.

SULPHIDE OF MERCURY & OF PHOSPHORUS.

I.) $2HgS; PS_3$

II.) $2HgS; PS_5$

SULPHIDE OF MERCURY & OF POTASSIUM. $HgS; KS + 5Aq$ Soluble in alkaline solutions. Decomposed by pure water.

SULPHIDE OF MERCURY & OF SODIUM. $HgS; NaS$ Soluble in alkaline solutions. Decomposed by pure water.

***Proto*SULPHIDE OF METHYL.** (*HydroSulphuric MethylEther. HydroSulphate of Methylene.*) C_2H_3S, or $\left.\begin{matrix}C_2H_3\\C_2H_3\end{matrix}\right\}S_2$ Insoluble in water. Easily soluble in alcohol. (Kolbe's *Lehrb.*, **1.** 268.)

***Bi*SULPHIDE OF METHYL.** $C_2H_3S_2$, or $\left.\begin{matrix}C_2H_3\\C_2H_3\end{matrix}\right\}S_4$ Scarcely at all soluble in water. Soluble in all proportions in alcohol, and ether. Soluble, without decomposition, in cold concentrated sulphuric acid, but is decomposed when heated therewith. (Cahours, *Ann. Ch. et Phys.*, (3.) **18.** 258.)

***Ter*SULPHIDE OF METHYL.** $C_2H_3S_3$, or $\left.\begin{matrix}C_2H_3\\C_2H_3\end{matrix}\right\}S_6$ Resembles the bisulphide.

SULPHIDE OF *tri*METHYLPHOSPHIN. $P\left\{(C_2H_3)_3S_2\right.$ Soluble in water.

***Bi*SULPHIDE OF MOLYBDENUM.** MbS_2 Soluble, with decomposition, in boiling concentrated sulphuric acid. Also soluble in aqua-regia. Nitric acid oxidizes, but does not dissolve it. Difficultly attacked by acids generally. Only slightly acted upon by potash-lye.

***Ter*SULPHIDE OF MOLYBDENUM.** MbS_3 Somewhat soluble in water, especially in hot water, but is precipitated therefrom on the addition of an acid, even sulphuretted hydrogen. (Berzelius.) Difficultly soluble in aqueous solutions of the caustic alkalies; more readily soluble in solutions of sulphide of potassium and the other alkaline sulphides, but still only slowly unless these are heated. (Berzelius, *Lehrb.*)

***Quadri*Sulphide of Molybdenum.** Insoluble in water. It is not decomposed by boiling water, or by acids. (Berzelius.) The compounds of $Mb\,S_4$ with the sulphides of potassium, sodium, lithium, and ammonium, are soluble in hot water; all others are insoluble.
$Mb\,S_4$

***Di*Sulphide of Nickel.** Soluble, with decomposition, in nitric acid, and slowly in strong chlorhydric acid, but is insoluble in hot dilute nitric acid. (Arfvedson.)
$Ni_2\,S$

***Proto*Sulphide of Nickel.**

a = $Ni\,S$ Soluble, with decomposition, in nitric acid, and aqua-regia. (Tupputi, *Ann. de Chim.*, 1811, **78.** 148.) Insoluble in chlorhydric or sulphuric acid.

When prepared in the dry way, it is insoluble in cold very dilute chlorhydric acid. (Ebelmen, *Ann. Ch. et Phys*, (3.) **25.** 96.) When prepared by fusing oxide of nickel, or one of its compounds, with carbonate of soda and sulphur, a small portion of it dissolves in the sulphide of sodium on treating the mass with water. (H. Rose, *Tr.*)

b = *hydrated.* Insoluble in water. Sparingly soluble in ammonia-water, still more soluble in a mixture of sulphide of ammonium with caustic ammonia, but is insoluble in sulphide of ammonium, which has been thoroughly saturated with sulphuretted hydrogen. Very sparingly soluble in acetic acid, somewhat more soluble in chlorhydric acid, still more soluble in nitric acid, but most easily in aqua-regia. (Fresenius, *Quant.*, pp. 137, 760.) Not absolutely insoluble in sulphide of ammonium or the alkalies. It is not dissolved by dilute chlorhydric acid. (H. Rose, *Tr.*) While yet moist it is soluble in an aqueous solution of sulphurous acid. (Berthier.) Difficultly soluble in chlorhydric acid; very sparingly soluble in acetic acid; more abundantly soluble in ammonia, and in alkaline sulphides. After having been exposed to the air, and partially decomposed, it is perfectly insoluble in acetic acid, or sulphide of ammonium, and is only very sparingly soluble in dilute mineral acids. (Wackenroder.)
$Ni\,S, H\,O$

A solution of sulphuretted hydrogen does not produce any immediate precipitate in neutral solutions of nickel salts, unless the acid therein contained is a very feeble one, like acetic acid, but after the lapse of some time a trace of sulphide of nickel separates out; if the solution is acidified with a mineral acid, or even with acetic acid, no precipitate whatever is produced.

When recently precipitated it dissolves, with decomposition, in a warm aqueous solution of cyanide of potassium. (Haidlen & Fresenius.) The presence of non-volatile organic substances, like tartaric acid, does not prevent the precipitation of nickel by means of sulphide of ammonium. (H. Rose, *Tr.*)

***Bi*Sulphide of Nickel**
$Ni\,S_2$

Sulphide of NitroBenzylene. *Vid.* Hydride of NitroSulphoBenzoyl.

Sulphide of Nitrogen. Insoluble in water. Slowly decomposes in moist air. Instantly decomposed by boiling water. Sparingly soluble in alcohol, ether, wood-spirit, and oil of turpentine. Its best solvent is bisulphide of carbon, 1 kilogramme of which dissolves about 15 grammes of it at the temperature of ebullition; this dissolution is accompanied with a very slight decomposition. It combines with the chlorides of sulphur. (Fordos & Gèlis, *Ann. Ch. et Phys.*, (3.) **32.** 395.) Insoluble in water. Readily soluble in alcohol. (Gregory.) It is decomposed by cold water in the course of a few days; hot water soon decomposes it. Sparingly soluble in alcohol, more readily soluble in ether, especially when this is hot. Soluble in absolute alcohol which contains caustic soda or sulphide of sodium in solution, but the solution thus obtained almost immediately undergoes decomposition. (Soubeiran.)
$N\,S_2$

Sulphide of Octyl. Very sparingly soluble, or insoluble, in water. Very sparingly soluble in pure alcohol, and insoluble in alcohol which is charged with sulphide of sodium or sulphide (iodide?) of potassium. (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 137.
(*Sulphide of Capryl. Capryl-Sulphydric Ether.*)
$C_{32}\,H_{34}\,S_2 = \left.\begin{matrix} C_{16}\,H_{17} \\ C_{16}\,H_{17} \end{matrix}\right\} S_2$

***Bi*Sulphide of Osmium.** Slightly soluble in water. No more soluble in alkaline solutions, and after having become dry, not at all soluble in alkalies. Soluble in nitric acid.
$Os\,S_2$

***Ter*Sulphide of Osmium.** Sparingly soluble in water. Soluble in nitric acid.
$Os\,S_3$

***Quadri*Sulphide of Osmium.** Sparingly soluble in water. Soluble in cold dilute nitric acid. Insoluble in aqueous solutions of the caustic or carbonated alkalies, or of the alkaline sulphides.
$Os\,S_4$

Sulphide of Palladium. Insoluble in water, or in an aqueous solution of sulphide of ammonium. Soluble in chlorhydric acid. In presence even of 10000 pts. of water sulphide of palladium is precipitated, imparting a brown yellow color to the solution.
$Pd\,S$

***Di*Sulphide of Phosphorus.**
(*Phosphorous HypoSulphide. HyposulphoPhosphorous Acid.*)
$P_2\,S$

I.) *Ordinary modif.* Unacted on by cold water from which air has been removed by boiling. Slowly decomposed when boiled with water. Insoluble in alcohol or ether, both of which, however, gradually decompose it, and dissolve the resulting products. Sparingly soluble in fixed and in volatile oils. Scarcely acted upon by weak, but decomposed by strong caustic potash or soda.

II.) *Red modif.* Unacted on by cold boiled water. When treated with cold nitric acid of 1.22 sp. gr. it is at first unacted upon, but at length suddenly combines with it with great violence. Weak acids act upon it only when hot.

***Proto*Sulphide of Phosphorus.**
(*Hypo SulphoPhosphoric Acid. Phosphoric HypoSulphide.*)
$P\,S$

I.) *Ordinary modif.* Unacted on by cold boiled water. Soluble in alcohol of 80%. (Bœttger, in *Gmelin*, **8.** 264.) Sparingly soluble in ether, the solution not being precipitated by water. Sparingly soluble in fixed and in volatile oils. Sparingly soluble in creosote (phenic acid). (Bœttger.) Soluble in bisulphide of carbon. (Corenwinder, *Ann. Ch. et Phys.*, (3.) **30.** 243.)

II.) *Red modif.* Unacted on by air or water. Slowly soluble, with decomposition, in caustic ammonia. Decomposed also by strong solutions of the fixed alkalies.

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*Proto*SULPHIDE OF PHOSPHORUS (Red modif.), with *Di*SULPHIDE OF PHOSPHORUS (Red modif.). P_2S, PS Permanent. Soluble in boiling liquid protosulphide of phosphorus.

*Ter*SULPHIDE OF PHOSPHORUS. (*SulphoPhosphorous Acid. Phosphorous Sulphide.*) PS_3 Decomposes rapidly in moist air. Easily soluble, with decomposition, in solutions of caustic alkalies, or of ammonia, or of carbonate of potash, or carbonate of soda.

*Quinqui*SULPHIDE OF PHOSPHORUS. (*SulphoPhosphoric Acid. Phosphoric Sulphide.*) PS_5 Slowly soluble, with decomposition, in cold solutions of the alkaline carbonates. Extremely soluble in solutions of the caustic alkalies or of ammonia.

*Per*SULPHIDE OF PHOSPHORUS. PS_{12} Soluble in aqueous solutions of the caustic alkalies. (Berzelius.)

SULPHIDE OF PHOSPHORUS & OF POTASSIUM. $PS_3 ; 4KS_3$ Deliquescent. Soluble, with decomposition, in water. (H. Rose.)

SULPHIDE OF PHOSPHORUS & OF SILVER.

I.) = $PS_5 ; 2AgS$

II.) = $PS_3 ; 2AgS$ Readily soluble in nitric acid, with decomposition. (Berzelius.)

III.) = $PS_5 ; 2AgS$ (*SulphoPhosphate of Silver.*)

SULPHIDE OF PHOSPHORUS & OF ZINC. $P_2S_3 ; 2ZnS$ Soluble, with decomposition, in chlorhydric acid.

*Proto*SULPHIDE OF PLATINUM. PtS Permanent. Soluble in water. Scarcely attacked by boiling mineral acids. Not decomposed by aqua-regia, or potash-lye. (E. Davy.) Soluble in a large excess of an aqueous solution of sulphide of ammonium. Upon alcohol it acts like platinum-black, but much less strongly. (Bœttger.)

*Bi*SULPHIDE OF PLATINUM. PtS_2 Of the acids, aqua-regia alone exerts a slight action upon it. (E. Davy.) Fuming nitric acid also slowly decomposes it. (Berzelius.) Insoluble in chlorhydric acid; only slightly attacked by boiling nitric acid; soluble in hot aqua-regia. (Fresenius, *Qual.*) Soluble in aqueous solutions of the alkaline sulphides and carbonates, and in the caustic alkalies. (Berzelius.) Sulphide of platinum, precipitated by means of sulphide of ammonium, is soluble in a large excess of the latter, but is only very difficultly soluble. (Claus, *Beiträge*, p. 37.) Unacted upon by boiling concentrated chlorhydric, sulphuric, or nitric acid (of 1.2 sp. gr.), or by boiling aqueous solutions of caustic ammonia, or potash, of carbonate of soda, or sulphide of ammonium. (Bœttger.) Precipitated sulphide of platinum is insoluble in aqueous solutions of chloride of ammonium, or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 99.) The limit of the reaction between sulphuretted hydrogen and a bisalt of platinum is in presence of 30000 pts. of water; the precipitate is soluble in chlorhydric acid. (Fischer.) 1 pt. of bichloride of platinum in 100 pts. of water mixed with 25 pts. of chlorhydric acid is not precipitated by sulphuretted hydrogen. (Reinsch.) [The compound above spoken of by Davy was prepared by fusing chloroplatinate of ammonium with sulphur; that of Bœttger, by decomposing an alcoholic solution of bichloride of platinum with bisulphide of carbon; while Berzelius's remarks refer to the ordinary precipitated sulphide.]

SULPHIDE OF PLATINUM & OF POTASSIUM.

SULPHIDE OF POTASSIUM.

I.) *mono.* KS Deliquescent. Very soluble in water, and in alcohol, though less so in the latter than in the former.

II.) *bi.* KS_2 Soluble in water, and alcohol.

III.) *ter.* KS_3 Decomposes in air. Easily soluble in water and in alcohol.

IV.) *quadri.* KS_4 Soluble in water, and alcohol.

V.) *quinqui.* KS_5 Hygroscopic. Soluble in all proportions in water, with production of cold. Readily soluble in alcohol.

All the sulphides of potassium are soluble in water, and those containing much sulphur are soluble in alcohol also. (Otto.) "Sulphide of potassium" is freely soluble in glycerin. (Parrish's *Pharm.*, p. 236.) It is insoluble in commercial acetate of ethyl. (Casaseca, *C. R.*, 1850, **30.** 821.) "*Kali Sulphuratum*" is soluble in 2 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht für* 1854, p. 76.)

SULPHIDE OF POTASSIUM & OF SILICON. Entirely soluble in water. (Berzelius.)

SULPHIDE OF POTASSIUM & OF SILVER.

SULPHIDE OF POTASSIUM with SULPHOCYANIDE OF ALLYL.

I.) Soluble in alcohol.
$KS ; C_8H_5NS_2$

II.) More soluble in alcohol than No. I.
$2KS ; C_8H_5NS_2$

*Proto*SULPHIDE OF RHODIUM. RhS Insoluble in water.

*Sesqui*SULPHIDE OF RHODIUM. Rh_2S_3 Completely soluble in an aqueous solution of sulphide of potassium; partially soluble in a solution of caustic potash, with decomposition. (Berzelius.) Insoluble in a solution of sulphide of ammonium. (Berzelius.) Soluble in chlorhydric (Fischer), and nitric acid. (Descotils.)

SULPHIDE OF RUTHENIUM. Slightly soluble in sulphide of ammonium. Easily soluble in nitric acid.

SULPHIDE OF SELENIUM. Sulphur and selenium combine together in all proportions. The compound SeS_2 is easily soluble in aqueous solutions of the fixed caustic alkalies, and, with decomposition, in aqua-regia, also slowly in nitric acid, and in solutions of the alkaline sulphides after long-continued boiling.

SULPHIDE OF SILICON. SiS_3 Decomposed by moist air. Entirely soluble, with decomposition, in water. Alcohol and ether combine with it. (Fremy, *Ann. Ch. et Phys.*, (3.) **38.** 314.) Very quickly decomposed by water, with complete solution. (Berzelius.)

SULPHIDE OF SILVER. AgS When prepared in the moist way, it is insoluble in water, dilute acids, solutions of the caustic alkalies, or of the alkaline sulphides. Soluble in a solution of cyanide of potassium only when the latter is used in large excess. The small portion thus dissolved is reprecipitated, however, for the most part, by the addition of water. (Béchamp, cited by Fresenius, *Quant.*, p. 142.) Insoluble in an aqueous solution of cyanide of potassium. (Haidlen

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& Fresenius.) Insoluble in aqueous solutions of chloride of ammonium, or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 99.) Soluble in nitric acid. Decomposed by hot concentrated chlorhydric acid. Soluble in strong sulphuric acid, with decomposition. Insoluble in sulphurous acid. (Berthier.) Insoluble in an aqueous solution of protonitrate of mercury. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 317.) Insoluble in caustic ammonia, unless in presence of chloride of silver, when a portion of it (Ag S) is dissolved. (Gredy, *C. R.*, **14.** 757.) It is precipitated from solutions of silver salts containing only 1 pt. of the latter to 20000 pts. of water (Pfaff), to 35000 pts. of water. (Harting.) As separated from metallic silver, e. g. from coin, which frequently contains a little of it, it is very slowly dissolved by hot nitric acid, and is scarcely at all acted upon by it in the cold; it is easily dissolved, however, by adding concentrated sulphuric acid to the nitric acid used. (Gay-Lussac, *Ann. Ch. et Phys.*, **63.** 334.) Silver utensils, which have become covered with sulphide of silver, may be readily cleansed by placing them in contact with metallic zinc in a saturated boiling aqueous solution of borax, or a tolerably concentrated solution of caustic potash. (Bœttger.)

Sulphide of Sodium.

I.) *mono.*

a = $Na\,S$ Readily soluble in water. Alcohol precipitates it from the concentrated aqueous solution, but the precipitate redissolves when a larger amount of alcohol is added. (Berzelius, *Lehrb.*, **2.** 92.) Insoluble in alcohol or ether. (Roussin.) Insoluble in commercial acetate of ethyl. (Casaseca, *C. R.*, 1850, **30.** 821.)

b = *hydrated.* Decomposes in the air. Much $Na\,S + 9\,Aq$ less soluble in alcohol than in water, and may even be washed with the former. (Berzelius.)

II.) *bi.* $Na\,S_2$

III.) *tri.* $Na\,S_3$

IV.) *quadri.* $Na\,S_4$

Resemble the potassium compounds, so far as is known.

V.) *quinqui.* Soluble in water with reduction $Na\,S_5$ of temperature.

Sulphide of Sodium & of Tungsten. Insoluble in water. (Wœhler.) $Na\,S,\ 3\,W\,S_2$

Sulphide of StannEthyl. $\left.\begin{matrix}C_4\,H_5\,Sn\\C_4\,H_5\,Sn\end{matrix}\right\}S_2$ Insoluble in water. Soluble in alcohol. (Cahours & Riche.) Insoluble in weak acids, or in ammonia-water; but soluble in strong chlorhydric acid, and in aqueous solutions of the fixed caustic alkalies and alkaline sulphides. (Frankland.)

Sulphide of Stib*tri*Amyl. Soluble in alcohol, and ether.

Sulphide of Stib*tri*Ethyl. Permanent. $Sb\left\{(C_4\,H_5)_3\,S_2\right.$ Readily soluble in water, and alcohol. Very sparingly soluble in cold, but readily soluble in warm ether. (Lœwig & Schweizer.)

Sulphide of StibEthylium. $\left.\begin{matrix}Sb\left\{(C_4\,H_5)_4\right.\\Sb\left\{(C_4\,H_5)_4\right.\end{matrix}\right\}S_2$ Very easily soluble in water, and alcohol. (Lœwig.)

Sulphide of StibMethyl*tri*Ethylium. $\left.\begin{matrix}Sb\left\{\begin{matrix}C_2\,H_3\\(C_4\,H_5)_3\end{matrix}\right.\\Sb\left\{\begin{matrix}C_2\,H_3\\(C_4\,H_5)_3\end{matrix}\right.\end{matrix}\right\}S_2$ Readily soluble in water, and alcohol. (Friedlænder.)

Sulphide of StibMethylium. $\left.\begin{matrix}Sb\left\{(C_2\,H_3)_4\right.\\Sb\left\{(C_2\,H_3)_4\right.\end{matrix}\right\}S_2$ Decomposes when exposed to the air. Very easily soluble in water, and alcohol. Insoluble in ether.

Sulphide of Stilbene. *Vid.* Hydride of SulphoBenzoyl.

Sulphide of Strontium.

I.) *mono.* Soluble in water, with decompo- $Sr\,S$ sition.

II.) *ter.* Resembles the corresponding barium $Sr\,S_3$ compound.

***Bi*Sulphide of SulphoCarb(onyl)Ammonium.** (*Hydranzothin. CarboSulphamid. Sulfocyanogène Bihydrosulfurée.*) $C_2\,H_2\,N\,S_4 = N\left\{\begin{matrix}C_2\,S_2''\\H_2\end{matrix}\right.,\,S_2$ Very sparingly soluble in cold, decomposed by boiling water. Soluble in cold alcohol, without alteration, but the solution is decomposed on boiling. Water precipitates it from the alcoholic solution. More soluble in ether than in alcohol. On evaporating the ethereal solution a portion of the substance is decomposed. With acetone it behaves as with ether. Decomposed by alkalies. Not sensibly acted on by sulphuric or chlorhydric acid. (Zeise, *Ann. Ch. et Phys.*, (3.) **9.** 125.)

***Per*Sulphide of *di*SulphoCarbonate of Ethyl.** *Vid.* *Bi*OxySulphoCarbonate of Ethyl.

Sulphide of Tantalum. Insoluble in water. Unacted upon by chlorhydric acid, or by most of the other acids. Slowly decomposed by boiling nitric acid, and by aqua-regia. Sulphuric or fluorhydric acids have scarcely any action upon it. A mixture of nitric and fluorhydric acids decomposes it. Unacted upon by potash-lye. (H. Rose.)

Sulphide of TellurEthyl. $\left.\begin{matrix}C_4\,H_5\,Te\\C_4\,H_5\,Te\end{matrix}\right\}S_2$

***Bi*Sulphide of Tellurium.** (*SulphoTellurous Acid.*) $Te\,S_2$ Sulphur and tellurium may be melted together in all proportions. Of these compounds, $Te\,S_2$ is soluble in a boiling aqueous solution of caustic potash. While still moist, it is soluble in a concentrated solution of caustic ammonia, but is scarcely at all acted upon by a dilute solution. Soluble, with combination, in boiling aqueous solutions of the alkaline sulphides.

***Ter*Sulphide of Tellurium.** Ppt. $Te\,S_3$

Sulphide of Thorium. When treated with $Th\,S$ acids, a faint odor of sulphuretted hydrogen is at first evolved, but the sulphide does not appear to be dissolved to a perceptible extent, even when the acid is warm; even nitric acid attacks it but slightly. Unacted upon by cold aqua-regia, but hot aqua-regia dissolves it completely, sulphate of thoria being formed. (Berzelius, *Pogg. Ann.*, 1829, **16.** 402.)

***Proto*Sulphide of Tin.**

a = $Sn\,S$ Soluble, with decomposition, in concentrated chlorhydric acid. Insoluble in an aqueous solution of potash. (Proust.)

b = *hydrated.* Insoluble in water, sulphuretted $Sn\,S, H\,O$ hydrogen water, or dilute acids. Soluble, with decomposition, in the stronger acids; easily in hot concentrated chlorhydric acid. Insoluble in caustic ammonia.

Insoluble in aqueous solutions of chloride of ammonium, or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 99.) Tolerably readily soluble (as bisulphide) in solutions of yellow sul-

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phide of ammonium (H. Rose), or yellow sulphide of potassium.

Completely insoluble in colorless sulphide of ammonium, i. e. in that which contains no excess of sulphur. Precipitated sulphide of tin generally dissolves in ordinary sulphide of ammonium, but a very large excess of the latter is required, and this is so much the greater in proportion as the solution is less strongly colored with sulphur. The rapidity of solution may be very much increased by adding a little pulverized sulphur, and heating. (H. Rose, *Tr.*) Insoluble in sulphurous acid. (Berthier.)

*Sesqui*Sulphide of Tin. Partially soluble, Sn_2S_3 with decomposition, in caustic potash, and concentrated chlorhydric acid.

*Bi*Sulphide of Tin.
(*Sulpho Stannic Acid.*)

a = $Sn S_2$ Soluble in hot solutions of caustic or carbonated potash, also in hot solutions of the sulphides of ammonium, sodium, and potassium. Sublimed bisulphide of tin is insoluble in chlorhydric acid, &c., but is dissolved by aqua-regia.

b = *hydrated.* $Sn S_2, H O$ Insoluble in water, sparingly soluble in water which contains sulphuretted hydrogen. Difficultly soluble in caustic ammonia. Easily soluble in solutions of caustic potash, and of the alkaline sulphides; also in hot concentrated chlorhydric acid. (Fresenius, *Quant.*, p. 155.) Soluble in aqueous solutions of caustic potash, caustic ammonia, and the alkaline carbonates, though less readily than the tersulphide of arsenic. Unlike the sulphide prepared in the dry way, it is soluble, with decomposition, in hot concentrated chlorhydric acid. (H. Rose, *Tr.*) More readily soluble than the anhydrous sulphide in solutions of the alkaline sulphides, or caustic alkalies, also of carbonate of potash.

Insoluble in aqueous solutions of chloride of ammonium, and nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 99.) Sulphuretted hydrogen ceases to precipitate tin when 120000 pts. of water are present. (Pfaff.)

*Bi*Sulphide of Titanium. Insoluble in $Ti S_2$ water, or in chlorhydric or sulphuric acid. Soluble, with decomposition, in aqua-regia. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **20.** 394.) Slowly soluble in acids. Decomposed, with partial solution, by caustic alkalies. Insoluble in alkaline sulphides. (H. Rose.)

*Bi*Sulphide of Tungsten. Completely in- $W S_2$ soluble in water. (Riche, *Ann. Ch. et Phys.*, (3.) **50.** 27.) Decomposed by aqua-regia. (Berzelius.)

*Ter*Sulphide of Tungsten. *Vid.* Sulpho- $W S_3$ Tungstic Acid.

*Proto*Sulphide of Uranium. Insoluble in $Ur S$ water. When prepared in the dry way, it is only slightly acted upon by chlorhydric acid. Decomposed by nitric acid at the ordinary temperature. When prepared by precipitation in the moist way, it appears to be slightly soluble in water, and is somewhat soluble in aqueous solutions of the alkaline sulphides. (Berzelius, *Lehrb.*, **2.** 738.)

*Bi*Sulphide of Vanadium. When prepared $V S_2$ in the dry way, it is insoluble in sulphuric or chlorhydric acids, or in aqueous solutions of the caustic alkalies, but is decomposed by nitric acid. As prepared in the moist way, it is insoluble in water, but soluble, with combination, in aqueous solutions of the alkaline sulphides, and sparingly soluble in solutions of the sulphides of the alkaline earths, also soluble in aqueous solutions of the caustic and boiling carbonated alkalies, and of boracic acid. Not decomposed by chlorhydric or sulphuric acid.

*Ter*Sulphide of Vanadium. Insoluble in $V S_3$ water. Soluble in aqueous solutions of the caustic, carbonated, and sulphuretted alkalies. It is not decomposed by sulphuric acid. [*Vid.* also SulphoVanadiate of X.]

Sulphide of Xanthene. Insoluble in water, "$C_3 H_3 N_2 S_3$" alcohol, or ether. Easily soluble in alkaline solutions. Unacted upon by dilute acids. (Vœlckel.)

Sulphide of Xuthene. Insoluble in water, "$C_{10} H_7 N_9 S_4$" alcohol, or ether. (Vœlckel.)

Sulphide of Yttrium. Insoluble in water. $Y S$ (Wœhler.) Decomposed by acids.

Sulphide of Zinc.

a = *anhydrous.* Insoluble in water. Less $Zn S$ readily soluble in acids than the hydrate. When prepared in the dry way, it is still soluble in cold dilute chlorhydric acid, but is insoluble in acetic acid. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **25.** 97.) Only very slowly soluble in concentrated chlorhydric acid. As it occurs in nature (Blende), it is only slightly attacked by acids, excepting aqua-regia. (Berzelius, *Lehrb.*) When heated with a solution of sulphuretted hydrogen in a sealed tube it dissolves with tolerable facility. (De Senarmont, *Ann. Ch. et Phys.*, (3.) **32.** 168.)

b = *hydrated* [as ordinarily precipitated]. In- $Zn S, H O$ soluble in water, in solutions of caustic or carbonated alkalies, or of the alkaline sulphides. Insoluble in solutions of caustic ammonia, or of its carbonate. Easily soluble, even in very dilute chlorhydric and nitric acids. It may, however, be precipitated by sulphuretted hydrogen from solutions acidulated with chlorhydric or sulphuric acid, especially if a large amount of water be present. [Compare a discussion of the observed facts, by Eliot & Storer, *Mem. Amer. Acad.*, (N. S.) **8.** 95]. Difficultly soluble, and only when heated, in concentrated chlorhydric acid. (Berzelius, *Lehrb.*, **2.** 650.) More easily soluble in nitric than chlorhydric acid. (Fresenius, *Qual.*) Slightly soluble in acetic acid. (Wackenroder.) While still moist it is soluble in an aqueous solution of sulphurous acid. (Berthier.) Insoluble in aqueous solutions of chloride of ammonium, or nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 99.) A solution of sulphide of potassium, when added to a solution of sulphate of zinc, produces a precipitate in the presence of 10000 pts. of water; there is still a slight opalescence in presence of 20000 pts. of water. (Lassaigne.)

Sulphide of Zirconium. Insoluble in wa- $Zr_2 S_3$ ter, or in sulphuric, nitric, or chlorhydric acid. Slowly attacked by boiling aqua-regia. Easily soluble in fluorhydric acid. Unacted upon by potash-lye.

*Bi*SulphiMethylic Acid. *Vid.* Methyl-Sulphurous Acid.

Sulphimid. *Vid.* Sulphurylamin.

SulphIndigotic Acid. Absorbs water from
(*Sulphate of Indigo. SulphIndylic Acid. CeruloSulphuric Acid. Soluble Indigo Blue.*)

$C_{16} H_5 N S_2 O_8 = N \left\{ \begin{array}{l} C_{16} H_4 O_2'' \\ S_2 O_4'' \end{array} \right. . O, H O$

the air. Very readily soluble in water; also readily soluble in alcohol. The alkaline

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salts of sulphindigotic acid are sparingly soluble in cold, more readily soluble in boiling water; they are insoluble in alcohol, and in aqueous solutions of other alkaline salts.

SulphIndigotate of Alumina.
I.) Readily soluble in water. (Berzelius.)
II.) *basic*. Ppt.

SulphIndigotate of Ammonia. Soluble in 40 @ 50 pts. of cold, and in a much smaller quantity of hot water. (Crum.) From this solution it is precipitated on the addition of alkaline sulphates, and by some other salts, but much less completely than the potash salt. It is not soluble in alcohol. (Berzelius; Crum.)

SulphIndigotate of Baryta. $C_{16} H_4 Ba N S_2 O_8$ Slightly soluble in cold, somewhat soluble in hot water.

SulphIndigotate of Lead.
I.) Sparingly soluble in water.
II.) *basic.*

SulphIndigotate of Lime. More readily soluble than sulphate of lime in water. Insoluble in alcohol. (Berzelius.)

SulphIndigotate of Magnesia. Readily soluble in water. Insoluble in alcohol. (Berzelius.)

SulphIndigotate of Potash. (*Precipitated Indigo. Soluble Indigo. Indigo Carmine. Carmine Blue.*) $C_{16} H_4 K N S_2 O_8$ Deliquescent. Soluble in 140 pts. of cold water; more easily soluble in boiling water. Insoluble in alcohol of 0.84 sp. gr. (Berzelius.) Water which contains one percent of acetate of potash does not dissolve it in the cold; when heat is applied a portion dissolves, but it separates out again as the solution cools. Insoluble in concentrated chlorhydric, but readily soluble in concentrated sulphuric acid. (Crum.)

SulphIndigotate of Soda. Insoluble, or very sparingly soluble, in water which contains 2% of acetate of soda. When dissolved in hot water containing a soda salt in solution, the greater part of it separates out again on cooling. It is less completely precipitated from the aqueous solution, on the addition of other salts than the sulphindigotate of potash. (Crum.)

SulphIndylic Acid. *Vid.* SulphIndigotic Acid.

SulphIsatanous Acid. (*Sulphite of Indylium.*) $C_{16} H_7 N S_2 O_8$ Soluble in water. (Laurent.)

SulphIsatanite of Ammonia. $C_{16} H_6 (N H_4) S_2 O_8 + 2 Aq$ Very soluble in water; slightly less soluble in alcohol. (Laurent.)

SulphIsatyde. (*Sulphasatyde.*) $C_{32} H_{12} S_2 N_2 O_6$ Insoluble in water. Boiling alcohol dissolves only traces. which separate out on cooling. It is not more soluble in ether than in alcohol. (Laurent.)

***Bi*SulphIsatyde.** (*Sulphisatin. Sulphesathyde.*) $C_{32} H_{12} S_4 N_2 O_4$ Insoluble in boiling water. Very readily soluble in warm alcohol, and ether. Soluble in strong sulphuric acid, and in potash-lye.

SulphiteAmmon. *Vid.* Sulphurylamin.

Sulphurous Acid.

I.) *gaseous.* $S O_2$ 1 vol. of water absorbs 30 vols. of $S O_2$ gas at 18° (Davy); about 20 vols. at the ordinary temperature (Dalton, in his *New System*, Pt. **2.** p. 389); 43.78 vols. (Saussure); about 50 vols. at 20°, and a barometric pressure of 76mm. (P. & F.); 33 vols. at the ordinary temperature. (T. Thomson, in his *New System of Chem.*, London, 1831, **2.** 38.)

1 pt. by weight of it is soluble in 0.1429 ($= \frac{1}{7}$) pt. of water at 5°, and the solution obtained is of 1.020 sp. gr. (Fourcroy & Vauquelin); in 0.0400 ($= \frac{1}{25}$) pt. of water at the ordinary temperature (Priestley); in 0.0909 ($\frac{1}{11}$) pt. of water at 16°, and the sp. gr. of the solution obtained = 1.0513. (Thomson.) Soluble in 2 pts. of water of 10°. (Pierre, *Ann. Ch. et Phys.*, (3.) **23.** 421.)

At 18° C., and the ordinary pressure, 100 vols. of	Absorb vols. of $S O_2$.
Water free from air	4378
Alcohol of 0.84 sp. gr. . . .	11577

(Th. de Saussure, Gilbert's *Ann. der Phys.*, 1814, **47.** 167.) Soluble in ether.

At °C.	1 vol. of a saturated aqueous solution of sulphurous acid contains of $S O_2$ gas: Vols. reduced to 0° and 0m. 76 barometric pressure.	1 vol. of water under a pressure of 0m.76 of mercury, dissolves of $S O_2$ gas: Vols. reduced to 0° and 0m. 76 barometric pressure.
0°	68 861	79.789
1°	67.003	77.210
2°	65.169	74.691
3°	63 360	72.230
4°	61.576	69.828
5°	59.816	67.485
6°	58.080	65.200
7°	56.369	62.973
8°	54 683	60.805
9°	53.021	58.697
10°	51.383	56.647
11°	49.770	54.655
12°	48.182	52.723
13°	46.618	50 849
14°	45.079	49 033
15°	43.564	47.276
16°	42.073	45.578
17°	40.608	43.939
18°	39.165	42.360
19°	37.749	40.838
20°	36.206	39.374
21°	34.986	37.970
22°	33.910	36.617
23°	32.847	35.302
24°	31.800	34.026
25°	30.766	32.786
26°	29.748	31.584
27°	28.744	30.422
28°	27.754	29.314
29°	26.788	28.210
30°	25.819	27.161
31°	24 873	26.151
32°	23.942	25.178
33°	23.025	24.244
34°	22.122	23.347
35°	21.234	22.489
36°	20.361	21.668
37°	19.502	20.886
38°	18.658	20.141
39°	17.827	19.435
40°	17.013	18.766

(Schœnfeld, *Ann. Ch. u. Pharm.*, **95.** pp. 5, 7, and fig.)

When mixed with hydrogen, or with carbonic acid gas, sulphurous acid gas is absorbed by water as readily as when it is pure, i. e. it obeys Dalton's law of absorption even when these gases are present. (Schœnfeld, *Ann. Ch. u. Pharm.*, **95.** 12.)

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Solubility of S O_2 in Water at 7°, — under various Pressures, — by Experiment.

P*	G* at P	G at 760mm.
27.0	0.010	0.273
49.8	0.015	0 224
89.6	0.025	0.208
133.7	0.035	0.196
239.0	0.059	0.189
741.8	0.173	0.177
757.1	0.174	0.174
770 8	0 178	0.176
986.3	0.228	0.175
1291.0	0.293	0.172

* P = "Partial pressure," i. e. the total pressure, minus the tension of aqueous vapor at the given temperature. G = Weight of S O_2, in grammes, which is dissolved in 1 gramme of water at the pressure P V = The volume of G grammes of S O_2 at 0° and 0m.760. The third column "(G at 0m 760)" indicates how much S O_2 would be contained in 1 gramme of water at 0m.760, if the absorption were proportional to the pressure.

The following table is calculated from the experimental results above given.

P.	G at P.	G at 760mm.	V at P.	V at 760mm.
30	0.010	0.263	3.634	92 06
40	0.013	0.242	4 451	84.55
50	0.015	0.223	5.129	77.95
60	0.017	0.218	6.024	76.28
70	0.020	0.213	6.868	74.55
80	0.022	0.210	7.743	73.55
90	0.025	0.208	8.598	72.62
100	0.027	0.205	9.421	71.60
120	0.032	0.201	11.09	70 20
140	0.036	0.197	12 71	69.00
160	0.041	0.195	14.34	68.15
180	0.046	0.193	15.97	67.40
200	0.050	0.191	17.59	66.83
220	0.055	0.190	19.19	66.30
240	0.059	0.188	20.79	65.84
260	0.064	0.187	22.40	65.44
280	0.069	0.186	23.99	65.10
300	0.073	0.185	25.59	64.81
350	0.085	0.184	29.55	64.16
400	0.096	0.182	33.51	63.65
450	0.107	0.181	37.44	63.25
500	0.118	0.180	41.42	62.94
550	0.130	0 179	45.31	62.60
600	0.141	0.178	49.20	62.32
650	0 152	0.178	53.10	62.09
700	0.163	0.177	56.98	61.86
750	0.174	0.176	60.88	61.69
760	0.176	0.176	61.65	61.65
800	0.185	0.176	64.74	61.50
850	0.196	0.175	68.57	61.30
900	0.207	0.175	72.41	61.15
950	0.218	0.175	76.25	61 00
1000	0.229	0.174	80.01	60.88
1050	0.240	0.174	83.97	60.77
1100	0.251	0.174	87.80	60.65
1200	0.273	0.173	95.45	60.45
1300	0.295	0.172	103.00	60.25

(Sims, *Ann. Ch. u. Pharm.*, 1861, **118**. 340.)

Solubility of S O_2 *in Water, at 20°, — at various Pressures, — by Experiment.*

P.	G at P.	G at 0m.760.
32.4	0.006	0.148
50 1	0.009	0.138
65.0	0.011	0.133
77.3	0.013	0.127
78.4	0.013	0.129
82.2	0.014	0.126
121.8	0.020	0 113
291.0	0.043	0.111
446.6	0.064	0.109
658.2	0.094	0.108
728.9	0.100	0.104
729.5	0.100	0.104
730 8	0.100	0.104
1570.0	0.218	0.105
1911.0	0.260	0.104

The following table (for 20°) is calculated from the experimental results above given.

P.	G at P.	G at 0m.760.	V at P.	V at 0m.760.
40	0.007	0.143	2.637	50.09
50	0.009	0.138	3.171	48.20
60	0.011	0.135	3.718	47.10
70	0.012	0.131	4.205	45.64
80	0.013	0.127	4.663	44.30
90	0.015	0.125	5.169	43 65
100	0.016	0.124	5.692	43.25
120	0.019	0.121	6.683	42.33
140	0.022	0.119	7.690	41.75
160	0.025	0.118	8.666	41.17
180	0.028	0.117	9.652	40.75
200	0.030	0.116	10.62	40.35
220	0.033	0.115	11.59	40.03
240	0.036	0.114	12.54	39.70
260	0.038	0.112	13.45	39.30
280	0.041	0.112	14.41	39.10
300	0.044	0.111	15.34	38.87
350	0.050	0.110	17.66	38.35
400	0 059	0.109	20.56	38.10
450	0.064	0.108	22.37	37.77
500	0.071	0.107	24.67	37.50
550	0.077	0.106	26.93	37.20
600	0.083	0.105	29.14	36.90
650	0.090	0.105	31.39	36.70
700	0.096	0.105	33.62	36.50
750	0.103	0.104	35.94	36.43
760	0.104	0 104	36.43	36.43
800	0.110	0.104	38.32	36.40
1000	0.137	0.104	47.85	36.37
1300	0.178	0.104	62 10	36.31
1600	0.218	0.104	76.35	36.27
1900	0.259	0.104	90.53	36.21

Solubility of S O_2 *in Water at 39.8°, — at various Pressures, — by Experiment.*

P.	G at P.	G at 0m.760.
205.9	0.017	0.062
293.1	0 023	0 060
696.0	0.054	0.059
697.6	0.054	0.059
701.6	0.053	0.055
1565.0	0.116	0.056
2021.0	0.150	0.056

The following table (for 39.8°) is calculated from the experimental results above given.

P.	G at P.	G at 0m.760.	V at P.	V at 0m.760.
200	0.016	0.062	5.675	21.57
300	0.024	0.061	8.368	21.20
400	0.031	0.060	11.03	20.95
500	0.039	0.059	13.67	20.77
600	0.047	0 059	16.29	20.64
760	0.059	0.059	20.50	20.50
800	0.062	0.059	21.58	20 50
1000	0.077	0.058	26.84	20.40
1500	0.113	0.057	39.65	20.09
2000	0.149	0.057	52.11	19.80

Solubility of S O_2 *in Water at 50°, — at various Pressures, — by Experiment.*

P.	G at P.	G at 0m.760.
191.5	0.011	0.011
664.0	0.039	0.039
1961.1	0.115	0.120

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The following table is calculated from the experimental results above given.

P.	G at P.	G at 0m.760.	V at P.	V at 0m.760.
200	0.012	0.045	4.156	15.97
400	0.024	0.045	8.275	15.72
600	0.035	0.045	12.36	15.65
760	0.045	0.045	15.62	15.62
800	0.047	0.045	16.43	15.60
1000	0.059	0.045	20.51	15.59
1500	0.088	0.044	30.73	15.57
2000	0.112	0.044	39.07	15.55

The following table of the *Solubility of* $S O_2$ *at various Temperatures, under a Pressure of* $0^m.760$ *of Mercury, is deduced from the foregoing.*

At °C.	G.	V.	At 0°.	G.	V.
8°	0.168	58.7	30°	0.078	27.3
10°	0.154	53.9	32°	0.073	25.7
12°	0.142	49.6	34°	0.069	24.3
14°	0.130	45.6	36°	0.065	22.8
16°	0.121	42.2	38°	0.062	21.6
18°	0.112	39.3	40°	0.058	20.4
20°	0.104	36.4	42°	0.055	19.3
22°	0.098	34.2	44°	0.053	18.4
24°	0.092	32.3	46°	0.050	17.4
26°	0.087	30.5	48°	0.047	16.4
28°	0.083	28.9	50°	0.045	15.6

With regard to this table Sims remarks: "These numbers do not agree closely with those of Schœnfeldt. The differences are sufficiently explained, however, by the different methods employed, by the fact that Schœnfeldt did not allow for the tension of aqueous vapor, and by the corrections employed by him under the assumption that Dalton's law is correct."

As a result of his research, Sims finds that in proportion as the temperature is higher, so much the more nearly does the solubility of $S O_2$ in water conform to Dalton's law, so that, in general terms, it may be said, that it obeys this law for temperatures above 40°. (Sims, *Ann. Ch. u. Pharm.*, 1861, **118.** pp. 340–344, and fig.) The saturated aqueous solution is of 1.040 sp. gr. (Berthollet.)

An aqueous solution saturated at

0° is of 1.06091 sp. gr.
10° " 1.05472 "
20° " 1.02386 "
40° " 0.95548 "

(Schœnfeld, *Ann. Ch. u. Pharm.*, **95.** 7.)

From these observations, cited by Bunsen in his *Gasometry*, Schiff calculates the following table, by means of the formulæ: Between 1° and 10°: $1.0607 - 0.0012\,t + 0.0006\,t^2$. Between 1° and 20°: $1.0605 + 0.00067\,t - 0.000125\,t^2$.

An aqueous solution saturated at °C.	Is of sp. gr.	An aqueous solution saturated at °C.	Is of sp. gr.
0°	1.0609	13°	1.0481
1°	1.0596	14°	1.0454
2°	1.0585	15°	1.0424
3°	1.0576	16°	1.0392
4°	1.0569	17°	1.0358
5°	1.0562	18°	1.0321
6°	1.0557	19°	1.0281
7°	1.0552	20°	1.0239
8°	1.0549	21°	1.0195
9°	1.0548	22°	1.0147
10°	1.0547	23°	1.0099
11°	1.0528	24°	0.9991
12°	1.0505		

Schiff also calculates the following table, by means of the formula: $D = 1 + 0.0023993\,p + 0.00003911\,p^2 - 0.00000013302\,p^3$; in which D = the sp. gr. of the solution and p the percentage of acid in the solution.

Sp. gr.	Percent of $S O_2$.	Sp. gr.	Percent of $S O_2$.
1.0024	1	1.0343	12
1.0049	2	1.0376	13
1.0075	3	1.0410	14
1.0102	4	1.0445	15
1.0130	5	1.0480	16
1.0158	6	1.0517	17
1.0187	7	1.0553	18
1.0217	8	1.0591	19
1.0247	9	1.0629	20
1.0278	10	1.0667	21
1.0311	11		

(H. Schiff, *Ann. Ch. u. Pharm.*, 1858, **107.** pp. 311, 312.)

1 vol. of alcohol, under a pressure of 0m. 76 of mercury, at °C.	Dissolves of $S O_2$ gas: vols. reduced to 0 °C. and 0m.76 pressure of mercury.
0°	328.62
1°	311.98
2°	295.97
3°	280.58
4°	265.81
5°	251.67
6°	238.16
7°	225.25
8°	212.98
9°	201.33
10°	190.31
11°	179.91
12°	170.13
13°	160.98
14°	152.45
15°	144.55
16°	137.27
17°	130.61
18°	124.58
19°	119.17
20°	114.48
21°	110.22
22°	106.68
23°	103.77
24°	101.47

(Bunsen's *Gasometry*, pp. 289, 128, 164.)

Oil of turpentine absorbs a considerable quantity of it. (T.) Sulphurous acid is absorbed by oil of turpentine with great rise of temperature, the oil turning light yellow, remaining mobile, and acquiring the odor of the acid. (Gehlen.) Sulphurous acid is rapidly absorbed by anhydrous aldehyde in the cold, 11 pts. of aldehyde absorbing 19 pts. of the acid. The absorption coefficient of aldehyde for $S O_2$ is 1.4 times greater than that of alcohol, and 7 times as great as that of water. (Geuther & Cartmell, in *Gm.*, from *Proc. Roy. Soc.*, **10.** 111.)

b = *hydrated.* Crystallizes out at 0°; but melts again at + 3.4°. Easily soluble in water, much less soluble in alcohol. Soluble in an aqueous solution of sulphurous acid, from which, if it be concentrated, it crystallizes out on cooling. (Pierre, *Ann. Ch. et Phys.*, (3.) **23.** 421.)

$S O_2 + 15\,Aq$ (Schœnfeld)

Only the alkaline normal salts of sulphurous acid are soluble in water, and they are all insoluble, or but sparingly soluble, in alcohol. The acid salts are soluble in water.

SULPHITE OF ACETONEAMMONIUM. Easily soluble in water, and alcohol. Insoluble in ether. (Stædeler.)

(*Sulphite of MesitylAmmonium.*)
$C_6 H_5 (N H_4) O_2, 2 S O_2 + 2\,Aq$

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Sulphite of AcetonePotassium. Tolerably soluble in water, more difficultly soluble in alcohol. (Limpricht, *Ann. Ch. u. Pharm.*, **93.** 239.)
(*Sulphite of MesitylPotassium.*)
$C_6H_5KO_2, 2SO_2 + Aq$

Sulphite of AcetoneSodium. Tolerably soluble in water, more difficultly soluble in spirit. (Limpricht, *loc. cit.*)
(*Sulphite of MesitylSodium.*)
$C_6H_5NaO_2, 2SO_2 + 2Aq$

Sulphite of Acetylammonium. Very soluble in water. Soluble in weak alcohol; difficultly soluble in absolute alcohol, or in ether. (Redtenbacher.)
(*BiSulphite of Aldehyde Ammonia. Isomeric with Taurin.*)
$C_4H_7NS_2O_6 = C_4H_3(NH_4)O_2, 2SO_2$

Petersen (*Ann. Ch. u. Pharm.*, **102.** 325) has observed a modification of this substance, which is much less soluble in water, especially in cold water, than Redtenbacher's compound. Scarcely at all soluble in alcohol, and ether.

***Bi*Sulphite of Aldehydeammonia.** *Vid.* Sulphite of Acetylammonium.
$NH_3, C_4H_4O_2 + 2SO_2$

Sulphite of Alloxan & of Potash. Rather difficultly soluble in cold, but easily soluble in boiling water.
$C_8H_5N_2KS_2O_{16} = C_8H_2N_2O_8, KO, 2SO_2 + 8Aq$

Sulphite of Alumina.

I.) *basic.* Insoluble in water. Soluble in sulphurous acid. (Fourcroy & Vauquelin.)
$Al_2O_3, SO_2 + 4Aq$

II.) "*normal.*" Decomposes in the air. Soluble in water, but the solution is decomposed on boiling. (Gougginsperg.) Moist hydrate of alumina is soluble in sulphurous acid, but is completely reprecipitated, as hydrate, on boiling the solution. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 75.)

"Sulphite of Ammon," &c. *Vid.* Sulphurylamid.
(Compounds of NH_3 & SO_2)

Sulphite of Ammonia.

I.) *mono.* Hygroscopic. Soluble in 1 pt. of water at 12°, with considerable reduction of temperature; much more soluble in hot water, but ammonia is evolved when the solution is boiled. (Fourcroy.) Sparingly soluble in absolute alcohol. (Muspratt.) Much more soluble than sulphite of potash. (Péan de St. Gilles, *Ann. Ch. et Phys.*, (3.) **36.** 83.)
NH_4O, SO_2

II.) $2(NH_4O, SO_2) + 8Aq$

III.) *bi.* Decomposes when exposed to the air. Easily soluble in water. Very soluble in alcohol. Insoluble in ether. (Muspratt.)
$NH_4O, 2SO_2$

Sulphite of Ammonia & of Cadmium. Exceedingly sparingly soluble in water, scarcely a trace being dissolved therein, even on boiling. Somewhat soluble at the ordinary temperature in sulphurous acid, but is reprecipitated on boiling. More soluble when in presence of the corresponding zinc salt than in pure water. (Schueler, *Ann. Ch. u. Pharm.*, **87.** 45.)
$NH_4O, SO_2; CdO, SO_2$

Sulphite of Ammonia & *of dinoxide* of Copper.

I.) Insoluble in water, or in weak acids. (Péan de St. Gilles, *Ann. Ch. et Phys.*, (3.) **42.** 30.) Decomposed by boiling with water. (Rogojski.)
$NH_4O, SO_2; Cu_2O, SO_2$

II.) Decomposed when heated in water. (Muspratt.)
$2(Cu_2O, SO_2); NH_4O, SO_2 + 3Aq$

III.) Rapidly decomposed in the air. Somewhat soluble in warm, less soluble in cold water. (Péan de St. Gilles, *Ibid.*)
$7(NH_4O, SO_2); Cu_2O, SO_2 + 10Aq$

Sulphite of Ammonia, *of dinoxide* of Copper, & *of protoxide* of Copper. Insoluble in water, but is decomposed when boiled therewith. Insoluble in weak acids; but is decomposed when left in contact with acid liquors. Soluble in ammonia-water. (*Idem, Ibid.*)
$NH_4O, SO_2, 2(Cu_2O, SO_2); CuO, SO_2 + 5Aq$

Sulphite of Ammonia & of Magnesia. Very sparingly soluble in water. (Fourcroy & Vauquelin.) Soluble in sulphurous acid.
$NH_4O, SO_2; 3(MgO, SO_2 + 5Aq)$

Sulphite of Ammonia & Nitric Oxide. Gradually deliquescent, with decomposition. Soluble in water at first without decomposition, but subsequently decomposes the more rapidly the higher the temperature. Less soluble in an aqueous solution of ammonia than in pure water, but the solution thus obtained decomposes much more slowly. (Pelouze.) Insoluble in hot alcohol. Alcohol precipitates it from the aqueous solution. (Pelouze.)
(*NitroSulphate of Ammonia.*)
NH_4O, NO_2, SO_2

Sulphite of Ammonia & of Platin(*ous*)*bi*amin.

I.) (Prepared from the green modif. (γ) of chloride of platin(ous)ammonium [see p. 174.].)

$a = NH_4O, SO_2;\ N_2\left\{H_6 . Pt'O, HO, 2SO_2\right.$ Separates from its alcoholic solution after a time. (Peyrone, *Ann. Ch. u. Pharm.*, **61.** 179.)

b = *With excess of sulphite of ammonia?* Soluble in all proportions in water, from which oily drops are precipitated on the addition of alcohol. (Peyrone, *loc. cit.*)

II.) (Prepared from the orange modif. (δ) of chloride of platin(ous) ammonium.)

$a = 2(NH_4O, SO_2);\ N_2\left\{H_6 . Pt'O, HO, 2SO_2\right.$ Soluble in all proportions in water, from which it is precipitated in oily drops on the addition of alcohol. (Peyrone, *Ann. Ch. u. Pharm.*, **61.** 179.)

Sulphite of Ammonia & of Platinum. Easily soluble in water. Insoluble in strong alcohol. (Liebig.)
$NH_4O, SO_2; PtO, SO_2 + Aq$

Sulphite of Ammonia & of Silver.

Sulphite of Ammonia & of Zinc. Soluble in water.

Sulphite of Anilin.

Sulphite of Anisicyl("Anisyl")Ammonium. Readily soluble in water. Sparingly soluble in aqueous solutions of the bisulphites. (Bertagnini.)

Sulphite of AnisicylPotassium. Readily soluble in pure water, less soluble in water charged with sulphites. Soluble in dilute alcohol. (Bertagnini.)

Sulphite of AnisicylSodium. Soluble in cold water, but the solution is decomposed on ebullition; less soluble in water which contains
$C_{16}H_7NaO_4, 2SO_2 + 2Aq$

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a little sulphite of soda; and nearly insoluble in a saturated cold solution of sulphite of soda, but is somewhat soluble in the same when warm. Soluble in boiling, less soluble in cold alcohol. (Bertagnini.)

Sulphite *of teroxide* of Antimony. Insoluble in water. (Berzelius.)
$SbO_3, 3SO_2$

Sulphite of Baryta.

I.) *mono.* Permanent. Scarcely at all soluble in water. Soluble in sulphurous acid. (Fourcroy.) Almost insoluble in water. Very sparingly soluble in sulphurous acid. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 75.)
BaO, SO_2

Sulphite of BenzoylAmmonium. Very soluble in water. (Bertagnini.)

Sulphite of BenzoylPotassium. Very easily soluble in pure water; less soluble in water which contains an alkaline sulphite, and nearly insoluble in a cold concentrated solution of an alkaline sulphite. The aqueous solution is decomposed on ebullition. Sparingly soluble in cold, readily soluble in boiling alcohol; decomposed by continued ebullition. (Bertagnini.)

Sulphite of BenzoylSodium. Readily soluble in water; the solution undergoing decomposition when boiled. Insoluble in an aqueous solution of bisulphite of soda. Tolerably soluble in hydrated alcohol. Insoluble in cold, sparingly soluble in boiling, absolute alcohol.
$C_{14}H_5NaO_2, 2SO_2 + 3Aq$

Sulphite of Bismuth. Insoluble in water, or in sulphurous acid. (Fourcroy.)
BiO_3, SO_2

Sulphite of BromoNaphtoyl. *Vid.* SulphoBromoNaphthalic Acid.

Sulphite of BromoSalicoylPotassium. Readily soluble in water. Decomposed by acids.
$C_{14}H_4BrKO_4, 2SO_2$

Sulphite of BromoSalicoylSodium. Readily soluble in water. Decomposed by acids.

Sulphite of Butoylammonium.
$C_8H_7(NH_4)O_2, S_2O_4$

Sulphite of ButoylSodium.
$C_8H_7NaO_2, S_2O_4$

Sulphite of Cadmium. Difficultly soluble in water. Insoluble in alcohol. Soluble, with combination, in ammonia-water. (Muspratt.) Soluble in sulphurous acid. (Fordos & Gélis, *Ann. Ch. et Phys.*, (3.) **8.** 352.)
$CdO, SO_2 + 2Aq$

Sulphite of Cadmium & of Cadmiumammonium. Decomposed by water. Soluble in ammonia-water. (Rammelsberg.)
$N\left\{\begin{matrix}H_3\\Cd\end{matrix}\right.\cdot O, SO_2; CdO, SO_2$

Sulphite of CapricylPotassium. Decomposed by warm water. Insoluble in saturated aqueous solutions of the bisulphites of potash and of soda. Very soluble in cold spirit. (Limpricht, *Ann. Ch. u. Pharm.*, **93.** 243.)
$C_{16}H_{15}KO_2, 2SO_2 + 8Aq$

Sulphite of CapricylSodium. Similar to the potassium compound. (Limpricht, *loc. cit.*)

Sulphite of Cerium.

I.) Soluble in water, the solution undergoing decomposition, with precipitation of No. 2, on boiling. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 77.)
CeO, SO_2

II.) *basic.* Insoluble in water. (Berthier, *loc. cit.*)

Sulphite of Chloride of Carbon. *Vid.* Sulphite of Chloride of ChloroMethyl.

Sulphite of Chloride of *bi*ChloroMethyl. Soluble in water, and alcohol, but the solutions are easily decomposed.
(*Chloride of biChlorMethyl Sulphurous Acid.*
Sulphite of protoChloride of Carbon.
Carbonate of protoChloride of Sulphur.)
$CClSO_2$ or $C_2S_2Cl_2O_4$ (of Kolbe)
$C_2HCl_2S_2O_4$ (of Gerhardt) $= \left.\begin{matrix}C_2HCl_2\\Cl\end{matrix}\right\}S_2O_4$

Sulphite of Chloride of *ter*ChloroMethyl. Insoluble in water or acids. Slowly decomposed by cold water, more rapidly by hot water. Easily soluble in bisulphide of carbon, in alcohol, and ether.
(*Chloride of terChloroMethylSulphurous Acid.*
Sulphite of PerChloride of Carbon.
OxyChloride of Sulphide of Carbon.
Carbonate of biChloride of Sulphur.
Chlorhyposulphite of ChloroCarbonic Oxide.)
$C_2Cl_4S_2O_4 = \left.\begin{matrix}C_2Cl_3\\Cl\end{matrix}\right\}S_2O_4$

Sulphite of ChloroBenzene. *Vid.* Chloride of SulphoPhenyl.

Sulphite of ChloroNaphthalin. Insoluble in cold, decomposed by boiling water. Soluble in ether, benzin, bisulphide of carbon, and oxychloride of phosphorus; likewise in alcohol, but not without alteration. (Kimberly.)
(*Naphthyl Sulphurous Chloride.*)
$C_{20}H_7Cl'', 2SO_2$

Sulphite of ChloroNaphtoyl. *Vid.* SulphoChloroNaphthalic Acid.

*Bi*Sulphite of *quinqui*Chloride of Phosphorus. Decomposed by water. (Kremers.)
$PCl_5, 2SO_2$

*Ter*Sulphite of *quinqui*Chloride of Phosphorus.
$PCl_5, 3SO_2$

Sulphite of ChloroSalicoylAmmonium.

Sulphite of ChloroSalicoylPotassium.
$C_{14}H_4ClKO_4, S_2O_4$

Sulphite *of protoxide* of Chromium. Insoluble in water.

Sulphite *of sesquioxide* of Chromium.

I.) *normal?* ("*basic.*") Insoluble in water, or alcohol. Soluble in cold aqueous solutions of the carbonates of potash, and soda, and in ammonia-water. (Berthier.)
$Cr_2O_3, 3SO_2$

II.) Soluble in water. Decomposed, with precipitation of No. I., by alcohol.
$2(Cr_2O_3, SO_2); HO, SO_2 + 15Aq$

Sulphite of CinnamoylAmmonium.

Sulphite of CinnamoylPotassium. Permanent. Soluble in cold, decomposed by boiling water. Almost insoluble in concentrated aqueous solutions of the alkaline sulphites. Very sparingly soluble in cold alcohol or spirit. Easily soluble in boiling alcohol. Insoluble in ether. (Bertagnini.)
$C_{18}H_7KO_3, 2SO_2$

Sulphite of CinnamoylSodium. Soluble in boiling alcohol. (Bertagnini.)

Sulphite of Cobalt.

I.) *mono.* Almost insoluble in water. Insoluble in alcohol. (Muspratt.)
$CoO, SO_2 + 5Aq$

II.) [?] "*basic.*" Partially soluble in water, becoming more and more basic by washing. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 79.)

Sulphite *of dinoxide* of Copper. Decomposes gradually in moist air. Scarcely at all soluble in water. Soluble in sulphurous and chlorhydric acids, and in ammonia-water. Sulphuric acid, even when dilute and cold, decomposes it instantly. (Ber-
$Cu_2O, SO_2 + 2Aq$

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thier, *Ann. Ch. et Phys.*, (3.) **7.** 80.) Decomposed by boiling with water.

Sulphite *of protoxide* of Copper. The aqueous solution of this salt decomposes spontaneously on standing, especially if exposed to solar light, and very rapidly on heating. (Berthier, *loc. cit.*)

Sulphite *of dinoxide & of protoxide* of Copper.

I.) *Red salt.* Insoluble in water, in sulphurous or acetic acids, or in solutions of the oxysalts of copper. (Péan de St. Gilles, *Ann. Ch. et Phys.*, (3.) **42.** 24.)

$Cu_2O, SO_2; CuO, SO_2 + 2Aq$

II.) *Yellow salt.* Insoluble in water. Easily soluble in sulphurous and acetic acids. It is also dissolved, especially when recently prepared and still moist, in aqueous solutions of the oxysalts of copper. When boiled with pure water it is decomposed in an irregular manner, but when boiled with water which contains a little sulphurous acid it is rapidly converted into the red salt (No. I.). Soluble in ammonia-water, and in chlorhydric acid with decomposition. (Péan de St. Gilles, *Ann. Ch. et Phys.*, (3.) **42.** 25.)

$Cu_2O, SO_2; CuO, SO_2 + 5Aq$

Sulphite *of dinoxide & of protoxide* of Copper & of Potash. Insoluble in water, and in weak acids.

$2(Cu_2O, SO_2); CuO, SO_2; KO, SO_2 + 5Aq$

Sulphite *of protoxide* of Copper & of Mercury. Soluble in water in all proportions, the solution undergoing decomposition when boiled. Decomposed by alcohol. (Péan de St. Gilles, *Ann. Ch. et Phys.*, (3.) **42.** 40.)

$CuO, SO_2; HgO, SO_2$

Sulphite *of dinoxide* of Copper & of Potash.

I.) Decomposed by long-continued washing with water. (Chevreul.)

$Cu_2O, SO_2; 2(KO, SO_2)$

II.) Soon decomposes in the air.

$Cu_2O, SO_2; 3(KO, SO_2) + 16Aq$

Sulphite *of protoxide* of Copper & of Potash. Insoluble in water.

Sulphite *of dinoxide* of Copper & of Soda. Soluble in water. When added to the aqueous solution, alcohol precipitates a sirupy layer of the salt. (Muspratt.)

$Cu_2O, SO_2; 5(NaO, SO_2) + 38Aq$

Sulphite of Cumoyl("Cumyl")Ammonium. Soluble in boiling, less soluble in cold alcohol. (Bertagnini.)

Sulphite of CumoylPotassium. Soluble, without decomposition, in water containing a small quantity of a bisulphite; but insoluble in concentrated solutions of the alkaline bisulphites. (Bertagnini.)

Sulphite of CumoylSodium. Insoluble in cold, decomposed by boiling water. (Trapp.) Soluble in hot, less soluble in cold, very dilute alcohol. Insoluble in ether. Soluble in a very dilute aqueous solution of bisulphite of soda, but the solution is very readily decomposed when boiled. Insoluble in concentrated solutions. (Bertagnini.)

$C_{20}H_{11}NaO_2, 2SO_2 + 4Aq$

Sulphite of Didymium. Insoluble in water. Soluble in a cold aqueous solution of sulphurous acid, from which it is precipitated on the application of heat, redissolving on cooling. (Marignac, *Ann. Ch. et Phys.*, (3.) **38.** 167.)

$DiO, SO_2 + 2Aq$

Sulphite of Dumasin & of Sodium. Readily soluble in water. Decomposed at once by boiling water. (Fittig.)

$C_{12}H_9NaO_3, 2SO_2 + 6Aq$

Sulphite of Ethyl.

I.) *acid.* *Vid.* EthylSulphurous Acid.

$\left.\begin{matrix}C_4H_5\\H\end{matrix}\right\}O_2, 2SO_2$

II.) *normal.* Very sparingly soluble, with decomposition, in water. Soluble in all proportions in alcohol, from which it is precipitated on the addition of water. Soluble in ether. (Ebelmen & Bouquet, *Ann. Ch. et Phys.*, (3.) **17.** 67.)

(*EthylSulphite of Ethyl.*)
C_4H_5O, SO_2

Sulphite of EthylAcetyl Sodium. Very soluble in water. (Fittig.)

$C_{10}H_9NaO_3, 2SO_2 + 8Aq$

Sulphite of Glucina. Hydrate of glucina is readily soluble in cold sulphurous acid, and this solution does not become troubled when boiled. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** pp. 75 – 83.)

$Gl_2O_3, 3SO_2$

Sulphite of GlyoxalAmmonium. Easily soluble in water, especially if it be hot. Insoluble in alcohol. (Debus, *Ann. Ch. u. Pharm.*, **102.** 20.) The aqueous solution is partially decomposed by long-continued boiling.

$C_4H_{12}N_2S_4O_{16} = \left.\begin{matrix}C_4H_2O_2''\\(NH_4)_2\end{matrix}\right\}O_4, 4SO_2 + 2Aq$
“$C_4(NH_4)_2O_4, 4SO_2 + 2Aq$”(of Debus)

Sulphite of GlyoxalBarium. Very difficultly soluble in cold, tolerably easily soluble in boiling water. (Debus, *loc. cit.*)

$C_4H_9Ba_2S_4O_{21} = \left.\begin{matrix}C_4H_2O_2''\\Ba_2\end{matrix}\right\}O_4, 4SO_2 + 7Aq$
“$C_4Ba_2O_4, 4SO_2 + 9Aq$(of Debus)

Sulphite of GlyoxalSodium. Easily soluble in water. Soluble in dilute, but insoluble in absolute alcohol. (Delus, *loc. cit.*)

$C_4H_6Na_2S_4O_{18} = \left.\begin{matrix}C_4H_2O_2''\\Na_2\end{matrix}\right\}O_4, 4SO_2 + 4Aq$
“$C_4Na_2O_4, 4SO_2 + 6Aq$”(of Debus)

Sulphite of Gold & of Potash. Known only in aqueous solution. (Berzelius, *Lehrb.*)

Sulphite of Gold & of Soda. Soluble in water. Insoluble in alcohol.

Sulphite of Harmalin. Readily soluble in water.

Sulphite of Harmin. Readily soluble in water.

Sulphite of Iridium & of Potash. Sparingly soluble in water. Readily soluble in chlorhydric acid. More soluble in an aqueous solution of caustic potash than in water. (Claus.)

$IrO, 2SO_2; 3(KO, SO_2), \&c. + 5Aq$

Sulphite *of protoxide* of Iron. Exceedingly easily decomposed when exposed to the air. Sparingly soluble in water. Easily soluble in sulphurous acid. (Fordos & Gélis, *Ann. Ch. et Phys.*, (3.) **8.** 351.) Insoluble in alcohol. (Kœne.)

$FeO, SO_2 + 3Aq$

Sulphite *of sesquioxide* of Iron.

I.) Decomposes in the air to sulphate. Very sparingly soluble in water. Soluble in dilute acids. After having once become dry, it is no longer soluble in water, and is permanent in the air. (Kœne.) Sparingly soluble in cold, easily soluble, with decomposition, in warm sulphurous acid. (Kœne.)

$Fe_2O_3, SO_2 + 6 \text{ or } 7Aq$

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II.) *basic.* Soluble compounds as basic as $Fe_2O_3, 2SO_2$ may be obtained. (Ordway, *Am. J. Sci.*, 1858, (2.) **26.** 202.) Insoluble in alcohol. (Berzelius.)

Sulphite of Iron & of Potash.

I.) Ppt.

$Fe_2O_3, SO_2; KO, 2SO_2$

II.) Ppt.

$Fe_2O_3, SO_2; 2(KO, SO_2) + 5Aq$

Sulphite of Lead. Insoluble in water. Decomposed by chlorhydric, sulphuric, and nitric acids. Sparingly soluble in sulphurous acid.

PbO, SO_2

Far more insoluble than the sulphate; indeed it is one of the most insoluble salts known. (Gregory, *Rep. Br. Assoc.*, 1850, p. 55.)

Sulphite of Lime. Slowly effloresces. Soluble in 800 pts. of cold water; 100 pts. of water dissolving 0.125 pt. of it. (Berzelius.) Readily soluble in sulphurous acid, forming bisulphite of lime, which is slowly efflorescent, and much more soluble in water. (Schubarth, *Tech.*) Scarcely more soluble in water than the sulphate; it dissolves in tolerably large quantity in sulphurous acid, but on boiling this solution it separates out again for the most part. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 75.)

$CaO, SO_2 + 2Aq$

Sulphite of Lithia. Soluble in water. Insoluble in alcohol. Soluble in sulphurous acid.

$LiO, SO_2 + 6Aq$

Sulphite of Magnesia.

I.) *mono.* Decomposes in the air. Difficultly soluble in water. (Muspratt.) Soluble in sulphurous acid. Soluble in water, from which it is precipitated by spirit of wine. Decomposed by vinegar and other acids. (Bergman, *Essays*, **1.** 442.)

$MgO, SO_2 + 3Aq$ & $6Aq$

II.) *acid.* Efflorescent. Soluble in 20 pts. of water at 16°, and in far less boiling water. (Fourcroy & Vauquelin.)

$MgO, 2SO_2$

Sulphite of Manganese. Permanent. Sparingly soluble in water. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 78.) Although difficultly soluble in water, it crystallizes out only after the lapse of some time, resembling in this respect ordinary phosphate of ammonia and magnesia. (Heeren, *Pogg. Ann.*, 1826, **7.** 63 [note].) Insoluble in water, or alcohol. (John.) Or in ether. (Muspratt.) Easily soluble in sulphurous acid. (Berthier, *loc. cit.*)

$MnO, SO_2 + 2Aq$

Sulphite of Mercury.

I.) *bi.* Tolerably easily soluble in water. (Wicke, *Ann. Ch. u. Pharm.*, **95.** 176.)

$HgO, 2SO_2 + Aq$

II.) *basic.* Decomposed when boiled with water. Soluble in great part in aqueous solutions of the alkaline sulphites, with partial decomposition; also soluble in solutions of the alkaline cyanides, and in cold chlorhydric acid. (Péan de St. Gilles, *Ann. Ch. et Phys.*, (3.) **36.** 84.)

$HgO, SO_2 + 2HgO, SO_2$
(*in varying proportions*)

III.) Consists, according to Péan de St. Gilles (*loc. cit.*, p. 82), of a mixture of Hg_2O, SO_2 & HgO, SO_2.

$2Hg_2O, 3SO_2; 3HgO, 4SO_2$
(of Rammelsberg)

Sulphite of Mercury & of Potash. Sparingly soluble in cold, decomposed by boiling water. (Péan de St. Gilles, *loc. cit.*, pp. 90, 93.)

$HgO, SO_2; KO, SO_2 + Aq$

Sulphite of Mercury & of Soda.

I.) More soluble in water than the corresponding potash salt. Decomposed by boiling water. (*Idem, loc. cit.*)

$HgO, SO_2; NaO, SO_2 + Aq$

II.) Much more soluble in water than the preceding salt (No. I.). Decomposed by boiling water. (*Idem, loc. cit.*, pp. 90, 94.)

$2(HgO, SO_2); NaO, SO_2 + Aq$

Sulphite of MesitylAmmonium, &c. *Vid.* Sulphite of AcetoneAmmonium, &c.

Sulphite of Nickel.

I.) *mono.* Insoluble in water. Easily soluble in sulphurous acid, and, with decomposition, in chlorhydric acid. (Muspratt.)

$NiO, SO_2 + 4Aq$ & $6Aq$

II.) [?] "*basic.*" Partially soluble in water, becoming more and more basic when washed with water. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 79.)

Sulphite of Nitric Oxide & Potash. Easily soluble in water, but the solution decomposes on standing. Insoluble in alcohol. (Pelouze.)

NO_2, KO, SO_2

Sulphite of Nitric Oxide & Soda. Resembles the corresponding potash compound, but is more soluble in water. (Pelouze.)

NO_2, NaO, SO_2

Sulphite of NitroBenzoicyl("Benzoyl") Ammonium. Readily soluble in cold, decomposed by boiling water. Very sparingly soluble in cold, easily soluble in boiling alcohol. Very abundantly soluble in a hot, less soluble in cold aqueous solution of bisulphite of ammonia. (Bertaguini.)

$$C_{14}H_{11}N_2S_2O_{12} = \left.\begin{matrix}C_{14}H_4(NO_4)\\ NH_4\end{matrix}\right\} O_2, 2SO_2 + 8Aq$$

Sulphite of NitroBenzoicylSodium. Efflorescent. Sparingly soluble in cold, readily soluble in boiling water. Soluble in an aqueous solution of sulphite of soda. Insoluble in cold alcohol. (Bertagnini.)

$$\left.\begin{matrix}C_{14}H_4(NO_4)\\ Na\end{matrix}\right\} O_2, 2SO_2 + 12Aq$$

Sulphite of NitroHarmalin. Very sparingly soluble in cold water, and even more difficultly soluble in water acidulated with sulphurous acid.

Sulphite of NitroSalicoyl("Salicyl") Ammonium.

Sulphite of NitroSalicoylPotassium. More soluble than the corresponding sodium compound.

Sulphite of NitroSalicoylSodium. Soluble in water. Insoluble in alcohol. (Bertagnini.)

Sulphite of ŒnanthoylAmmonium. Sparingly soluble in water. Slowly decomposed by cold water, but quickly by hot water and by acids. Sparingly soluble in cold, somewhat more soluble in hot alcohol. (Bertagnini; Tilley.)

$C_{14}H_{13}(NH_4)O_2, 2SO_2$

Sulphite of ŒnanthoylPotassium. Soluble in a warm aqueous solution of bisulphite of potash, and in alcohol. (Bertagnini.)

Sulphite of ŒnanthoylSodium. Readily soluble in cold, and very soluble, without alteration, in warm water. Almost insoluble in cold, readily soluble in warm alcohol. (Bertagnini.) Soluble in an aqueous solution of bisulphite of soda. (Bouis.)

$C_{14}H_{13}NaO_2, 2SO_2 + 4Aq$

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Sulphite of Osmium & of Potash. Sparingly soluble in water. (Claus.)
$OsO, 2SO_2; 3(KO, SO_2) + 5Aq$

Sulphite of Picolin. Soluble in all proportions in water. (Unverdorben.)

*Bi*Sulphite of Platin(*ous*)*bi*amin. Easily soluble in water, from which it is precipitated on the addition of alcohol. Not precipitated by caustic alkalies or soluble metallic sulphides. (Liebig, *Ann. Ch. u. Pharm.*, **23.** 23; Bœckmann, *Ibid.*, **42.** 316 (*note*).)
$N_2\Big\} H_6 \cdot PtO, 2SO_2$

Sulphite of Platin(*ous*)*bi*amin & of Platin(*ous*)ammonium.

I.) Scarcely at all soluble in cold water. Soluble in 190 pts. of boiling water. (Peyrone, *Ann. Ch. u. Pharm.*, **61.** 181.)
$N\left\{\begin{matrix}H_3\\Pt\end{matrix}\right. \cdot O, SO_2; N_2\Big\{ H_6 \cdot PtO, SO_2 + 2Aq$

II.) Insoluble in cold, very sparingly soluble in boiling water. Insoluble in alcohol. (Peyrone, *Ann. Ch. u. Pharm.*, **61.** 178.)
$2\left(N\left\{\begin{matrix}H_3\\Pt\end{matrix}\right. \cdot O, SO_2\right); N_2\left\}\begin{matrix}H_6\\Pt\end{matrix}\right. \cdot O, HO, 2SO_2$

Sulphite *of protoxide* of Platinum. Known only in aqueous solution, and in combination. (Berzelius, *Lehrb.*)

Sulphite *of binoxide* of Platinum. Easily soluble in water, and alcohol. It is not decomposed either by chlorhydric or sulphuric acid. (Dœbereiner.) With alkaline sulphites it forms double salts.
$PtO_2, 2SO_2$

Sulphite *of protoxide* of Platinum & of Potassium. Soluble in an aqueous solution of sulphite of potash.
$PtO, 2SO_2; 3(KO, SO_2) + 2\frac{1}{2}Aq$

Sulphite of Platinum & of Soda.

I.) Tolerably easily soluble in water. (Litton & Schnedermann.) Insoluble in a solution of chloride of sodium.
$PtO, SO_2; NaO, SO_2 + Aq$

II.) Slightly soluble in cold, somewhat more soluble in hot water. Soluble in an aqueous solution of cyanide of potassium, and in boiling solutions of the sulphides of ammonium and of potassium. Insoluble in alcohol, or in solutions of the chlorides of sodium, ammonium, or barium, or of nitrate of silver. Other salts do not interfere with its solubility in water. Soluble, with decomposition, in acids. Not decomposed by boiling aqueous solutions of caustic potash and soda. (Litton & Schnedermann.)
$PtO, SO_2; 3(NaO, SO_2)$

Sulphite of Potash.

I.) *mono.* Deliquescent. Easily soluble in water. Very sparingly soluble in alcohol. Alcohol precipitates it from the aqueous solution. (Muspratt.) Soluble in 1 pt. of cold, and in much less hot water. (Fourcroy.) Much less soluble than the sulphites of soda or of ammonia. (Péan de St Gilles, *Ann. Ch. et Phys.*, (3.) **36.** 83.) Insoluble in commercial acetate of ethyl. (Casaseca, *C. R.*, 1850, **30.** 821.)
$KO, SO_2 + 2Aq$

II.) *bi.*

a = *anhydrous.* Permanent. Slowly soluble in water. Very sparingly soluble in alcohol. Insoluble in ether. (Muspratt.)
$KO, 2SO_2$

b = *hydrated.* Insoluble in absolute alcohol.
$KO, HO, 2SO_2$

Sulphite of Potash & of Ruthenium. Sparingly soluble in water. (Claus.)
$KO, SO_2; RuO, SO_2$

Sulphite of Potash & of Silver.

Sulphite of PropionAmmonium. Very soluble in water. (Limpricht, *Ann. Ch. u. Pharm.*, **94.** 328.)

Sulphite of PropionPotassium. Insoluble, or very sparingly soluble, in an aqueous solution of bisulphite of potash. (Idem.)
$C_{10}H_9KO_2, 2SO_2 + 3Aq$

Sulphite of PropionSodium. Insoluble, or very sparingly soluble, in an aqueous solution of bisulphite of soda. (Idem.)
$C_{10}H_9NaO_2, 2SO_2 + 3Aq$

Sulphite of Rutoyl("Rutyl")Ammonium. Soluble in water, but the solution is easily decomposed. Soluble in warm spirit. More soluble in cold alcohol than the sulphite of œnanthoylammonium. (Bertagnini.) Insoluble in water. Readily soluble in boiling alcohol. (Wagner.)
$C_{20}H_{19}(NH_4)O_2, 2SO_2 + 4Aq$

Sulphite of RutoylPotassium. Tolerably soluble in boiling, less soluble in cold alcohol. (Bertagnini.)

Sulphite of RutoylSodium. Soluble in boiling alcohol.

Sulphite of Salicoyl("Salicyl")Ammonium. Soluble in warm, less soluble in cold water. (Bertagnini.)

Sulphite of SalicoylPotassium. Readily soluble in cold, decomposed by boiling water. Easily soluble in warm, less soluble in cold alcohol. Decomposed by acids, and by alkaline solutions. (Bertagnini.)
$C_{14}H_5KO_4, 2SO_2 + 2Aq$

Sulphite of SalicoylSodium. Readily soluble in water. Soluble, with partial decomposition, in boiling alcohol. Soluble in warm hydride of salicyl. (Bertagnini.)
$C_{14}H_5NaO_4, 2SO_2 + Aq$

Sulphite of Silver. Permanent. Very slightly soluble in water. (Muspratt.) Insoluble in water, and almost insoluble in sulphurous acid. It is not decomposed by acetic acid, but the strong acids expel sulphurous acid from it. Easily soluble in ammonia-water. Decomposed when boiled with water, or heated to 100° in the air. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 82.) Soluble in aqueous solutions of the alkaline sulphites, forming double salts which easily decompose.
AgO, SO_2

Readily soluble, with decomposition, in aqueous solutions of the soluble hyposulphites. (Herschel, *Edin. Phil. Journ.*, 1819, **1.** 397.)

Sulphite of Silver & of Soda.

Sulphite of Soda.

I.) *mono.* Efflorescent. Soluble in 4 pts. of water at 15°, with reduction of temperature (Dumas), and in less than 1 pt. of boiling water. (Fourcroy.) Its maximum solubility is at 33°; it being less soluble at higher temperatures. (Mitscherlich.)
$NaO, SO_2 + 8Aq$

Soluble in about	pts. of water at
7.07	0°
3.49	20°
2.02	40°

(Kremers, *Pogg. Ann.*, **99.** 50.)

Much more soluble than sulphite of potash.

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(Péan de St. Gilles, *Ann. Ch. et Phys.*, (3.) **36.** 83.) Insoluble in commercial acetate of ethyl. (Casaseca, *C. R.*, 1850, **30.** 821.) Insoluble in alcohol.

II.) *bi.* Tolerably easily soluble in water. $NaO, 2SO_2 + 10 Aq$ Less soluble in water than bicarbonate of soda. Insoluble in weak alcohol.

Sulphite of Strontia. Slowly decomposes SrO, SO_2 when exposed to the air. Scarcely at all soluble in water. Soluble in sulphurous acid. (Muspratt.) Almost insoluble in water. Very sparingly soluble in sulphurous acid. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 75.)

Sulphite of Sulphide of Ethyl. Insoluble in water. Easily soluble in alcohol, and ether.
(*Sulphite of SulphEthyl. HypoSulphite of Ethylene.*)
C_4H_5S, SO_2

Sulphite of TellurMethyl.

Sulphite *of protoxide* of Tin.
I.) Soluble in water. [Y.]

II.) *basic.* Ppt. Decomposed by boiling with water. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 81.)

Sulphite of Toluidin.

Sulphite *of protoxide* of Uranium. Insoluble in water. Readily soluble in acids. Easily soluble in sulphurous acid, but is reprecipitated as the solution is evaporated. (Rammelsberg.) The sulphurous acid solution rapidly oxidizes when exposed to the air. (A. Girard, *C. R.*, **34.** 22.)
$2 UrO, SO_2 + 2 Aq$

Sulphite *of sesquioxide* of Uranium.
I) *normal.* Permanent. Insoluble in water. (Muspratt.) Soluble both in aqueous and alcoholic solutions of sulphurous acid, from which solutions it is precipitated on boiling. (A. Girard, *C. R.*, 1852, **34.** 23.)
$Ur_2O_3, SO_2 + 3 Aq$ or $4 Aq$

II.) *basic, granular.* Precipitated on boiling a solution of carbonate of ammonia and of uranium in sulphurous acid, or on boiling a mixture of sulphite of ammonia and a salt of uranium, but is not precipitated in the cold. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 76; compare Girard, *loc. cit.*)

Sulphite of Valeroyl("Valeryl")Ammonium.
$C_{10}H_9(NH_4)O_2, 2SO_2$

Sulphite of ValeroylSodium. Sparingly soluble in cold water, more readily soluble in water at 70° @ 80°, but is decomposed at higher temperatures. Almost insoluble in anhydrous alcohol, and in ether. (Parkinson.)
$C_{10}H_9NaO_2, 2SO_2 + 3 Aq$

Sulphite of Yttria. Insoluble in water. Sparingly soluble in sulphurous acid. (Berlin.) Hydrate, or carbonate, of yttria is soluble in sulphurous acid, but if this solution is boiled the yttria is completely precipitated as a subsulphite, which is entirely insoluble in water, but soluble in sulphurous acid. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 75.)
YO, SO_2

Sulphite of Zinc. Sparingly soluble in water. Insoluble in alcohol. (Fourcroy & Vauquelin.) Sparingly soluble in water. (Fordos & Gélis, *Ann. Ch. et Phys.*, (3.) **8.** 350.) Easily soluble in sulphurous acid. (Berzelius, *Lehrb.*) Oxide of zinc is soluble in sulphurous acid, and if this solution is boiled it deposits a "sub"sulphite of zinc, which appears to decompose, and become less and less soluble when the ebullition is long continued. But solutions of the salts of zinc are not precipitated on the addition of sulphite of ammonia, even on boiling. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 81.)
$ZnO, SO_2 + 2 Aq$

Sulphite of Zirconia.
I.) *mono.* Insoluble in water. Slightly soluble in sulphurous acid, from which it is reprecipitated when the solution is boiled. [Compare Oxide of Zirconium (hydrated).] Soluble in an aqueous solution of sulphite of ammonia, from which hydrate of zirconia is precipitated on boiling. (Berzelius, *Lehrb.*)
$Zr_2O_3, 3SO_2$

SulphoAmylolic Acid. *Vid.* AmylSulphurous Acid.

SulphoBenzamic Acid. Scarcely at all soluble in cold, more soluble in boiling water; more readily soluble in alcohol, and ether.

$C_{14}H_7NS_2O_8 = N\left\{\begin{matrix} C_{14}H_4O_2 \cdot S_2O_4'' \\ H_2 \end{matrix}\right. .O, HO$

SulphoBenzamate of Ammonia. Soluble in water.

SulphoBenzamate of Baryta. Soluble in water.
$C_{14}H_6BaNS_2O_8 + 4 Aq$

SulphoBenzamate of Ethyl. Easily soluble in hot alcohol, and ether; less soluble in boiling water.
$C_{14}H_6(C_4H_5)NS_2O_8$

SulphoBenzamate of Silver. Tolerably easily soluble in hot water.
$C_{14}H_6AgNS_2O_8 + 2 Aq$

"**SulphoBenzamid.**" *Vid.* SulphoBenzoylamid.

SulphoBenzamid. Nearly insoluble in cold, easily soluble in hot water. Sparingly soluble in cold alcohol; readily soluble in hot alcohol, either hydrated or anhydrous. (Limpricht & v. Uslar, *Ann. Ch. u. Pharm.*, **102.** 253.)
(*SulphoBenzoylamide.*)

$C_{14}H_8N_2S_2O_6 = N_2\left\{\begin{matrix} C_{14}H_4O_2(S_2O_4)'' \\ H_4 \end{matrix}\right. \& + 2 Aq$

SulphoBenzAnilid. *Vid.* *di*PhenylSulphoBenzoyl*bi*amid.

SulphoBenzene. *Vid.* SulphoBenzid.

SulphoBenzid. Very sparingly soluble in water. Soluble in alcohol, and ether. Soluble in somewhat concentrated acids, from which it is precipitated on the addition of water. Insoluble in aqueous solutions of the alkalies. (Mitscherlich.)
(*SulphoBenzole. SulphoBenzen. Phenylthionoxyde. Phenylide of SulphoPhenyl.*)

$C_{24}H_{10}S_2O_4 = \left.\begin{matrix} C_{12}H_5S_2O_4 \\ C_{12}H_5 \end{matrix}\right\}$

Scarcely at all soluble in water. Sparingly soluble in cold, more readily soluble in hot spirit. Soluble, without decomposition, in warm dilute nitric acid; decomposed by concentrated nitric acid. Insoluble in hot dilute nitric acid. Soluble in warm dilute sulphuric acid, separating out again unchanged as the solution cools. Soluble, with decomposition, in warm concentrated sulphuric acid. (Gericke, *Ann. Ch. u. Pharm.*, **100.** 207.)

SulphoBenzidic Acid. *Vid.* PhenylSulphurous Acid.

SulphoBenzoic Acid. Deliquesces in moist air. Soluble in water. (Mitscherlich.)
$C_{14}H_6S_2O_{10} = C_{14}H_4O_2'', 2HO, 2SO_3$

SulphoBenzoate of Baryta.
I.) *normal.* Very soluble in water. (Mitscherlich; Fehling.)
$C_{14}H_4Ba_2S_2O_{10}$

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II.) *acid*. Permanent. Soluble in 20 pts. of water at 20°; more soluble in warm water. (Mitscherlich.)
$C_{14}H_5BaS_2O_{10} + 8\,Aq$

SulphoBenzoate of Cobalt.

SulphoBenzoate *of protoxide* of Copper.

SulphoBenzoate of Ethyl.

I.) *normal*. Soluble in all proportions in water; the solution undergoing decomposition when boiled. Soluble in alcohol. (Limpricht & v. Uslar, *Ann. Ch. u. Pharm.*, **102**. 252.)
$C_{14}H_4(C_4H_5)_2S_2O_{10}$

II.) *mono*. *Vid.* EthylSulphoBenzoic Acid.
$C_{14}H_5(C_4H_5)S_2O_{10}$

SulphoBenzoate *of protoxide* of Iron.

SulphoBenzoate of Lead. Readily soluble in hot, sparingly soluble in cold water. (Fehling.)
$C_{14}H_4Pb_2S_2O_{10} + 4\,Aq$

SulphoBenzoate of Lime.

SulphoBenzoate of Magnesia.

SulphoBenzoate of Nickel.

SulphoBenzoate of Potash.

I.) *normal*. Deliquesces in moist air.

II.) *acid*. Efflorescent.

SulphoBenzoate of Silver. Readily soluble in water.
$C_{14}H_4Ag_2S_2O_{10} + 2\,Aq$

SulphoBenzoate of Soda.

SulphoBenzoate of Zinc.

SulphoBenzoenic Acid. *Vid.* ToluenylSulphurous Acid.

SulphoBenzol. *Vid.* SulphoBenzid; and also Sulphide of Benzol.

SulphoBenzolic Acid. *Vid.* PhenylSulphurous Acid.

*Bi*SulphoBenzolic Acid.
(*BiThioBenzolic Acid.*)
$C_{12}H_6S_4O_{12}$

*Bi*SulphoBenzolate of Baryta. Very readily soluble in water, from which it is precipitated on the addition of alcohol. (Buckton & Hofmann, *J. Ch. Soc.*, **9**. 256.)
$C_{12}H_4Ba_2S_4O_{12}$

SulphoBenzoVinic Acid. *Vid.* EthylSulphoBenzoic Acid.

SulphoBismuthate of *X*. *Vid.* Sulphide of Bismuth and of *X*.

" SulphoBenzoylamid. *Vid.* SulphoBenzamid.

SulphoBenzoylamid. Soluble in boiling water.
(*SulphoBenzamid.*)
$C_{14}H_7NS_2 = N\left\{\begin{matrix}C_{14}H_5S_2\\H_2\end{matrix}\right.$

SulphoBromoBenzolicAcid. *Vid.* BromoPhenylSulphurous Acid.

SulphoBromoNaphthalic Acid. *Vid.* BromoSulphoNaphthalic Acid.

SulphoBromoSalicylous Acid. *Vid.* Sulphide of BromoSalicene.

SulphoButylic Acid. *Vid.* ButylSulphuric Acid.

SulphoButyric Acid.
$C_8H_8S_2O_{10} = C_8H_6S_2O_8, 2\,HO$

SulphoButyrate of Baryta. Very readily soluble in water; somewhat less soluble in alcohol. (Buckton & Hofmann, *J. Ch. Soc.*, **9**. 253.)
$C_8H_6Ba_2S_2O_{10}$

SulphoCacodylic Acid. Not isolated.
$C_4H_7AsS_4$

SulphoCacodylate of Antimony. May be washed with alcohol.
$C_{12}H_{18}As_3SbS_{12}$

SulphoCacodylate of Bismuth. Permanent. Insoluble in water. Scarcely at all soluble in alcohol, and ether.
$C_{12}H_{18}As_3BiS_{12}$

SulphoCacodylate of Cacodyl. *Vid. Bi*Sulphide of Cacodyl.

SulphoCacodylate of Copper. Insoluble in water, alcohol, ether, or dilute acids.
$C_4H_6CuAsS_4$

SulphoCacodylate of Gold. Insoluble in water, alcohol, ether, or chlorhydric acid. (Bunsen.)
$C_4H_6AuAsS_4$

SulphoCacodylate of Lead. Permanent. Insoluble in water, and nearly insoluble in alcohol.
$C_4H_6PbAsS_4$

SulphoCamphic Acid. *Vid.* ThymylSulphurous Acid.

SulphoCamphoric Acid. Extremely soluble in water; the anhydrous acid dissolving even more rapidly than the hydrated. Very soluble in alcohol, either ordinary or absolute. Soluble in ether. Insoluble in cold, very sparingly soluble in warm oil of turpentine. Insoluble in bisulphide of carbon, either hot or cold. Slowly soluble in cold, readily soluble, without decomposition, in boiling nitric acid. Soluble in cold nitrous-nitric acid. Sparingly soluble in cold, somewhat more soluble in hot chlorhydric acid. Sparingly soluble in cold concentrated sulphuric acid, but dissolves readily when this is gently warmed, decomposing when strongly heated. (Walter, *Ann. Ch. et Phys.*, (3.) **9**. 186.) All of the salts of sulphocamphoric acid are soluble.
$C_{18}H_{16}S_2O_{12} = C_{18}H_{14}O_4, 2\,HO, 2\,SO_3\,\&\,+ 4\,Aq$

SulphoCamphorate of Ammonia. Very soluble in water. Sparingly soluble in alcohol. (Walter, *loc. cit.*, p. 191.)
$C_{18}H_{14}(NH_4)_2S_2O_{12} + 2\,Aq$

SulphoCamphorate of Baryta. Very soluble in water. Sparingly soluble in alcohol. (Walter, *loc. cit.*, p. 195.)
$C_{18}H_{14}Ba_2S_2O_{12}$

SulphoCamphorate of Baryta & of Copper. Soluble in cold water, the solution undergoing decomposition when heated.
$C_{18}H_{14}BaCuS_2O_{12}$

SulphoCamphorate of Copper. Soluble in water. Insoluble in alcohol. (Walter, *loc. cit.*, p. 198.)
$C_{18}H_{14}Cu_2S_2O_{12} + 4\,Aq$

SulphoCamphorate of Lead. Soluble in water. Insoluble in alcohol. (Walter, *loc. cit.*, p. 197.)
$C_{18}H_{14}Pb_2S_2O_{12}$

SulphoCamphorate of Lime. Soluble in water; less soluble in alcohol.
$C_{18}H_{14}Ca_2S_2O_{12}$

SulphoCamphorate of Potash. Very soluble in water. Sparingly soluble in ordinary alcohol; and still less soluble in absolute alcohol. Very sparingly soluble in ether. (Walter, *loc. cit.*, p. 190.)
$C_{18}H_{14}K_2S_2O_{12}$

SulphoCamphorate of Silver. Soluble in water, though less so than any of the other sulphocamphorates. Sparingly soluble in cold, and a little more soluble in warm alcohol. (Walter, *loc. cit.*, p. 198.)
$C_{18}H_{14}Ag_2S_2O_{12}$

SulphoCaprylic Acid. *Vid.* CaprylSulphuric Acid.

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SulphoCarbamic Acid. Known only in aqueous solutions; in which it quickly decomposes. (Zeise.)

(*Sulphide of Hydrogen & of SulphoCarbammonium. HydroThioSulphoCyanic Acid. HydroThioSulphoPrussic Acid.*)

$C_2H_3NS_4 = N\left\{\begin{matrix}C_2S_2''\\H_2\end{matrix}\right. .\,S,HS$

Its salts were called *sulphocyanhydrates* by Berzelius.

SulphoCarbamate of Ammonia. Deliquescent. Somewhat abundantly soluble in water. Very slowly soluble in cold, more quickly in warm alcohol; still more slowly soluble in ether, and not at all soluble in naphtha. (Zeise.)

$C_2H_2(NH_4)NS_4$

"**SulphoCarbamate of Amyl.**" *Vid.* Xanthamylamid.

SulphoCarbamate of Barium. Soluble in water, and alcohol.

SulphoCarbamate of Calcium. Soluble in alcohol, and water.

SulphoCarbamate of Copper. Insoluble in cold water, and in alcohol. Slowly decomposed by boiling water.

"**SulphoCarbamate of Ethyl.**" *Vid.* Hydrate of SulphoCarbonylEthylammonium.

SulphoCarbamate of Iron. Ppt. Soon decomposed in contact with water.

SulphoCarbamate of Lead. Ppt., which soon decomposes. While recently precipitated, it is soluble in a solution of nitrate of lead.

$C_2H_2PbNS_4$

Soluble in water. (Laurent, *Method.*, p. 250.)

SulphoCarbamate of Mercury. Ppt., soon decomposing.

SulphoCarbamate of Potassium. Soluble in water, and in alcohol. When in aqueous solution the salt is decomposed at a temperature below the boiling point. In the alcoholic solution decomposition occurs after standing for several days. (Zeise, *Schw.*, **41.** 192.)

$C_2H_2KNS_4$

SulphoCarbamate of Silver. Ppt. Soluble in water. (Laurent, *Method.*, p. 250.)

SulphoCarbamate of Zinc. Ppt.

SulphoCarbanilid. *Vid. di*PhenylSulphoCarbamid.

SulphoCarboMethylic Acid. *Vid.* OxySulphoCarbonate of Methyl.

SulphoCarboMethylic Ether. *Vid.* OxySulphoCarbonate of Methyl.

SulphoCarboNaphthalid. *Vid. di*NaphthylSulphoCarbamid.

"*Di***SulphoCarbonic Acid.**" *Vid.* OxySulphoCarbonic Acid.

SulphoCarbonic Acid. Not sensibly soluble in water. Miscible in all proportions with alcohol, ether, liquid carbonic acid, caoutchin, and many other organic liquids. Miscible with oil of turpentine (Lampadius), and the oils generally.

(*BiSulphide of Carbon. Sulphide of SulphoCarbonyl.*)

$C_2S_2'', S_2 = 2CS_2$

The vapors of bisulphide of carbon are best absorbed by an alcoholic solution of potash. They are scarcely at all acted upon by an aqueous solution of caustic potash, and are only very slowly absorbed by solutions of sulphate of copper, or acetate of lead, by concentrated sulphuric acid, or a chlorhydric acid solution of dichloride of copper. Slowly absorbed, with combination, by bromine. (Berthelot, *Ann. Ch. et Phys.*, (3.) **51.** 74.)

The compounds of sulphocarbonic acid (trisulphocarbonates, or sulphocarbonylsulphates) of the formula $\left.\begin{matrix}MS\\MS\end{matrix}\right\} C_2S_4$, with the alkalies, and those of some of the earths are soluble in water, the others being insoluble, and the solutions, when concentrated, are tolerably permanent in the air, but when dilute they are rapidly decomposed. The salts not soluble in water are soluble in alkaline solutions.

SulphoCarbonate of Ammonium. Deliquescent. Readily soluble, with decomposition, in water. Sparingly soluble in alcohol. Almost insoluble in ether. (Zeise.)

NH_4S, CS_2

SulphoCarbonate of Amyl.

(*TerSulphoCarbonate of Amyl.*)

"*Mono***SulphoCarbonate of Amyl.**" *Vid.* AmylSulphoCarbonate of Amyl.

*Di***SulphoCarbonate of Amyl.** *Vid.* OxySulphoCarbonate of Amyl.

SulphoCarbonate of Barium. Difficultly soluble in water. (Berzelius.)

BaS, CS_2

SulphoCarbonate of Bismuth. Soluble in an aqueous solution of sulphocarbonate of calcium.

$BiS_3, 3CS_2$

SulphoCarbonate of BromoMethyl. Insoluble in water, or alcohol. Only sparingly soluble in ether. (Kolbe's *Lehrb.*, **1.** 271.)

$C_6H_4Br_2S_6 = \left.\begin{matrix}(C_2H_2Br)S\\(C_2H_2Br)S\end{matrix}\right\} C_2S_4$

SulphoCarbonate of Cadmium. Sparingly soluble in water. (Berzelius.)

CdS, CS_2

SulphoCarbonate of Calcium. Hygroscopic. Readily soluble in alcohol, and in water, the solution undergoing decomposition when boiled. (Berzelius.)

CaS, CS_2

SulphoCarbonate of Cerium. Appears to be soluble in water. (Berzelius, *Lehrb.*)

CeS, CS_2

SulphoCarbonate of Chromium. Insoluble in water. (Berzelius.)

$Cr_2S_3, 3CS_2$

SulphoCarbonate of Cobalt. Soluble in water.

CoS, CS_2

SulphoCarbonate of Copper. Soluble in a solution of sulphocarbonate of calcium. (Berzelius.)

CuS, CS_2

SulphoCarbonate of Ethyl.

(*TerSulphoCarbonate of Ethyl. SulphoCarbonylSulphate of Ethyl.*)

I.) Very sparingly soluble in water. Readily soluble in alcohol, and ether. (Schweitzer.)

$C_{10}H_{10}S_6 = \left.\begin{matrix}C_4H_5S\\C_4H_5S\end{matrix}\right\} C_2S_4$

II.) Not isolated.

$C_6H_6S_6 = \left.\begin{matrix}C_4H_5S\\HS\end{matrix}\right\} C_2S_4$

(*SulphoXanthic Acid. EthylSulphoCarbonic Acid*(of Kolbe).)

SulphoCarbonate of Ethyl & of Potassium. Soluble in water, and alcohol. Decomposes at 100°. (Chancel.)

$\left.\begin{matrix}C_4H_5S\\KS\end{matrix}\right\} C_2S_4$

"*Mono***SulphoCarbonate of Ethyl.**" *Vid.* EthylSulphoCarbonate of Ethyl.

*Di***SulphoCarbonate of Ethyl.** *Vid.* OxySulphoCarbonate of Ethyl.

SulphoCarbonate of Glucina. Apparently soluble in water. (Berzelius, *Lehrb.*)

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SulphoCarbonate of Gold. Ppt.
$AuS_3, 3CS_2$

SulphoCarbonate of Iron (*Ferrous*). Partially soluble.
FeS, CS_2

SulphoCarbonate of Iron (*Ferric*). Insoluble in water. (Berzelius.)
$Fe_2S_3, 3CS_2$

SulphoCarbonate of Lead. Ppt.
PbS, CS_2

SulphoCarbonate of Lithium. Deliquescent. Easily soluble in water, and alcohol. (Berzelius.)
LiS, CS_2

SulphoCarbonate of Magnesium. A portion of it is easily soluble in water, while the remainder forms a basic salt insoluble in cold water, but soluble, with decomposition, and deposition of carbonate of magnesia, in boiling water. (Berzelius, *Lehrb.*, 3. 460.)
MgS, CS_2

SulphoCarbonate of Manganese. Sparingly soluble in water. (Berzelius.)
MnS, CS_2

SulphoCarbonate *of disulphide* of Mercury. Ppt.
Hg_2S, CS_2

SulphoCarbonate *of protosulphide* of Mercury. Ppt. Soluble in an aqueous solution of sulphocarbonate of calcium. (Berzelius.)
HgS, CS_2

SulphoCarbonate of Methyl. Scarcely at all soluble in water. Miscible in all proportions with alcohol, and ether. (Cahours.)
(*TriSulphoCarbonate of Methyl. SulphoCarbonylSulphate of Methyl.*)
$C_6H_6S_6 = \left.\begin{matrix}C_2H_3S\\C_2H_3S\end{matrix}\right\}C_2S_4$

"*Mono*SulphoCarbonate of Methyl." *Vid.* MethylSulphoCarbonate of Methyl.

*Di*SulphoCarbonate of Methyl. *Vid.* OxySulphoCarbonate of Methyl.

SulphoCarbonate of Nickel. Soluble in water.
NiS, CS_2

SulphoCarbonate of Platinum (PtS_2). Ppt. Soluble in an aqueous solution of sulphocarbonate of calcium. (Berzelius.)
$PtS_2, 2CS_2$

SulphoCarbonate of Potassium. Exceedingly hygroscopic. Readily soluble in water. Sparingly soluble in alcohol. (Berzelius.)
KS, CS_2

SulphoCarbonate of Silver. Soluble in an aqueous solution of sulphocarbonate of calcium.
AgS, CS_2

SulphoCarbonate of Sodium. Deliquescent. Soluble in water, and alcohol. (Berzelius.)
NaS, CS_2

SulphoCarbonate of Strontium. More soluble in water than the barium salt. (Berzelius.)
SrS, CS_2

SulphoCarbonate *of protosulphide* of Tin. Ppt.
SnS, CS_2

SulphoCarbonate *of bisulphide* of Tin. Ppt.
$SnS, 2CS_2$

SulphoCarbonate of Uranium. Sparingly soluble in water.
Ur_2S_3, CS_2

SulphoCarbonate of Zinc. Insoluble in water.
ZnS, CS_2

*Di*SulphoCarbonic Acid. *Vid.* OxySulphoCarbonic Acid.

SulphoCarbonidic Acid.
(*BinOxySulphoCarbonic Acid. Persulfure de l'Acide diSulfoCarbonique.*)
$\Big(\begin{matrix}C_2O_4\\C_2S_4\end{matrix}\Big\}\begin{matrix}HS_2\\HS_2\end{matrix}$ of Gerhardt.)
$C_2HS_4O_2 = \left.\begin{matrix}C_2S_4\\H\end{matrix}\right\}O_2$

SulphoCarbonidate of Amyl. Insoluble in water. Soluble in alcohol.
(*BinOxySulphoCarbonate of Amyl. PersulfureAmyl diSulfoCarbonique.*)
$\Big(\begin{matrix}C_2O_4\\C_2S_4\end{matrix}\Big\}\begin{matrix}C_{10}H_{11}S_2\\C_{10}H_{11}S_2\end{matrix}\Big)$(of Gerhardt).
$C_{12}H_{11}S_4O_2 = \left.\begin{matrix}C_2S_4\\C_{10}H_{11}\end{matrix}\right\}O_2$

SulphoCarbonidate of Ethyl. Insoluble in water. Readily soluble in absolute alcohol, and in ether. (Debus.)
(*BinOxySulphoCarbonate of Ethyl. PerSulfureEthyl diSulphoCarbonique.*)
$\Big(\begin{matrix}C_2O_4\\C_2S_4\end{matrix}\Big\}\begin{matrix}C_4H_5S_2\\C_4H_5S_2\end{matrix}$ of Gerhardt.)
$C_6H_5S_4O_2 = \left.\begin{matrix}C_2S_4\\C_4H_5\end{matrix}\right\}O_2$

SulphoCarbonidate of Methyl. Soluble in dilute wood-spirit. (Desains.)
(*BinOxySulphoCarbonate of Methyl.*)
$C_4H_3S_4O_2 = \left.\begin{matrix}C_2S_4\\C_2H_3\end{matrix}\right\}O_2$

SulphoCarbonylAllylPhenyl*bi*amid. *Vid.* PhenylThiosinnamin.

SulphoCarbonylic Acid.
(*MonoSulphoCarbonic Acid*(of Gerhardt).
$C_2H_2S_2O_4 = \left.\begin{matrix}HS\\HS\end{matrix}\right\}C_2O_4$, or $\left.\begin{matrix}C_2S_2''\\H_2\end{matrix}\right\}O_4$

SulphoCarbonylate of Ethyl. *Vid.* EthylSulphoCarbonic Acid; and EthylSulphoCarbonate of Ethyl.

SulphoCarbonylSulphate of *X*. *Vid.* SulphoCarbonate of *X*.

SulphoCarbovinic Acid. *Vid.* OxySulphoCarbonate of Ethyl.

SulphoCerosate of Baryta. Very soluble in water. (Lewy, *Ann. Ch. et Phys.*, (3.) 13. 457.)

SulphoChloride of *X*. *Vid.* Chloride of *X* with Sulphide of *X*.

SulphoChlorIsatin. Insoluble in water. Insoluble, or very sparingly soluble in weak spirit. Insoluble in bisulphide of carbon. (Erdmann.)
$C_{16}H_5ClNS_4 = N\left\{\begin{matrix}C_{16}H_3ClS_4''\\H_2\end{matrix}\right.$

SulphoChloroNaphthalic Acid. *Vid.* ChloroSulphoNaphthalic Acid.

SulphoCinnamic Acid. Hygroscopic. Readily soluble in water, and alcohol. Most of the sulphocinnamates are soluble in water.
$C_{18}H_8S_2O_{10} = C_{18}H_6O_2, 2HO, 2SO_3, \& + 6Aq$

SulphoCinnamate of Ammonia & of Baryta.

SulphoCinnamate of Baryta.

I.) *normal.* Permanent. Almost insoluble in water. (Herzog.)
$C_{18}H_6Ba_2S_2O_{10} + 2Aq$

II.) *acid.* Permanent. Sparingly soluble in water, and alcohol. (Herzog.)
$C_{18}H_7BaS_2O_{10} + 2Aq$

SulphoCinnamate of Copper. Easily soluble in water.

SulphoCinnamate of Potash.

I.) *normal.* Hygroscopic. Readily soluble in water. Very difficultly soluble in alcohol. (Herzog.)
$C_{18}H_6K_2S_2O_{10}$

II.) *acid.* Soluble in water. Very difficultly soluble in alcohol. (Herzog.)
$C_{18}H_7KS_2O_{10}$

SulphoCinnamate of Silver. Easily soluble in hot water, in ammonia-water, and in nitric acid. (Herzog.)
$C_{18}H_6Ag_2S_2O_6$

SulphoCinnamate of Zinc.

SulphoCinnamid. Insoluble in water. Dif-

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ficultly soluble in alcohol. Easily soluble in ether. (Herzog, cited in Wittstein's *Handw.*)

SulphoCumolic Acid. *Vid.* CumenylSulphurous Acid.

SulphoCyanhydric Acid. Soluble in water, the solution undergoing partial decomposition when boiled. The saturated aqueous solution is of 1.022 sp. gr. Soluble in alcohol. (Porrett, *Phil. Trans.*, 1814, p. 548.) Most of the sulphocyanides are soluble in water, and alcohol.

$C_2HNS_2 = \left.\begin{matrix}Cy\\H\end{matrix}\right\}S_2$

SulphoCyanhydrate of Aconitin.

SulphoCyanhydrate of Ammonium. Easily soluble in water, more difficultly soluble in alcohol, and still less soluble in ether. The aqueous solution undergoes decomposition after a time. (Zeise.)

$NH_4S,\ \left.\begin{matrix}Cy\\H\end{matrix}\right\}S_2$

SulphoCyanhydrate of Anilin.

$N\left\{\begin{matrix}C_{12}H_5\\H_2\end{matrix}\right.\,.\,HS,\ CyS$

SulphoCyanhydrate of AzoNaphthylamin. Appears to be readily soluble in water.

SulphoCyanhydrate of Beberin.

SulphoCyanhydrate of Brucin. Tolerably soluble in water. (Dolfuss.)

$N_2\left\{C_{46}H_{26}O_8^{\mathrm{vi}}\right.\,.\,HS,\ CyS$

SulphoCyanhydrate of Cinchonin.

$N_2\left\{C_{40}H_{24}O_2^{\mathrm{vi}}\right.\,.\,HS,\ CyS$

SulphoCyanhydrate of Codein. Somewhat soluble in alcohol.

$N\left\{\begin{matrix}C_{36}H_{20}O_6''\\H\end{matrix}\right.\,.\,HS,\ CyS + Aq$

SulphoCyanhydrate of Morphine.

$N\left\{\begin{matrix}C_{34}H_{18}O_6''\\H\end{matrix}\right.\,.\,HS,\ CyS$

SulphoCyanhydrate of Quinine.

$N_2\left\{C_{40}H_{24}O_4^{\mathrm{vi}}\right.\,.\,HS,\ HS,\ 2\,CyS$

SulphoCyanhydrate of Sinapin. Soluble in water, alcohol, and aqueous alkaline solutions. (Henry & Garot.) Sparingly soluble in cold, readily soluble in boiling water, and spirit. Very sparingly soluble in absolute alcohol. Almost insoluble in ether. Soluble in ether, bisulphide of carbon, and oil of turpentine. (Simon.)

(*SulphoSinapisin.* *Sinapin* (of Berzelius).)

$N\left\{C_{32}H_{23}O_{10}\right.\,.\,HS,\ CyS$

SulphoCyanhydrate of Strychnine. Somewhat sparingly soluble in cold water. (Dolfuss.)

$N_2\left\{C_{43}H_{22}O_4^{\mathrm{vi}}\right.\,.\,HS,\ CyS$

SulphoCyanide of Allyl. Sparingly soluble in water. (Wittstock.) Soluble in all proportions in alcohol, and ether. (Dumas; Pelouze.) Rectified essence of mustard is soluble in 50 pts. of water; and very easily soluble in alcohol, and ether. (Wittstein's *Handw.*)

(*Essence of Mustard.*)

$C_8H_5NS_2 = \left.\begin{matrix}C_6H_5\\Cy\end{matrix}\right\}S_2$

SulphoCyanide of Allyl with Sulphydrate of Ammonium.

$\left.\begin{matrix}C_6H_5\\Cy\end{matrix}\right\}S_2;\ NH_4S,\ HS$

SulphoCyanide of Allyl with Sulphydrate of Barium. Soluble in water, and alcohol.

$\left.\begin{matrix}C_6H_5\\Cy\end{matrix}\right\}S_2;\ BaS,\ HS + 4\,Aq$

SulphoCyanide of Allyl with Sulphydrate of Lead. Insoluble, or very sparingly soluble, in cold water.

$\left.\begin{matrix}C_6H_5\\Cy\end{matrix}\right\}S_2;\ PbS,\ HS$

SulphoCyanide of Allyl with Sulphydrate of Lime. Soluble in water, and alcohol.

SulphoCyanide of Allyl with Sulphydrate of Potassium. Soluble in water, and alcohol.

$\left.\begin{matrix}C_6H_5\\Cy\end{matrix}\right\}S_2;\ KS,\ HS$

SulphoCyanide of Allyl with Sulphydrate of Sodium. Soluble in water, and alcohol.

$\left.\begin{matrix}C_6H_5\\Cy\end{matrix}\right\}S_2;\ NaS,\ HS + 6\,Aq$

SulphoCyanide of AllylAmmonium. *Vid.* Thiosinnamin.

SulphoCyanide of Aluminum.

I.) "*octahedrons.*" Permanent. [Soluble in alcohol ?] (Porrett, *Phil. Trans.*, 1814, p. 552.)

II.) *normal.* Soluble in water, but the solution is decomposed by evaporation. (Rammelsberg, in *Berzelius's Lehrb.*) Soluble in water. (Meitzendorff.)

$C_6N_6Al_2S_6 = \left.\begin{matrix}Cy_3\\Al_2'''\end{matrix}\right\}S_6$

III.) *basic.* Insoluble in water. Soluble in a boiling aqueous solution of caustic potash. Only slightly attacked by acids. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 72.)

SulphoCyanide of Ammonium. Deliquescent. Soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 553.) Less deliquescent than the sodium salt. Easily soluble in water, and alcohol. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 67.)

$C_2H_4N_2S_2 = \left.\begin{matrix}Cy\\NH_4\end{matrix}\right\}S_2$

SulphoCyanide of Ammonium & of Silver. Decomposed by water.

SulphoCyanide of Ammonium & of Platinum. Soluble in water, and alcohol. (Buckton.)

$C_6H_4N_4PtS_6 = \left.\begin{matrix}Cy\\NH_4\end{matrix}\right\}S_2;\ \left.\begin{matrix}Cy_2\\Pt\end{matrix}\right\}S_4$

SulphoCyanide of Amyl. Miscible in all proportions with alcohol, and ether; but separates from these solutions on the addition of water, in which it is nearly insoluble. (Medlock, *J. Ch. Soc.*, 1. 375.) Soluble, with slight decomposition, in concentrated sulphuric acid; it is precipitated from this solution on the addition of water. Unacted upon by concentrated chlorhydric acid, by aqua-regia, or by ammonia-water, either hot or cold. Slightly attacked by a concentrated aqueous solution of caustic potash. (O. Henry, *Ann. Ch. et Phys.*, (3.) **25.** 248.)

$C_{12}H_{11}NS_2 = \left.\begin{matrix}Cy\\C_{10}H_{11}\end{matrix}\right\}S_2$

SulphoCyanide of Barium. Deliquescent. Soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 552.) Deliquescent. Easily soluble in water, and alcohol. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 68.)

$C_2BaNS_2 + 2\,Aq = \left.\begin{matrix}Cy\\Ba\end{matrix}\right\}S_2 + 2\,Aq$

SulphoCyanide of Barium & of Mercury.

"**SulphoCyanide of Benzoyl.**" *Vid.* Hydrate of SulphoCyanoBenzoyl.

$C_{16}H_5NS_2$

SulphoCyanide of Bismuth.

I.) *normal.* Insoluble, or very sparingly soluble, in water. When recently precipitated, it is decomposed by boiling with water, but after having been dried, this decomposition is very difficult. Soluble in sulphocyanhydric acid, also soluble in nitric and chlorhydric acids. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** pp. 83 - 85.) Sulphocyanide of bismuth appears to

$C_6BiN_3S_6 = \left.\begin{matrix}Cy_3\\Bi'''\end{matrix}\right\}S_6$

be very soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 553.)

II.) *basic.* Insoluble in water, but is decomposed, when recently precipitated, by washing and boiling with water. After having been dried, this decomposition is very difficult. Insoluble in sulphocyanhydric acid. (Meitzendorff, *Pogg. Ann.*, **56.** pp. 83, 85.)
(OxySulpho Cyanide of Bismuth.)
$\left.\begin{matrix}Cy_3\\Bi'''\end{matrix}\right\}S_6 ; 4\,Bi\,O_3 + 4\,Aq$

SulphoCyanide of Cadmium. $C_2CdNS_2 = \left.\begin{matrix}Cy\\Cd\end{matrix}\right\}S_2$ Difficultly soluble in water. Soluble, with combination, in ammonia-water. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 81.)

SulphoCyanide of Cadmiumammonium. $C_2H_3CdN_2S_2 = N\left\{\begin{matrix}Cy\\H_3\\Cd\end{matrix}\right\}S_2$ Decomposed by water. Soluble in ammonia-water. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 82.)

SulphoCyanide of Calcium. $C_2CaNS_2 + 8\,Aq = \left.\begin{matrix}Cy\\Ca\end{matrix}\right\}S_2 + 3\,Aq$ Deliquescent. Soluble in water, and alcohol. (Porrett, *Phil. Trans.*, 1814, p. 552.) Very deliquescent. Easily soluble in water, and alcohol. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 71.)

SulphoCyanide of Calcium & of Mercury.

SulphoCyanide *of sesquioxide* **of Chromium.** Very soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 553.)

SulphoCyanide of Cobalt. $C_2CoNS_2 = \left.\begin{matrix}Cy\\Co\end{matrix}\right\}S_2$ Appears to be very soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 553.) Easily soluble in water, and alcohol. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 77.)

SulphoCyanide of Cobaltammonium. $C_2H_3CoN_2S_2 = N\left\{\begin{matrix}Cy\\H_3\\Co\end{matrix}\right\}S_2$ There are two compounds:

I.) *Crystalline.* Deliquescent. Soluble in water, and alcohol.

II.) *Brownish-red powder.* Soluble in water. Insoluble in alcohol. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 77.)

***Di*SulphoCyanide of Copper.** $C_2Cu_2NS_2 = \left.\begin{matrix}Cy\\Cu_2\end{matrix}\right\}S_2$ Insoluble in water, and in most acids. Decomposed by aqueous solutions of the caustic alkalies. (Porrett, *Phil. Trans.*, 1814, p. 552.) Insoluble in water or dilute acids. Very slightly acted upon by cold, soluble in warm concentrated chlorhydric acid; from this solution dichloride of copper separates out if the acid is not present in excess. Decomposed by warm concentrated sulphuric acid, and by strong nitric acid. Soluble, with combination, in ammonia-water. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** pp. 86, 87.) Insoluble in an aqueous solution of sulphocyanide of potassium.

***Proto*SulphoCyanide of Copper.** $C_2CuNS_2 = \left.\begin{matrix}Cy\\Cu\end{matrix}\right\}S_2$ Somewhat soluble. Readily decomposed to the di-salt when in presence of water. Very slightly acted upon by cold, soluble in warm concentrated chlorhydric acid. Also soluble in warm concentrated sulphuric acid, and in strong nitric acid. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 88.) Soluble in aqueous solutions of the alkaline sulphocyanides, but the solutions thus obtained are decomposed when largely diluted with water. Soluble, with combination, in ammonia-water.

***Di*SulphoCyanide of Copper with *proto*-SulphoCyanide of Copper.** $C_4Cu_3N_2S_4 = \left.\begin{matrix}Cy\\Cu_2\end{matrix}\right\}S_2, \left.\begin{matrix}Cy\\Cu\end{matrix}\right\}S_2$ Permanent. Insoluble in an aqueous solution of sulphocyanide of potassium. Unacted upon by chlorhydric acid, even when this is hot. Decomposed by nitric acid. (Hull.)

SulphoCyanide of Cupr(*ic*)ammonium. $C_2H_3CuN_2S_2 = N\left\{\begin{matrix}Cy\\H_3\\Cu\end{matrix}\right\}S_2$ Soluble in a small quantity of water, but is decomposed by much water, with evolution of ammonia, and separation of a basic salt. Soluble in ammonia-water, from which it is precipitated on the addition of absolute alcohol. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 93.)

SulphoCyanide of Cupr(*eous*)ammonium. *Ibid.*, p. 88.)

SulphoCyanide of Ethyl. $C_6H_5NS_2 = \left.\begin{matrix}Cy\\C_4H_5\end{matrix}\right\}S_2$ Insoluble in water. Soluble in all proportions in alcohol, and ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **18.** 264.) Quickly decomposed by warm concentrated nitric acid, the statement of Cahours, that it dissolves therein without change, being an error. (Muspratt.)

SulphoCyanide of Ethylene. $C_8H_4N_2S_4 = \left.\begin{matrix}Cy_2\\C_4H_4''\end{matrix}\right\}S_4$ Somewhat soluble in boiling, less soluble in cold water. Easily soluble in warm alcohol. (H. L. Buff, *Ann. Ch. u. Pharm.*, **96.** 302.) Very soluble in warm, less soluble in cold alcohol. Soluble in chloride of ethylene. (Sonnenschein.) Miscible with anilin, without decomposition, at temperatures below 100°. Very easily soluble, without decomposition, in very dilute nitric acid; decomposed by strong nitric acid. (Buff, *Ibid.*, **100.** 231.) Soluble in ether.

***Proto*SulphoCyanide of Gold.** $C_2AuNS_2 = \left.\begin{matrix}Cy\\Au\end{matrix}\right\}S_2$ Soluble in ammonia-water. (Grotthus.)

***Ter*SulphoCyanide of Gold.** $C_6N_3AuS_6 = \left.\begin{matrix}Cy_3\\Au\end{matrix}\right\}S_6$ Soluble in an aqueous solution of sulphocyanide of potassium, and in ammonia-water. Partially decomposed by aqueous solutions of the fixed caustic alkalies. (Grotthus.)

SulphoCyanide of Harmalin. Sparingly soluble in cold, more soluble in boiling water.

SulphoCyanide of Harmin. Sparingly soluble in water.

***Proto*SulphoCyanide of Iron.** $C_2FeNS_2 + 3\,Aq = \left.\begin{matrix}Cy\\Fe\end{matrix}\right\}S_2 + 6\,Aq$ Very soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 553.) Very easily oxidized when exposed to the air. Easily soluble in water, alcohol, and ether. (Claus, *Ann. Ch. u. Pharm.*, **99.** 48.)

***Sesqui*SulphoCyanide of Iron.** $C_6Fe_2N_3S_6 + 8\,Aq = \left.\begin{matrix}Cy_3\\Fe_2'''\end{matrix}\right\}S_6 + 8\,Aq$ Deliquescent. Very soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 553.) Soluble in water, and in absolute alcohol. (v. Grotthus.)

Readily soluble in water, alcohol, and ether. Ether extracts it from the aqueous solution. When a concentrated aqueous solution is diluted with much water it decomposes, becoming colorless. This does not occur when alcohol is substituted for the water. The color of the solution is destroyed on the addition of alkalies, or of salts which have an alkaline reaction. The aqueous solution is not decolorized by monobasic acids, like chlorhydric, sulphuric, nitric, boracic, or the fatty acids. A large excess of concentrated sulphuric acid decomposes it, however. On the other hand, polybasic acids, like tartaric, malic, lactic, and especially oxalic and phosphoric acids, destroy the color of its solutions. On the addition of a considerable excess of chlorhydric acid the original color is usually restored, excepting in the cases of oxalic or phosphoric acid. (Claus, *Ann. Ch. u. Pharm*, **99.** 53.) The solution obtained by dissolving recently precipitated sesquioxide of iron in sulphocyanhydric acid, suffers partial decomposition when evaporated upon the water-bath, the residue being no longer completely soluble in water. By repeated evaporation the salt may be almost completely decomposed, so that when treated with water the latter is scarcely at all colored. The insoluble residue appears to be pure hydrated oxide of iron, and not a basic sulphocyanide. A similar decomposition occurs when a dilute aqueous or alcoholic solution of the salt is boiled. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 80.)

SulphoCyanide of Lead.

$C_2\,Pb\,N\,S_2 = \left.\begin{matrix}Cy\\Pb\end{matrix}\right\}S_2$

I.) *normal.* Almost insoluble in cold water; boiling water decomposes it, with separation of an insoluble powder. (Liebig.) According to Porrett (*Phil. Trans.*, 1815, p. 553), it crystallizes in obtuse rhombs, which are slowly deliquescent, and soluble in water. Berzelius (*Lehrb.*, **3.** 718) maintains that the statement of Porrett is erroneous, while Gmelin (*Handbook*, **8.** 88) refers to a similar statement by Brandes. (*Taschenbuch*, 1849, p. 192.)

II.) *basic.* Perfectly insoluble in water. (Liebig.)
(*OxySulphoCyanide of Lead.*)

$\left.\begin{matrix}Cy\\Pb\end{matrix}\right\}S_2,\ Pb\,O,\ H\,O$

SulphoCyanide of Magnesium. Deliquescent. Soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 552.) Easily soluble in water, and alcohol. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 71.)

$C_2\,Mg\,N\,S_2 + 4\,Aq = \left.\begin{matrix}Cy\\Mg\end{matrix}\right\}S_2 + 4\,Aq$

SulphoCyanide of Magnesium & of Mercury.

SulphoCyanide of Manganese. Easily soluble in water, and alcohol. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 73.) Appears to be very soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 553.) Deliquescent. Soluble in water. Nearly insoluble in absolute alcohol. (Grotthus.)

$C_2\,Mn\,N\,S_2 + 8\,Aq = \left.\begin{matrix}Cy\\Mn\end{matrix}\right\}S_2 + 3\,Aq$

***Di*SulphoCyanide of Mercury.** Insoluble in water. (Porrett, *Phil. Trans.*, 1814, p. 552.) Insoluble in cold, decomposed by boiling water. When boiled with concentrated chlorhydric acid, a small portion of it dissolves, and may be reprecipitated by adding water. Unacted upon by aqua-regia, unless this has been prepared from concentrated acids, in which case it very slowly decomposes the salt; if the acid, after having been boiled with the salt for some time, be diluted with water, a portion of the sulphocyanide will be precipitated from it unchanged. (Berzelius, *Lehrb.*)

$C_2\,Hg_2\,N\,S_2 = \left.\begin{matrix}Cy\\Hg_2\end{matrix}\right\}S_2$

***Proto*SulphoCyanide of Mercury.**

$C_2\,Hg\,N\,S_2 = \left.\begin{matrix}Cy\\Hg\end{matrix}\right\}S_2$

I.) *normal.* Very sparingly soluble in cold, rather more soluble in hot water. Easily soluble in alcohol, and in dilute chlorhydric acid. (Crookes, *J. Ch. Soc.*, **4.** 18.)

II.) *basic.* Only slightly acted upon by aqueous acids, or alkaline solutions. (Claus.) Berzelius obtained an analogous compound, soluble in chlorhydric acid, from which it is precipitated on the addition of water.
(*OxySulphoCyanide of Mercury.*)

$Cy\,S,\ Hg\,S,\ 2\,Hg\,O$

SulphoCyanide of Mercury & of Potassium. Soluble in cold, and more readily in hot water. Readily soluble in alcohol, especially when hot, and in ether. Very easily soluble in aqueous solutions of chloride of ammonium and chloride of potassium. (Claus.)

$C_6\,Hg_2\,K\,N_3\,S_6 = 2\left(\left.\begin{matrix}Cy\\Hg\end{matrix}\right\}S_2\right);\ \left.\begin{matrix}Cy\\K\end{matrix}\right\}S_2$

SulphoCyanide of Methyl. Very slightly soluble in water. Soluble in all proportions in alcohol, and ether. Soluble, without decomposition, in warm tolerably concentrated nitric acid, separating out, unchanged, as the solution cools. (Cahours, *Ann. Ch. et Phys.*, (3.) **18.** 261.)

$C_4\,H_3\,N\,S_2 = \left.\begin{matrix}Cy\\C_2\,H_3\end{matrix}\right\}S_2$

SulphoCyanide of MethylNicotine. Soluble in water.

SulphoCyanide of Molybdenum. Appears to be very soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 553.)

$C_2\,Mo\,N\,S_2 = \left.\begin{matrix}Cy\\Mo\end{matrix}\right\}S_2$

SulphoCyanide of Naphthyl. *Vid.* NaphtoylSulphoCarbamid.

SulphoCyanide of Nickel. Appears to be very soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 553.) Soluble in water, and alcohol. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 78.) Also, with combination, in ammonia-water.

$C_2\,Ni\,N\,S_2 = \left.\begin{matrix}Cy\\Ni\end{matrix}\right\}S_2$

SulphoCyanide of NickelBiamin. Slowly efflorescent. Decomposed by water. Soluble in ammonia-water. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 79.)

$C_2\,H_6\,Ni\,N_3\,S_2 = N_2\left\{\begin{matrix}Cy\\H_6\,.\,Ni\end{matrix}\right\}S_2$

SulphoCyanide of NitroHarmalin. Sparingly soluble in water.

SulphoCyanide of NitroHarmin. Soluble in warm water.

SulphoCyanide of Palladium. Appears to be very soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 553.)

$C_2\,Pd\,N\,S_2$

SulphoCyanide of Phenyl.
(*Sulpho Carbonyl Phenylamide.*)

$C_{14}\,H_5\,N\,S_2 = \left.\begin{matrix}C_{12}\,H_5\\C_2\,N\end{matrix}\right\}S_2$

SulphoCyanide of PhenylNaphthylamin. Very sparingly soluble in alcohol, and ether. (Hofmann.)
(*PhenylNaphthyl Sulpho Carbamid.*)

$C_{34}\,H_{14}\,N_2\,S_2 = N\left\{\begin{matrix}C_{20}\,H_8''\\C_{12}\,H_5\end{matrix}\right.,\ H\,Cy\,S_2$

SulphoCyanide of Platin(*ous*)*bi*amin & of Platinum. Completely insoluble in water, or alcohol. Soluble in dilute chlorhydric acid.
(*SulphoCyanide of diPlatosammonium & of Platinum.*)

$C_4\,H_6\,Pt_2\,N_4\,S_4 = N_2\left\{H_6\,.\,Pt',\ Cy\,S_2;\ Pt\,Cy\,S_2\right.$

SULPHOCYANIDE OF PLATIN(*ous*)AMMONIUM. (*Sulpho Cyanide of Platosammonium.*) Soluble in water. The aqueous solution undergoes partial decomposition when boiled for a long time. More soluble in alcohol than in water. (Buckton, *J. Ch. Soc.*, **7.** 38.)

$C_2\,H_3\,Pt\,N_2\,S_2 = N\left\}\begin{smallmatrix}H_3\\Pt\end{smallmatrix}\right.\,.\,Cy\,S_2$

*Proto*SULPHOCYANIDE OF PLATINUM. Insoluble in water, or alcohol. Soluble in dilute acids, and in aqueous solutions of the metallic chlorides, from which it is precipitated on the addition of water, or alcohol. (Grotthus.) Unacted upon by an aqueous solution of caustic potash.

$C_2\,Pt\,N\,S_2 = \left.\begin{smallmatrix}Cy\\Pt\end{smallmatrix}\right\}S_2$

*Bi*SULPHOCYANIDE OF PLATINUM. Insoluble in water. Soluble in aqueous solutions of chloride of potassium, chloride of sodium, and chloride of ammonium, also in acids.

$C_4\,Pt\,N_2\,S_4 = \left.\begin{smallmatrix}Cy_2\\Pt\end{smallmatrix}\right\}S_4$

SULPHOCYANIDE OF PLATINUM & OF POTASSIUM. (Claus, *Beiträge*, p. 40.)

$\left.\begin{smallmatrix}Cy_2\\Pt\end{smallmatrix}\right\}S_4\,;\ \left.\begin{smallmatrix}Cy\\K\end{smallmatrix}\right\}S_2$

SULPHOCYANIDE OF PLATOSAMMONIUM. *Vid.* SulphoCyanide of Platin(*ous*)ammonium.

SULPHOCYANIDE OF POTASSIUM. Deliquescent. Soluble in water, and alcohol. (Porrett, *Phil. Trans.*, 1814, p. 552.) Abundantly soluble in water, with reduction of temperature; somewhat less soluble in spirit, but very soluble in boiling alcohol.

$C_2\,K\,N\,S_2 = \left.\begin{smallmatrix}Cy\\K\end{smallmatrix}\right\}S_2$

SULPHOCYANIDE OF POTASSIUM & OF SILVER. Permanent. Decomposed by water. (Hull.)

$C_4\,K\,Ag\,N_2\,S_4 = \left.\begin{smallmatrix}Cy\\K\end{smallmatrix}\right\}S_2\,;\ \left.\begin{smallmatrix}Cy\\Ag\end{smallmatrix}\right\}S_2$

SULPHOCYANIDE OF SILVER. Insoluble in water. (Porrett, *Phil. Trans.*, 1814, p. 552.) Insoluble in water, or in acids, excepting concentrated sulphuric and nitric acids. (Liebig.) Soluble in an aqueous solution of protonitrate of mercury. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 317.) Insoluble in dilute ammonia-water. (Berzelius, *Lehrb.*) Soluble in ammonia-water, and in a solution of sulphocyanide of potassium. Insoluble in aqueous solutions of nitrate of silver, or sulphocyanide of ammonium, or in nitric acid. (Aschoff.)

$C_2\,Ag\,N\,S_2 = \left.\begin{smallmatrix}Cy\\Ag\end{smallmatrix}\right\}S_2$

SULPHOCYANIDE OF SODIUM. Deliquescent. Soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 552.) Very deliquescent. Very easily soluble in water, and alcohol. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 66.)

$C_2\,Na\,N\,S_2 = \left.\begin{smallmatrix}Cy\\Na\end{smallmatrix}\right\}S_2$

SULPHOCYANIDE OF STRONTIUM. Deliquescent. Soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 552.) Easily deliquescent. Easily soluble in water, and alcohol. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 70.)

$C_2\,Sr\,N\,S_2 + 3\,Aq = \left.\begin{smallmatrix}Cy\\Sr\end{smallmatrix}\right\}S_2 + 3\,Aq$

SULPHOCYANIDE OF TIN. Appears to be very soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 553.)

*Proto*SULPHOCYANIDE OF URANIUM. Deliquescent. Soluble in water. (Rammelsberg.)

$C_2\,Ur\,N\,S_2 = \left.\begin{smallmatrix}Cy\\Ur\end{smallmatrix}\right\}S_2$

*Sesqui*SULPHOCYANIDE OF URANIUM. Appears to be very soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 553.) Insoluble in alcohol. (Brandes.)

$C_6\,Ur_2\,N_3\,S_6 + 2\,Aq = \left.\begin{smallmatrix}3\,Cy\\Ur_2'''\end{smallmatrix}\right\}S_6 + 2\,Aq$

SULPHOCYANIDE OF YTTRIUM. Deliquescent. Soluble in water. (Berlin.)

$C_2\,Yr\,N\,S_2 = \left.\begin{smallmatrix}Cy\\Yr\end{smallmatrix}\right\}S_2$

SULPHOCYANIDE OF ZINC. Appears to be very soluble in water. (Porrett, *Phil. Trans.*, 1814, p. 553.) Soluble in water, and alcohol; somewhat less readily than many other of the sulphocyanides. Soluble in ammonia-water. (Meitzendorff, *Pogg. Ann.*, 1842, **56.** 74.)

$C_2\,Zn\,N\,S_2 = \left.\begin{smallmatrix}Cy\\Zn\end{smallmatrix}\right\}S_2$

SULPHOCYANIDE OF ZINCAMMONIUM. Decomposed by water, with separation of oxide of zinc. Soluble in ammonia-water. (Weitzendorff, *Pogg. Ann.*, 1842, **56.** 75.)

$C_2\,H_3\,Zn\,N_2\,S_2 = N\left\{\begin{smallmatrix}Cy\\H_3\\Zn\end{smallmatrix}\right\}S_2$

*Per*SULPHOCYANHYDRIC ACID. (*HydroperSulphoCyanhydric Acid. Hydroxanthic Acid. Sulphuretted HydroSulphoCyanic Acid.*) Almost insoluble in cold, completely, though sparingly, soluble in boiling water. More soluble in alcohol, and ether, than in hot water. Soluble, without decomposition, in cold concentrated sulphuric acid, from which it is precipitated on the addition of water. Soluble in aqueous solutions of the alkalies, with separation of sulphur. The persulphocyanides corresponding to metallic sulphides which are not decomposed by dilute acids, are themselves not decomposable by these agents. (Vœlckel.)

$C_4\,H_2\,N_2\,S_6 = \left.\begin{smallmatrix}Cy_2\,S_2''\\H_2\end{smallmatrix}\right\}S_4$

*Per*SULPHOCYANIDE OF LEAD.

I.) *normal.* Completely insoluble in water, alcohol, or weak acids. (Vœlckel.)

$Cy_2\,Pb_2\,S_6$

II.) *basic.* By the action of boiling acids it is converted into the normal compound (No. I.). (Vœlckel.)

$Cy_2\,Pb_2\,S_6\,;\,2\,Pb\,O$

SULPHOCYANOBENZYLENE. *Vid.* Hydride of SulphoCyanoBenzoyl.

*Per*SULPHOCYANOGEN. (*SulphoCyanogen. PseudoSulphoCyanogen. OxySulphide of Cyanogen.*) Insoluble in water, alcohol, or ether. (Vœlckel.) Soluble in warm concentrated sulphuric acid, from which it is precipitated unchanged on the addition of water. Also soluble, for the most part, in ammonia-water. (Liebig.) Insoluble in ammonia-water. (Wœhler.) Soluble in an aqueous solution of caustic potash, and readily, with decomposition, in sulphide of potassium. (Liebig.)

$C_6\,H\,N_3\,S_6 = \left.\begin{smallmatrix}Cy_2\,S_2''\\H\,.\,Cy\end{smallmatrix}\right\}S_4$

*Per*SULPHOCYANOGEN with LEAD. Ppt. (Vœlckel.)

$C_6\,Pb_2\,H\,N_3\,S_6\,O_2 = \left.\begin{smallmatrix}Cy_2\,S_2''\\Pb\,.\,Cy\end{smallmatrix}\right\}S_4 + \left.\begin{smallmatrix}Pb\\H\end{smallmatrix}\right\}O_2$

SULPHOCYANOGEN *bihydrosulphurée.* *Vid.* BiSulphide of SulphoCarbammonium.

SULPHOCYANOPLATINIC ACID. *Vid.* Platino*ter*SulphoCyanhydric Acid.

SULPHOCYANOPLATINOUS ACID. *Vid.* Platino*bi*SulphoCyanhydric Acid.

SULPHOCYMENIC ACID. *Vid.* ThymylSulphurous Acid.

SULPHODRACONIC ACID. Soluble in water. (Laurent.)

SULPHODRACONATE OF BARYTA. Very soluble in water. Somewhat soluble in spirit. (Lallemand, *Ann. Ch. et Phys.*, (3.) **49.** 150.)

$C_{20}\,H_{11}\,Ba\,S_2\,O_6$

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SulphoDraconate of Lead. Very soluble in water. (Gerhardt.)

SulphoDraconate of Lime. Soluble in water.

SulphoDraconate of Silver. Soluble in water.

SulphoDracylic Acid. *Vid.* ToluenylSulphurous Acid.

SulphoEtholic Acid. *Vid.* SulphEtholic Acid.

SulphoFerrate of Iron. Known only in aqueous solution. The dilute solution may be boiled without undergoing decomposition, but a concentrated solution is decomposed by boiling. (H. Rose, in *Berzelius's Lehrb.*, **2.** 729; and **3.** 211.)

SulphoFlavic Acid. Soluble in water, and
(*Indigo Yellow.*) alcohol. (Berzelius.)

SulphoFlavate of Lead. Insoluble in water.

Sulphoform. Very sparingly soluble in water.
C_2HS_3 Soluble in alcohol, and ether. Decomposed by acids, and by alkaline solutions. (Bouchardat.)

SulphoFormic Acid. *Vid.* MethylSulphurous Acid.

SulphoFulvic Acid. Soluble in water, and in absolute alcohol.

SulphoFulvate of Lead. Readily soluble in water, and alcohol. (Berzelius.)

SulphoGlucicAcid. *Vid.* SulphoLignic Acid.

SulphoGlutinic Acid. Easily soluble in
(*HypoSulpho Glutinic Acid.*) water, and alcohol; less easily soluble in ether.

SulphoGlutinate of Soda. Soluble in water.

SulphoGlyceric Acid. Soluble in water,
$C_6H_8S_2O_{12} = C_6H_7O_5, HO, 2SO_3$ and in concentrated sulphuric acid. (Fremy.) All the metallic sulphoglycerates are very soluble in water. (Redtenbacher.)

SulphoGlycerate of Baryta. Soluble in
$C_6H_7BaS_2O_{12}$ water.

SulphoGlycerate of Lead. Easily soluble
$C_6H_7PbS_2O_{12}$ in water. (Pelouze.)

SulphoGlycerate of Lime. Soluble in less
$C_6H_7CaS_2O_{12}$ than 1 pt. of cold water. Insoluble in alcohol or ether.

SulphoGlycerate of Silver. Very soluble in water. (Pelouze.)

SulphoGlycolic Acid.
$C_4H_6S_2O_{10} = C_4H_5O_3, HO, 2SO_3$

SulphoGlycolate of Baryta. Somewhat
$C_4H_5BaS_2O_{10}$ deliquescent. Easily soluble in water. Nearly insoluble in absolute alcohol, and in ether. (Simpson.)

SulphoHellenate of Baryta. Very soluble in water. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **12.** 191.)

SulphoLignic Acid; and

SulphoGlucic Acid. Both contain $C_{12}H_{12}O_{12} + x\,SO_3$; but since they are very unstable, it is not easy to determine their true composition.

I) (*acid from cellulose.*) Very deliquescent.

Baryta Salt.

The Lead Salt is very deliquescent and soluble in water. Insoluble in alcohol. (Blondeau.)

Lime Salt. Deliquescent. Easily soluble in
$C_{24}H_{23}CaS_2O_{20}$ (*as cited by* Weltzien.) water.

II.) (*acid from Starch.*)

Baryta Salt.

Lead Salt.

Lime Salt.

III.) (*acid from Glucose.*) Almost all of its salts are soluble in water.

SulphOleic Acid. Soluble in pure water. Insoluble in water which contains sulphuric acid. Decomposed after a while, when in contact with water. Soluble in alcohol. The sulpholeates of potash, soda, and ammonia, are soluble in water; but the other salts are insoluble in water, and only sparingly soluble in alcohol.

SulphoMannitic Acid. Soluble in water.
(*SulphoMannicylic Acid.*) (Favre, *Ann. Ch. et Phys.*,
$C_{12}H_{14}O_{12}, 6SO_3$ (3.) **11.** 77.)

SulphoMannitate of Ammonia.

SulphoMannitate of Baryta. Soluble in
$C_{12}H_{11}Ba_3O_{12}, 6SO_3$ water. Insoluble in alcohol. (Favre, *loc. cit.*)

SulphoMannitate of Copper. Readily soluble in water.

SulphoMannitate of Lead.

I.) Deliquescent.
$C_{12}H_{11}Pb_3O_{12}, 6SO_3$

II.) "*mono.*" Appears to be somewhat soluble in water. (Favre, *loc. cit.*)

III.) Insoluble in water. Very soluble in
"$C_6H_5O_4, 4PbO, 2SO_3$" slightly acidulated water, the solution being slowly decomposed when boiled. (Favre, *loc. cit.*)

SulphoMannitate of Lime. Soluble in water. Insoluble in alcohol.

SulphoMannitate of Potash. Very deli-
$C_{12}H_{11}K_3O_{12}, 6SO_3$ quescent.

SulphoMannitate of Silver.

SulphoMannitate of Soda.
$C_{12}H_{11}Na_3O_{12}, 6SO_3$

SulphoMargaric Acid. Soluble in pure water, and in alcohol. Insoluble in water which contains sulphuric acid. (Fremy.)

SulphoMellonic Acid. Scarcely at all
(*HydroThioMellon. HydroSulphoMellonic Acid. Ammelide Sulfuré.*) soluble in
$C_6H_4N_4S_4 = NCyH_2, 2CyHS_2 \text{ or } N_3\left\{\begin{matrix}(C_2S_2'')_3\\ C_2N\\ H_4\end{matrix}\right.$ cold water, in alcohol, or in ether. Sparingly soluble in boiling water. (Jamieson.)

SulphoMellonate of Baryta. Very sol-
$C_6H_3BaN_4S_4 + 5\,Aq$ uble in water.

SulphoMellonate of Lime. Soluble in
$C_6H_3CaN_4S_4 + 2\,Aq$ water.

SulphoMellonate of Magnesia. Very
$C_6H_3MgN_4S_4 + 6\,Aq$ soluble in water.

SulphoMellonate of Potash. Very solu-
$C_6H_3KN_4S_4 + 3\,Aq$ ble in water, and alcohol.

SulphoMellonate of Silver. Completely
$C_6H_3AgN_4S_4$ insoluble in water.

SulphoMellonate of Soda. Soluble in
$C_6H_3NaN_4S_4 + 8\,Aq$ water, especially when this is hot.

SulphoMellonate of Strontia. Soluble
$C_6H_3SrN_4S_4 + 4\,Aq$ in water.

SulphoMesitylic Acid (of Hofmann). *Vid.* MesitylSulphuric Acid.

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SulphoMesitylic Acid. Deliquescent. Soluble in water, and in strong alcohol. (Hlasiwetz.) Soluble in water. (Kane.)

SulphoMesitylate of Baryta. Soluble in water.

SulphoMesitylate of Copper. Souble in $C_6 H_5 Cu S_2 O_6 + 2 Aq$ water, and in boiling alcohol. (Hlasiwetz.)

SulphoMesitylate of Lime. Soluble in $C_6 H_5 Ca S_2 O_6$ water, and in alcohol. Ether precipitates it from the alcoholic solution. (Hlasiwetz.)

Sulpho*per*Mesitylic Acid. Soluble in water. (Kane.)

Sulpho*per*Mesitylate of Baryta. Soluble in water.

Sulpho*per*Mesitylate of Lime. Deliquescent. $C_{12} H_{10} Ca_4 S_4 O_{15} + 2 Aq$ Soluble in water. (Kane.)

SulphoMesityloSulphuric Acid. *Vid.* SulphoMesitylic Acid.

SulphoMethylane. Sulphamate of Me- $C_2 H_5 N S_2 O_6$ thyl.

SulphoMethylic Acid. *Vid.* MethylSulphuric Acid.

SulphoMethylSulphuric Acid. *Vid.* MethylSulphurous Acid.

***Di*SulphoMetholic Acid.** *Vid.* Methionic Acid.

SulphoMolybdic Acid. *Vid.* *Ter*Sulphide of Molybdenum.

The alkaline sulphomolybdates, and those of the alkaline earths, are soluble in water, and the solutions are tolerably stable when concentrated, but they gradually undergo decomposition when dilute.

SulphoMolybdate of Ammonium.

I.) Easily soluble in water. Very sparingly $N H_4 S, Mo S_3$ soluble in alcohol. (Berzelius, *Lehrb.*)

II.) *acid.* Tolerably easily soluble in water. Very sparingly soluble in alcohol. (Berzelius, *Lehrb.*)

SulphoMolybdate of Baryta.

I.) More soluble in water than No. II. $Ba S, Mo S_3$

II.) Less soluble in water than No. I. (Berze- $Ba S, 3 Mo S_3$ lius.) Not decomposed by cold concentrated chlorhydric acid, but is more readily attacked by dilute acid.

SulphoMolybdate of Bismuth. Ppt. $Bi S_3, 3 Mo S_3$

SulphoMolybdate of Cadmium. Insoluble $Cd S, Mo S_3$ in water. (Berzelius.)

SulphoMolybdate of Calcium.

I.) Permanent. More soluble in water than $Ca S, Mo S_3$ No. II.

II.) Permanent. $Ca S, 3 Mo S_3$

SulphoMolybdate *of protosulphide* of Cerium.

I.) Insoluble in water. $Ce S, Mo S_3$

SulphoMolybdate *of sesquisulphide* of Ce- $Ce_2 S_3, 3 Mo S_3$ rium. Partially soluble in water. (Berzelius.)

SulphoMolybdate of Chromium. Insol- $Cr_2 S_3, 3 Mo S_3$ uble in water.

SulphoMolybdate of Cobalt. Soluble in $Co O, Mo S_3$ an aqueous solution of sulphomolybdate of potassium. (Berzelius.)

SulphoMolybdate of Copper. Ppt. $Cu S, Mo S_3$

SulphoMolybdate of Glucinum. Soluble $Gl_2 S_3, 3 Mo S_3$ in water, but the aqueous solution gradually undergoes decomposition. (Berzelius, *Lehrb.*)

SulphoMolybdate of Gold. Soluble in $Au S_3, 3 Mo S_3$ water, from which it separates out after a time. (Berzelius, *Lehrb.*)

SulphoMolybdate of Iron.

I.) Soluble in water. (Berzelius.) $Fe S, Mo S_3$

II.) Soluble in an aqueous solution of sulpho- $Fe_2 S_3, 3 Mo S_3$ molybdate of potassium. (Berzelius.)

SulphoMolybdate of Lead. Ppt. $Pb S, Mo S_3$

SulphoMolybdate of Lithium. Perma- $Li S, Mo S_3$ nent. Very easily soluble in water.

SulphoMolybdate of Magnesium. Solu- $Mg S, Mo S_3$ ble in an aqueous solution of bisulphide of molybdenum.

SulphoMolybdate of Manganese.

I.) *mono.* Soluble in water. $Mn S, Mo S_3$

II.) *acid.* Insoluble in water.

III.) *basic.* Insoluble in water.

SulphoMolybdate *of disulphide* of Mer- $Hg_2 S, Mo S_3$ cury. Ppt.

SulphoMolybdate *of protosulphide* of Mer- $Hg S, Mo S_3$ cury. Ppt. Insoluble in an aqueous solution of sulphomolybdate of potassium. (Berzelius.)

SulphoMolybdate of Nickel. Permanent. $Ni S, Mo S_3$ Soluble in an aqueous solution of molybdate of potash. (Berzelius, *Lehrb.*)

SulphoMolybdate *of bisulphide* of Plati- $Pt S_2, 2 Mo S_3$ num. Ppt.

SulphoMolybdate of Potassium.

I.) Soluble in water; less soluble in alcohol. $K S, Mo S_3$ (Berzelius.)

II.) Slowly soluble in cold, rapidly soluble in $K S, 3 Mo S_3$ boiling water.

SulphoMolybdate of Silver. Ppt. $Ag S, Mo S_3$

SulphoMolybdate of Sodium.

I.) Soluble in water, and in alcohol. Much $Na S, Mo S_3$ more soluble in alcohol than the potash-salt. (Berzelius.)

II.) Difficultly soluble in water. $Na S, 3 Mo S_3$

SulphoMolybdate of Strontium. } Similar to the barium salts. (Berzelius.)

I.) $Sr S, Mo S_3$

II.) $Sr S, 3 Mo S_3$

SulphoMolybdate *of protosulphide* of Tin. $Sn S, Mo S_3$ Ppt.

SulphoMolybdate *of bisulphide* of Tin. $Sn S_2, 2 Mo S_3$ Ppt.

SulphoMolybdate *of sesquisulphide* of Ura- $Ur_2 S_3, Mo S_3$ nium. Permanent. Insoluble in water. (Berzelius.)

SulphoMolybdate of Yttrium. Appears $Y S, Mo S_3$ to be soluble in water. (Berzelius, *Lehrb.*)

SULPHOMOLYBDATE OF ZINC. $Zn S, Mo S_3$ Insoluble in water. (Berzelius.)

*Per*SULPHOMOLYBDIC ACID. $Mo S_4$ *Vid. quadri*-Sulphide of Molybdenum. The persulphomolybdates, with the exception of those of the alkalies, are insoluble in water. (Berzelius.)

*Per*SULPHOMOLYBDATE OF AMMONIUM. $N H_4 S, Mo S_4$ Slightly soluble in cold, more abundantly soluble in hot water. Totally insoluble in ammonia-water. (Berzelius.)

*Per*SULPHOMOLYBDATE OF BARYTA. $Ba S, Mo S_4$ Insoluble in water, but is decomposed when boiled with water. (Berzelius.)

*Per*SULPHOMOLYBDATE OF BISMUTH. $Bi S_3, Mo S_4$ Ppt.

*Per*SULPHOMOLYBDATE OF CADMIUM.

*Per*SULPHOMOLYBDATE OF CALCIUM. $Ca S, Mo S_4$ Sparingly soluble in water; less soluble in alcohol. (Berzelius.)

*Per*SULPHOMOLYBDATE OF CERIUM. Insoluble in water.

*Per*SULPHOMOLYBDATE OF CHROMIUM. $Cr_2 S_3, 3 Mo S_4$ Insoluble in water.

*Per*SULPHOMOLYBDATE OF COBALT. $Co S, Mo S_4$ Ppt.

*Per*SULPHOMOLYBDATE OF COPPER. $Cu S, Mo S_4$ Ppt.

*Per*SULPHOMOLYBDATE OF GLUCINUM. $Gl_2 S_3, Mo S_4$ Ppt.

*Per*SULPHOMOLYBDATE OF GOLD. $Au S_3, 3 Mo S_4$ Ppt.

*Per*SULPHOMOLYBDATE OF IRON (*Ferrous*). $Fe S, Mo S_4$ Insoluble in aqueous solutions of the protosalts of iron, but soluble in a solution of persulphomolybdate of potassium. (Berzelius.)

*Per*SULPHOMOLYBDATE OF IRON (*Ferric*). Ppt.

*Per*SULPHOMOLYBDATE OF LEAD. $Pb S, Mo S_4$ Ppt.

*Per*SULPHOMOLYBDATE OF LITHIUM. $Li S, Mo S_4$ Slightly soluble in cold, readily soluble in hot water. (Berzelius.)

*Per*SULPHOMOLYBDATE OF MAGNESIUM. $Mg S, Mo S_4$ Insoluble in water. (Berzelius.)

*Per*SULPHOMOLYBDATE OF MANGANESE. $Mn S, Mo S_4$ Insoluble in water.

*Per*SULPHOMOLYBDATE OF MERCURY.

I.) Ppt.
$Hg_2 S, Mo S_4$

II.) Ppt.
$Hg S, Mo S_4$

*Per*SULPHOMOLYBDATE OF NICKEL. $Ni S, Mo S_4$ Ppt. Soluble in an aqueous solution of persulphomolybdate of potassium, from which it separates after standing for some 24 hours. (Berzelius.)

*Per*SULPHOMOLYBDATE *of bisulphide* OF PLATINUM. $Pt S_2, 2 Mo S_4$ Ppt.

*Per*SULPHOMOLYBDATE OF POTASSIUM. $K S, Mo S_4$ Very sparingly soluble in cold, but soluble in boiling water. Insoluble in a cold aqueous solution of caustic potash, or in cold chlorhydric acid. (Berzelius.)

*Per*SULPHOMOLYBDATE OF SILVER. $Ag S, Mo S_4$ Ppt.

*Per*SULPHOMOLYBDATE OF SODIUM. $Na S, Mo S_4$ Sparingly soluble in cold, readily soluble in hot water. (Berzelius.)

*Per*SULPHOMOLYBDATE OF STRONTIUM. $Sr S, Mo S_4$ Similar to the barium salt.

*Per*SULPHOMOLYBDATE *of protosulphide* OF TIN. $Sn S, Mo S_4$ Ppt.

*Per*SULPHOMOLYBDATE *of bisulphide* OF TIN. $Sn S_2, 2 Mo S_4$ Sparingly soluble in water. Soluble in an aqueous solution of persulphomolybdate of potash. (Berzelius.)

*Per*SULPHOMOLYBDATE *of sesquisulphide* OF URANIUM. $Ur_2 S_3, Mo S_4$ Insoluble in water. (Berzelius.)

*Per*SULPHOMOLYBDATE OF YTTRIUM. $Y S, Mo S_4$ Ppt.

*Per*SULPHOMOLYBDATE OF ZINC. $Zn S, Mo S_4$ Ppt.

SULPHOMOLYBDOUS ACID. *Vid. bi*Sulphide of Molybdenum.

SULPHOMORPHINE. (*SulphoMorphide.*) $C_{68} H_{36} N_2 S_2 O_{16} = N_2 \left\{ \begin{matrix} (C_{34} H_{18} O_6'')_2 \\ S_2 O_4'' \end{matrix} \right.$ Sparingly soluble in water. Decomposed by boiling water. Insoluble in alcohol, and ether. Easily soluble in dilute acids; decomposed by concentrated acids, and by alkaline solutions.

SULPHOMURIATIC ACID. *Vid.* Chloride of Sulphur.

SULPHONAPHTHALIC ACID. (*NaphtylSulphurous Acid. HypoSulphoNaphthalic Acid. Naphtyl diThionic Acid. SulphoNaphthamic Acid. Sulphite of Naphtoyl.*)

a = $C_{20} H_8 S_2 O_6 + 2 Aq$ Deliquescent. Readily soluble in water, and alcohol. It dissolves in melted naphthalin, in oil of turpentine, and olive-oil, the more readily in proportion as it is more nearly anhydrous. As a hydrate, it is almost insoluble in naphthalin. The hydrate melts in its water of crystallization, at a temperature lower than 100°. (Faraday, *Phil. Trans.*, 1826, **116.** pp. 147, 148.)

Its salts are all soluble in water, and most of them are soluble in alcohol also. (Faraday, *loc. cit.*) Very sparingly soluble in ether.

b. An isomeric modification, known as the "acid of Faraday's smouldering baryta salt," is readily soluble in water, but does not absorb moisture from the air. (Berzelius.)

SULPHONAPHTHALATE OF AMMONIA. Permanent. Readily soluble in water, and alcohol. Its solutions are decomposed to a certain extent by evaporation. (Faraday, *Phil. Trans.*, 1826, **116.** 150.)

SULPHONAPHTHALATE OF BARYTA.

a = *ordinary*. (*Flaming Salt, of Faraday.*) $C_{20} H_7 Ba S_2 O_6 + 1$ or $2 Aq$ Permanent. Readily soluble in water, and alcohol, Insoluble in ether. It is not decomposed by moderately strong nitric acid, or aqua-regia, even when boiled with them, but decomposition occurs if it is treated with very strong acids. (Faraday, *Phil. Trans.*, 1826, **116.** 151.) 100 pts. of water at 15° dissolve only 1.13 pts. of it; at 100° they dissolve 4.76 pts. of it. Soluble in absolute alcohol, and in ether. (Gerhardt, *Tr.*, &c.)

b = "*Glowing Salt,*" of Faraday. By no means so soluble in water, either hot or cold, as *a*. Soluble in alcohol. (Faraday, *loc. cit.*, pp. 153, 151, 146.)

SULPHONAPHTHALATE OF COPPER.

a = *acid.*

SULPHONAPHTHALATE OF ETHYL. $C_{24} H_{12} S_2 O_6 = C_{20} H_7 (C_4 H_5) S_2 O_6$ Insoluble in water. Mixes in all proportions, with alcohol, and ether. (Kimberly.)

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SulphoNaphthalate *of protoxide* of Iron. Slowly absorbs oxygen from the air. (Faraday, *Phil. Trans.*, 1826, **116.** 154.)

SulphoNaphthalate of Lead.

I.) *normal.*

a = $C_{20} H_7 Pb S_2 O_6$ Permanent. Soluble in water, and alcohol. (Faraday, *Phil. Trans.*, 1826, **116.** 154.) Less soluble in water containing free acid than in pure water. More soluble in water than the baryta salt, the warm saturated solution solidifying on cooling. (Berzelius.)

b = *Isomeric modif.* Exactly like the *b* baryta salt. (Berzelius.)

II.) *di.* Less soluble in water than the normal
$C_{20} H_7 Pb S_2 O_6; Pb O$ salt. (Regnault.)

III.) *tetra.*
$C_{20} H_7 Pb S_2 O_6; 3 Pb O$

IV.) *polybasic.* Insoluble in water. (Berzelius.)

SulphoNaphthalate of Lime. Slightly soluble in water. Soluble in alcohol. (Faraday, *Phil. Trans.*, 1826, **116.** 154.)

SulphoNaphthalate of Magnesia. Soluble in water. (Faraday, *Phil. Trans.*, 1826, **116.** 154.)

SulphoNaphthalate of Manganese. Soluble in water, and alcohol. (Faraday, *Phil. Trans.*, 1826, **116.** 154.)

SulphoNaphthalate *of dinoxide* of Mercury. Permanent. Partially soluble in water, and alcohol, with formation of a basic salt. (Faraday, *Phil. Trans.*, 1826, **116.** 155.)

SulphoNaphthalate *of protoxide* of Mercury. Deliquescent. (Faraday, *loc. cit.*)

SulphoNaphthalate of Nickel.

a = *normal.* Soluble in water. (Faraday, *Phil. Trans.*, 1826, **116.** 155.)

b = *basic.* Insoluble in water. (Faraday, *loc. cit.*)

SulphoNaphthalate of Potash.

a = $C_{20} H_7 K S_2 O_6 + Aq$ Permanent. Soluble in water, though not very readily, and the solution is not changed by long-continued ebullition. Soluble in alcohol. (Faraday, *Phil. Trans.*, 1826, **116.** pp. 149, 146.)

b An isomeric salt corresponding to the "smouldering baryta salt" of Faraday, is readily soluble in alcohol, and is not decomposed by boiling with concentrated potash solution, from which it crystallizes out unchanged on cooling.

SulphoNaphthalate of Silver. Permanent. Soluble in water, the solution undergoing decomposition on being boiled. (Faraday, *Phil. Trans.*, 1826, **116.** 155.) Soluble in 9.7 pts. of water at 20°, or 100 pts. of water at 20° dissolve about 10.3 pts. of it. (Regnault.) The aqueous solution deposits, by prolonged boiling, a black insoluble mass. (Faraday, *loc. cit.*) Does *not* decompose, even after several hours' boiling. (Regnault.)
$C_{20} H_7 Ag S_2 O_6$

SulphoNaphthalate of Soda. Permanent. Soluble in water, and alcohol. (Faraday, *Phil. Trans.*, 1826, **116.** 149.)

SulphoNaphthalate of Strontia. Permanent. Soluble in water, and alcohol. (Faraday, *Phil. Trans.*, 1826, **116.** 153.)

SulphoNaphthalate of Zinc. Permanent. Moderately soluble in hot water, crystallizing out as the solution cools. (Faraday, *Phil. Trans.*, 1826, **116.** 154.)

*Bi*SulphoNaphthalic Acid. Deliquescent. Very easily soluble in water, and alcohol.
(*ThioNaphthalinic Acid. ThioNaphthic Acid. HypoSulphoNapthic Acid.*)
$C_{20} H_8 S_4 O_{12} = C_{20} H_8, 4 S O_3$

Its salts are readily soluble in water; but, generally speaking, are less soluble in alcohol than the sulphonaphthalates.

*Bi*SulphoNaphthalate of Ammonia. Soluble in water.

*Bi*SulphoNaphthalate of Baryta. Very slowly soluble in water, even when this is boiling, but the solution may be evaporated down to a considerable extent before yielding any deposit. Very slightly soluble in alcohol, which also precipitates it from the aqueous solution.
$C_{20} H_6 Ba_2 S_4 O_{12}$

*Bi*SulphoNaphthalate of Lead. Readily soluble in water. Almost insoluble in alcohol, which precipitates it from the aqueous solution. (Berzelius.)
$C_{20} H_6 Pb_2 S_4 O_{12} + 4 Aq$

*Bi*SulphoNaphthalate of Potash. Readily soluble in water. Sparingly soluble in alcohol.

*Bi*SulphoNaphthalate of Soda. Soluble in water. Tolerably soluble in alcohol.

SulphoNaphthalid. Insoluble in water, concentrated nitric acid, or solution of caustic potash. Very slightly, if at all, soluble in cold, slightly soluble in boiling absolute alcohol. Very slightly soluble in ether. (Berzelius.)
$C_{24} H_{10} S O_2$

SulphoNaphthalin. Insoluble in water. Scarcely at all soluble in cold, somewhat more soluble in hot spirit. Decomposed by fuming nitric acid. (Gericke, *Ann. Ch. u. Pharm.*, **100.** 216.) Boiling water dissolves only a trace of it, and becomes opaline on cooling. Soluble in cold alcohol, especially in anhydrous alcohol. (Berzelius.)

$$C_{40} H_{14} S_2 O_4 = \left\{ \begin{matrix} C_{20} H_7 S_2 O_4 \\ C_{20} H_7 \end{matrix} \right.$$

SulphoNaphthalidamic Acid. *Vid.* Naphthionic Acid.

SulphoNaphthanic Acid. *Vid.* SulphoNaphthalic Acid.

SulphoNaphthylamic Acid. *Vid.* Naphthionic Acid.

SulphoNarcotin. Insoluble in cold, soluble in boiling water. Soluble in alcohol, and in an aqueous solution of caustic potash. Insoluble in ammonia-water. (Laurent & Gerhardt, *Ann. Ch. et Phys.*, (3.) **24.** 114.)
(*SulphoNarcotid.*)

$$C_{92} H_{48} N_2 S_2 O_{32} = N_2 \left\{ \begin{matrix} S_2 O_4'' \\ (C_{26} H_{15} O_6)_2 \\ (C_{20} H_9 O_8)_2 \end{matrix} \right.$$

SulphoNitrite of Potassium. Soluble in water, and alcohol; but these solutions soon undergo decomposition. (Berzelius, *Lehrb.*, **3.** 198.)
$K S, N S_3$

SulphoNitroNaphthalic Acid. *Vid.* NitroSulphoNaphthalic Acid.

SulphoParaBenzolic Acid. Soluble in water.
$C_{12} H_6, 2 S O_3$

SulphoParaBenzolate of Ammonia. Very soluble in water, and alcohol. Insoluble, or nearly insoluble, in ether. (Church, *Phil. Mag.*, (4.) **14.** 417.)

SulphoParaBenzolate of Baryta. Exceedingly soluble in water. Very sparingly soluble in absolute alcohol. Almost insoluble in anhydrous ether.
$C_{12} H_5 Ba, 2 S O_3$

SulphoParaBenzolate of Copper. $C_{12} H_5 Cu, 2 S O_3$ Exceedingly soluble in water.

SulphoPerChloride of Phosphorus (*Chloride of Phosphorus & of Sulphur.*) $P Cl_4 S_4$ (of Gladstone). Immediately decomposed by water. Also decomposed by alcohol, ether, and oil of turpentine. Miscible with bisulphide of carbon. (Gladstone, *J. Ch. Soc.*, **3.** 7.)

SulphoPhenanilid. (*SulphoPhenylAnilide. Phenyl SulphoPhenylamid. Isomeric with AmidoSulphoBenzid.*) $C_{24} H_{11} N S_2 O_4 = N \left\{ \begin{matrix} C_{12} H_5 S_2 O_4 \\ C_{12} H_5 \\ H \end{matrix} \right.$ Very sparingly soluble in water. Easily soluble in alcohol and ether. (Biffi, *Ann. Ch. u. Pharm.*, **91.** 107.) Sparingly soluble in water. Easily soluble in alcohol, and ether. (Gericke, *Ann. Ch. u. Pharm.*, **100.** 217.)

SulphoPhenic Acid. *Vid.* PhenylSulphuric Acid.

SulphoPhenoylamid. $C_{12} H_5 N S_2 . O_2 = N \left\{ \begin{matrix} C_{12} H_4 S_2 O_2'' \\ H \end{matrix} \right.$ Difficultly soluble in cold, easily soluble in boiling water.

SulphoPhenoyl*bi*amid. $C_{12} H_8 N_2 S_2 O_2 = N_2 \left\{ \begin{matrix} C_{12} H_4 S_2 O_2'' \\ H_4 \end{matrix} \right.$ Very soluble in boiling, very sparingly soluble in cold water. Soluble in ammonia-water, and in solutions of the fixed alkalies, forming salts which are very soluble in water. But its baryta and silver salts are scarcely at all soluble in water. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **53.** 311.)

SulphoPhenylamid. (*PhenylSulphimid.*) $C_{12} H_7 N S_2 O_4 = N \left\{ \begin{matrix} C_{12} H_5 S_2 O_4 \\ H_2 \end{matrix} \right.$ Insoluble in water. Readily soluble in alcohol. Soluble in boiling ammonia-water. (Gerhardt & Chiozza, *Ann. Ch. et Phys.*, (3.) **46.** 143.)

SulphoPhenylamid with Silver. Ppt.

$$N \left\{ \begin{matrix} C_{12} H_5 S_2 O_4 \\ H \\ Ag \end{matrix} \right.$$

***Di*SulphoPhenylamid.** Soluble in ether.

$$C_{24} H_{11} N S_4 O_8 = N \left\{ \begin{matrix} (C_{12} H_5 S_2 O_4)_2 \\ H \end{matrix} \right.$$

SulphoPhenylAnilid. *Vid.* SulphoPhenAnilid.

SulphoPhenylBenzamic Acid. *Vid.* BenzoylSulphoPhenylamic acid.

SulphoPhenylBenzamid. *Vid.* BenzoylSulphoPhenylamid.

SulphoPhenylBenzoylAcetamid. (*BenzoylAcetylSulphoPhenylamid. BenzAcetoSulphoPhenamid.*) $C_{30} H_{13} N S_2 O_8 = N \left\{ \begin{matrix} C_{14} H_5 O_2 \\ C_{12} H_5 S_2 O_4 \\ C_4 H_3 O_2 \end{matrix} \right.$ Soluble in boiling ether. (Gerhardt & Chiozza.)

SulphoPhenylBenzoylamic Acid. *Vid.* BenzoylSulphoPhemylamic Acid.

SulphoPhenylBenzoylamid. *Vid.* BenzoylSulphoPhenylamid.

SulphoPhenylBenzoylCuminamid. *Vid.* CumylBenzoylSulphoPhenylamid.

SulphoPhenylCuminamid. *Vid.* CumylSulphoPhenylamid.

SulphoPhenylicAcid. *Vid.* PhenylSulphurous Acid.

Sulpho*tri*PhenylPhosphamid.

$$N_3 \left\{ \begin{matrix} P S_2 \\ (C_{12} H_5)_3 \\ H_3 \end{matrix} \right.$$

SulphoPhenylSuccinamicAcid. $C_{20} H_{11} N S_2 O_{10} = N \left\{ \begin{matrix} C_8 H_4 O_4'' \\ C_{12} H_5 S_2 O_4 . O, H O \\ H \end{matrix} \right.$ Soluble, with decomposition in water.

SulphoPhenylSuccinamate of Ammonia. $C_{20} H_{10} (N H_4) N S_2 O_{10}$ Very soluble in water. Soluble in alcohol.

SulphoPhenylSuccinamate of Silver. $C_{20} H_{10} Ag N S_2 O_{10}$ Ppt. (Gerhardt & Chiozza, *Ann. Ch. et Phys.*, (3.) **46.** 159.)

SulphoPhenylSuccinamid. *Vid.* SuccinylSulphoPhenylamid.

SulphoPhloretic Acid. (*PhloretinSulphuricAcid.*) $C_{18} H_{10} S_2 O_{12} = C_{18} H_8 O_4, 2 H O, 2 S O_3$ Very readily soluble in water, and alcohol. (Hlasiwetz.)

SulphoPhloretate of Baryta.
I.) *normal.* $C_{18} H_8 Ba_2 S_2 O_{12} + 6 Aq$ Soluble in water. Insoluble in alcohol or ether.

SulphoPhloretate of Lime. $C_{18} H_8 Ca_2 S_2 O_{12}$ Soluble in water.

SulphoPhloretate of Magnesia. $C_{18} H_8 Mg_2 S_2 O_{12}$ Soluble in water.

SulphoPhloretate of Soda. $C_{18} H_8 Na_2 S_2 O_{12}$ Easily soluble in water. Insoluble in alcohol or ether.

SulphoPhœnicic Acid. (*Indigo Purple. Phœnicine. SulphoPurpuric Acid.*) $C_{32} H_{10} N_2 S_2 O_{10} = N_2 \left\{ \begin{matrix} S_2 O_4'' \\ (C_{16} H_4 O_2'')_2 O, \\ H \end{matrix} \right. . H O$ Soluble in water, and alcohol. (Crum.) Insoluble in several saline solutions, as chloride of ammonium, or acetate of potash, and in alkaline solutions. Readily soluble in strong sulphuric acid, especially in the fuming acid. The sulpho-phœnicates are very sparingly soluble in water, but are more readily soluble in alcohol. (Crum; Berzelius.)

SulphoPhœnicate of Alumina. A solution of alum precipitates the acid from its solution in 8000 pts. of water. (Crum.)

SulphoPhœnicate of Copper. A solution of sulphate of copper precipitates the acid from its solution in 2000 pts. of water. (Crum.)

SulphoPhœnicate *of protoxide* of Iron. A solution of protosulphate of iron precipitates the acid from its solution in 3000 pts. of water. (Crum.)

SulphoPhœnicate of Lime. A solution of chloride of calcium precipitates the acid from its solution in 8000 pts. of water. (Crum.) Sparingly soluble in boiling alcohol. (Berzelius.)

SulphoPhœnicate of Magnesia. A solution of sulphate of magnesia precipitates the acid from its solution in 2000 pts. of water. (Crum.)

SulphoPhœnicate of Potash. $C_{32} H_9 K N_2 S_2 O_{10} + 2 Aq$ Soluble in 100 pts. of water. Insoluble, or but sparingly soluble, in alcohol, or in an aqueous solution of acetate of potash.

SulphoPhœnicate of Soda. A solution of chloride of sodium precipitates the acid from its solution in 60 pts. of water. (Crum.)

SulphoPhœnicate of Zinc. A solution of sulphate of zinc precipitates the acid from its solution in 2000 pts. of water. (Crum.)

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Sulpho*tri*Phosphamid. Decomposed at once by hot water, but somewhat more slowly by cold water. Partially decomposed by alcohol. (Schiff.)
$N_3\left\{\begin{array}{l}P S_2{}'''\\ H_6\end{array}\right.$

SulphoPhosphAnilid.
(*SulphoPhosphoryltriPhenylteramid.*
$C_{36} H_{18} N_3 P S_2 = N_3\left\{\begin{array}{l}P S_2{}'''\\ (C_{12} H_5)_3\\ H_3\end{array}\right.$

"**SulphoPhosphoric Acid**"(of Berzelius). *Vid.* *Quinqui*Sulphide of Phosphorus.

"**SulphoPhosphate of** *X*." } (of Berzelius).
"**SulphoPhosphite of** *X*." }
Vid. Sulphide of Phosphorus & of *X*.

SulphoPhosphoric Acid (of Wurtz). Soluble in water; but the solution is readily decomposed, especially on boiling. (A. Wurtz, *Ann. Ch. et Phys.*, (3.) **20.** 473.)
(*SulphOxyPhosphoric Acid.*)
$P O_3 S_2$

SulphoPhosphate of Baryta. Insoluble in water. (Wurtz.)
$3 Ba O, P O_3 S_2$

SulphoPhosphate of Cobalt. Insoluble in water; partially decomposed when boiled with water. (Wurtz, *loc. cit.*)

SulphoPhosphate of Copper. Insoluble in water. Decomposes very readily. (Wurtz, *loc. cit.*)

SulphoPhosphate of Ethyl. *Vid.* Ethyl-SulphoPhosphoric Acid.

SulphoPhosphate *of sesquioxide* **of Iron.** Insoluble in water. (Wurtz, *loc. cit.*)

SulphoPhosphate of Lead. Insoluble in water. Easily decomposed. (Wurtz, *loc. cit.*)
$3 Pb O, P O_3 S_2$

SulphoPhosphate of Lime. Insoluble in water. (Wurtz, *loc. cit.*)

SulphoPhosphate of Nickel. Insoluble in water; partially decomposed when boiled with water. (Wurtz, *loc. cit.*)

SulphoPhosphate of Potash. Very soluble in water. (Wurtz, *loc. cit.*, p. 476.)
$3 K O, P O_3 S_2$

SulphoPhosphate of Soda. Effloresces in dry air. Sparingly soluble in cold, very soluble in boiling water. Insoluble in alcohol. (Wurtz, *loc. cit.*, p. 474.)
$3 Na O, P O_3 S_2 + 24 Aq$

SulphoPhosphate of Strontia. Insoluble in water. (Wurtz, *loc. cit.*)

SulphoPhosphorous Acid. *Vid.* *ter*Sulphide of Phosphorus.

SulphoPhosphoVinic Acid. *Vid.* Ethyl-SulphoPhosphoric Acid.

SulphoOpianic Acid. Insoluble in water. Soluble in alcohol, and in alkaline solutions. (Wœhler.)
$C_{20} H_{10} S_2 O_8 = C_{20} H_9 S_2 O_7, H O$

SulphOpianate of Ammonia. Soluble in water, or at least in ammonia-water.

SulphOpianate of Lead. Ppt.

SulphOpianate of Potash. Soluble in water, or in a solution of caustic potash.

SulphOpianate of Silver. Ppt.

SulphOpianate of Soda. Resembles the potash salt.

SulphoPlatinic Acid. *Vid.* *bi*Sulphide of Platinum.

SulphoPlatinate of Ammonium.

SulphoPlatinate of Sodium. Soluble in water.

***Bi*SulphoPropiolicAcid.**
$C_6 H_8, 4 S O_3$

***Bi*SulphoPropiolate of Baryta.** Very soluble in water. Soluble in alcohol. (Buckton & Hofmann, *J. Ch. Soc.*, **9.** 253.)
$C_6 H_6 Ba_2, 4 S O_3$

SulphoPropionic Acid.
(*PropionSulphuric Acid.*)
$C_6 H_6 S_2 O_{10} = C_6 H_4 O_3, 2 H O, 2 S O_3$

SulphoPropionate of Ammonia. Soluble in water, and dilute alcohol. From these solutions it is precipitated by absolute alcohol.

SulphoPropionate of Baryta. Tolerably soluble in hot water. (Buckton & Hofmann, *J. Ch. Soc.*, **9.**)
$C_6 H_4 Ba_2 S_2 O_{10}$

SulphoPropylic Acid.
(*PropylSulphuricAcid. TritylSulphuric Acid. Sulphate of Propyl.*)
$C_6 H_8 S_2 O_8 = C_6 H_7 O, H O, 2 S O_3$

SulphoPropylate of Baryta. Soluble in water; the solution is decomposed to a slight extent on evaporation. (Berthelot & De Luca, *Ann. Ch. et Phys.*, (3.) **43.** 402.)
$C_6 H_7 Ba S_2 O_8 + 6 Aq \;\&\; + 2 Aq$

SulphoPropylate of Lime. Deliquescent.

SulphoPropylate of Potash. Very soluble in water, the solution undergoing decomposition when boiled. Soluble in boiling absolute alcohol. (Chancel.)
$C_6 H_7 K S_2 O_8$

SulphoPurpuric Acid. [The name has also been incorrectly applied to SulphoPhœnicic Acid, q. v.] Soluble in water. Insoluble, or very sparingly soluble, in alcohol.

SulphoPurpurate of Lead.
I.) Slightly soluble in water. Insoluble in alcohol.
II.) *basic.* Insoluble in water.

SulphoPurpurate of Potash. Soluble in water. (Berzelius.)

SulphoRetinylate of Baryta. Sparingly soluble in water, being much less soluble in water than the cumenyl-sulphite of baryta. Difficultly soluble in absolute alcohol. (Gerhardt & Cahours.)
$C_{18} H_{11} Ba S_2 O_6$

SulphoRhodiate of Potassium. Soluble in an aqueous solution of sulphide of potassium. (Berzelius.)

SulphoRufic Acid. Soluble in water. Insoluble in alcohol. (Berzelius.)

SulphoRufate of Lead. Easily soluble in water, and alcohol.

SulphoSaccharic Acid. Soluble in water. Most of its salts are soluble in water.

SulphoSaccharate of Baryta. Easily soluble in water.

SulphoSaccharate of Lead. Insoluble in water. (Peligot.)
$4 Pb O, C_{24} H_{20} O_{20}, S O_3$

SulphoSalicol. *Vid.* SulphoSalicylous Acid.

SulphoSalicylic Acid. Deliquescent. Soluble in all proportions in water, alcohol, and ether. (Mendius.)
$C_{14} H_6 S_2 O_{12} = C_{14} H_4 O_6, 2 H O, 2 S O_3$

Most of its salts are soluble in water, but insoluble in alcohol or ether.

SulphoSalicylate of Ammonia. Soluble in water, the solution undergoing decomposition when evaporated. (Mendius, *Ann. Ch. u. Pharm.*, **103.** 39.)

SulphoSalicylate of Baryta.

I.) *normal.* $C_{14}H_4Ba_2S_2O_{12}+6Aq$ Sparingly soluble in cold, readily soluble in hot water. Insoluble in alcohol or ether.

II.) *acid.* $C_{14}H_5BaS_2O_{12}+4Aq$ Permanent. Readily soluble in water. Insoluble in alcohol or ether.

SulphoSalicylate of Copper.

I.) *normal.* $C_{14}H_4Cu_2S_2O_{12}$ Permanent. Very soluble in water. Sparingly soluble in hot, less soluble in cold alcohol.

II.) *basic.* $C_{14}H_4Cu_2S_2O_{12}, 2CuO+4Aq$ Easily soluble in water. Insoluble in alcohol.

SulphoSalicylate of Ethyl. $C_{14}H_4(C_4H_5)_2S_2O_{12}$ Insoluble in water. Readily soluble in alcohol, and ether. (Mendius.)

SulphoSalicylate of Lead. $C_{14}H_4Pb_2S_2O_{12}$ Sparingly soluble in cold water. Insoluble in alcohol.

SulphoSalicylate of Lime. $C_{14}H_4Ca_2S_2O_{12}+2Aq$ Soluble in water. Insoluble in alcohol or ether.

SulphoSalicylate of Magnesia. $C_{14}H_4Mg_2S_2O_{12}+6Aq$ Very soluble in water. Insoluble in alcohol.

SulphoSalicylate of Potash.

I.) *normal.* $C_{14}H_4K_2S_2O_{12}+4Aq$ Permanent. Very soluble in water. Very sparingly soluble in alcohol, and ether.

II.) *acid.* $C_{14}H_5KS_2O_{12}+4Aq$ Very readily soluble in water. Insoluble in alcohol.

III.) *sesquibasic.* $C_{14}H_4K_2S_2O_{12}; C_{14}H_5KS_2O_{12}+2Aq$ Easily soluble in water. Insoluble in alcohol.

SulphoSalicylate of Potash & of Soda. $C_{14}H_4KNaS_2O_{12}+8Aq$ Soluble in water. Insoluble in alcohol or ether.

SulphoSalicylate of Silver. $C_{14}H_4Ag_2S_2O_{12}+2Aq$ Sparingly soluble in cold, readily soluble in hot water, but the solution is decomposed by long-continued boiling. Insoluble in alcohol.

SulphoSalicylate of Soda.

I.) *normal.* $C_{14}H_4Na_2S_2O_{12}+6Aq$ Very soluble in water. Insoluble in alcohol or ether.

II.) *acid.* $C_{14}H_5NaS_2O_{12}+4Aq$ Permanent. Easily soluble in water. Sparingly soluble in alcohol.

SulphoSalicylate of Zinc. $C_{14}H_4Zn_2S_2O_{12}+6Aq$ Readily soluble in water. Insoluble in alcohol.

SulphoSalicylous Acid. (*SulphoSalicol. Thio Salicol. Hydride of SulphoSalicyl.*) $C_{14}H_6S_2O_2$ Insoluble, or very sparingly soluble, in alcohol. Soluble, with combination, in alkaline solutions. (Cahours.)

SulphoSinapic Acid. *Vid.* AllylSulphoCarbamic Acid.

SulphoSinapisin. *Vid.* SulphoCyanhydrate of Sinapin.

SulphoMethylic Acid. *Vid.* MethylSulphurous Acid.

SulphoStannic Acid. *Vid. bi*Sulphide of Tin. The sulphostannates of the alkalies and alkaline earths are soluble in water. (Berzelius.)

SulphoStannate of Ammonium.

SulphoStannate of Barium. Soluble in water. (Berzelius.)

SulphoStannate of Calcium.

SulphoStannate of Copper & of Iron. $2Cu_2S, SnS_2; 2FeS, SnS_2$ Soluble, with decomposition, in nitric acid.

SulphoStannate of Potassium. $KS, SnS_2 \& +10Aq$ Very easily soluble in water, from which alcohol throws down a more concentrated solution. (Kuehn.)

SulphoStannate of Sodium.

I.) NaS, SnS_2+7Aq Permanent. Soluble in water. (Hœring.)

II.) $2NaS, SnS_2+12 @ 15Aq$ Soluble in water. (Kuehn.)

SulphoStannate of Strontium.

SulphoSuccinanil. *Vid.* SuccinylSulphoPhenylamid.

SulphoSuccinanilic Acid. *Vid.* SulphoPhenylSuccinamic Acid.

SulphoSuccinic Acid. $C_8H_6S_2O_{14}+2Aq = C_8H_3O_5, 3HO, 2SO_3+2Aq$ Very hygroscopic. Readily soluble in water, alcohol, and ether. (Fehling.) Most of its salts are easily soluble in water.

SulphoSuccinate of Ammonia. $C_8H_3(NH_4)_3S_2O_{14}+2Aq$

SulphoSuccinate of Baryta. $C_8H_3Ba_3S_2O_{14}$ Whilst still moist it is readily soluble in chlorhydric and nitric acids, and sparingly in hot acetic acid; but after having become dry it is much less soluble in chlorhydric, and almost insoluble in acetic acid. Soluble in sulphosuccinic acid. (Fehling.)

SulphoSuccinate of Cobalt. Appears to be soluble in water.

SulphoSuccinate of Copper. Appears to be soluble in water.

SulphoSuccinate *of protoxide* of Iron. Appears to be soluble in water.

SulphoSuccinate of Lead.

I.) *normal.* $C_8H_3Pb_3S_2O_{14}+3Aq$ Insoluble in water. Soluble in nitric and chlorhydric acids, and in an aqueous solution of acetate of ammonia acidulated with acetic acid.

II.) *basic.* $C_8H_3Pb_3S_2O_{14}, PbO$ Tolerably soluble in chlorhydric, nitric, and sulphosuccinic acids.

SulphoSuccinate of Lime. $C_8H_4Ca_2S_2O_{14}$ Very easily soluble in water. Insoluble in alcohol. (Berzelius's *Lehrb.*, 3. 422.)

SulphoSuccinate of Magnesia. $C_8H_4Mg_2S_2O_{14}$ Extremely easily soluble in water. (*Ibid.*, p. 456.)

SulphoSuccinate of Manganese. Appears to be soluble in water.

SulphoSuccinate of Nickel. Appears to be soluble in water.

SulphoSuccinate of Potash.

I.) *normal.* $C_8H_3K_3S_2O_{14}+5Aq$ Hygroscopic, but not deliquescent. Readily soluble in water. Almost insoluble in absolute alcohol, but very easily soluble in alcohol of 80%. (Fehling.)

II.) *di.* $C_8H_4K_2S_2O_{14}+2Aq \& 4Aq$ Permanent. Readily soluble in cold, and in almost all proportions in boiling water.

SulphoSuccinate of Silver. $C_8H_3Ag_3S_2O_{14}$ Insoluble in water. Easily decomposed.

SulphoSuccinate of Soda.

I.) *normal.* Readily soluble in water, and spirit.

SulphoTellurous Acid. *Vid.* *bi*Sulphide of Tellurium. The alkaline sulpho-tellurites are readily soluble in water; less soluble in alcohol; but the solutions undergo decomposition when exposed to the air.

SulphoTellurite of Ammonium. Soluble
$3 NH_4 S, Te S_2$ in water.

SulphoTellurite of Barium. Tolerably
$3 Ba S, Te S_2$ permanent. Slowly soluble in water. (Berzelius.)

SulphoTellurite of Bismuth. Ppt.
$Bi S_3, 3 Te S_2$

SulphoTellurite of Cadmium. Ppt.
$3 Cd S, Te S_2$

SulphoTellurite of Calcium. Quickly
$3 Ca S, Te S_2$ decomposes in the air. Easily soluble in water.

SulphoTellurite of Cerium. Ppt.
$3 Ce S, Te S_2$

SulphoTellurite of Cobalt. Ppt.
$3 Co O, Te S_2$

SulphoTellurite of Copper. Ppt.
$3 Cu S, Te S_2$

SulphoTellurite of Gold. Somewhat
$Au S_3, Te S_2$ soluble in water. (Berzelius.)

SulphoTellurite *of protosulphide* of Iron.
$3 Fe S, Te S_2$ Ppt.

SulphoTellurite *of bisulphide* of Iron.
$Fe_2 S_3, Te S_2$ Ppt.

SulphoTellurite of Lead. Ppt.
$3 Pb S, Te S_2$

SulphoTellurite of Lithium. Soluble in
$3 Li S, Te S_2$ water.

SulphoTellurite of Magnesium. Soluble,
$3 Mg S, Te S_2$ without decomposition, in water. Tolerably soluble in alcohol. (Berzelius.)

SulphoTellurite of Manganese. Ppt.
$Mn S, Te S_2$

SulphoTellurite *of disulphide* of Mer-
$3 Hg_2 S, Te S_2$ cury. Ppt.

SulphoTellurite *of protosulphide* of Mer-
$3 Hg S, Te S_2$ cury. Ppt.

SulphoTellurite of Nickel.

SulphoTellurite of Platinum. Soluble
$3 Pt S_2, 2 Te S_2$ in water, but after several days it separates out from the solution.

SulphoTellurite of Potassium. Deli-
$3 K S, Te S_2$ quesces in moist air. Soluble in water, but the solution soon undergoes decomposition when exposed to the air.

SulphoTellurite of Silver. Ppt.
$3 Ag S, Te S_2$

SulphoTellurite of Sodium. Soluble in
$3 Na S, Te S_2$ water.

SulphoTellurite of Strontium. Toler-
$3 Sr S, Te S_2$ ably permanent. Completely soluble in water.

SulphoTellurite *of protosulphide* of Tin.
$3 Sn S, Te S_2$ Ppt.

SulphoTellurite *of bisulphide* of Tin. Ppt.
$3 Sn S_2, 2 Te S_2$

SulphoTellurite of Zinc. Ppt.
$3 Zn S, Te S_2$

SulphoTerebic Acid.
$C_{20} H_{16} S_2 O_6$?

SulphoTerebate of Baryta. Soluble in
$C_{20} H_{15} Ba S_2 O_6$ water. (Gerhardt.)

SulphoThymic Acid. *Vid.* ThymylSulphuric Acid.

SulphoToluenic Acid. *Vid.* ToluenylSulphurous Acid.

SulphoToluic Acid. *Vid.* ToluenylSulphurous Acid.

SulphoToluol. Insoluble in water. (De-
(*Thio Toluol.*) ville.)
$C_{14} H_7 S O_2$

SulphoTungstic Acid. Sparingly soluble
(*Ter Sulphide of Tungsten.*) in water, more readily
$W S_3$ in hot than in cold. It is precipitated from the aqueous solution on the addition of chloride of ammonium, or of acids, though not absolutely insoluble in acidulated water. Soluble, especially when recently precipitated and still moist, in aqueous solutions of caustic potash, carbonate of potash, the alkaline sulphides, and in ammonia-water. The alkaline sulphotungstates are soluble in water, but the solutions gradually undergo decomposition when exposed to the air.

SulphoTungstate of Ammonium. Much
$NH_4 S, W S_3$ more readily soluble in pure water than in dilute saline solutions. The aqueous solution is slowly decomposed when exposed to the air. (Berzelius.)

SulphoTungstate of Ammonium with
$NH_4 S, W S_3; NH_4 O, W O_3$ Tungstate of Ammonia. Soluble in water, and alcohol. (Berzelius, *Lehrb.*, 3. 338.)

SulphoTungstate of Barium. Soluble in
$Ba S, W S_3$ an aqueous solution of sulphide of barium.

SulphoTungstate of Bismuth.
$Bi S_3, 3 W S_3$

SulphoTungstate of Cadmium. Ppt.
$Cd S, W S_3$

SulphoTungstate of Calcium. Easily
$Ca S, W S_3$ soluble in water; also somewhat soluble in alcohol. (Berzelius.)

SulphoTungstate of Cerium. Ppt.
$Ce S, W S_3$

SulphoTungstate of Chromium. Soluble
$Cr_2 S_3, W S_3$ in water. (Berzelius, *Lehrb.*)

SulphoTungstate of Cobalt. Sparingly
$Co S, W S_3$ soluble in water. (Berzelius.)

SulphoTungstate of Copper. Ppt.
$Cu S, W S_3$

SulphoTungstate of Glucinum. Apparently soluble in water. (Berzelius, *Lehrb.*)

SulphoTungstate of Gold. Soluble in
$Au S_3, 3 W S_3$ water, but a precipitate forms in this solution after it has stood for a few days. (Berzelius, *Lehrb.*)

SulphoTungstate *of protosulphide* of Iron.
$Fe S, W S_3$ Soluble in water. (Berzelius, *Lehrb.*)

SulphoTungstate *of sesquisulphide* of Iron.
$Fe_2 S_3, 3 W S_3$ Ppt.

SulphoTungstate of Lead. Ppt.
$Pb S, W S_3$

SulphoTungstate of Magnesium.

I.) *normal.* Readily soluble in water, and al-
$Mg S, W S_3$ cohol. (Berzelius.)

II.) *acid.* Insoluble in water.

III.) *basic.* Ppt.

SulphoTungstate of Manganese. Soluble
$Mn S, W S_3$ in water. (Berzelius.)

SulphoTungstate *of disulphide* of Mer-
$Hg_2 S, W S_3$ cury. Ppt.

SulphoTungstate *of protosulphide* **of Mercury.** Ppt.
$Hg S, W S_3$

SulphoTungstate of Nickel. Soluble in water.
$Ni S, W S_3$

SulphoTungstate *of bisulphide* **of Platinum.** The aqueous solution remains clear for a long time, but finally deposits a precipitate.
$Pt S_2, 2 W S_3$

SulphoTungstate of Potassium.

I.) Easily soluble in water. Sparingly soluble in alcohol, by which it is precipitated from the aqueous solution.
$K S, W S_3$

II.) Soluble in water.
$K S, 2 W S_3$

SulphoTungstate of Potassium with Tungstate of Potash. Soluble in water, and alcohol. (Berzelius, *Lehrb.*)
$K S, W S_3 ; K O, W O_3 + 4 Aq$

SulphoTungstate of Silver.
$Ag S, W S_3$

SulphoTungstate of Sodium. Very soluble in water; less soluble in alcohol, although still very soluble therein, especially if it contains sulphide of sodium.
$Na S, W S_3$

SulphoTungstate of Strontium. Soluble in water and in an aqueous solution of sulphide of strontium.
$Sr S, W S_3$

SulphoTungstate *of protosulphide* **of Tin.** Ppt.
$Sn S, W S_3$

SulphoTungstate *of bisulphide* **of Tin.** Ppt.
$Sn S_2, 2 W S_3$

SulphoTungstate of Vanadium. Soluble in water.

SulphoTungstate of Zinc. Soluble in water, with subsequent precipitation.
$Zn S, W S_3$

SulphoValerolic Acid. Not isolated.

SulphoValerolate of Lead. Soluble in water. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **7.** 278.)

SulphoVanadic Acid. *Vid. ter*Sulphide of Vanadium. The sulphovanadiates of the alkalies are soluble, those of the alkaline earths difficultly soluble, and those of the metals proper insoluble in water.

SulphoVanadiate of Ammonium.

SulphoVanadiate of Barium. Slightly soluble in water.

SulphoVanadiate of Calcium. Slightly soluble in water.

SulphoVanadiate of Potassium. Soluble in water. Insoluble in alcohol.
$K S, V S_3$

SulphoVanadiate of Strontium. Slightly soluble in water.

SulphoVanadious Acid. *Vid. bi*Sulphide of Vanadium. The alkaline sulphovanadites are soluble in water. (Berzelius.)

SulphoVanadite of Ammonium. Soluble in water.

SulphoVanadite of Potassium. Soluble in water.
$K S, V S_2$

SulphoVinic Acid. *Vid.* EthylSulphuric Acid.

SulphoViridic Acid. Very readily soluble in water. Slowly, but completely, soluble in strong alcohol. (Berzelius.)

SulphoViridate of Lead. Somewhat soluble in water. (Berzelius.)

SulphoXanthic Acid. *Vid.* SulphoCarbonate of Ethyl (No. II.).

SulphOxyArsenic Acid. Sparingly soluble in water.
$As O_3 S_2$

SulphOxyArseniate of Potash. Permanent. Sparingly soluble in water. The aqueous solution soon undergoes decomposition, especially when boiled, unless an excess of alkali is present, in which event the decomposition is retarded. (Bouquet & Cloez, *Ann. Ch. et Phys.*, (3.) **13.** 54.)
$K O, As O_3 S_2 + 2 Aq$

SulphOxylolic Acid. *Vid.* XylenylSulphurous Acid.

SulphOxyPhosphoric Acid. *Vid.* SulphoPhosphoric Acid.

Sulphur. The ordinary modification of sulphur is insoluble in water; slightly soluble in alcohol, ether, benzin, oil of turpentine, and in general in the fatty and essential oils, especially when these liquids are warm. Much more soluble in bisulphide of carbon, from which it is precipitated on the addition of ether, alcohol, or a hot solution of caustic potash.
S

100 pts. of	Saturated at °C.	Dissolve pts. of flowers of sulphur.
Ether (hot)		0.54
" (cold)		0.188
Bisulphide of carbon (hot)		73.46
Bisulphide of carbon	16°	38.70
Rectified coal-tar naphtha (boiling at 98 @ 100°)	98 @ 100°	26.98
" "	16°	1.51
Benzin (boiling at 86°)	86°	17.04
" "	75°	7.91
" "	16°	1.79
A mixture of equal pts. of benzin and oil of turpentine	boiling	16.41
" "	16°	2.19
Oil of turpentine	150°	16.16
" "	75°	6.24
" "	16°	1.37
A mixture of 4 vols. oil of turpentine and 1 vol. benzin	boiling	14.26
" "	16°	2.59
Naphtha (from Valtravers)	boiling	10.56
" "	16°	2.77
Absolute alcohol	boiling	0.42
" " . . .	16° . . .	0.12

(Payen, *C. R.*, 1852, **34.** pp. 509, 456.)

Soluble in 20 pts. of hot nearly absolute alcohol; less easily soluble in weaker alcohol. (Laurogais; Favre.) Soluble in 600 pts. of boiling alcohol of 40° B. (Chevallier, *J. Ch. Méd.*, **2.** 587 [P.]); in 500 pts. of alcohol (Meissner, in his *Neues System der Chem. 2te Auf.*, **3.** 111 [P.]; in 200 pts. of alcohol (Pelouze & Fremy); in 1926.7 pts. of absolute alcohol at 15°, *i. e.* 100 pts. of absolute alcohol at 15° dissolve 0.0519 pt. of sulphur. (Pohl, *Wien. Akad. Bericht*, **6.** 600.)

Quickly soluble in 12.5 pts. of ether at the ordinary temperature. (Favre.) Acetic ether dissolves 6% of it. (Favre.)

Soluble in 12 pts. of hot rock-oil (naphtha) from Amiano, but nearly insoluble in cold naphtha. (Saussure.) 100 pts. of nicotin at 100° dissolve 10.58 pts. of sulphur, this separates out again, for the most part, as the solution cools. Also soluble in warm anilin. (Barral, *Ann. Ch. et Phys.*, (3.) **20.** 352.) Abundantly soluble in hot, less soluble in cold anilin. (Fritzche.) Very largely soluble in anilin, and quinolein (as in all the essential oils), especially when these are warm. From the hot solution it separates out on cooling. (Hofmann, *Ann Ch. et Phys.*, (3.) **9.** pp. 143, 169.) Soluble in 2.6 pts. of boiling, sparingly soluble in cold creosote. (Reichenbach.)

Soluble, by digestion, in about 2 pts. of oil of turpentine. More soluble in hot than in cold oil of turpentine.

When oil of turpentine is heated with sulphur to 150° decomposition commences. (Payen, *C. R.*, **34.** 508.) Soluble in hot oil of copaiba, from which it crystallizes on cooling. (Gerber.) Soluble in oil of mandarin. (Luca.) Abundantly soluble in hot oil of caraway, being deposited again on cooling.

Sulphur is soluble to a notable extent in the numerous liquids comprising the hydrogenized and oxygenated essential oils, the alcohols, ethers, fatty oils, and pyrogenous oils. (Payen, *C. R.*, 1852, **34.** 509.)

Somewhat soluble in hot, less soluble in cold wood-spirit. (Payen, *C. R.*, 1852, **34.** 509.) Sparingly soluble in wood-spirit, in lignone, from which it is precipitated on the addition of water (L. Gmelin), in bromoform; in cold benzin, but largely soluble in boiling benzin (Mansfield, *J. Ch. Soc.*, **1.** 262), in mercuric methyl, in nitrate of ethyl, which, when of 0.909 sp. gr., dissolves $\frac{1}{20}$ pt. of it; from this solution it is not precipitated by water. (Favre.) Very slightly soluble in cold acetone. (Chenevix, *Ann. de Chim.*, 1809, **69.** 50.)

Soluble in naphtha, in aldehyde (Liebig), in iodal, in bromal (Lœwig), in chloroform, in warm choral (Liebig), in an aqueous solution of sinkalin (Babo), in chloride of ethyl, in warm chloride of benzoyl, in bichloride of tin, in warm liquid sulphydric acid (Niemann), in warm sulphide of phosphorus, in sulphide of bromine, in bromine, in terchloride of nitrogen, in an aqueous solution of sulphide of barium (Dumas, *Tr.*), in an alcoholic solution of quinquisulphide of potassium, but is re-precipitated on the addition of water to the saturated solution. (Berzelius's *Lehrb.*, **2.** 82.) Soluble in aqueous solutions of the alkaline sulphites, especially if these are hot. (Bolley, *Ann. Ch. u. Pharm.*, 1842, **44.** 357.) Slightly soluble in a strong boiling aqueous solution of sulphocyanhydric acid, from which it separates again, for the most part, on cooling. (Porrett, *Phil. Trans.*, 1814, p. 548.) Soluble in sulphydrate of butyl (butylsulphydric acid), in warm retinole, and in alkaline leys.

Extremely soluble in coniin. (Blyth, *J. Ch. Soc.*, **1.** 350.) Very readily soluble in caprylic alcohol (hydrate of capryl). (Bouis, *Ann. Ch. et Phys.*, (3.) **44.** 103.) Readily soluble in dichloride of sulphur. Very soluble in warm sulphocyanide of allyl (essence of mustard) (Fontanelle; Dumas & Peligot), and in hot alkarsin (oxide of cacodyl). Very readily soluble in hot, less soluble in cold sulphoperchloride of phosphorus ($P\,Cl_5\,S_4$ of Gladstone). Tolerably readily soluble in warm styrol, separating out again on cooling. Readily soluble in warm, less soluble in cold toluene, and rosin-oil. (Pelletier & Walter.) Soluble in olive-oil at 115°, from which it separates out, in great part, on cooling. Also soluble in the pyrogenous oil of resin, both crude and purified, at 120°, the solution solidifying almost completely on cooling. (Payen, *C. R.*, 1852, **34.** 509.) Largely soluble in hot oil of amber (ambereupion), from which it crystallizes out on cooling. (Dœpping.) Soluble in 2 pts. of hot, slightly solulbe in cold caoutchin; the hot solution deposits much of it on cooling, but still retains a larger quantity than can be taken up by cold caoutchin.

Sulphydrate of ethyl dissolves sulphur slowly, but in considerable quantity. (Zeise.) Insoluble in valerianic acid, valerate of amyl, hydride of valeryl, or hydrate of amyl (fusel-oil). (Trautwein.)

The soft elastic sulphur which is obtained when molten sulphur, the temperature of which is higher than 260°, is poured into water, sometimes contains as much as 35% of a peculiar amorphous modification of sulphur which is completely insoluble in bisulphide of carbon, either hot or cold. It dissolves, however, in absolute alcohol. When subjected to a current of aqueous vapor at 100°, or indeed to the action of simple heat at 90° or 100°, this modification is changed into ordinary sulphur, crystallizable and soluble in bisulphide of carbon. (Ch. Deville, in Pelouze & Fremy, *Tr.*) The variety of sulphur insoluble in bisulphide of carbon has also been obtained under other circumstances, viz., by the action of chlorhydric acid on metallic hyposulphites. (Fordos & Gélis.)

When heated to 350°, or till it passes from the pasty to the thin fluid state, and then slowly cooled, sulphur dissolves almost entirely in bisulphide of carbon. That which has been heated to 300°, and then quickly cooled, is only partially soluble in bisulphide of carbon, and especially that which has been cooled by pouring into cold water; over 40% of this sulphur being insoluble. From the solution in bisulphide of carbon, after rhombic crystals have separated, amorphous granules are deposited which cannot be again dissolved in the bisulphide. The rhombic crystals, however, are readily soluble in bisulphide of carbon. (Magnus, *Ann. Ch. u. Pharm.*, **101.** 61.)

Bisulphide of carbon at 12° dissolves 0.35 pt. of ordinary sulphur. Some varieties of sulphur are, however, not entirely soluble in bisulphide of carbon, thus:

Variety of sulphur.	Pts. of S dissolved by one pt. of $C\,S_2$.	At °C.	Fraction of the original weight which is insoluble in $C\,S_2$.
Octahedral, from Sicily	0.335	12°	0.000
Crystall. dry way, recently prepared	0.415	13°	0.029
" prep. 8 yrs.	0.333	12°	0.004
" " 9 yrs.			0.020
" " 15 yrs.			0.051
Red needles, recently prepared	0.382	12°	0.023
Soft yellow, recently prepared			0.353
" 2 years	0.316	11°	0.157
Soft red, recently prepared	0.374	11°	0.157
Soft red, prep. 5 yrs.			0.181
Flowers of sulphur	0 351	13°	0.113
" " another sample			0.234
Roll brimstone, outside			0.029
" " inside			0.073

(Ch. Deville, *Ann. Ch. et Phys.*, (3.) **47.** 99.)

All these varieties of sulphur, even the portion

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insoluble in bisulphide of carbon, dissolve without residue in warm absolute alcohol; crystallizing on cooling. They are less soluble in chloroform or ether than in alcohol. Readily soluble in boiling, less soluble in cold benzin. (Ch. Deville, *loc. cit.*)

The soft pasty sulphur obtained by decomposing H S with S O_2 forms an almost clear emulsion (pseudosolution)* or incomplete solution, from which it is precipitated by various salts and other soluble substances which have no chemical affinity for it. This pseudo solution appears to depend upon a peculiar kind of diffusion, analogous to the swelling up of gelatinous, albuminous, and slimy substances, or of starch, so that an apparent solution is formed. Of the sulphur in question, 23 pts. combine with 100 pts. of water. When precipitated by the addition of saline solutions it retains, very pertinaciously, portions of the precipitant. When the pseudosolution of sulphur is exposed to the light, the sulphur is gradually converted into a pulverulent modification, and separates as such. The same thing occurs when the ps.- solution is boiled. It is precipitated by the concentrated mineral acids, without affecting its solubility at first, but it soon changes when kept in contact with them. It is precipitated by many mineral salts; especially by those of potassium; in this case its power of forming pseudo solutions is destroyed. But when thrown down by salts of soda or of ammonia, it may again be dissolved in pure water. Caustic, carbonated, and sulphuretted alkalies convert the soluble sulphur into insoluble. The pseudo solution of sulphur in water may be mixed with alcohol without change. When shaken for a long time with naphtha or oil of turpentine it is decomposed. The pseudo solution combines readily with bisulphide of carbon, and forms an emulsion which subsequently undergoes composition. The sulphur itself is only partially soluble in bisulphide of carbon. (Selmi, *J. pr. Ch.*, **57.** 49.)

Berthelot refers all the varieties of sulphur to two modifications; viz., I.) "octahedral," or, electronegative, and, II.) "amorphous," or, electropositive.

I.) *Octahedral*, or *electronegative Sulphur.* All of its varieties are soluble in bisulphide of carbon. It is scarcely acted upon by a solution of bisulphite of potash. Oxydizing bodies in contact with sulphur at the moment it is disengaged convert this to insoluble sulphur.

II.) *Amorphous*, or *electropositive Sulphur.* Insoluble in neutral solvents, viz., in water, alcohol, ether, bisulphide of carbon, &c. Soluble, with tolerable rapidity, in a solution of bisulphite of potash. By continued contact with a solution of sulphide of sodium, a portion of it is dissolved, and the remainder changed into octahedral sulphur. With solutions of caustic potash, and ammonia, similar reactions occur. Less easily oxydized by nitric acid than the other modification. Some varieties, as that contained in soft sulphur prepared by heat, are soluble, to a certain extent, in alcohol, and ether; and, by boiling, the rest of the sulphur is converted into the electronegative modification. A similar result is attained by long-continued contact with cold alcohol. According to Berthelot, the condition of the sulphur is changed before it dissolves. Solutions of the alkalies, alkaline salts, and alkaline sulphides, all change insoluble to soluble sulphur. (Berthelot, *Ann. Ch. et Phys.*, (3.) **49.** 430.)

Of the compounds of sulphur with the metals (sulphides), all those of the alkalies are soluble in water, but most of those of the heavy metals are not acted upon by water. Only the sulphides of potassium and of sodium are soluble in alcohol. Several of the alkaline sulphides are soluble in ether. (Gmelin.)

Sulphuret of X. *Vid.* Sulphide of X.

Sulphuretted Acetic Acid. *Vid.* Sulphydrate of Acetyl.

Sulphuretted Hydrogen. *Vid.* Sulphydric Acid.

Sulphuretted Hyposulphuric Acid. *Vid.* *tri*Thionic Acid.

***Bi*Sulphuretted Hyposulphuric Acid.** *Vid.* *tetra*Thionic Acid.

***Ter*Sulphuretted Hyposulphuric Acid.** *Vid.* *penta*Thionic Acid.

SulphurettedNitroSulphide of Iron. $Fe_2\,S_3,\,N\,O_2,\,4\,H\,S$ Insoluble in water, but is decomposed thereby. Soluble in alcohol, and ether; also, with combination, in aqueous alkaline solutions. (Roussin, *Ann. Ch. et Phys.*, (3.) **52.** 295.)

***Bi*SulphurettedOxide of Ethyl.** *Vid.* Oxide of *bi*SulphEthyl.

SulphurettedSulphurous Acid. *Vid.* Hyposulphurous Acid.

Sulphuric Ether. *Vid.* Oxide of Ethyl.

Sulphurous Ether. *Vid.* Sulphite of Ethyl.

Sulphurylammonium.

$N\left\{\begin{matrix}H_2\\S_2O_2''\end{matrix}\right.$

Sulphuryl*bi*ammonium. $N_2\left\{\begin{matrix}H_6\\S_2O_2''\end{matrix}\right.$ Deliquesces, with decomposition. Easily soluble in water, without decomposition at first, but the solution soon undergoes decomposition. (H. Rose.)

Sulphydric Acid. (*Hydrosulphuric Acid. Sulphuretted Hydrogen. Sulphide of Hydrogen.*) H S 1 vol. of water absorbs 1.08 vol. of it at 10° (Henry, *Phil. Trans.*, 1803, p. 274 [T.]); 2.53 vols. at 18° (De Saussure, *Ann. Phil.*, **6.** 340 [T.]); 3.66 vols. at the ordinary temperature (T. Thomson, in his *System. of Chem.*, London, 1831, **1.** 275); 3 vols. at 11° (Gay-Lussac & Thénard); about 2.5 vols. of it, not 1 vol. as was previously stated. (Dalton, in his *New System*, **2.** 310; compare *Ibid.*, p. 451.)

1 vol. of water, under a pressure of 0m.76 of mercury, at °C.	Dissolves of H S gas: vols. reduced to 0 °C. & 0m.76 pressure of mercury.
0°	4.3706
1°	4.2874
2°	4.2053
3°	4.1243
4°	4.0442
5°	3.9652
6°	3.3872
7°	3.8103
8°	3.7345
9°	3.6596
10°	3.5858
11°	3.5132
12°	3.4415
13°	3.3708
14°	3.3012
15°	3.2326
16°	3.1651
17°	3.0986

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* The other varieties of pasty sulphur (prepared in various ways) do not possess this property.

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1 vol. of water, under a pressure of 0m.76 of mercury, at °C.	Dissolves of H S gas: vols. reduced to 0°C. & 0m.76 pressure of mercury.
18°	3.0331
19°	2.9687
20°	2.9053
21°	2.8430
22°	2.7817
23°	2.7215
24°	2.6623

(Schœnfeld, *Ann. Ch. u. Pharm.*, **95.** 1; and Bunsen's *Gasometry*, pp. 289, 128, 146.)

Less soluble in aqueous solutions of chloride of sodium or chloride of calcium than in pure water. Sulphuretted hydrogen gas seems to be out of proportion less soluble than carbonic acid gas in water at high temperatures, as when heated in sealed tubes. (De Senarmont, *Ann. Ch. et Phys.*, (3.) **32.** 169.)

At 18°C. and the ordinary pressure, 100 vols. of	Absorb vols. of H S.
Water, free from air	253
Alcohol, of 0.84 sp. gr.	606

(Th. de Saussure, *Gilbert's Ann. der Phys.*, 1814, **47.** 167.)

1 vol. of alcohol, under a pressure of 0m.76 of mercury, at °C.	Dissolves of H S gas: vols., reduced to 0°C. and 0m.76 pressure of mercury.
0°	17.891
1°	17.242
2°	16.606
3°	15.983
4°	15.373
5°	14.776
6°	14.193
7°	13.623
8°	13.066
9°	12.523
10°	11.992
11°	11.475
12°	10.971
13°	10.480
14°	10.003
15°	9.539
16°	9.088
17°	8.650
18°	8.225
19°	7.814
20°	7.415
21°	7.030
22°	6.659
23°	6.300
24°	5.955

(Bunsen's *Gasometry*, pp. 289, 128, 160.)

Soluble in acetate of methyl. (Marchand.) Soluble in ether. (Higgins.) Insoluble in caoutchin.

Difficultly absorbed by concentrated sulphuric acid, with separation of sulphur and evolution of sulphurous acid. Instantly decomposed by fuming nitric acid. At the temperature of —18° (= 0°F.) the hydrate of sulphydric acid is insoluble in weak alcohol, or in acetic ether, but at higher temperatures it dissolves at once. (Wœhler.)

Sulphydrate of Acetoyl. *Vid.* Hydride of SulphAcetyl.

Sulphydrate of Acetyl. *Vid.* ThiAcetic Acid.

Sulphydrate of Allyl.
(*AllylMercaptan.*)
$C_6 H_4 S, H S$

Sulphydrate of Ammonium. Soluble in water, and alcohol. When the aqueous solution is exposed to the air, as when kept in half-filled or badly stoppered bottles, decomposition occurs, hyposulphite of ammonia being formed, and sulphur deposited. The solution, as commonly prepared, also contains more or less bisulphide of ammonium, whence its yellow color. (Berzelius, *Lehrb.*)

(*Sulphide of Ammonium & of Hydrogen. BiHydroSulphate of Ammonia.*)
$N H_4 S, H S$

Sulphydrate of Amyl. Insoluble in water. Easily soluble in alcohol, and ether. [Compare Sulphide of Amyl & of *X*.]

(*AmylMercaptan. AmylSulphydric Acid.*)
$C_{10} H_{12} S_2 = C_{10} H_{11} S, H S$

Sulphydrate of AzoBenzoyl. Nearly insoluble in alcohol. Somewhat soluble in hot, less soluble in cold ether. (Laurent.)

$C_{42} H_{18} N_2 S_3$ (?)

Sulphydrate of Barium. Effloresces, with decomposition. Very easily soluble in water. Much more readily soluble in water, either hot or cold, than hydrate of baryta. Very difficultly soluble in alcohol. (Berzelius's *Lehrb.*)

$Ba S, H S + x Aq$

Sulphydrate of BromoMethyl.

$$C_2 H_3 Br S_2 = C_2 H_2 \left.\begin{matrix} Br \\ H \end{matrix}\right\} S_2$$

Sulphydrate of Butyl. Very sparingly soluble in water. Miscible in all proportions with alcohol, and ether. (Humann, *Ann. Ch. et Phys.*, (3.) **44.** 338.) [See also Sulphide of Butyl & of *X*.]

(*ButylSulphydric Acid. Butylic Mercaptan. TetrylSulphydric Acid.*)
$C_8 H_{10} S_2 = C_8 H_9 S, H S$

Sulphydrate of Butyryl. Sparingly soluble in water. More easily soluble in alcohol.

(*ThioButyric Acid.*)
$C_8 H_7 O_2 S, H S$

Sulphydrate of Calcium. Very soluble in water.

$Ca S, H S$

Sulphydrate of CarboThiacetonin. Insoluble in water. Sparingly soluble in ether. Soluble in warm alcohol, with partial decomposition.

$C_{20} H_{18} N_2 S_4, 2 H S$

Sulphydrate of Carvol. Slowly soluble in boiling, much less soluble in cold alcohol. (Varrentrapp.)

$C_{20} H_{15} S O_2 = C_{20} H_{14} O_2, H S$

Sulphydrate of Cetyl. Insoluble in water. Scarcely at all soluble in cold alcohol. Easily soluble in ether; and, somewhat less easily, in boiling alcohol.

(*Cetylic Mercaptan. CetylSulphydric Acid.*)
$C_{32} H_{34} S_2 = C_{32} H_{33} S, H S$

Sulphydrate of Chloride of Aluminum. Deliquescent. Decomposed by water. (Wœhler.)

Sulphydrate of Cinnamoyl. *Vid.* ThioCinnol.

"**Sulphydrate of Cyanogen.**" *Vid.* Cyanogen with Sulphydric Acid.

Sulphydrate of Ethyl. Very sparingly soluble in water. 7 drops of it require 25 grms. of water to dissolve them. (Zeise.) Miscible in all proportions with strong alcohol, and ether. Sparingly soluble in weak alcohol. (Zeise.)

(*EthylSulphydric Acid. Mercaptan.*)
$C_4 H_6 S_2 = C_4 H_5 S, H S$

The ethyl sulphides ("mercaptides") of the heavy metals are insoluble in water; some of them dissolve in alcohol. [See Sulphide of Ethyl and of *X*.]

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Sulphydrate of Ethylamin. Soluble in water. (Wurtz, *Ann. Ch. et Phys.*, (3.) **30.** 484.)

Sulphydrate of Ethylene. Soluble in alcohol, from which it is not precipitated at first by water; but after a time the aqueous solution decomposes. (Lœwig & Weidmann.)
(*Sulphide of Ethylene & of Hydrogen. Sulphydrate of Sulphide of Elayl.*)
$C_4 H_6 S_4 = C_4 H_4'', S_2, 2 H S$

Sulphydrate of Harmalin. Soluble in water, with partial decomposition.

Sulphydrate of Harmin.

Sulphydrate of Hydride of *bi*Bromo-SulphoSalicyl. Soluble in alcohol, from which it is precipitated on the addition of water. Soluble in ether. (Heerlein.)
(*SulphobiBromoSalicylous Acid.*)
$C_{14} H_6 Br_2 O_2 S_4 = C_{14} H_4 Br_2 O_2 S_2, 2 H S$

Sulphydrate of HydroKinone.

I.) $C_{24} H_{13} S O_8 = 2 C_{12} H_6 O_4 ; H S$

II.) Permanent. Decomposed by water.
$C_{36} H_{20} S_2 O_{12} = 3 C_{12} H_6 O_4 ; 2 H S$

Sulphydrate of Lithium. Hygroscopic. Easily soluble in water, and alcohol. (Berzelius, *Lehrb.*, **3.** 275.)
$Li S, H S$

Sulphydrate of Magnesium. Soluble in water, the solution undergoing decomposition when heated. Decomposed by acids.
$Mg S, H S$

Sulphydrate of Methyl. Only slightly soluble in water.
(*Methyl Mercaptan.*)
$C_2 H_4 S_2 = \left.\begin{matrix} C_2 H_3 \\ H \end{matrix}\right\} S_2$

Sulphydrate of Methylene. *Vid. proto*-Sulphide of Methyl.

Sulphydrate of Naphtylamin. Soluble in alcohol, but the solution undergoes decomposition when boiled. (Zinin.)

Sulphydrate of Potassium. Deliquescent. Very soluble in water, and in alcohol, with production of cold in both cases. (Berzelius; Vauquelin, *Ann. de Chim.*, **42.** 40 [T.].)
$K S, H S$

Sulphydrate of Sodium.

$a = Na S, H S$ Deliquescent. Soluble in water, and alcohol.

$b =$ *hydrated.* Not sensibly altered by exposure to the air during 24 hours, but slowly deliquesces. When heated it melts in its water of crystallization. (T. Thomson, in his *System of Chem.*, London, 1831, **2.** 903.)
$Na S, H S + 7 Aq$

Sulphydrate of Strontium. Tolerably permanent. Soluble in water; more readily than hydrate of strontia.
$Sr S, H S$

Sulphydrate of SulphAcetyl. See under Hydride of SulphAcetyl.

Sulphydrate of SulphoCarvol. Soluble in ether, from which it is precipitated on the addition of alcohol.
$C_{20} H_{15} S_3 = C_{20} H_{14} S_2, H S$

Sulphydrate of SulphoCyanide of Allyl. *Vid.* AllylSulphoCarbonic Acid.

Sulphydrate of Tin. Ppt. (Kuehn.)
$Sn S_2, H S$

Sulphydric Ether. *Vid.* Sulphide of Ethyl.

SulphHypoSulphuric Acid (of Langlois). *Vid. tri*Thionic Acid.

Sumbulamic Acid. Insoluble in water. Soluble in alcohol.

Sumbulamate of Potash. Soluble in an aqueous solution of caustic potash, from which it is precipitated on the addition of water. (Reinsch.)

Sumbulolic Acid ("*Acide Sumbulique*"). *Vid.* Angelic Acid.

Super-carbonate (&c.) **of** *X*. See under Carbonate (&c.) of *X*.

Surinamin (from *Geoffroya Surinamensis*). Sparingly soluble in cold, easily soluble in hot water. Sparingly soluble in alcohol. Nearly insoluble in ether.
(*Geoffroyin.*)

Sylvic Acid. *Vid.* Resins, of Turpentine.

Synaptase. Soluble in water. Insoluble in alcohol, or ether. (Thomson & Richardson, *Rep. Br. Assoc.*, 1838, p. 49.) Very soluble in cold water. Almost insoluble in alcohol. The aqueous solution soon decomposes when exposed to the air. (Robiquet.) Difficultly soluble in water. Insoluble in alcohol when phosphates are present; but alcohol does not precipitate it from the solution in pure water. (Bull, *Am. J. Sci.*, (2.) **8.** pp. 76, 77, 78.) Easily soluble in acids. (Ortloff.)
(*Emulsin.*)
"$C_{36} H_{25} N_4 O_{24}$"

Syringin (from *Syringa vulgaris*). Soluble in 8 @ 10 pts. of water; and in about the same proportion of alcohol. Insoluble in ether. Soluble in concentrated sulphuric acid. (Bernays.) Insoluble in water, or acids, excepting acetic acid. (Meillet.)
(*Lilacin.*)

T.

Tallows. See Fats.

Tanacetin (from *Tanacetum vulgare*). Soluble in water, and spirit. (Frommherz.)

Tanghinin (from *Tanghinia Thouars*). Efflorescent. Insoluble in water. Soluble in alcohol, and ether. But little acted upon by acids or alkalies.

TannAspidic Acid. Insoluble in water. Very easily soluble in alcohol. Insoluble in ether free from alcohol, or in fatty or essential oils. Soluble in concentrated acetic acid, from which it may be precipitated by adding water. Soluble in concentrated sulphuric and nitric acids. Also soluble in aqueous solutions of the caustic alkalies. (Luck.)
$C_{26} H_{12} O_{10}, H O$

TannAspidate of Ethyl. Insoluble in water. Soluble in alcohol. Insoluble in ether, or in fixed or volatile oils. Soluble in concentrated sulphuric acid.
(*Ethyl Tannaspidic Acid.*)
$C_{56} H_{31} O_{22}$

TannAspidate of Ethyl & of Lead.

I.) Ppt.
$C_{56} H_{31} O_{21}, Pb O$

II.) *basic.* Ppt.

TannAspidate of Lead. Ppt.
$C_{26} H_{13} Pb O_{11}$

Tannic Acid. *Vid.* GalloTannic Acid.

Tannigenamic Acid. *Vid.* Gallamic Acid.

Tanningenic Acid. *Vid.* Catechin.

TannOxylic Acid. Soluble in water acidulated with acetic acid. Insoluble in alcohol.
(*TannoMelanic Acid. TannylOxylic Acid.*)
$C_{14} H_6 O_{12} = C_{14} H_3 O_9, 3 H O$

TannOxylate of Lead. Very sparingly soluble in strong boiling acetic acid. (Buchner.)

TannOxylate of Potash. Soluble in water.

Tantalic Acid. Insoluble in water. (H. Rose.)
$3\,Ta\,O_2, 2\,H\,O$

Tantalate of Ammonia. Very sparingly soluble in pure water. (H. Rose.)
$N\,H_4\,O, 9\,Ta\,O_2 + 6\,Aq$

Tantalate of Baryta. Very sparingly soluble in water. (H. Rose.)
$Ba\,O, 2\,Ta\,O_2$

Tantalate of Magnesia. Ppt.
$Mg\,O, 2\,Ta\,O_2 + 5\,Aq$

Tantalate *of dinoxide* **of Mercury.** Ppt.
$Hg_2\,O, 2\,Ta\,O_2 + Aq$

Tantalate of Potash.

I.) Soluble in potash-lye.
$K\,O, Ta\,O_2$

II.) $K\,O, 4\,Ta\,O_2$ } Are precipitated on boiling
III.) $K\,O, 6\,Ta\,O_2$ } the solution of No. I.

Tantalate of Silver. Ppt. Soluble in ammonia-water. Decomposed by nitric acid. (H. Rose.)
$Ag\,O, Ta\,O_2 + Aq$

Tantalate of Soda.

I.) Soluble in 493 pts. of cold, and in 162 pts. of hot water; the aqueous solution is not altered by boiling, but is decomposed by evaporation, an insoluble acid salt being precipitated. Insoluble in alkaline solutions. (H. Rose.)
$Na\,O, 2\,Ta\,O_2 + 7\,Aq$

II.) Insoluble in water.
$Na\,O, 3\,Ta\,O_2 + 2\,Aq$

III.) $Na\,O, 9\,Ta\,O_2$

IV.) $Na\,O, 12\,Ta\,O_2$

Tantalum. Permanent. Unacted upon by water, or by an aqueous solution of caustic potash. Insoluble in chlorhydric, nitric, or sulphuric acids, or in aqua-regia. Slowly soluble in fluorhydric acid; quickly soluble in a mixture of fluorhydric and nitric acids. (H. Rose.)
Ta

Tar. Insoluble in water. Soluble in fatty and essential oils, benzin, coal-oils, &c.

Soluble in water acidulated with oxyphenic acid. (Buchner, *Ann. Ch. u. Pharm.*, **96.** 189.)

Taraxacin(from *Taraxacum officinale*). Sparingly soluble in cold, easily soluble in boiling water. Easily soluble in alcohol, ether, and concentrated acids. (Polex.)

Tartanil. *Vid.* PhenylTartrylamid.

Tartanilic Acid. *Vid.* PhenylTartrylamic Acid.

Tartanilid. *Vid.* *bi*PhenylTartryl*bi*amin.

Tartar Emetic. *Vid.* Tartrate of Antimony and of Potash.

Tartralic Acid(Old, of Fremy). *Vid.* IsoTartaric Acid.

Tartralic Acid(New, of Fremy). [Obtained, according to the most recent statement of this chemist, by heating tartaric acid to 190°. See Pelouze & Fremy, *Traité de Chimie générale*, Paris, 1855, **4.** 226; and *Gmelin's Handbook*, **10.** 333.] Deliquescent.
$2\,C_8\,H_4\,O_{10}, 3\,H\,O$

Tartralate of Baryta. Soluble in water, the solution undergoing decomposition when boiled.

Tartralate of Lead. Insoluble, or very sparingly soluble, in cold water.

Tartralate of Lime. Soluble in water, the solution undergoing decomposition when boiled.

Tartralate of Strontia. Soluble in water; the solution undergoing decomposition when boiled.

Tartramethane. *Vid.* Tartramate of Ethyl.

Tartramic Acid.
$C_8\,H_7\,N\,O_{10} = N \left\{ \begin{matrix} C_8\,H_4\,O_8'' \\ H_2 \end{matrix} \right. .\,O, H\,O$

Tartramate of Ammonia. Soluble in all proportions in water. Insoluble in alcohol. (Laurent, *Ann. Ch. et Phys.*, (3.) **23.** 116.)

Tartramate of Ethyl.
(*Tartramethane.*)
$C_8\,H_6\,(C_4\,H_5)\,N\,O_{10}$

Tartramate of Lime. Insoluble in alcohol. (Laurent, *loc. cit.*)
$C_8\,H_6\,Ca\,N\,O_{10}$

Tartramid. There are two modifications of tartramid (right and left), but they do not differ from each other in solubility. Soluble in water. (Pasteur.)
$C_8\,H_8\,N_2\,O_8 = N_2 \left\{ \begin{matrix} C_8\,H_4\,O_8'' \\ H_4 \end{matrix} \right.$

Tartramylic Acid. *Vid.* AmylTartaric Acid.

Tartaric Acid(amorphous). *Vid.* MetaTartaric Acid.

Tartaric Acid(anhydrous). There are two isomeric modifications: one soluble in water (*vid.* Tartrelic Acid), the other insoluble in water. This last is insoluble in cold water, alcohol, or ether; but when left in contact with water for several hours, it is converted into ordinary tartaric acid; this transformation is effected more rapidly by boiling water. (Fremy.)
(*Tartaric Anhydride.*)
$C_8\,H_4\,O_{10} = C_8\,H_4.O_8'' \left.\right\} O_2$

Tartaric Acid(ordinary). Permanent. There are two modifications (right and left). The ordinary acid is the "right" modification; but the solubility of both the modifications is the same. (Pasteur, *Ann. Ch. et Phys.*, (3.) **28.** 71.)
(*Weinsæure*, or *Weinsteinsæure.*)
$C_8\,H_6\,O_{12} = C_8\,H_4\,O_{10}, 2\,H\,O$

By direct experiment Pasteur found that 1 pt. of right tartaric acid is soluble in 1.326 pts. of water at 19° @ 20°; and that 1 pt. of left tartaric acid is soluble in 1.322 pts. of water at the same temperature. (*Ann. Ch. et Phys.*, (3.) **28.** 73.) Crystallized tartaric acid is soluble in 0.727 pt. of water at 15°. (Gerlach's determination, see his table of sp. grs., below.) Soluble in 0.538 pt. of cold water, and in less hot water. (Gmelin's *Handbook.*) The dilute aqueous solution is decomposed after a time. Soluble in 2 pts. of cold, and in 1 pt. of hot water. (Wittstein's *Handw.*) Soluble in 4 pts. of water at 15.5°, and in 0.5 pt. of boiling water; the solution saturated at 15.5° contains 20% of it, and the boiling saturated solution 66.66%. Soluble in 1.714 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht für* 1854, p. 76.)

Percentage of Crystallized Tartaric Acid ($C_8\,H_4\,O_{10} + 2\,Aq$) *in Aqueous Solutions.*

Sp. gr. (at 15°).	Percent of crystallized acid.
1.0045	1
1.0090	2
1.0136	3
1.0179	4
1.0224	5
1.0273	6
1.0322	7
1.0371	8
1.0420	9

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Sp. gr. at (15°).	Percent of crystallized acid.
1.04692	10
1.0517	11
1.0565	12
1.0613	13
1.0661	14
1.0709	15
1.0761	16
1.0813	17
1.0865	18
1.0917	19
1.09693	20
1.1020	21
1.1072	22
1.1124	23
1.1175	24
1.1227	25
1.1282	26
1.1338	27
1.1393	28
1.1449	29
1.15047	30
1.1560	31
1.1615	32
1.1670	33
1.1726	34
1.1781	35
1.1840	36
1.1900	37
1.1959	38
1.2019	39
1.20785	40
1.2138	41
1.2198	42
1.2259	43
1.2317	44
1.2377	45
1.2441	46
1.2504	47
1.2568	48
1.2632	49
1.26962	50
1.2762	51
1.2828	52
1.2894	53
1.2961	54
1.3027	55
1.3093	56
1.3159	57
1.3220	57.9*

(Gerlach, *Sp. Gew. der Salzlœsungen*, 1859, p. 24.)

* Saturated solution.

An aqueous solution of sp. gr. (at 15°).	Contains (by experiment) percent of the crystallized acid $C_8H_6O_{12}$.
1.0167	3.67
1.0337	7.33
1.0511	11.
1.0690	14.66
1.1062	22.
1.1654	33.

From these results Schiff deduces the formula: $D = 0.0044637\ p + 0.000016529\ p^2$; in which D = the sp. gr. of the solution, and p the percentage of substance in the solution, by means of which Ott has calculated the following table.

Sp. gr. (at 15°).	Percent of $C_8H_6O_{12}$.
1.0045	1
1.0090	2
1.0135	3
1.0181	4
1.0227	5
1.0274	6
1.0321	7
1.0368	8
1.0415	9
1.0463	10
1.0511	11
1.0559	12
1.0608	13
1.0657	14
1.0707	15
1.0757	16
1.0807	17
1.0857	18
1.0908	19
1.0859	20
1.1010	21
1.1062	22
1.1114	23
1.1166	24
1.1219	25
1.1272	26
1.1325	27
1.1379	28
1.1433	29
1.1488	30
1.1543	31
1.1598	32
1.1653	33
1.1709	34
1.1765	35
1.1821	36
1.1878	37
1.1935	38
1.1992	39
1.2050	40
1.2108	41
1.2166	42
1.2225	43
1.2884	44
1.2343	45
1.2403	46
1.2463	47
1.2523	48
1.2584	49
1.2645	50

(H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 189.)

Sp. gr.	Percent of cryst. acid.
1.04	9.06
1.08	17.45
1.12	24.98
1.16	32.06
1.20	39.04
1.24	46.03
1.28	52.59
1.32	58.75
1.36	64.56

(Richter, in *Gmelin's Handbook*, **10.** 271.)

1 0086	1.63
1.0235	5.00
1 0678	14 28
1.1090	22.27
1.1217	25.01
1.1553	30.76
1.1740	34.24
1.2078	40.00
1.2736	51.42

(Osann, *Kastner's Archiv.*, 1824, **3.** 370.)

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From these experimental results Osann deduces the formula: $y = 0.01729\,x + 4.1$, by which to calculate the percentage for any sp. gr. between 1.1217 and 1.2736; in this formula $x =$ the sp. gr. of the solution, and y the percentage of acid in the solution.

An aqueous solution containing 25% of crystallized tartaric acid, boils at 102.2°; one of 50% boils at 106.7°. (Gerlach's *Sp. Gew. der Salzlœsungen*, p. 111.)

Soluble in 2.06 pts. of alcohol, of 80%, at 15°; or 100 pts. of 80% alcohol at 15°, dissolve 49 pts. of it; or, the solution in 80% alcohol, saturated at 15°, contains 33% of it, and its sp. gr. is 0.999. (H. Schiff, *Ann. Ch. u. Pharm.*, 1860, **113.** 189.) Readily soluble in alcohol; more soluble in wood-spirit. Insoluble in ether.

Entirely insoluble in pure oil of turpentine. (Pasteur, *Ann. Ch. et Phys.*, (3.) **28.** 67.) Insoluble in caoutchin, but is decomposed when boiled with it. (Himly.) Soluble in boiling creosote, the solution solidifying as it becomes cold. (Reichenbach.)

Right and left tartaric acids, as well as their compounds, have identical solubilities so long as they are contained in combinations which exert no action upon polarized light; but when united with bodies which have any molecular action whatsoever on the plane of polarization, then their identity ceases, and they have no longer the same solubility. (Pasteur, *Ann. Ch. et Phys.*, (3.) **38.** pp. 460, 461.)

The normal tartrates, excepting those of the alkalies, are but sparingly soluble, or insoluble, in water; the acid salts, on the other hand, are mostly soluble, except those of the alkalies. All the metallic tartrates, which are insoluble in water, are soluble in chlorhydric and nitric acids, and, excepting those of silver and mercury, in aqueous solutions of caustic potash and soda; also in ammonia-water, excepting tartrate of mercury.

On the addition of a small portion of a ferment to dilute aqueous solutions of the alkaline tartrates, exposed to the air in a tolerably warm place, decomposition rapidly ensues, the salt being converted into a carbonate. (Buchner, Jr., *Ann. Ch. u. Pharm.*, 1851, **78.** 207.)

TARTRATE OF ALLYL. Soluble in ether. Decomposed by alkaline solutions.

TARTRATE OF ALUMINA. Permanent. Readily soluble in water. (v. Pæcken.) Not precipitated by the alkalies, or alkaline carbonates. (H. Rose.)
$C_{24}\,H_{12}\,(Al_2''')_2\,O_{36}$

TARTRATE OF ALUMINA & POTASH. Permanent. Very easily soluble in water. (Vogel.)

TARTRATE OF AMMONIA.

I.) *normal.* Efflorescent, with loss of ammonia. Very soluble in water, but more easily in *cold* than in hot water.
$C_8\,H_4\,(N\,H_4)_2\,O_{12}$

II.) *acid.* Very sparingly soluble in cold, readily soluble in boiling water. Completely insoluble in absolute alcohol. (Nœllner.)
$C_8\,H_5\,(N\,H_4)\,O_{12}$

100 pts. of water at 15° dissolve 2.192 pts. of right bitartrate of ammonia. (Pasteur, *Ann. Ch. et Phys.*, (3.) **38.** 464.) The right bitartrate combines with active bimalate of ammonia (*q. vid.*), but the left bitartrate does not thus combine, and is less soluble in a solution of active bimalate of ammonia than in pure water. (Pasteur, *loc. cit.*, p. 465.) More soluble in water than bitartrate of potash, which in other respects it resembles closely, being, like it, soluble in aqueous solutions of caustic potash, soda, and ammonia, and of the alkaline carbonates, as well as in the stronger acids. (H. Rose, *Tr.*)

TARTRATE OF AMMONIA & OF ANTIMONY. Efflorescent. Much more soluble in water than the corresponding potash salt.
(*Ammoniacal Tartar Emetic.*)
$C_8\,H_4\,Sb'''\,(N\,H_4)\,O_{14} + Aq$ & $5\,Aq$

TARTRATE OF AMMONIA & OF ARSENIC. Efflorescent. More soluble than arsenious acid in water. (Mitscherlich.)
$C_8\,H_4\,As'''\,(N\,H_4)\,O_{14} + Aq$

TARTRATE OF AMMONIA & OF IRON ($Fe_2\,O_3$). Soluble in a little more than 1 pt. of water, and the aqueous solution is not decomposed by long-continued boiling. Alcohol precipitates it from the aqueous solution. (Procter, *Amer. J. Pharm.*)
$C_8\,H_4\,Fe_2'''\,(N\,H_4)\,O_{14} + 4\,Aq$

TARTRATE OF AMMONIA & OF LEAD.

TARTRATE OF AMMONIA & OF LIME. The aqueous solution of bitartrate of lime is not precipitated by ammonia. (Thénard [T.].)

TARTRATE OF AMMONIA & OF MAGNESIA. Easily soluble in water, being much more soluble than normal tartrate of magnesia. Decomposed by ammonia-water. (W. Mayer, *Ann. Ch. u. Pharm.*, **101.** 166.) Very readily soluble in a solution of sulphate of ammonia, less soluble in a solution of chloride of ammonium. (Field.)

TARTRATE OF AMMONIA & OF POTASH. Efflorescent. Soluble in 2 pts. of cold, and in less than 1 pt. of boiling water. (Wittstein's *Handw.*) Soluble in 2 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht für* 1854, p. 76.) Very soluble in water. In consequence of the ammonia-salt being less soluble, this compound has a tendency to contain more than one equivalent of ammonia. Thus Rammelsberg describes a salt of the following composition, $C_8\,H_4\,(N\,H_4)_{\frac{6}{5}}\,K_{\frac{4}{5}}\,O_{12} + Aq$.
$C_8\,H_4\,(N\,H_4)\,K\,O_{12}$

TARTRATE OF AMMONIA & OF SODA. The solubility of both the right and left tartrate of ammonia and soda is the same; by direct experiment it was found that 1 pt. of the right tartrate is soluble in 3.706 pts. of water at 0°; and 1 pt. of the left tartrate in 3.742 pts. of water at 0°. (Pasteur, *Ann. Ch. et Phys.*, (3.) **28.** 91.)
$C_8\,H_4\,(N\,H_4)\,Na\,O_{12} + 8\,Aq$

TARTRATE OF AMMONIA & *of protoxide* OF URANIUM. Resembles the corresponding potash-salt.

TARTRATE OF AMMONIUMCHLOROPLATIN(*ous*)AMMONIUM. Somewhat soluble in water. (Gros, *Ann. der Pharm.*, 1838, **27.** 256.)
(*Gros's Tartrate.*)

TARTRATE OF ANILIN. More soluble in boiling than in cold water. (Hofmann, *Ann. Ch. et Phys.*, (3.) **9.** 155.)

TARTRATE OF ANISAMATE OF ETHYL. Soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** pp. 346, 347.)

TARTRATE OF ANTIMONY.

I.) *normal.* Hygroscopic. Easily soluble in water. Alcohol precipitates No. II. from the aqueous solution. (Berzelius, *Lehrb.*, **3.** 1124.)
$C_{24}\,H_9\,(Sb''')_2\,O_{42}$ (?) or $Sb\,O_3,\ 3\,C_4\,H_2\,O_5$

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II.) *di.* Insoluble in water or alcohol. Soluble $2\,Sb\,O_3, C_8\,H_6\,O_{12} + 2\,Aq$ in a solution of normal tartrate of potash, and in most other soluble tartrates, with combination. (Berzelius.)

III.) *acid.* Insoluble in alcohol. (Péligot, $Sb\,O_3, C_8\,H_4\,O_{10}$(?) *Ann. Ch. et Phys.*, (3.) **20.** 290.)

IV.) *peracid.* Deliquesces in moist air. Very $Sb\,O_3, C_{16}\,H_{16}\,O_{28}$? soluble in water. (Péligot, *loc. cit.*, p. 289.)

Tartrate of Antimony & of Baryta. Ppt. $C_8\,H_4\,Ba\,Sb'''\,O_{14} + 2\,Aq$

Tartrate of Antimony & of Cadmium. $C_8\,H_4\,Sb'''\,Cd\,O_{14}$ Ppt.

Tartrate of Antimony & of Chromium. $C_8\,H_4\,Cr_2'''\,Sb'''\,O_{16}$ Ppt.

Tartrate of Antimony & *of sesquioxide* of Iron. $C_8\,H_4\,Fe_2'''\,Sb'''\,O_{16}$ Ppt.

Tartrate of Antimony & of Lead. Ppt. $C_8\,H_4\,Sb'''\,Pb\,O_{14}$

Tartrate of Antimony & of Lime. Ppt. $C_8\,H_4\,Sb'''\,Ca\,O_{14}$

Tartrate of Antimony & of Lithia. $C_8\,H_4\,Sb'''\,Li\,O_{14} + 5\,Aq$

Tartrate of Antimony & of Potash.

I.) *normal.* Effloresces superficially. Soluble (*Tartar Emetic.*) $C_8\,H_4\,Sb'''\,K\,O_{14} + Aq$ in 14.5 pts. of cold, and in 1.88 pts. of boiling water. (Bucholz.)

[In *Brandes's Archiv.* (**3.** 223), R. Brandes & Firnhaber have published statements concerning the solubility of tartar emetic, which have been copied into many text-books of chemistry; but the figures of the article in question exhibit little accordance among themselves, and are in several instances manifestly erroneous. In the statements of the immediate results of their experiments, the figures indicate that the substance weighed by these chemists in their determinations was the anhydride $C_8\,H_2\,K\,Sb\,O_{12}$ [Eq. = 307.2]. Starting from this inference, I have recalculated each of their experiments from the statement of "dry residue found"; estimating the ordinary crystallized salt as $C_8\,H_6\,K\,Sb\,O_{15}$ [Eq. = 334.2*]. See the following table.]

1 pt. of the crystallized salt is

soluble in	18.80	pts. of water at	8.75°
"	11.42	"	21.25°
"	7.13	"	31.25°
"	5.61	"	37.5°
"	4.54	"	50°
"	3.76	"	62.5°
"	2.18	"	75°
"	2.02	"	87.5°
"	1.76	"	100°

Or, 100 pts.

of water at	8.75°	dissolve	5.320	pts. of it.
"	21.25°	"	8.756	"
"	31.25°	"	14.021	"
"	37.5°	"	17.830	"
"	50°	"	22.025	"
"	62.5°	"	26.608	"
"	75°	"	45.933	"
"	87.5°	"	49.541	"
"	100°	"	56.895	"

Or, the aqueous solution saturated at °C.	Contains per-cent of it.
8.75°	5.05
21.25°	8.05
31.25°	12.30
37.5°	15.13
50°	18.05
62.5°	21.02
75°	31.48
87.5°	33.13
100°	36.26

(From the data given by R. Brandes & Firnhaber, *Brandes's Archiv.*, 1823, **3.** 223.)

100 pts.	of water at	15.5°	dissolve	6.6	pts. of it.
"	"	100°	"	33	"
"	"	100°	"	50	"

(Ure's *Dict.*)

Soluble in 16 pts. of water at 18.75. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht für* 1854, p. 76.) It is liable to form supersaturated solutions. (Ogden.)

Insoluble in alcohol.

Freely soluble in glycerin. (Parrish's *Pharm.*, p. 236.)

The aqueous solution soon decomposes, but a solution prepared by dissolving 1 pt. of the salt in 50 pts. of water, and adding 10 pts. of alcohol, may be kept. (Harms, *Ann. Ch. u. Pharm.*, **96.** 128.)

II.) *acid.* Efflorescent. More soluble than $C_8\,H_4\,Sb'''\,K\,O_{14}; C_8\,H_6\,O_{12} + 2\,Aq$ the preceding salt in water. Alcohol precipitates the preceding salt when added to the aqueous solution. (Knapp.)

III.) Sparingly soluble in water, from which $C_8\,H_4\,Sb'''\,K\,O_{14}; 3\,C_8\,H_5\,K\,O_{12} + 3\,Aq$ it is precipitated on the addition of alcohol. (Knapp.)

IV.) $C_8\,H_4\,Sb'''\,K\,O_{14}; 6\,C_8\,H_4\,K_2\,O_{12}$ (Knapp.)

Tartrate of Antimony & of Silver. Ppt. $C_8\,H_4\,Sb'''\,Ag\,O_{14} + 2\,Aq$

Tartrate of Antimony & of Soda. Hygroscopic. $C_8\,H_4\,Sb'''\,Na\,O_{14} + Aq$

Tartrate of Antimony & of Strontia. $C_8\,H_4\,Sb'''\,Sr\,O_{14}$ Almost insoluble in boiling water; much more soluble in an aqueous solution of nitrate of strontia.

Tartrate of Antimony & of Uranium. $C_8\,H_4\,Sb\,Ur_2\,O_{16} + 2\,Aq = \left.\begin{matrix}C_8\,H_4\,O_8'' \\ Sb'''.\,Ur_2'''\end{matrix}\right\}O_8 + 2\,Aq\ \&\ 9\,Aq$ Soluble in boiling, but exceedingly sparingly soluble in cold water. (Péligot, *Ann. Ch. et Phys.*, (3.) **12.** 566.)

Tartrate of Arsenic($As\,O_3$) & of Potash. $C_8\,H_4\,As\,K\,O_{14} + Aq = \left.\begin{matrix}C_8\,H_4\,O_8'' \\ K.\,As'''\end{matrix}\right\}O_6 + Aq$ Efflorescent.

Tartrate of Arsenic($As\,O_5$) & of Potash. $C_8\,H_4\,As\,K\,O_{16} + 5\,Aq = \left.\begin{matrix}C_8\,H_4\,O_8'' \\ K.\,As^{v}\end{matrix}\right\}O_8 + 5\,Aq$ Very soluble in water, but the solution soon decomposes, unless free arsenic acid is present. Alcohol precipitates it from the aqueous solution. (Pelouze, *Ann. Ch. et Phys.*, (3.) **6.** 64.)

Tartrate of Asparagin. Soluble in water.?

Tartrate of AzoNaphtylamin. Tolerably soluble in water, and alcohol; less soluble in ether.

Tartrate of Baryta.

I.) *normal.* Soluble in from 400 @ 1000 pts. $C_8\,H_4\,Ba_2\,O_{12}$ of water; less easily soluble after

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* The equivalent of antimony, after Dexter, = 122.

drying. (Bolle.) Easily soluble in tartaric acid. Soluble in an aqueous solution of tartrate of ammonia.

When recently precipitated, it is soluble in a cold aqueous solution of chloride of ammonium, and also, though less readily, in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 96.) Unlike the tartrates of lime and strontia, its solutions in the fixed caustic alkalies do not coagulate when heated. (Osann, *Gilbert's Ann. der Phys.*, 1821, **69.** 290.) Insoluble in an aqueous solution of chloride of ammonium. (Wittstein.) Soluble in an aqueous solution of normal citrate of soda. (Spiller.)

II.) *bi.* 100 pts. of water at 18.3° dissolve 1.24 pts. of it. (Thomson's *System of Chem.*, London, 1831, **2.** 488.)

$C_8 H_5 Ba O_{12} + 2 Aq$

Tartrate of Baryta & of Potash. Very sparingly soluble in water. (Dulk.)

$C_8 H_4 K Ba O_{12} + 2 Aq$

Tartrate of Baryta & of Soda. Sparingly soluble in water; more soluble in aqueous solutions of Rochelle salts, and of chloride of barium. (Kaiser.)

$C_8 H_4 Na Ba O_{12} + 2 Aq$

Tartrate of Benzidin. Much more soluble in water than benzidin.

Tartrate of Bismuth. Decomposed by pure water. Insoluble in cold dilute tartaric acid.

$2 Bi O_3, 3 C_8 H_4 O_{10} = \left.\begin{matrix} 3\, C_8 H_4 O_8'' \\ 2\, Bi''' \end{matrix}\right\} O_{12} + Aq \;\&\; 6 Aq$

Tartrate of Bismuth & of Potash. Decomposed by water. (Schwarzenberg.)

$C_8 H_4 (Bi''')_2 O_{12} ;\; C_8 H_4 K_2 O_{12}$

Tartrate of Boron (B O₃) & of Lime, with Tartrate of Lime. Soluble in 257 pts. of water. (Wittstein.)

$\left.\begin{matrix} B''' \\ Ca . C_8 H_4 O_8'' \end{matrix}\right\} O_6 ;\; 3 \left.\begin{matrix} C_8 H_4 O_8'' \\ H . Ca \end{matrix}\right\} O_4 + 2 Aq$

Tartrate of Boron (B O₃) & of Potash. (*Soluble Cream of Tartar. Boro Tartrate of Potash.*)

I.) Permanent. Soluble in 0.75 pt. of cold, and in 0.25 pt. of boiling water. Insoluble in alcohol. (Berzelius's *Lehrb.*) Soluble in 1 pt. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht für* 1854, p. 76.)

$C_8 H_4 B K O_{14} = \left.\begin{matrix} C_8 H_4 O_8'' \\ B''' . K \end{matrix}\right\} O_6 \;\&\; + 2 Aq$

II.) Readily soluble in water. Sparingly soluble in alcohol of 25° B.

$C_8 H_4 B K O_{14} ;\; C_8 H_5 K O_{12} = \left.\begin{matrix} C_8 H_4 O_8'' \\ B''' . K \end{matrix}\right\} O_6 + \left.\begin{matrix} C_8 H_4 O_8'' \\ H . K \end{matrix}\right\} O_4$

III.) Permanent. Easily soluble in water. Slightly decomposed by alcohol, which also dissolves a trace of it as such. (Wittstein.)

$C_{16} H_{12} K B_2 O_{31} = \left.\begin{matrix} C_8 H_4 O_8'' \\ B''' . K \end{matrix}\right\} O_6 ;\; \left.\begin{matrix} C_8 H_4 O_8'' \\ B''' . H \end{matrix}\right\} O_6 + 8 Aq$

Tartrate of Boron (B O₃), of Potash, & of Soda. (*Borotartrate of Soda.*) Slowly deliquescent. Very easily soluble in water. Insoluble in, or decomposed by, alcohol. (Duflos.)

$\left.\begin{matrix} B''' \\ K . C_8 H_4 O_8'' \end{matrix}\right\} O_6 ;\; \left.\begin{matrix} B''' \\ Na . C_8 H_4 O_8'' \end{matrix}\right\} O_6 ;\; \left.\begin{matrix} B''' \\ H . C_8 H_4 O_8'' \end{matrix}\right\} O_6 + 12 Aq$

[There are several other compounds.]

Tartrate of Boron (B O₃) & of Soda. As hygroscopic as borax. Easily soluble in water. Slightly decomposed by alcohol, which also dissolves traces of it as such. (Wittstein.)

$C_{16} H_{12} Na B_2 O_{31} = \left.\begin{matrix} C_8 H_4 O_8'' \\ B''' . Na \end{matrix}\right\} O_6 ;\; \left.\begin{matrix} C_8 H_4 O_8'' \\ B''' . H \end{matrix}\right\} O_6 + 8 Aq$

Tartrate of Brucine.

I.) *normal.*

a = "*right.*" Efflorescent, though less so than the left salt. Sparingly soluble in cold, exceedingly soluble in warm water. Sparingly soluble in cold alcohol, being less soluble therein than the left salt. (Pasteur, *Ann. Ch. et Phys.*, (3.) **38.** 472.)

$C_8 H_4 \left(N_2 \left\{ C_{46} H_{26} O_8^{vi} . H \right.\right)_2 O_{12} + 6 Aq \;\&\; 11 Aq$

b = *left.* Very efflorescent. Sparingly soluble in cold, exceedingly soluble in warm water. More soluble in alcohol than the right salt. (Pasteur, *loc. cit.*)

$C_8 H_4 \left(N_2 \left\{ C_{46} H_{26} O_8^{vi} . H \right.\right)_2 O_{12} + 28 Aq$

II.) *acid.*

a = *right.* Soluble in water. Very sparingly soluble in cold, more soluble in hot alcohol. (Pasteur, *loc. cit.*, pp. 472, 473.)

$C_8 H_5 \left(N_2 \left\{ C_{46} H_{26} O_8^{vi} . H \right.\right) O_{12}$

b = *left.* Effloresces in dry air. Very sparingly soluble in cold, exceedingly soluble in warm water. Soluble in alcohol. (Pasteur, *loc. cit.*)

$C_8 H_5 \left(N_2 \left\{ C_{46} H_{26} O_8^{vi} . H \right.\right) O_{12} + 9 Aq$

Tartrate of Cadmium. Difficultly soluble in water.

$C_8 H_4 Cd_2 O_{12}$

Tartrate *of protoxide* of Cerium. Sparingly soluble in water. Readily soluble in aqueous solutions of caustic potash and soda, and still more soluble in ammonia-water. No more soluble in tartaric acid than in water. (Berzelius.)

$C_8 H_4 Ce_2 O_{12}$

*Bi*Tartrate of Cesium. Soluble in 10.32 pts. of water at 25°, and in 1.02 pts. of boiling water; being about 8 times as soluble as the corresponding rubidium salt. (Allen, *Am. J. Sci.*, 1862, **34.** pp. 372, 373.)

$C_8 H_5 Cs O_{12}$

Tartrate *of sesquioxide* of Chromium.

I.) *normal.* Efflorescent. Easily soluble in water. (Moser.) Not precipitated by alkaline solutions.

$C_{24} H_{12} (Cr_2''')_2 O_{36}$

II.) *basic.* Soluble in water. (Berzelius's *Lehrb.*, **3.** 1092.)

$C_{16} H_8 (Cr_2''')_2 O_{24}$

Tartrate of Chromium & of Lead. Ppt.

$C_8 H_4 Cr_2''' Pb O_{14}$

Tartrate of Chromium & of Potash. Slowly soluble in cold water, but quickly and abundantly in hot water. Insoluble in alcohol.

$C_8 H_4 Cr_2''' K O_{14} + 7 Aq$

Tartrate of Chromium & of Silver.

$C_8 H_4 Cr_2''' Ag O_{14}$

Tartrate of Cinchonicin. The right salt is more soluble in water than the left salt.

Tartrate of Cinchonidin (of Pasteur).

I.) *normal.* Readily soluble in water.

II.) *acid.* Very difficultly soluble in water. (Leers, *Ann. Ch. u. Pharm.*, **82.** 160.)

Tartrate of Cinchonin.

I.) *normal.* Sparingly soluble in water. (Arppe.)

$C_8 H_4 \left(N_2 \left\{ C_{40} H_{24} O_2^{vi} . H \right.\right)_2 O_{12} + 4 Aq$

II.) *acid.*

a = *right.* Very sparingly soluble in cold, $C_8H_5\left(N_2\left\{C_{40}H_{24}O_2^{vi}\,.\,H\right.\right)O_{12}+8\,Aq$ much more soluble in warm water. Very soluble in absolute alcohol. (Pasteur, *Ann. Ch. et Phys.*, (3.) **38.** pp. 470, 472.)

b = *left.* Extremely sparingly soluble in water, $C_8H_5\left(N_2\left\{C_{40}H_{24}O_2^{vi}\,.\,H\right.\right)O_{12}+2\,Aq$ and alcohol. 100 pts. of absolute alcohol at 19° dissolve 0.296 pt. of the crystallized salt, or 1 pt. of the latter is soluble in 337.8 pts. of absolute alcohol at 19°. (Pasteur, *loc. cit.*)

Tartrate of Cobalt. Soluble in water. $C_8H_4Co_2O_{12}$ Not precipitated by the caustic or carbonated alkalies.

Tartrate of Cobalt & of Potash.
$C_8H_4CoKO_{12}$

Tartrate of Codein.

Tartrate of Coniin. Soluble in water.

Tartrate *of protoxide* **of Copper.** Soluble $C_8H_4Cu_2O_{12}+6\,Aq$ in 1715 pts. of cold, and in 310 pts. of boiling water. (Werther.) Insoluble in cold water, but dissolves in more than 1000 pts. of boiling water. (Trommsdorff.) Soluble in an aqueous solution of caustic potash and soda, and in 2.5 pts. of carbonate of potash in aqueous solution. Easily soluble in a boiling, but nearly insoluble in cold dilute aqueous solution of carbonate of soda. Soluble in cold nitric acid. Insoluble in tartaric acid.

Tartrate of Copper(Cu O) & of Potash. $C_8H_4CuKO_{12}$ Readily soluble in water. Insoluble in alcohol: (Werther.)

Tartrate of Copper & of Soda.

I.) *basic.* Somewhat difficultly soluble in cold, $C_8H_4CuNaO_{12}\,;\,2\,CuO+7\,Aq$ but easily soluble in warm water. Insoluble in alcohol. (Werther.)

Tartrate of Cumidin.

Tartrate of Cupr(*ic*)ammonium. Permanent. $C_8H_4\left(N\left\{\begin{matrix}H_2\\Cu\end{matrix}\right.\right)_2O_{12}+4\,Aq$ Soluble in ammonia-water, from which it is precipitated on the addition of alcohol. (Du Menil.)

Tartrate of Emetin. Readily soluble in water.

Tartrate of Ethyl.

I.) *normal.* Very easily soluble in water. $C_8H_4(C_4H_5)_2O_{12}$ Miscible with ether in all proportions. (Demondesir.)

II.) *acid.* *Vid.* EthylTartaric Acid.
$C_8H_5(C_4H_5)O_{12}$

Tartrate of Ethylamin.

I.) *acid.* Soluble in water, and alcohol. (E. Meyer.)

Tartrate of Furfurin.

I.) *acid.* Permanent. Soluble in water. (Svanberg & Bergström.)

Tartrate of Glucina. Readily soluble in $C_{24}H_{12}(Gl_2''')_2O_{36}$ water. (Vauquelin.)

Tartrate of Glycocoll. Soluble in water. When alcohol is added to the aqueous solution an oily fluid separates. (Horsford, *Am. J. Sci.*, (2.) **4.** 63.)

Tartrate of Guanin.
$3\,C_{10}H_5N_5O_2,\,2\,C_8H_6O_{12}+4\,Aq$

Tartrate *of protoxide* **of Iron.**

a = *anhydrous.* Difficultly soluble in water. $C_8H_4Fe_2O_{12}$ Soluble in 1127 pts. of cold water [about 1200 pts. of water at 15° (Wittstein's *Handw.*, & Berzelius's *Lehrb.*)]. (Dulk.) Readily soluble in alkaline solutions.

b = *hydrated.* Soluble in 426 pts. of cold water, and in 402 pts. of boiling water. (Bucholz.) It is not precipitated by the alkalies or alkaline carbonates. Persoz mentions a "tartrate of iron" which is insoluble in water. (*Ann. Ch. et Phys.*, (2.) **63.** 278.).

Tartrate *of sesquioxide* **of Iron.** Tolerably $C_{24}H_{12}(Fe_2''')_2O_{36}+6\,Aq$ permanent. Easily soluble in water, the aqueous solution undergoing partial decomposition when boiled. Not precipitated by alkalies. Insoluble in alcohol or ether. (Wittstein.)

Soluble basic compounds may be obtained, though not so easily as with many other acids; three equivalents of tartaric acid being required to take up two equivalents of ferric oxide. (Ordway, *Am. J. Sci.*, 1858, (2.) **26.** 202.) Not precipitated by caustic alkalies.

Tartrate *of protoxide & sesquioxide* **of Iron.**

I.) Soluble in 384 pts. of cold, and in 320 pts. $C_8H_4Fe_2O_{12}\,;\,C_{24}H_{12}(Fe_2''')_2O_{36}+4\,Aq$ of boiling water. (Bucholz.)

II.) Resembles the normal tartrate of sesqui- $C_8H_4Fe_2O_{12}\,;\,3(C_{24}H_{12}(Fe_2''')_2O_{36})+24\,Aq$ oxide of iron. (Wittstein.) The aqueous solution is decomposed by continuous boiling.

III.) *basic.* Insoluble in water, alcohol, or $C_8H_4Fe_2O_{12}\,;\,3\,(C_{12}H_6(Fe_2''')_2O_{24})$ ether. Acetic acid only dissolves traces of it. Completely soluble in much tartaric acid. Easily soluble in the mineral acids. Insoluble in ammonia-water. (Wittstein.)

Tartrate *of protoxide* **of Iron & of Potash.** $C_8H_4FeKO_{12}$ Sparingly soluble in water.

Tartrate *of sesquioxide* **of Iron & of Potash.**

I.) *normal.* Hygroscopic. Soluble in 7 pts. of $C_8H_4KFe_2'''O_{14}$ water. (Parrish's *Pharm.*, p. 518.) The dry salt is soluble in 4 pts. of water, and is also slightly soluble in alcohol. (Bucholz [T.].) Insoluble in alcohol.

II.) *basic.* There are numerous other basic salts more or less soluble in water; most of them being but partially soluble, however.

Bitartrate of potash can dissolve two equivalents of hydrated sesquioxide of iron, making $2\,Fe_2O_3,\,KO,\,C_8H_4O_{10}$. (Ordway, *Am. J. Sci.*, 1858, (2.) **26.** 202.)

Tartrate of Lanthanum. Soluble in ammonia-water. (Berzelius.)

Tartrate of Lead. Almost entirely insol- $C_8H_4Pb_2O_{12}$ uble in water. (Pasteur, *Ann. Ch. et Phys.*, (3.) **28.** 65.) Very soluble in tartaric and nitric acids, from which it is not precipitated on the addition of alcohol. Easily soluble in an aqueous solution of tartrate of ammonia. Soluble in warm solutions of the nitrate and succinate of ammonia, and imperfectly in carbonate of ammonia. (Wittstein.) Soluble in nitric, but insoluble in acetic acid. (Persoz, *Chim. Moléc.*, p. 354, *text and note.*) When recently precipitated it is soluble in a cold aqueous solution of chloride of ammonium; the lead may be reprecipitated from this solution by adding an excess of caustic ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** pp. 96, 99.) Soluble in a strong aqueous solution of chloride of sodium; from the solution thus obtained crystals of a double salt of tartrate and chloride of lead separate out after a time. (Becquerel, *C. R.*, 1845, **20.** pp. 1523, 1525.) Soluble in aqueous solutions of the caustic alkalies.

TARTRATE OF LEAD & OF POTASH. $C_8 H_4 Pb K O_{12}$ Insoluble in water, and is not decomposed by aqueous solutions of the alkaline sulphates or carbonates. (Thénard.)

TARTRATE OF LIME.

I.) *normal.* $C_8 H_4 Ca_2 O_{12} + 8 Aq$ Very sparingly soluble in cold, somewhat more soluble in boiling water.

Soluble in 1995 pts. of water at 8°.
" 906 " " at 80°. (Osann.)
" 600 " boiling water.
" 1210 " cold "
" 350 " boiling "

(Casselmann, *J. Ch. Soc.*, **8.** 306; from *Arch. Pharm.*, **83.** 148.)

Insoluble in cold water; but 100 pts. of boiling water dissolve 0.16 pt. of it. (Ure's *Dict.*) Easily soluble in the mineral acids, acetic acid, tartaric acid, in an aqueous solution of bitartrate of potash, or of any of the soluble tartrates. When recently precipitated it is soluble even in cold aqueous solutions of chloride of ammonium and nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 96.) This solution does not occur, however, after the precipitate has become crystalline. (Wittstein.) The chlorhydric acid solution of tartrate of lime is not precipitated on the addition of ammonia.

Soluble in concentrated aqueous solutions of normal tartrate of potash, tartrate of potash and ammonia, and tartrate of potash and soda, separating out again for the most part when the solutions are diluted with water. (Hornemann.) A solution of 1 pt. of normal tartrate of potash in 1 pt. of water dissolves 27% of tartrate of lime at the temperature of ebullition. (Hornemann.) Soluble in cold, or better in moderately warm aqueous solutions of caustic potash or soda; a completely saturated solution obtained in this manner is partially precipitated on the addition of water, but no precipitate is produced by water in solutions containing an excess of alkali. These solutions in the fixed alkalies undergo decomposition on being heated, a basic tartrate of lime being precipitated, but this precipitate redissolves as the liquid in which it has formed becomes cold. (Osann, *Kastner's Archiv.*, 1824, **3.** 207; compare Tartrate of Lime & of Potash.)

II.) *acid.* $C_8 H_5 Ca O_{12}$ Soluble in 140 pts. of water at 16° [45° in B.'s *Lehrb.*]; more readily soluble in hot water. (Dulk.)

III.) *basic.* $3 Ca O, T$ Insoluble in water, or in hot or cold potash lye. (Osann, *Kastner's Archiv.*, 1824, **3.** 209, and 1825, **5.** 107.)

TARTRATE OF LIME & OF POTASH.

I.) *normal.*

II.) *With excess of Tartrate of Potash.* Hygroscopic. Completely soluble in boiling, but decomposed by cold water. (Hornemann.) Soluble in water. Whenever the cold aqueous solution is heated to boiling an abundant precipitate is formed, but redissolves when the liquid is allowed to cool. (Lassone, *Mémoires de l'Acad. des Sci.* (*de Paris*), 1773, p. 193 *et seq.*) This coagulation occurs as well in closed as in open vessels; up to a certain point the precipitate is more abundant in proportion as the solution is more concentrated, but when the solution is very concentrated coagulation no longer occurs; as a rule, the temperature at which precipitation takes place is higher in proportion as the solution is more concentrated, and the precipitate also dissolves again more quickly when the solution from which it was precipitated is more concentrated. (Osann, *Gilbert's Ann. der Phys.*, 1821, **69.** pp. 288, 291.) The precipitate consists of basic tartrate of lime. (Osann, *Kastner's Archiv.*, 1824, **3.** 204.)

III.) *acid.* Nearly insoluble in cold, decomposed by boiling water. (Martius.)

TARTRATE OF LIME & OF SODA.

I.) $C_8 H_4 Ca Na O_{12}$ Sparingly soluble in water, more readily soluble in an aqueous solution of Rochelle salt, and still more readily in a solution of chloride of calcium. (Kaiser.)

II.) *basic.* Soluble in water. Whenever the cold aqueous solution is heated nearly to boiling an abundant precipitate is formed, but redissolves when the liquid is allowed to cool. (Lassone, *Mémoires de l'Acad. des Sci.* (*de Paris*), 1773, p. 199.) This coagulation occurs as well in closed as in open vessels; up to a certain point the precipitate is more abundant in proportion as the solution is more concentrated, but in very concentrated solutions precipitation no longer occurs. As a rule, the temperature at which precipitation takes place is higher in proportion as the solution is more concentrated, and the precipitate also dissolves again more quickly when the solution from which it was precipitated is more concentrated. (Osann, *Gilbert's Ann. der Phys.*, 1821, **69.** pp. 288, 291.) The precipitate consists of basic tartrate of lime. (Osann, *Kastner's Archiv.*, 1824, **3.** 204.)

TARTRATE OF LITHIA.

I.) *normal.* $C_8 H_4 Li_2 O_{12}$ Permanent. Very readily soluble in water. (Arfvedson.)

II.) *acid.* $C_8 H_5 Li O_{12} + 8 Aq$ Still more soluble in water than the normal salt. (C. Gmelin.)

TARTRATE OF LITHIA & OF POTASH. $C_8 H_4 Li K O_{12} + 2 Aq$ Permanent. (Troost.) Slightly efflorescent. Readily soluble in water. (C. Gmelin.)

TARTRATE OF LITHIA & OF SODA. $C_8 H_4 Li Na O_{12} + 4 Aq$ Superficially efflorescent. Easily soluble in water. (C. Gmelin.)

TARTRATE OF MAGNESIA.

I.) *normal.* $C_8 H_4 Mg_2 O_{12} + 8 Aq$ Soluble in 122 pts. of water at 16°. (Dulk.) [In 123.3 pts. of water at 15°. (Berzelius, *Lehrb.*).] When recently precipitated, it is soluble in aqueous solutions of chloride of ammonium, and also, though less readily, of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 96.)

II.) *acid.* $C_8 H_5 Mg O_{12}$ Soluble in 52 pts. of water, at 16° [in 53 pts. of water at 15°. (Berzelius, *Lehrb.*).] (Dulk.) Difficultly soluble in alcohol, which precipitates it from the aqueous solution. (Bergman, *Essays*, **1.** 450.)

III.) *basic.* $C_8 H_4 Mg_2 O_{12}, 2 Mg O + 4 Aq$ Very sparingly soluble in water, requiring 4100 pts. of water, at the ordinary temperature, to dissolve it. In ammoniacal water its solubility is the same as in pure water. Somewhat more readily soluble in an aqueous solution

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of chloride of ammonium. (W. Mayer, *Ann. Ch. u. Pharm.*, **101.** 169.)

TARTRATE OF MAGNESIA & OF POTASH.

$C_8 H_4 Mg K O_{12} + 8 Aq$

I.) Easily soluble in water, being much more readily soluble than the normal tartrate of magnesia. (W. Mayer, *loc. cit.*)

$2 C_8 H_4 Mg_2 O_{12} ; C_8 H_8 K O_{12} + 4 Aq$

II.) Small crystals. Permanent. Insoluble in water. (T. Thomson, in his *System of Chem.*, London, 1831, **2.** 794.)

$C_8 H_4 Mg Na O_{12} + 10 Aq$

TARTRATE OF MAGNESIA & OF SODA. Efflorescent. Easily soluble in water; being much more readily soluble than the normal tartrate of magnesia. (W. Mayer, *loc. cit.*)

$Mg O, C_2 H_4 N_2 O_2, 2 C_8 H_4 O_{10}$

TARTRATE OF MAGNESIA & OF UREA. Tolerably soluble in water. (Hlaziwetz.)

$C_8 H_4 Mn_2 O_{12}$

TARTRATE *of protoxide* OF MANGANESE. Difficultly soluble in water. Decomposed by boiling water to an insoluble basic and a soluble acid salt. (Pfaff.) Not precipitated by alkaline solutions.

TARTRATE *of sesquioxide* OF MANGANESE.

$C_8 H_4 Mn K O_{12}$

TARTRATE *of protoxide* OF MANGANESE & OF POTASH. Very soluble in water. Not precipitated by caustic or carbonated alkalies. (Scheele.)

$C_8 H_4 \left(N \left\{ \begin{matrix} H_3 \\ Hg \end{matrix} \right. \right)_2 O_{12} ; 6 Hg O$

TARTRATE OF MERCUR(*ic*)AMMONIUM with *prot*OXIDE OF MERCURY. Soluble in 1000 pts. of water; and in 455 pts. of alcohol. Insoluble in ether. Easily soluble in chlorhydric acid. Partially soluble in concentrated sulphuric acid; scarcely at all soluble in cold, almost entirely soluble in hot nitric acid. (Harff.)

TARTRATE OF *tri*MERCUR(*ic*)AMMONIUM.

I.) Insoluble in water.

$C_8 H_4 \left(N \left\{ \begin{matrix} H \\ Hg_3 \end{matrix} \right. \right)_2 O_{12} + 6 Aq$

II.) "*neutral.*" Readily soluble in water either hot or cold. Insoluble in alcohol or ether. Soluble in cold concentrated sulphuric acid. (Burckhardt.)

III.) *basic.* Insoluble in water, alcohol, or ether. Easily soluble in nitric, acetic, and tartaric acids. (Burckhardt.)

TARTRATE OF MERCUR(*ous*)AMMONIUM.

I.) *basic, white.* Insoluble either in hot or in cold water. Soluble, especially while it is moist, in ammonia-water, and in aqueous solutions of nitrate and tartrate of ammonia. Soluble in strong acetic acid, in hot nitric acid, and in cold concentrated sulphuric acid. (Burckhardt.)

II.) *basic, black.* Insoluble in water, alcohol, or ether. Mostly soluble in nitric and acetic acids. (Harff.)

$C_8 H_4 Hg_4 O_{12}$

TARTRATE *of dinoxide* OF MERCURY. Insoluble in water, alcohol, or ether. Decomposed by boiling water. Easily soluble, especially when moist, in strong acetic, and tartaric acids, in nitric acid, even dilute, and in boiling concentrated sulphuric acid, but less easily soluble in dilute sulphuric acid. (Burckhardt.) 1000 pts. of water dissolve 1.2 pts. of it; 1000 pts. of alcohol 1.3 pts. When boiled with pure water it is decomposed, an acid salt dissolving, while an insoluble basic salt remains. Soluble without decomposition in a boiling aqueous solution of tartaric acid. (Harff, in *Berzelius's Lehrb.*) When treated with aqueous solutions of the alkaline chlorides, and especially if these are hot, a certain amount of protochloride of mercury is formed and dissolves. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 179.) Soluble in a hot or warm aqueous solution of chloride of ammonium; less readily soluble in a solution of nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 97.)

$C_8 H_4 Hg_2 O_{12}$

TARTRATE *of protoxide* OF MERCURY. Insoluble in water, alcohol, or ether, even when these are boiling. (Burckhardt.)

1000 pts. of water dissolve 3. pts. of it.
" alcohol " 2.6 "
" ether " 3.8 "

In the presence of free tartaric acid its solubility in these liquids is increased. (Harff, in *Berzelius's Lehrb.*) Only a trifle more soluble in water than the tartrate of the dinoxide, but exceedingly soluble in aqueous solutions of the alkaline chlorides, with formation of protochloride of mercury; this solution is affected still more readily when heat is applied. (Mialhe, *Ann. Ch. et Phys.*, (3.) **5.** 182.) Soluble in strong acetic and tartaric acids; and in boiling concentrated sulphuric acid, though nearly insoluble in cold sulphuric acid. Readily soluble in dilute nitric acid.

$C_8 H_4 Hg_2 K O_{12}$

TARTRATE *of dinoxide* OF MERCURY & OF POTASH. Insoluble in cold, sparingly soluble in boiling water. Readily soluble in nitric, acetic, and hot tartaric acid, from the last of which it separates out unchanged on cooling. (Burckhardt.)

TARTRATE *of protoxide* OF MERCURY & OF POTASH. Nearly insoluble in cold, sparingly soluble in hot water. Insoluble in alcohol or ether. (Burckhardt.) Soluble in ether. (Harff.) Soluble in chlorhydric and nitric acids (Harff), and in warm concentrated sulphuric acid, with partial decomposition. Also soluble in an aqueous solution of normal tartrate of potash.

TARTRATE OF METHYL.

I.) *normal.*

$C_8 H_4 (C_2 H_3)_2 O_{12}$

II.) *acid.* *Vid.* MethylTartaric Acid.

$C_8 H_5 (C_2 H_3) O_{12}$

TARTRATE OF METHYLNICOTIN. Soluble in water.

TARTRATE *of protoxide* OF MOLYBDENUM. Insoluble in water. Slightly soluble in tartaric acid. (Berzelius, *Lehrb.*)

$C_8 H_4 Mo'' O_{12}$

TARTRATE *of binoxide* OF MOLYBDENUM. Soluble in water. Not precipitated by caustic alkalies. (Berzelius.)

TARTRATE OF MOLYBDIC ACID. Completely soluble in water, and alcohol. (Berzelius, *Lehrb.*)

TARTRATE *of protoxide* OF MOLYBDENUM & OF POTASH. Sparingly soluble in water. Easily soluble in ammonia-water.

TARTRATE *of binoxide* OF MOLYBDENUM & OF POTASH.

I.) *normal.* Readily soluble in water. (Berzelius.)

II.) *basic.* Sparingly soluble in water. Soluble in alkaline solutions.

TARTRATE OF MOLYBDIC ACID & OF POTASH. Soluble in water.

TARTRATE OF MORPHINE.

I.) *normal.* Efflorescent. Soluble in water, and alcohol.

$C_8 H_4 \left(N \left\{ \begin{matrix} C_{34} H_{18} O_6'' . H \\ H \end{matrix} \right. \right)_2 O_{12} + 6 Aq$

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II.) *acid.*

$C_8 H_5 \left(N \left\{ \begin{array}{l} C_{24} H_{16} O_6'' . H \\ H \end{array} \right. \right) O_{12} + Aq$

$C_8 H_4 Ni_2 O_{12}$

Tartrate of Nickel. Almost insoluble in water, even when this is hot. (Werther.) Soluble in tartaric acid, and in the other vegetable acids. It is not precipitated when tartaric acid is added to the solution of a nickel salt. (Tupputi, *Ann. de Chim.*, 1811, **78.** 164.) Easily soluble in aqueous solutions of caustic potash and soda, and in boiling solutions of the alkaline carbonates. Not precipitated by alkaline carbonates.

$C_8 H_4 Ni K O_{12}$

Tartrate of Nickel & of Potash. Efflorescent. Easily soluble in water. (Wœhler.)

Tartrate of Nicotin. Readily soluble in water. (Posselt & Reimann.)

Tartrate of (α) **NitrAnilin.** Soluble in water.

Tartrate of (β) **NitrAnilin.** Soluble in water, and in an aqueous solution of caustic potash. (Arppe.)

$C_8 H_4 Pd_2 O_{12}$

Tartrate of Palladium. Ppt.

Tartrate of Picolin. Soluble in absolute alcohol. (Unverdorben.)

Tartrate of Potash.

(*Soluble Tartar.*)
$C_8 H_4 K_2 O_{12}$

I.) *normal.* Deliquesces in very moist air.

Soluble in	0.75	pt. of water at	2°
"	0.66	"	14°
"	0.63	"	23°
"	0.47	"	64°

(Osann.)

Soluble in 1 pt. of water at 10°, and still more soluble in hot water. (Wenzel, *Verwandtschaft*, p. 308 [T.].) Soluble in 1 pt. of cold, and in 0.5 pt. of boiling water. (Wittstein's *Handw.*) 100 pts. of water dissolve 133 pts. of it at 15°, and 296.2 pts. at 114.7°, the boiling point of the saturated aqueous solution. (Berzelius, *Lehrb.*, **3.** 168.) Soluble in 240 pts. of boiling alcohol. (Wenzel.) The aqueous solution saturated at 10° contains 33.3% of it (Eller); and at 12.5°, 61.7%. (Hassenfratz, *Ann. de Chim.*, **28.** 291.) Soluble in 1 pt. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht für* 1854, p. 76.) 100 pts. of the saturated aqueous solution, at its boiling point (112.2°), contain 68 pts. of the dry salt; or 100 pts. of water at 112.2° dissolve 212.5 pts. of it; or 1 pt. of the dry salt is soluble in 0.471 pt. of water at 112.2°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) The saturated aqueous solution boils at 116.7°. (Faraday.)

Very sparingly soluble in boiling alcohol.

An aqueous solution of sp. gr. (at 12.5°)	Contains per-cent of the salt.	An aqueous solution of sp. gr. (at 12.5°)	Contains per-cent of the salt.
1.0050	1	1.0856	16
1.0102	2	1.0968	18
1.0153	3	1.1080	20
1.0212	4	1.1196	22
1.0258	5	1.1317	24
1.0311	6	1.1447	26
1.0363	7	1.1569	28
1.0417	8	1.1700	30
1.0470	9	1.1838	32
1.0525	10	1.1978	34
1.0634	12	1.2118	36
1.0744	14	1.2259	38
1.2400	40	1.3351	52
1.2547	42	1.3527	54
1.2696	44	1.3707	56
1.2861	46	1.3902	58
1.3015	48	1.4120	60
1.3180	50		

(Hassenfratz, *Ann. de Chim.*, **28.** 304.)

In a solution containing for 100 pts. of water, pts. of dry normal tartrate of potash,	The boiling point is elevated.	Difference.
0.0	0°	
26.9	1°	26.9
47.2	2°	20.3
65.0	3°	17.8
82.3	4°	17.3
100.1	5°	17.8
118.5	6°	18.4
137.3	7°	18.8
156.5	8°	19.2
176.1	9°	19.6
196.2	10°	20.1
216.8	11°	20.6
237.9	12°	21.1
259.5	13°	21.6
281.6	14°	22.1
296.2 (saturated)	14.67°	14.6

The point of ebullition of pure water, observed in a glass tube containing bits of zinc, having been 100.3°. (Legrand, *Ann. Ch. et Phys.*, 1835, (2.) **59.** 438.) It has a remarkable tendency to cause succussion when added to a boiling liquid. (*Ibid.*, p. 426.)

(*Cream of Tartar. Tartar.*)
$C_8 H_5 K O_{12}$

II.) *acid*, or *bi.* Permanent. Very sparingly soluble in cold water.

Soluble in	240	pts. of water at	10°. (Pettenkofer.)
"	234.6	"	15.5°. [T.]
"	238	"	2.7°.
"	190	"	13°
"	54	"	40°
"	20	"	68°. (Osann.)
Soluble in	183.67 184.71 202.10	pts. of water at	18.75°.
"	89.0	"	25°
"	47.4	"	37.5°
"	37.8	"	50°
"	32.4	"	62.5°
"	22.0	"	75°
"	17.7	"	87.5°
"	14.3	"	100°

Or, the aqueous solution saturated at °C.	Contains percent of the salt.
18.75°	0.54 0.53 0.49
25°	1.11
37.5°	2.06
50°	2.58
62.5°	2.99
75°	4.35
87.5°	5.62
100°	6.32

(R. Brandes & Wardenburg, *Ann. der Pharm.*, 1832, **1.** pp. 12-16.) [The first of these two tables is calculated from the *experimental data* of B. & W.] Soluble in 177.6 pts. of water at 17.5°, and in 15.3 pts. of boiling water (Melandri-Contessi, from *Gazz. eclet. di Farm.*, Verona 1832, No. 15, in *Ann. der Pharm.*, 1833, **5.** 312); in 184 pts. of cold, and in 18 pts. of boiling water

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(Parrish's *Pharm.*, p. 456); in 95 pts. of cold water (Vogel); in 15 pts. of boiling water (A. Vogel); in somewhat more than 14 pts. of boiling water (Wenzel, *Verwandtschaft*, p. 311 [T.]); in 160 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht für* 1854, p. 76.) 100 pts. of the saturated aqueous solution, at its boiling point (= 101.1°), contain 9.5 pts. of the dry salt; or, 100 pts. of water at 101.1° dissolve 10.497 pts. of it; or, 1 pt. of the dry salt is soluble in 9.526 pts. of water at 101.1°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.) 100 pts. of water at 15.5° dissolve 4.6 pts. of it, and at 100° 7.0 pts. of it. (Ure's *Dict.*) The aqueous solution saturated at 10° contains 5.8% of it. (Eller, cited in *Ann. de Chim.*, **28.** 291.) The aqueous solution, when left to itself, gradually undergoes decomposition. (Berthollet, *Mem. Par.*, 1782 [T.].)

Insoluble in strong alcohol. Very soluble in concentrated mineral acids. An addition of chlorhydric acid greatly increases the solvent power of water upon it; then follow, in order, sulphuric, nitric, oxalic, phosphoric, and citric acids. Acetic acid has but little influence, and tartaric acid seems to render it less soluble. It is much more soluble in boracic acid than in water. From the solution in water acidulated with chlorhydric acid, alcohol precipitates it as such, but from the solution in dilute sulphuric acid alcohol precipitates sulphate of potash, and from an aqueous solution which contains it and nitrate of potash, the latter is precipitated on the addition of alcohol. (Destouches.) Readily soluble in aqueous solutions of caustic potash, soda, and ammonia, and of carbonate of potash.

Tartrate of Potash & of Silver. Insoluble in water. Soluble in ammonia-water. Decomposed by solutions of the fixed alkalies and their carbonates, also by solutions of the sulphates and chlorides. (*Ann. de Chim.*, **28.** 36 [T.].)

$C_8 H_4 K Ag O_{12}$

Tartrate of Potash & of Soda. Permanent. The anhydrous salt dissolves in 2.62 pts. of water at 6°. (Fresenius.)

(Rochelle Salt. Seignette Salt.)
$C_8 H_4 K Na O_{12} + 8 Aq$

The crystallized (hydrated) salt
is soluble in 3.3 pts. of water at 3°
" 2.4 " 11°
" 1.5 " 26°
(Osann.)

1 pt. of the crystallized salt
is soluble in 1.99 pts. of water at 1.88°
" 1.22 " 12.50°
" 0.42 " 25°
" 0.30 " 37.5°

Or, 100 pts. of water at °C	Dissolve of the crystallized salt, pts.
1.88°	53
12.50°	82
25°	239
37.5	332

Or, the aqueous solution saturated at	Contains percent of the crystallized salt
1.88°	34.67
12.50°	45.76
25°	70.73
37.5°	76.84

(R. Brandes, cited in *Brandes's Archiv.*, 1824, **9.** 108, from *Buchner's Repertitorium*, **14.** pp. 449 – 452. In his *Jahresbericht*, **4.** 101, Berzelius gives the first table, as from *Buchner's Repert.*, **14.** pp. 451, 105, but prints 5.6°, instead of 1.88° as above.) When the salt is heated above 37.5° it begins to soften, and at 50° it melts completely in its water of crystallization. (Brandes, *Archiv.*, *loc. cit.*) Soluble in 1.714 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in Canstatt's *Jahresbericht für* 1854, p. 76.) 100 pts. of water at 15.5° dissolve 20 pts. of it. (Ure's *Dict.*) An aqueous solution saturated at 8° is of 1.254 sp. gr. (Anthon, *Ann. der Pharm.*, 1837, **24.** 211.) 100 pts. of the aqueous solution saturated at its boiling point (115.5°) contain 90 pts. of the anhydrous salt, or 100 pts. of water at 115.5° dissolve 900 pts. of it; or 1 pt. of the anhydrous salt is soluble in 0.1112 pt. of water at 115.5°. (T. Griffiths, *Quar. J. Sci.*, 1825, **18.** 90.)

Insoluble in alcohol.

It is liable to form supersaturated solutions. (Ogden.)

Tartrate of Potash & of Strontia.

I.) *normal.* Exceedingly difficultly soluble in water. (Dulk.)

$C_8 H_4 K Sr O_{12} + 2 Aq$

II.) *basic.* Soluble in water. Whenever the cold aqueous solution is heated an abundant precipitate forms in it, which redissolves as the liquid cools unless the heating has been long continued. This coagulation occurs as well in closed as in open vessels. Up to a certain point the precipitate is more abundant in proportion as the solution is more concentrated, but when the solution is very concentrated coagulation no longer occurs. As a rule, the temperature at which precipitation takes place is higher in proportion as the solution is more concentrated, and the precipitate also dissolves again more quickly when the solution from which it was precipitated is more concentrated. (Osann, *Gilbert's Ann. der Phys.*, 1821, **69.** pp. 290, 291; compare *Idem*, *Kastner's Archiv.*, 1824, **3.** 204.)

Tartrate of Potash & of Tellurium. Decomposed by cold, soluble in warm water.

Tartrate of Potash & of Thoria. Slowly soluble in water. It is not precipitated by alkalies. (Berzelius, *Pogg. Ann.*, 1829, **16.** 413.)

$C_8 H_4 K Th O_{12}$

Tartrate of Potash & *of protoxide* of Tin. Easily soluble in water. No precipitate is produced in its aqueous solution by the caustic or carbonated alkalies. (Thénard; Schneider.)

$C_8 H_4 K Sn O_{12}$

Tartrate of Potash & *of protoxide* of Uranium. Easily soluble in water.

$4 K O, 10 Ur O, 6 C_8 H_4 O_{10} + 4 Aq$

Tartrate of Potash & *of binoxide* of Vanadium. Soluble in water.

Tartrate of Potash & of Zinc. Very soluble in water. No precipitate is produced in its solution by the alkalies or their carbonates. (Thénard, *Ann. de Chim.*, **38.** 35 [T.].)

$C_8 H_4 K Sr O_{12}$

Tartrate of Quinicin. The right salt is more soluble in water than the left salt.

Tartrate of Quinidin. More soluble in water than the corresponding salt of quinine.

Tartrate of Quinine.

I.) *normal.* Sparingly soluble in water. (Arppe.)

$C_8 H_4 \left(N_2 \right\} C_{40} H_{24} O_4^{vi} . H \Big)_2 O_{12} + 2 Aq$

II.) *acid.* Easily soluble in water. (Arppe.)

$C_8 H_6 \left(N_2 \right\} C_{40} H_{24} O_4^{vi} . H \Big) O_{12} + 2 Aq$

According to Pasteur, there are two isomeric modifications of the acid salt.

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a = *right.* Less soluble than *b* in water.

b = *left.* Readily soluble in water. Much more soluble in water than the right salt, especially when the water is warm. (Pasteur, *Ann. Ch. et Phys.*, 1853, (3.) **38.** 477.)

***Bi*Tartrate of Rubidium.** Soluble in 84.56 pts. of water at 25°, and in 8.5 pts. of boiling water; being about 8 times less soluble in water than the corresponding salt of cesium. (Allen, *Am. J. Sci.*, 1862, **34.** pp. 372, 373.)

$C_8 H_5 Rb O_{12}$

Tartrate of Silver. Scarcely at all soluble in water. Soluble in ammonia-water.

$C_8 H_4 Ag_2 O_{12}$

It is not precipitated from solutions which contain citrate of soda. (Spiller.)

Tartrate of Soda.

I.) *normal.* Permanent.

$C_8 H_4 Na_2 O_{12} + 4 Aq$

Soluble in 5 pts. of water at the ordinary temperature. It *dissolves* in 0.5 pt. of boiling water, but the saturated solution thus obtained may be rendered very much more concentrated, and that without depositing any of the salt, by evaporating it at the temperature of boiling; thus 1 pt. of the salt may even remain dissolved in 0.0417 pt. of the boiling water; on cooling such a syrup for a moment it solidifies. (Bucholz, *Gehlen's Neues all. Journ. der Chemie*, 1805, **5.** 528.) Soluble in 1 pt. of cold water, and in all proportions in hot water. (Wenzel, *Verwandtschaft*, p. 308 [T.].)

Soluble in	2.	pts. of cold water.	(Herzog.)
"	3.46	"	at 6°
"	2.28	"	24°
"	1.75	"	38°
"	1.5	"	42.5°
			(Osann.)

The aqueous solution saturated at 10° contains 27.2% of it (Eller); and at 12.5°, 33.3%. (Hassenfratz, *Ann. de Chim.*, **28.** 291.) 100 pts. of water at 15.5° dissolve 100 pts. of it. (Ure's *Dict.*)

An aqueous solution of sp. gr. (at 12.5°).	Contains percent of the salt.
1.0034	1
1.0072	2
1.0108	3
1.0148	4
1.0190	5
1.0231	6
1.0272	7
1.0313	8
1.0355	9
1.0397	10
1.0481	12
1.0567	14
1.0655	16
1.0745	18
1.0837	20
1.1032	22
1.1153	24
1.1283	26
1.1436	28
1.1600	30
1.1801	32

(Hassenfratz, *Ann. de Chim.*, **28.** 304.)

Insoluble in absolute alcohol, either boiling or at the ordinary temperature. (Bucholz, *loc. cit.*, p. 529.)

II.) *acid.* Soluble in 12 pts. of cold water (Vogel); in 8.929 pts. of water at the ordinary temperature, and in 1.8 pts. of boiling water. Insoluble in absolute alcohol, either at the ordinary temperature or on boiling. (Bucholz, *Gehlen's Neues all. Journ. der Chemie*, 1805, **5.** 537.)

$C_8 H_5 Na O_{12} + 2 Aq$

Tartrate of Soda & of Strontia.

I.) *normal.* Soluble in 1.4 pts. of water at 15°, and in all proportions in hot water. (Dulk.)

$C_8 H_4 Na Sr O_{12} + 2 Aq$

II.) *basic.* Soluble in water. Whenever the cold aqueous solution is heated an abundant precipitate forms in it, which redissolves as the liquid cools unless the heating has been long continued. This coagulation occurs as well in closed as in open vessels. Up to a certain point the precipitate is more abundant in proportion as the solution is more concentrated; but when the solution is very concentrated coagulation no longer occurs. As a rule, the temperature at which precipitation takes place is higher in proportion as the solution is more concentrated, and the precipitate also dissolves again more quickly when the solution from which it was precipitated is more concentrated. (Osann, *Gilbert's Ann. der Phys.*, 1821, **69.** pp. 290, 291; compare *Idem*, *Kastner's Archiv.*, 1824, **3.** 204.)

Tartrate of Solanin. Soluble in water.

Tartrate of StannEthyl. Tolerably soluble in water.

Tartrate of StibEthylium.

I.) *normal.* Very deliquescent. Soluble in water.

II.) *acid.* Deliquescent.

Tartrate of StibMethylEthylium. Very soluble in water. (Friedlænder.)

Tartrate of StibMethylium.

I.) *normal.*

II.) *acid.* Much more soluble in water than bitartrate of potash.

Tartrate of Strontia. Soluble in 147 pts. of water at 16°, and in 320 pts. of boiling water. (Dulk.) 100 pts. of water at 100° dissolve 0.6 pt. of it. (Ure's *Dict.*) Readily soluble in aqueous solutions of chloride of ammonium, and succinate of ammonia, slowly in nitrate of ammonia. (Wittstein.) When recently precipitated it is readily soluble in aqueous solutions of chloride of ammonium and nitrate of ammonia. (Brett, *Phil. Mag.*, 1837, (3.) **10.** 96.) Soluble in aqueous solutions of caustic potash and soda, the solution coagulating on being heated, but clearing up again on cooling, unless it has previously been heated for too long a time. In any case the precipitate redissolves the more slowly in proportion as it has been longer heated. (Osann, *Gilbert's Ann. der Phys.*, 1821, **69.** 290, and *Kastner's Archiv.*, 1824, **3.** 211.)

$C_8 H_4 Sr_2 O_{12} + 8 Aq$

Tartrate of Strychnine.

I. *normal.*

a = *right.* Soluble in water.

$C_8 H_4 \left(N_2 \left\{ C_{42} H_{22} O_4^{VI} . H\right)_2 O_{12} + x Aq\right.$

b = *left.* Soluble in water.

$C_8 H_4 \left(N_2 \left\{ C_{42} H_{22} O_4^{VI} . H\right)_2 O_{12} + y Aq\right.$

II.) *acid.*

a = *right.* Soluble in water. Insoluble in absolute alcohol. (Pasteur, *Ann. Ch. et Phys.*, (3.) **38.** 475.)

$C_8 H_5 \left(N_2 \left\} C_{42} H_{22} O_4 \cdot H\right) O_{12} + 6 Aq\right.$

b = *left.* (Of same composition as the right salt.) Soluble in water. Soluble to a consider-

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able extent in absolute alcohol, but it finally ceases to dissolve therein. (Pasteur, *loc. cit.*)

Tartrate of Tellurium. Readily soluble in water. Not precipitated by alkalies.
$C_8 H_4 Te'' O_{12}$

Tartrate of TellurMethyl. Easily soluble in water. (Wœhler & Dean.)

Tartrate of Thoria.

I.) *normal.* Insoluble in alcohol. Slowly and but partially soluble in ammonia-water. Soluble in tartaric acid. (Berzelius, *Pogg. Ann.*, 1829, **16.** 412.)
$C_8 H_4 Th_2 O_{12}$

II.) *acid.* Soluble in water. Decomposed by alcohol to the normal salt, which remains undissolved, and a soluble peracid salt. The aqueous solution may be mixed with ammonia-water without being precipitated. (Berzelius, *Pogg. Ann.*, 1829, **16.** 413.)

Tartrate *of protoxide* **of Tin.**

I.) *normal.* Difficultly soluble in cold, more soluble in boiling water; and still more readily in water acidulated with tartaric acid. It is not decomposed by boiling water. (Bouquet.)
$C_8 H_4 Sn_2 O_{12}$

II.) *basic.* Soluble in aqueous alkaline solutions, from which it is precipitated as a thick syrup on the addition of alcohol. (Werther.)
$C_8 H_4 Sn_2 O_{12}; 2 (Sn O, H O)$

Tartrate *of binoxide* **of Titanium.** Insoluble in water. Soluble in chlorhydric acid.

Tartrate *of protoxide* **of Uranium.** Insoluble in water. Very soluble in chlorhydric acid, from which it is precipitated on the addition of ammonia. Very sparingly soluble in tartaric acid, and in an aqueous solution of bitartrate of potash.
$C_8 H_4 Ur_2 O_{12}, Ur O, + 6 Aq$

Tartrate *of sesquioxide* **of Uranium.** Soluble in water. (Peligot, *Ann. Ch. et Phys.*, (3.) **12.** 63.) More soluble in hot than in cold water. (Berzelius, *Lehrb.*) It is precipitated by caustic alkalies. (H. Rose.)
$2 Ur_2 O_3, C_8 H_4 O_{12} + 2 Aq \;\&\; 8 Aq$

Tartrate of Urea.
$C_2 H_4 N_2 O_2, 2 C_8 H_4 O_{10} + Aq$

Tartrate *of binoxide* **of Vanadium.** Very slowly soluble in cold water; more quickly soluble in ammonia-water. (Berzelius.)

Tartrate of Vanadic Acid.

Tartrate of Veratrin. Readily soluble in water.

Tartrate of *tetra***Vinylium.** Insoluble in alcohol. (Heintz & Wislicenus.)

Tartrate of Yttria.

I.) *normal.* Sparingly soluble in water. Readily soluble in alkaline solutions. Slightly soluble in free tartaric acid. (Berzelius.)
$C_8 H_4 Y_2 O_{12}$

II.) *acid.*

Tartrate of Zinc.

I.) *normal.* Very sparingly soluble in water, either hot or cold. (Werther.) Easily soluble in cold aqueous solutions of caustic potash and soda. (Werther.) Not precipitated by alkalies. (Thénard.)
$C_8 H_4 Zn_2 O_{12}$

II.) *basic.* Scarcely at all soluble in water.

III.) *acid.* Soluble in water, and alcohol. (John.)
$C_8 H_5 Zn O_{12}$

Tartrate of Zirconia. Difficultly soluble in water, or in acids. Soluble in aqueous solutions of caustic potash, carbonate of ammonia, and tartaric acid. (Berzelius.)
$C_8 H_4 Zr_2 O_{12}$

Tartrelic Acid. Deliquescent. Easily soluble in water; but the solution is decomposed when boiled. Soluble in alcohol. (Fremy.)
(*Iso Tartridic Acid. Soluble modification of Tartaric Acid.*)
$C_8 H_4 O_{10} = C_8 H_3 O_9, H O$

Tartrelate of Ammonia. Alcohol precipitates it from the aqueous solution. (Fremy.)

Tartrelate of Baryta. Insoluble in water or alcohol. (Laurent & Gerhardt.)
$C_8 H_3 Ba O_{10}$

Tartrelate of Lead.

I.) Insoluble in water or alcohol. (Laurent & Gerhardt.)
$C_8 H_3 Pb O_{10}$

II.) $C_8 H_2 Pb_2 O_{10}$

Tartrelate of Lime. Completely insoluble in water. Insoluble in alcohol. (Laurent & Gerhardt.)
$C_8 H_3 Ca O_{10}$

Tartrelate of Potash. Alcohol precipitates it from the aqueous solution. (Fremy.)

Tartrelate of Soda. Alcohol precipitates it from the aqueous solution. (Fremy.)

Tartrelate of Strontia. Insoluble in water or alcohol. (Laurent & Gerhardt.)
$C_8 H_3 Sr O_{10}$

TartroMalamid. *Vid.* Malamid with Tartramid.

TartroGlyceric Acid. Soluble in water; partially decomposed when treated with much water, especially if this is hot. Insoluble in pure ether, but easily soluble in a mixture of alcohol and ether. The metallic tartroglycerates are soluble in water, but insoluble in alcohol. (Berzelius.)
$C_{14} H_{12} O_{16} = \left.\begin{matrix} C_8 H_4 O_8'' \\ H . C_6 H_7 O_4 \end{matrix}\right\} O_4$

TartroGlycerate of Lime. Permanent. Soluble in a small quantity of water, without decomposition; but a larger quantity of water decomposes it. Alcohol precipitates it from the aqueous solution. (Berzelius.)
$C_{14} H_{11} Ca O_{16}$

TartroMethylic Acid. *Vid.* MethylTartaric Acid.

Tartronic Acid. Soluble in water, and the solution is not decomposed on boiling.
$C_6 H_4 O_{10} = C_6 H_2 O_8, 2 H O$

Tartronate of Ammonia.

I.) *normal.* Soluble in water.

II.) *acid.* Soluble in water.

Tartronate of Silver. Ppt. (Dessaignes.)
$C_6 H_2 Ag_2 O_{10}$

Tartrovinic Acid. *Vid.* EthylTartaric Acid.

Tartrylic Acid. *Vid.* Tartaric Acid.

TartrylPhenylamid. *Vid.* PhenylTartrylamid.

Taurin. Permanent. Soluble in 15.5 pts. of water at 12°, and in less hot water. (Gmelin.) Almost insoluble in absolute alcohol. Sparingly soluble in hot spirit. Insoluble in ether. (Cloetta.) Soluble in 513 pts. of cold, somewhat more soluble in hot alcohol (of 0.835 sp. gr.). (Wittstein's *Handw.*) Slowly soluble, without decomposition, even at the boiling point, in concentrated sulphuric, chlorhydric, and nitric acids. (Gmelin.)
$C_4 H_7 N S_2 O_6$

TauroCholic Acid. Soluble in water. Sparingly soluble in dilute, insoluble in concentrated mineral acids. (Strecker, *Ann. Ch. et Phys.*, (3.) **22.** 39.) More soluble in water than cholic acid, the aqueous solution being decomposed by evaporation. Easily soluble in alcohol. Almost insoluble in ether. Taurocholic acid dissolves fats, fatty acids, and cholesterin, in large quantities. Decomposed by boiling mineral acids, and alkaline solutions.

(*Choleic Acid. SulphoCholeic Acid.*)

$C_{52}H_{45}NS_2O_{14} = N\left\{\begin{array}{l}C_4H_5S_2O_6 \,.\, O, HO \\ C_{48}H_{37}O_6 \\ H_2\end{array}\right.$

The alkaline taurocholates are very soluble in water, and alcohol, but are insoluble in ether.

TauroCholate of Baryta. Soluble in water, and alcohol. Insoluble in ether.

TauroCholate of Copper. Less soluble in water than in alcohol.

TauroCholate of Lead.

I.) *normal.* Appears to be soluble in water.

II.) *basic.* Ppt. Soluble in boiling water, and more freely in boiling alcohol. Soluble in an aqueous solution of acetate of lead.

TauroCholate of Lime. Soluble in water.

TauroCholate of Magnesia. Soluble in water.

TauroCholate of Potash. Hygroscopic. Readily soluble in water, and alcohol. Insoluble in ether.
$C_{52}H_{44}KNS_2O_{14}$

TauroCholate of Silver. Soluble in water.

TauroCholate of Soda. Hygroscopic. Readily soluble in water, and alcohol. Insoluble in ether.
$C_{52}H_{44}NaNS_2O_{14}$

Taurylic Acid. (Perhaps identical with Hydrate of Cresyl.) Soluble in ether.
$C_{14}H_8O_2$

Taxin (from the leaves of *Taxus baccata*). Difficultly soluble in water. Easily soluble in alcohol, and ether. Also soluble in dilute acids. Soluble in concentrated sulphuric and nitric acids. (H. Lucas.)

Tekoretin. Insoluble in water. Sparingly soluble in boiling, less soluble in cold alcohol. Readily soluble in ether. (Forchammer.)
(*Isomeric with Petrolene.*)
$C_{40}H_{32}''$

Telerythrin. Very easily soluble in water; less soluble in alcohol. Insoluble in ether. (Kane.) Soluble in ammonia-water.
$C_{14}H_6O_{12}$ ("$C_{22}H_{10}O_{19}$" of Kane)

TellurAmyl. Insoluble in water. (Wœhler & Dean.)
$\left.\begin{array}{l}C_{10}H_{11}Te \\ C_{10}H_{11}Te\end{array}\right\}$

Telluric Acid. There are two allotropic modifications:
TeO_3

a (*anhydrous*). Completely insoluble, either in cold or in boiling water; in cold concentrated chlorhydric acid; in boiling nitric acid; or in a boiling solution of potash-lye, unless the latter be exceedingly concentrated, in which case modification *β* is formed.

β (*hydrated*).

a = TeO_3, HO When first treated with cold water it appears to be insoluble therein, but after long digestion in the cold, and more quickly, though still slowly, when boiled, it dissolves completely.

b = $TeO_3, 3HO$ Slowly, but abundantly soluble in cold, and in almost all proportions in boiling water. Soluble in dilute, but insoluble, or very sparingly soluble, in absolute alcohol. Soluble, without decomposition, in nitric and sulphuric acids. (Berzelius, *Lehrb.*, **2.** pp. 241–244.) Soluble in concentrated chlorhydric acid, from which it separates out again unchanged when the solution is allowed to evaporate spontaneously. (*Ibid.*, **3.** 1132.) 1 pt. of the acid dissolves in 1.63 pts. of water at 19.5°, and in almost any proportion in boiling water. [*Gm.*]

Insoluble in absolute alcohol. Sparingly soluble in hydrated alcohol, the solubility being greater in proportion as the alcohol is weaker; this solution is not decomposed by boiling. (Berzelius.)

Many alkaline quadritellurates are soluble in water so long as they remain in the hydrated state, but after having been ignited they are no longer soluble in water, acids, or alkalies; most acids, even acetic, extract the base of these alkaline tellurates. The salts of the alkaline earths are but slightly soluble in water, though the acid salts are more soluble than the mono salts. All the other tellurates are nearly insoluble, but water decomposes some of them to basic and acid salts.

Tellurate of Alumina. Ppt. Soluble in aqueous solutions of alumina salts. (Berzelius, *Lehrb.*)
$Al_2O_3, 3TeO_3$

Tellurate of Ammonia.

I.) *mono.* Slowly but completely soluble in cold, quickly soluble in hot water. Very sparingly soluble in an aqueous solution of chloride of ammonium. Sparingly soluble in alcohol, less easily if chloride of ammonium be present. (Berzelius.)
NH_4O, TeO_3

II.) *bi.* Difficultly soluble in water, though more soluble than the potash salt.
$NH_4O, 2TeO_3$

III.) *quadri.* Very sparingly soluble in water. Insoluble in alcohol.

Tellurate of Baryta.

I.) *mono.* Slightly soluble in cold, more soluble in boiling water. Easily soluble, with decomposition, in nitric acid. (Berzelius, *Lehrb.*)
BaO, TeO_3

II.) *bi.* Ppt. Much more soluble in water than the mono salt. By washing with water it is decomposed to the mono salt and a soluble acid salt. (Berzelius, *Lehrb.*)
$BaO, 2TeO_3$

III.) *quadri.* More easily soluble in water than either the mono or bi salt. Soluble in acetic acid.
$BaO, 4TeO_3$

Tellurate *of sesquioxide* **of Chromium.** Ppt. Soluble in aqueous solutions of chromic salts.

Tellurate of Cobalt. Ppt.
CoO, TeO_3

Tellurate *of protoxide* **of Copper.**

I.) *mono.* Ppt.
CuO, TeO_3

II.) *bi.* Ppt.

Tellurate of Glucina. Resembles the yttria salt.
$Gl_2O_3, 3TeO_3$

Tellurate *of protoxide* **of Iron.** Ppt.
FeO, TeO_3

Tellurate *of sesquioxide* **of Iron.** Ppt. Soluble in aqueous solutions of the sesquisalts of iron. (Berzelius, *Lehrb.*)
$Fe_2O_3, 3TeO_3$

Tellurate of Lead.

I.) *mono.* Slightly soluble in water.
PbO, TeO_3

II.) *bi.* More soluble in water than the mono salt, but still difficultly soluble.

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III.) *quadri.* Soluble to a considerable extent in water. Very sparingly soluble in dilute acetic acid. Soluble in dilute nitric acid, even after ignition. (Berzelius.)

IV.) *basic.* Not absolutely insoluble in water. (Berzelius.)

TELLURATE OF LIME.

I.) *mono.* Somewhat soluble in hot water, but difficultly soluble in water.
$Ca\,O, Te\,O_3$

TELLURATE OF LITHIA.

I.) *mono.*
II.) *bi.*
III.) *quadri.* } Soluble in water while moist, but insoluble after having been heated to 100°.

TELLURATE OF MAGNESIA.

I.) *mono.* More soluble in water than the baryta, lime, or strontia salt.
$Mg\,O, Te\,O_3$

II.) *bi.* Still more soluble in water than the mono salt.

TELLURATE OF MANGANESE. Ppt.
$Mn\,O, Te\,O_3$

TELLURATE *of dinoxide* OF MERCURY. Ppt.
$Hg_2\,O, Te\,O_3$

TELLURATE *of protoxide* OF MERCURY. Ppt.
$Hg\,O, Te\,O_3$

TELLURATE OF NICKEL. Ppt.
$Ni\,O, Te\,O_3$

TELLURATE OF POTASH.

I.) *mono.* Hygroscopic. Easily soluble in water. Difficultly soluble in alkaline solutions. Insoluble in alcohol. (Berzelius, *Lehrb.*, 3. 175.)
$K\,O, Te\,O_3 + 5\,Aq$

II.) *bi.* There are two salts, one with the α, the other with β telluric acid:
$K\,O, 2\,Te\,O_3$

α = *Insoluble.* Insoluble in boiling water, or in acids, or in alkaline solutions.

β = $K\,O, 2\,Te\,O_3 + 4\,Aq$ Difficultly soluble in cold, very much more soluble in boiling water. Less soluble in water than the corresponding salt of ammonia. Insoluble in a boiling aqueous solution of nitrate of potash.

III.) *quadri.*
$K\,O, 4\,Te\,O_3$

α = *Insoluble.* (*Yellow.*) Insoluble in water, or in dilute acids, or in tolerably concentrated sulphuric, nitric, or chlorhydric acid, or an aqueous solution of caustic potash, at the ordinary temperature. By long-continued boiling with nitric acid it is dissolved, being transformed into the β modification.

β = $K\,O, 4\,Te\,O_3 + 4\,Aq$ Not completely insoluble in water. Soluble in acids.

TELLURATE OF SILVER.

I.) *mono.* Decomposed by water, with formation of an insoluble basic, and a soluble acid salt. (Berzelius.) Soluble in ammonia-water.
$Ag\,O, Te\,O_3$

II.) *bi.* Ppt.
$Ag\,O, 2\,Te\,O_3$

III.) *quadri.* Ppt.
$Ag\,O, 4\,Te\,O_3$

IV.) *sesqui.* Insoluble in boiling water.
$3\,Ag\,O, 2\,Te\,O_3$

V.) *tri.* Soluble in ammonia-water.
$3\,Ag\,O, Te\,O_3$

TELLURATE OF SODA.

I.) *mono.* When telluric acid is saturated with a solution of caustic soda it dissolves therein, but if the alkali is added in excess the solution deposits granular monotellurate of soda, especially on warming. As thus obtained, the salt is exceedingly difficultly soluble, either in cold or hot water. What remains in the alkaline solution may be precipitated, in the granular state, with alcohol. If it be boiled with renewed portions of water it dissolves, and remains dissolved so long as no excess of soda is present. When this solution is evaporated on the water-bath nothing separates out, and at last a soft gum-like mass remains, which is soluble in water, unless it be completely dried, in which case it will be as difficultly soluble as at first. When the salt is heated until its water of crystallization has been driven off, which requires a heat approaching to ignition, it passes into another allotropic condition, and is now insoluble, either in cold or in hot water, though it dissolves in hot dilute nitric acid. (Berzelius, *Lehrb.*, 3. 256.)
$Na\,O, Te\,O_3 + 2\,Aq$

II.) *bi.* Slowly but completely soluble in water. Difficultly soluble in an aqueous solution of acetate of soda. Insoluble in alcohol. (Berzelius, *Lehrb.*, 3. 257.)
$Na\,O, 2\,Te\,O_3 + 4\,Aq$

III.) *quadri.* There are two modifications of the hydrated salt, one slowly soluble in cold water, the other insoluble, even in boiling water. When the aqueous solution of the soluble modification is evaporated to dryness a portion of the insoluble modification is formed. On heating strongly either of these hydrates an anhydrous (α) yellow quadritellurate is obtained, which is as insoluble as the corresponding potash salt. (Berzelius, *Lehrb.*, 3. 257.)
$Na\,O, 4\,Te\,O_3 + x\,Aq$

TELLURATE OF STRONTIA.

I.) *mono.* Sparingly soluble in water. (Berzelius.)
$Sr\,O, Te\,O_3$

TELLURATE OF THORIA. Insoluble in water, or in aqueous solutions of the thorium salts. (Berzelius.)
$Th\,O, Te\,O_3$

TELLURATE *of sesquioxide* OF URANIUM. Insoluble in water, or in an aqueous solution of nitrate of sesquioxide of uranium.
$Ur_2\,O_3, Te\,O_3$

TELLURATE OF YTTRIA. Insoluble in water, or in aqueous solutions of yttria salts. (Berzelius, *Lehrb.*)
$Y\,O, Te\,O_3$

TELLURATE OF ZIRCONIA. Ppt. Soluble in aqueous solutions of the zirconium salts.
$Zr_2\,O_3, 3\,Te\,O_3$

TELLURETHYL. Nearly insoluble in water. Soluble in alcohol. (Wœhler.)
$C_4\,H_5\,Te$ or $\left.\begin{matrix} C_4\,H_5\,Te \\ C_4\,H_5\,Te \end{matrix}\right\}$

TELLURHYDRIC ACID. (*Hydrotelluric Acid.*) Soluble in water; the solution decomposing when exposed to the air.
$H\,Te$

Among the metallic tellurides, those only are soluble in water which correspond to the soluble oxides; thus the tellurides of potassium, sodium, lithium, barium, strontium, calcium, and magnesium, are soluble in water, while all the others are insoluble. (Persoz, *Chim. Moléc.*, p. 463.)

TELLURIDE OF ALUMINUM. Decomposed by water.

TELLURIDE OF AMYL. *Vid.* TellurAmyl.

TELLURIDE OF BISMUTH.

TELLURIDE OF ETHYL.

I.) *mono.* *Vid.* TellurEthyl.

II.) *bi.*
$C_4\,H_5\,Te_2$

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Telluride of Glucinum. Decomposed by water.

Telluride of Gold & of Lead. Soluble, with decomposition, in nitric acid.

Telluride of Gold & of Silver.

I.) $5 Ag Te ; Au Te$

II.) Soluble, with decomposition, in aqua-regia.
$Ag Te_4 ; Au Te_3$

III.) $Ag Te_3 ; Au Te_3$

Telluride of Iron. Soluble, with decomposition, in chlorhydric acid.

Telluride of Lead.
$Pb Te$

Telluride of Methyl. *Vid.* TellurMethyl.

Telluride of Potassium. Soluble in water, the solution undergoing decomposition when exposed to the air. Decomposed by acids.

Telluride of Silver. Slowly soluble in cold, quickly soluble in hot nitric acid. (G. Rose.)
$Ag Te$

Telluride of Sodium.

Telluride of TellurEthyl.
$C_4 H_5 Te, Te$

Telluride of Zinc. Insoluble in strong sulphuric or chlorhydric acid.

Tellurous Acid. *Vid. bin*Oxide of Tellurium.

The alkaline tellurites are soluble in water; the others are either difficultly soluble or insoluble therein, but dissolve in chlorhydric acid.

Tellurite of Alumina. Ppt. Insoluble in aqueous solutions of alumina salts. (Berzelius, *Lehrb.*)
$Al_2 O_3, 3 Te O_2$

Tellurite of Ammonia.

I.) *acid.* Soluble in water, but the solution undergoes decomposition when evaporated. Insoluble in alcohol, and, after having been washed with alcohol, it is no longer soluble in water.

II.) *quadri.* Nearly insoluble in an aqueous solution of chloride of ammonium. Insoluble in alcohol. (Berzelius.)
$N H_4 O, 4 Te O_2 + 4 Aq$

Tellurite of Baryta.

I.) *mono.* As prepared in the moist way, it is a precipitate, sparingly soluble in water. But when prepared in the dry way, boiling water dissolves only a very slight amount of it. (Berzelius, *Lehrb.*)
$Ba O, Te O_2$

II.) *quadri.*
$Ba O, 4 Te O_2$

Tellurite *of sesquioxide* **of Chromium.** Ppt. Soluble in aqueous solutions of the chromic salts.

Tellurite of Cobalt.
$Co O, Te O_2$

Tellurite of Copper. Ppt.
$Cu O, Te O_2$

Tellurite of Glucina. Ppt. Resembles the yttria compound.
$Gl_2 O_3, 3 Te O_2$

Tellurite of Iodide of Tellurium. Unacted upon by water.

Tellurite *of protoxide* **of Iron.** Ppt.
$Fe O, Te O_2$

Tellurite *of sesquioxide* **of Iron.** Ppt.
$Fe_2 O_3, 3 Te O_2$

Tellurite of Lead.

I.) *mono.* Easily soluble in acids.
$Pb O, Te O_2$

II.) *basic.* Not absolutely insoluble in water. (Berzelius.)

Tellurite of Lime.

I.) *mono.* Very sparingly soluble in cold, more soluble in boiling water.
$Ca O, Te O_2$

II.) *bi.*
$Ca O, 2 Te O_2$

III.) *quadri.*
$Ca O, 4 Te O_2$

Tellurite of Lithia.

I.) *mono.* Soluble in water.
$Li O, Te O_2$

II.) *bi.* Decomposed by cold, but is completely soluble in hot water.
$Li O, 2 Te O_2$

III.) *quadri.* Behaves towards water like the potash and soda salts.
$Li O, 4 Te O_2$

Tellurite of Magnesia.

I.) Much more soluble in water than the lime, baryta, or strontia salt.
$Mg O, Te O_2$

II.) *quadri.* Less soluble than No. I.

Tellurite of Manganese. Ppt.
$Mn O, Te O_2$

Tellurite *of dinoxide* **of Mercury.** Ppt.
$Hg_2 O, Te O_2$

Tellurite *of protoxide* **of Mercury.** Ppt.
$Hg O, Te O_2$

Tellurite of Nickel. Ppt.
$Ni O, Te O_2$

Tellurite of Potash.

I.) *mono.* Sparingly soluble in cold, more quickly soluble in hot water. (Berzelius.)
$K O, Te O_2$

II.) *bi.* Partially soluble in cold water; soluble, with decomposition, in hot water. (Berzelius.)
$K O, 2 Te O_2$

III.) *quadri.* Decomposed by water.
$K O, 4 Te O_2$

Tellurite of Silver.

I.) *mono.* Soluble in ammonia-water.
$Ag O, Te O_2$

II.) *bi.* Insoluble in water. Soluble in nitric acid. (G. Rose.)
$Ag O, 2 Te O_2$

Tellurite of Soda.

I.) *mono.* Slowly, but completely soluble in cold, and more quickly in warm water. It does not separate from the hot solution on cooling. Insoluble in alcohol. (Berzelius, *Lehrb.*)
$Na O, Te O_2$

II.) *bi.* Decomposed by water, like the potash salt. (Berzelius.)
$Na O, 2 Te O_2$

III.) *quadri.* Soluble in boiling water.
$Na O, 4 Te O_2$

Tellurite of Strontia. Similar to the baryta salt.

Tellurite of Thoria. Insoluble in water, or in aqueous solutions of thorium salts. (Berzelius.)
$Th O, Te O_2$

Tellurite *of protoxide* **of Tin.** Is precipitated, even when in the presence of 60000 pts. of water. (Fischer.)

Tellurite *of sesquioxide* **of Uranium.** Insoluble in water.
$Ur_2 O_3, Te O_2$

Tellurite of Yttria. Insoluble in water, or in aqueous solutions of yttrium salts. (Berzelius, *Lehrb.*)
$Y O, Te O_2$

Tellurite of Zinc.
$Zn O, Te O_2$

Tellurite of Zirconia. Ppt.
$Zr_2 O_3, 3 Te O_2$

Tellurium. Insoluble in water. Soluble, without oxidation, in concentrated sulphuric acid, from which it is precipitated on the
Te

addition of water. Decomposed by concentrated nitric acid, aqua-regia, and hot concentrated sulphuric acid.

According to Hartung-Schwarzkopf (from *Arch. der Pharm.*, **108.** 150, in *Ann. Min.*, (4.) **19.** 345), amorphous tellurium, prepared by reducing telluric acid with sulphurous acid, is not acted upon by concentrated nitric acid, even after prolonged boiling, contrary to the statements of many chemical treatises.

TellurMethyl. Not miscible with water.
$\left.\begin{matrix}C_2 H_3 Te\\ C_2 H_3 Te\end{matrix}\right\}$ (Wœhler & Dean, *Ann. Ch. u. Pharm.*, **93.** 233.)

TerChloride (&c.) **of** *X*. See under Chloride (&c.) of *X*, as *ter*Chloride of *X*, and the like.

Terebic Acid. Sparingly soluble in cold, much more soluble in boiling water. Very readily soluble in alcohol, and ether. (Rabourdin.) Soluble, without alteration, in concentrated nitric acid. (Bromeis.)
(*Terebilic Acid. Terpenthic Acid.*)
$C_{14} H_{10} O_8 = C_{14} H_8 O_6, 2 H O$

The terebates of the alkalies and alkaline earths are very soluble in water.

Terebate of Amyl.
I.) *acid.*
$C_{24} H_{20} O_8 = C_{14} H_9 (C_{10} H_{11}) O_8$

Terebate of Ethyl.
I.) *acid.* Sparingly soluble in water. (Caillot.)
$C_{18} H_{14} O_8 = C_{14} H_9 (C_4 H_5) O_8$

Terebate *of sesquioxide* **of Iron.** Difficultly soluble in water; being the least soluble of the terebates. (Rabourdin.)

Terebate of Lead.
I.) *acid.* Very soluble in water.
$C_{14} H_9 Pb O_8$
II.) *basic.* Soluble in water.

Terebate of Methyl.
I.) *acid.* Sparingly soluble in water. (Caillot.)
$C_{16} H_{12} O_8 = C_{14} H_9 (C_2 H_3) O_8$

Terebate of Silver.
I.) *normal.*
$C_{14} H_8 Ag_2 O_8 + 2 Aq$
II.) *acid.* Sparingly soluble in cold, much more soluble in hot water.
$C_{14} H_9 Ag O_8$

"**Terebene**" of (Soubeiran). *Vid.* Camphilene.

Terebene. Insoluble in water, and does not combine therewith, even after half a year's contact. Soluble in alcohol, and ether. (Deville.)
(*Isomeric with Oil of Turpentine.*)
$C_{20} H_{16}$

Terebentic Acid (?). Soluble in alcohol, and the solution is rendered turbid by water. (Weppen.) Its salts are soluble in alcohol.
$C_{18} H_{14} O_{10}$ (?)

Terebentate of Lead. Insoluble in water. Soluble in alcohol. (Weppen.)

Terebentilic Acid. Nearly insoluble in cold, more readily soluble in boiling water. Very easily soluble in alcohol. Readily soluble in ether. (Personne.)
$C_{16} H_{10} O_4 = C_{16} H_9 O_3, H O$

Terebentilate of Ethyl.
$C_{20} H_{14} O_4 = C_{16} H_9 (C_4 H_5) O_4$

Terebentilate of Lead.

Terebentilate of Lime.
$C_{16} H_9 Ca O_4$

Terebentilate of Silver. Sparingly soluble in boiling water, separating out again as the solution cools.
$C_{16} H_9 Ag O_4$

Terebenzic Acid. Soluble in boiling, much less soluble in cold water. Largely soluble in alcohol, and ether. The terebenzates are usually equally soluble with the corresponding benzoates. (Caillot, *Ann. Ch. et Phys.*, (3.) **21.** pp. 31, 33.)
$C_{22} H_{14} O_8 = C_{22} H_{12} O_6, 2 H O$

Terebenzate of Baryta. Very sparingly soluble in water. (Caillot.)

Terebenzate of Silver.

Terebilene. Combines with chlorhydric acid, forming a liquid compound. (Soubeiran & Capitaine.)
("*Peucyl*" (*of Blanchet & Sell*).)
Isomeric with Oil of Turpentine.)
$C_{20} H_{16}$

Terebilic Acid. *Vid.* Terebic Acid.

Terechrysic Acid. Soluble in all proportions in water, alcohol, and ether. Most of its salts are soluble in water. (Caillot, *Ann. Ch. et Phys.*, (3.) **21.** 34.)
$C_{12} H_8 O_{10} = C_{12} H_6 O_8, 2 H O$

Terechrysate of Baryta. Soluble in water.

Terechrysate of Ethyl.

Terechrysate of Lead. Somewhat soluble in hot, less soluble in cold water.

TerePhtalic Acid. Insoluble in water, alcohol, or ether. Soluble in alkaline solutions, with combination. (Caillot, *Ann. Ch. et Phys.*, (3.) **21.** 29.)
$C_{16} H_6 O_8 = C_{16} H_4 O_6, 2 H O$

TerePhtalate of Ammonia. Soluble in water.

TerePhtalate of Baryta. Insoluble, or very sparingly soluble, in water. (Caillot.)

TerePhtalate of Silver.

Teretinic Acid. Insoluble in water. Soluble in alcohol, from which it is precipitated on the addition of water.
(*Terpentinic Acid.*)
$C_{18} H_{14} O_{10} = C_{18} H_{12} O_9, H O$

Terpenthic Acid. *Vid.* Terebic Acid.

Terpin. *Vid.* Hydrate of Turpentine-Oil.

Terpinol.
(*MonoHydrate of Oil of Turpentine* (of Berthélot and of Gerhardt))
$C_{40} H_{34} O_2 = \left.\begin{matrix}C_{40} H_{33}\\ H\end{matrix}\right\} O_2$

TetraSulphate (&c.) **of** *X*. See under Sulphate (&c.) of *X*, as *tetra*Sulphate of *X*, and the like.

Tetryl. *Vid.* Butyl.

*Di***Tetryl.** *Vid.* Butylene.

Tetrylamin. }
Tetrylammonia. } *Vid.* Butylamin.

TetryAmyl. *Vid.* ButylAmyl.

Tetrylene. *Vid.* Butylene.

Tetrylene *Chloré*. *Vid.* ChloroButylene.

Tetrylic Alcohol. *Vid.* Hydrate of Butyl.

Tetrylic Urethane. *Vid.* Carbamate of Butyl.

TetrylSulphuric Acid. *Vid.* ButylSulphuric Acid.

TetrylSulphydric Acid. *Vid.* ButylSulphydric Acid.

Thalleiochin. Soluble in alcohol. Also in acids, with combination. (Brandes & Leber.)
$C_{18} H_{10} N O_8$

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Thebain. Insoluble, or but sparingly soluble, in water. Readily soluble in alcohol, and ether, especially when these are hot. Insoluble in strong aqueous solutions of caustic ammonia, or potash, but soluble in a dilute solution of caustic potash. Easily soluble in acids. Soluble in cold concentrated sulphuric acid, but the solution is decomposed on boiling.
(*ParaMorphin.*)
$C_{38}H_{21}NO_6 = N\left\{\begin{matrix}C_{38}H_{20}O_6''\\H\end{matrix}\right.$

Thein. *Vid.* Caffein.

Theobromin. Sparingly soluble in boiling water; and still less soluble in alcohol, and ether. (Woskresensky.) Permanent.
$C_{14}H_8N_4O_4 = N_2\left\{\begin{matrix}C_2O_2''\\C_6O_2''\\(C_2H_2)_2\\C_2N\\H_2\end{matrix}\right.$

Soluble in 1600 pts. of cold water.
" 55 " hot "
" 1460 " cold alcohol.
" 47 " boiling "
" 17000 " cold ether.
" 600 " boiling "

Easily soluble in ammonia-water, acetic acid, and aqueous solutions of the caustic alkalies, especially when these liquids are warm. (Wittstein's *Handw.*) Soluble in 960 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht für* 1854, p. 76.) Soluble in a boiling aqueous solution of caustic baryta, from which it separates again as the solution cools. (Parrish's *Pharm.*, p. 399.)

Therythrin. Scarcely at all soluble in water. Easily soluble in alcohol, acetone, and bisulphide of carbon. Sparingly soluble in ether. (Zeise.)

ThiAcetic Acid(Anhydrous). *Vid.* Sulphide of Acetyl.

ThiAcetic Acid. Soluble in water, especially when this is warm; still more readily soluble in alcohol, and ether. The salts of thiacetic acid are all more or less soluble in water, and alcohol.
(*Sulphydrate of Acetyl. AcetylSulphydric Acid.*)
$C_4H_4S_2O_2 = \left.\begin{matrix}C_4H_3O_2\\H\end{matrix}\right\}S_2$

ThiAcetate of Ammonium. Very deliquescent.

ThiAcetate of Barium. Soluble in water, and alcohol.
$C_4H_3BaO_2S_2 + 3\ Aq$

ThiAcetate of Copper(Cu O). Insoluble in water. (Ulrich.)

ThiAcetate of Ethyl. Insoluble in water. (Kekulé, *Ann. Ch. u. Pharm.*, **90.** 313.)
$C_4H_3(C_4H_5)O_2S_2$

ThiAcetate *of sesquioxide* **of Iron.** Soluble in water.

ThiAcetate of Lead. Sparingly soluble in cold water. Somewhat more soluble in warm water, and in alcohol. (Kekulé, *loc. cit.*, p. 311.)
$C_4H_3PbO_2S_2$

ThiAcetate of Lime. Soluble in water.
$C_4H_3CaO_2S_2 + 2\ Aq$

ThiAcetate of Magnesia. Deliquescent. Soluble in water.

ThiAcetate *of protoxide* **of Mercury.** Ppt.

ThiAcetate of Potash. Readily soluble in water, and alcohol. (Ulrich.)
$C_4H_3KS_2O_2$

ThiAcetate of Silver. Insoluble in water.

ThiAcetate of Sodium. Very soluble in water, and alcohol. (Ulrich.)
$C_4H_3NaS_2O_2$

ThiAcetate of Strontium. Soluble in water.
$C_4H_3SrS_2O_2 + 2\ Aq$

ThiAcetate of Zinc. Soluble in water.

ThiAcetonin. Rather difficultly soluble in water. Easily soluble in alcohol, ether, acetone, and dilute acids. (Stædeler.)
(" *Probably identical with Zeise's Akcethin.*")
$C_{18}H_{19}NS_4$?

ThiAethaldin. Easily soluble in ether. Soluble in chlorhydric acid, with combination. (Flueckiger.)
$C_{16}H_{17}NS_4$

Thialdin. Very sparingly soluble in water. Very soluble in alcohol, and still more soluble in ether. (Liebig & Wœhler.)
$C_{12}H_{13}NS_4 = N\left\{C_{12}H_{13}S_4'''\right.$

Thialoel. *Vid. bi*Sulphide of Ethyl.

ThiAnisiol. *Vid.* Hydride of SulphAnisyl.

ThianylAnisamid. *Vid.* PhenylAnisamid.

Thimethaldin.
$C_{14}H_{15}NS_4$

ThioBenzaldin. Soluble in boiling ether.
$C_{42}H_{19}NS_4 = N\left\{\begin{matrix}(C_{14}H_7S_2)_2\\C_{14}H_5\end{matrix}\right.$; or $N\left\{C_{42}H_{19}S_4'''\right.$

*Bi***ThioBenzolic Acid.** Not isolated. Its salts are readily soluble in water.
(*PhenylbiSulphobiamic Acid.*)
$C_{12}H_6N_2S_4O_{12}$

*Bi***ThioBenzolate of Ammonium.** Extremely soluble in water, and spirit. Very sparingly soluble in absolute alcohol. Insoluble in ether. Unacted upon by concentrated chlorhydric or cold sulphuric acid. (Hilkenkamp, *Ann. Ch. u. Pharm.*, **95.** 95.)
$C_{12}H_6(NH_4)_2N_2S_4O_{12}$

*Bi***ThioBenzolate of Barium.** Soluble in water. Insoluble in alcohol or ether. (Hilkenkamp, *loc. cit.*)
$C_{12}H_6Ba_2N_2S_4O_{12}$

ThioButyric Acid. *Vid.* Sulphydrate of Butyryl.

ThioCinnol. Sparingly soluble in alcohol. (Cahours.)
(*Sulphydrate of Cinnamoyl.*)
$C_{18}H_8S_2 = \left.\begin{matrix}C_{18}H_7\\H\end{matrix}\right\}S_2$

ThioCyanhydric Acid. *Vid.* HydroThioCyanic Acid.

ThioFormic Acid. Insoluble in water. Nearly insoluble in cold, tolerably soluble in boiling alcohol, and ether. Soluble in formic acid. Sparingly soluble in warm concentrated acetic acid, less soluble in cold concentrated acetic acid. Boiling chlorhydric acid has no action upon it; nitric acid decomposes it; concentrated sulphuric acid, when gently warmed, dissolves it, with decomposition. Insoluble in an aqueous solution of sulphide of ammonium, either cold or boiling. Scarcely at all attacked by a boiling aqueous solution of caustic potash. (Limpricht, *Ann. Ch. u. Pharm.*, **97.** 361.)
(*ThioFormylic Acid. Sulphide of Formyl.*)
$C_2H_2S_2O_2 = \left.\begin{matrix}C_2HO_2\\H\end{matrix}\right\}S_2$

ThioFucusol. Resembles ThioFurfurol.
(*FucusolSulphuré.*)

ThioFurfurol. Insoluble in cold, sparingly soluble in boiling water. Tolerably soluble in alcohol, especially when this is hot. Soluble in ether. The alcoholic solution slowly decomposes when exposed to the air. (Cahours, *Ann. Ch. et Phys.*, (3) **24.** 284.)
(*ThioFurfol. FurfurylSulfuré. Sulphide of Furfuryl.*)
$C_{10}H_4O_2S_2 = C_{10}H_4O_2''\}S_2$

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THIOMELANIC ACID. Insoluble in water, or in alkaline solutions.
$C_{20} H_{24} S_3 O_{20}, 2 H O$?

THIOMELANATE OF AMMONIA. Insoluble in water.

THIOMELANATE OF BARYTA. Insoluble in water.

THIOMELANATE OF LEAD. Insoluble in water.

THIOMELANATE OF POTASH. Insoluble in water. A small quantity of this salt is retained in suspension by water, but is deposited on the addition of chloride of sodium. (Erdmann.)

THIONAMID. Soluble in water, and alcohol.
(*Sulphamid.*)
$N H_2 S O_2$

THIONAPHTHALINIC ACID. *Vid.* *bi*Sulpho-Naphthalinic Acid.

THIONAPHTHAMIC ACID. Not isolated. Its salts are all soluble in water. (Piria.)
(*Isomeric with Naphthionic Acid.*)
$C_{20} H_9 N S_2 O_6$

THIONAPHTHAMATE OF AMMONIA. Very soluble in water, and alcohol. (Piria, *Ann. Ch. et Phys.*, (3.) **31.** 244.)
$C_{20} H_8 (N H_4) N S_2 O_6$

THIONAPHTHAMATE OF BARYTA. Soluble in water. (Piria.)
$C_{20} H_8 Ba N S_2 O_6 + 3 Aq$

THIONAPHTHAMATE OF LEAD. Very sparingly soluble in water. Almost insoluble in alcohol. (Piria.)

THIONAPHTHAMATE OF LIME. Very soluble in water. (Piria.)

THIONAPHTHAMATE OF MAGNESIA. Very soluble in water. (Piria.)

THIONAPHTHAMATE OF POTASH. Very soluble in pure water. Very sparingly soluble in aqueous solutions of caustic and carbonated potash. Scarcely at all soluble in alcohol. (Piria.)
$C_{20} H_8 K N S_2 O_6$

THIONAPHTHAMATE OF SODA. Sparingly soluble in cold, very soluble in boiling water. Very sparingly soluble in an aqueous solution of carbonate of soda. (Piria.)

***Di*THIONIC ACID.** *Vid.* HypoSulphuric Acid.

***Tri*THIONIC ACID.** Known only in solution; its aqueous solution gradually decomposes, less rapidly when it is dilute.
(*Sulphuretted Hyposulphuric Acid.*
MonoSulhyposulphuric Acid.
Acide Hyposulphurique Monosulfuré.)
$S_3 O_5$

The aqueous solutions of all the thionic acids appear to be considerably more stable when they contain acids. On the other hand, they are all, with the exception of dithionic acid, easily decomposed by weak alkaline solutions. (Fordos & Gélis, *Ann. Ch. et Phys.*, (3.) **28.** 454.)

***Tri*THIONATE OF BARYTA.** Sparingly soluble in water, less soluble in alcohol. Easily soluble in nitric acid. (Langlois.)
$Ba O, S_3 O_5 + 2 Aq$

***Tri*THIONATE *of protoxide* OF IRON.** Soluble in water. (Plessy, *loc. cit.*)

***Tri*THIONATE OF LEAD.**

***Tri*THIONATE OF LIME.** Hygroscopic. Soluble in water. (Baumann; Plessy, *loc. cit.*)
$Ca O, S_3 O_5$

***Tri*THIONATE OF MANGANESE.** Soluble in water. (Plessy, *loc. cit.*)

***Tri*THIONATE OF NICKEL.** Soluble in water. (Plessy, *loc. cit.*)

***Tri*THIONATE OF POTASH.** Permanent. Soluble in water. (Langlois.) Easily soluble in water, especially when this is warmed to 50° @ 60°, but the solution is decomposed on boiling. Soluble in hot alcohol, from which it separates as the solution cools. (Plessy, *Ann. Ch. et Phys.*, (3.) **11.** 185.)
$K O, S_3 O_5$

***Tri*THIONATE OF SILVER.** Ppt.

***Tri*THIONATE OF SODA.**
$Na O, S_3 O_5$

***Tri*THIONATE OF ZINC.** Soluble in water. (Fordos & Gélis.)

***Tetra*THIONIC ACID.** Soluble in water, and the aqueous solution is about as stable as that of hyposulphuric acid, it being possible to obtain it in a tolerably concentrated state. When largely diluted the solution may be boiled without suffering decomposition, but as the solution becomes more concentrated decomposition ensues. It is not acted upon by dilute chlorhydric or sulphuric acid, but is decomposed by dilute nitric acid. Most of its salts are soluble in water, and less soluble in alcohol; but their aqueous solutions slowly decompose when exposed to the air; on heating them the decomposition is rapid. (Fordos & Gélis, *Ann. Ch. et Phys.*, (3.) **6.** pp. 493, 492.)
(*BiSulphuretted Hyposulphuric Acid.*
BiSulhyposulphuric Acid.
Acide Hyposulfurique bisulfuré.)
$S_4 O_5$ & $+ H O$

***Tetra*THIONATE OF BARYTA.** Permanent. Very soluble in water, though less soluble than iodide of barium. Sparingly soluble in alcohol. (Fordos & Gélis, *Ann. Ch. et Phys.*, (3.) **6.** pp. 489, 490.) Easily soluble in water. Insoluble in strong alcohol. (Fordos & Gélis, *Ann. Ch. et Phys.*, (3.) **22.** 70.)
$Ba O, S_4 O_5 + 2 Aq$

***Tetra*THIONATE OF COPPER.** Soluble in water. (Fordos & Gélis, *Ann. Ch. et Phys.*, (3.) **6.** 492.)

***Tetra*THIONATE OF IRON.** Soluble in water. (Fordos & Gélis, *Ann. Ch. et Phys.*, (3.) **6.** 492.) The aqueous solution is decomposed by evaporation. Alcohol does not precipitate the salt from the aqueous solution. (Berzelius's *Lehrb.*, **3.** 601.)
$Fe O, S_4 O_5$

***Tetra*THIONATE OF LEAD.** Soluble in water. Insoluble in alcohol.
$Pb O, S_4 O_5 + 2 Aq$

***Tetra*THIONATE *of dinoxide* OF MERCURY.** Ppt.

***Tetra*THIONATE OF POTASH.** Soluble in hot water; much less soluble in alcohol. (Kessler.)
$K O, S_4 O_5$

***Tetra*THIONATE OF SILVER.** Ppt.

***Tetra*THIONATE OF SODA.** Soluble in water. Less insoluble in alcohol than the potash salt. (Kessler.)
$Na O, S_4 O_5$

***Tetra*THIONATE OF STRONTIA.** More soluble in alcohol than the baryta salt. (Kessler.)
$Sr O, S_4 O_5 + 6 Aq$

***Tetra*THIONATE *of protoxide* OF TIN.**

***Tetra*THIONATE OF ZINC.** Soluble in water. (Fordos & Gélis, *Ann. Ch. et Phys.*, (3.) **6.** 492.)

***Penta*THIONIC ACID.** Soluble in water, but the solution is very instable; its aqueous solution, or that of any of the pentathionates, being only preserved with difficulty (Fordos & Gélis, *Ann. Ch. et Phys.*, (3.) **28.** 452), but an alcoholic solution of pentathionic acid can be preserved
(*TerSulphypo Sulphuric Acid.*
TerSulphuretted HypoSulphuric Acid.)
$S_5 O_5, H O$

undecomposed for months. (Fordos & Gélis, *Ann. Ch. et Phys.*, (3.) **22.** 80.) All the pentathionates are soluble in water, alcohol, and ether. (Wackenroder, *Ann. Ch. et Phys.*, (3.) **20.** 151.) Many of them are known only in solution.

*Penta*THIONATE OF BARYTA. Very soluble in water. Soluble in alcohol, and ether. The aqueous solution begins to decompose at 25°. (Wackenroder, *Ann. Ch. et Phys.*, (3.) **20.** 151.) More soluble in water, and more alterable than tetrathionate of baryta. The aqueous solution soon decomposes on standing, and more rapidly when boiled. Alcohol, and ether precipitate it from the aqueous solution. (Fordos & Gélis, *Ann. Ch. et Phys.*, (3.) **22.** pp. 78, 80.) Soluble in water. Very sparingly soluble in absolute alcohol; more soluble in dilute spirit. (Sobrero & Selmi, *Ann. Ch. et Phys.*, (3.) **28.** 211.)
$Ba\,O, S_5\,O_5 + 2\,Aq$

*Penta*THIONATE *of protoxide* OF IRON. Soluble in water, the solution undergoing decomposition when evaporated.
$Fe\,O, S_5\,O_5$

*Penta*THIONATE OF LEAD. Soluble in water.

*Penta*THIONATE OF POTASH. ?

*Penta*THIONATE OF SILVER. Ppt.

*Pentu*THIONATE OF SODA. Known only in solution.
$Na\,O, S_5\,O_5$

THIONESSAL. Almost insoluble in boiling alcohol. Difficultly soluble in boiling ether. Its best solvent is hot naphtha, from which it separates on cooling. (Laurent.)
$C_{52}\,H_{18}\,S_2 = \left.\begin{matrix} C_{26}\,H_9 \\ C_{26}\,H_9 \end{matrix}\right\}S_2$

*Di*THIONOUS ACID. *Vid.* HypoSulphurous Acid.

THIONURIC ACID. Permanent. Readily soluble in water, the solution being decomposed by boiling. The alkaline thionurates are soluble in water, but those of the alkaline earths and metals are difficultly soluble, or insoluble, therein, though easily soluble in dilute acids.
$C_8\,H_5\,N_3\,S_2\,O_{12} = N_3\left\{\begin{matrix} C_2\,O_2'' \\ C_6\,O_4'' \\ S_2\,O_4'' \\ H_3 \end{matrix}\right., 2\,H\,O$

THIONURATE OF AMMONIA.
I.) *normal.* Sparingly soluble in cold, very soluble in warm water.
$C_8\,H_3\,(N\,H_4)_2\,N_3\,S_2\,O_{12} + 2\,Aq$
II.) *acid.* Soluble in water.
$C_8\,H_4\,(N\,H_4)\,N_3\,S_2\,O_{12}$

THIONURATE OF BARYTA. Very soluble in chlorhydric acid.
$C_8\,H_3\,Ba_2\,N_3\,S_2\,O_{12} + 2\,Aq$

THIONURATE *of dinoxide* OF COPPER.

THIONURATE *of protoxide* OF COPPER.
I.) *acid.*
$C_8\,H_4\,Cu\,N_3\,S_2\,O_{12} + Aq$

THIONURATE OF LEAD. Soluble in dilute chlorhydric acid.
$C_8\,H_3\,Pb_2\,N_3\,S_2\,O_{12} + 2\,Aq$

THIONURATE OF LIME.

THIONURATE OF MANGANESE. Insoluble in cold, scarcely at all soluble in hot water. (Merrick, *Thesis of Lawrence Scientific School*, Cambridge, 1859.)
$C_8\,H_3\,Mn_2\,N_3\,S_2\,O_{12} + 2\,Aq$

THIONURATE OF SODA.
I.) *normal.* Sparingly soluble in hot water, separating out again almost entirely as the solution cools. (Merrick, *loc. cit.*)

THIONURATE OF ZINC. Very sparingly soluble in water.
$C_8\,H_4\,Zn\,N_3\,S_2\,O_{12} + Aq$

THIONYLAMID. Insoluble in water, by which it is soon decomposed, however. Decomposed at once by alkaline solutions. (Schiff.)
$N_2\left\{\begin{matrix} S_2\,O_2'' \\ H_4 \end{matrix}\right.$

THIONYLAMIC ACID. Easily decomposed.
$N\left\{\begin{matrix} H_2 \\ S_2\,O_2'' \end{matrix}\right. . O, H\,O$

THIOSALICOL. *Vid* SulphoSalicylous Acid.

THIOSINAMIN. Soluble in water, especially when this is warm. Easily soluble in alcohol, and ether. It is partially precipitated from the alcoholic solution on the addition of water. (Dumas & Pelouze.) After having been fused, it is less soluble in water. (Aschoff.) When thiosinamin is dissolved in boiling water it rarely crystallizes out again as the solution cools, if this is left at rest, but on strongly agitating this supersaturated cold solution it solidifies at once. Again, if thiosinamin is melted beneath a small quantity of water it remains as a viscous layer below the water for a long time after it has become cold, but on being agitated it solidifies immediately. (Berthelot & De Luca, *Ann. Ch. et Phys.*, (3.) **44.** 499.)
(*Rhodalin. SulphoCyanide of Allylammonium.*)
$C_8\,H_8\,N_2\,S_2 = N_2\left\{\begin{matrix} C_2\,S_2'' \\ C_6\,H_5 \\ H_3 \end{matrix}\right. \text{ or } N\left\{\begin{matrix} H_3 \\ C_6\,H_5 \\ C_2\,N \end{matrix}\right\}S_2$

THIOSINETHYLAMIN. *Vid.* EthylThiosinamin.

THIOSINNAPHTYLAMIN. *Vid.* NaphtylThioSinamin.

THIOSINPHENYLAMIN. *Vid.* PhenylThioSinamin.

THIOTOLAMIC ACID. *Vid.* ThioToluic Acid.

THIOTOLUIC ACID. Not isolated. All of its salts are readily soluble in water.
(*ThioTolamic Acid. ToluenylSulphaminic Acid.*)
$C_{14}\,H_9\,N\,S_2\,O_6 = N\left\{\begin{matrix} C_{14}\,H_7 \\ S_2\,O_4'' \end{matrix}\right. . H\,O, H\,O$

THIOTOLUATE OF AMMONIA. Permanent in dry air, but gradually decomposes in moist air. Very soluble in water. Readily soluble in spirit, and absolute alcohol. Insoluble in ether. (Hilkenkamp.)
$C_{14}\,H_8\,(N\,H_4)\,N\,S_2\,O_6$

THIOTOLUATE OF BARYTA. Soluble in water, and easily in spirit. Insoluble in absolute alcohol or ether. (Hilkenkamp.)

THIOTOLUATE OF POTASH. Soluble in water, and in boiling absolute alcohol; but less soluble in both the liquids than the ammonia-salt. (Hilkenkamp.)
$C_{14}\,H_8\,K\,N\,S_2\,O_6$

THIOTOLUATE OF SODA. Easily soluble in water. Sparingly soluble in alcohol. Insoluble in ether. (Hilkenkamp.)

THIOTOLUOL. *Vid.* SulphoToluol.

THORIUM. Unacted upon by water, either hot or cold. When treated with dilute sulphuric acid the pulverulent metal is somewhat acted upon at first, but this action soon becomes less rapid, and the mixture may now be warmed, without occasioning the solution of any considerable quantity of thorium, unless the digestion be long continued. Fluorhydric acid has no more action upon it than sulphuric acid, and nitric acid attacks it, if anything, less readily than these; the metal may even be boiled with nitric acid, without dissolving to any great extent. On the other hand, thorium is very easily soluble in chlorhydric acid, complete solution being very quickly effected when the acid
Th

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is warm. Unacted upon by aqueous solutions of tho caustic alkalies. (Berzelius, *Pogg. Ann.*, 1829, **16**. pp. 394, 395.)

Thymeid. Soluble in alcohol, and ether. (Lallemand.)
$C_{48}H_{34}O_8 = \left.C_{24}H_{16}O_2''\right\}O_4$

Thymene.

Thymic Acid. *Vid.* Thymylic Acid.

Thymin. *Vid.* Leucin.

Thymol. *Vid.* Thymylic Acid.

Thymol*chloré*. *Vid.* ChloroThymic Acid.

Thymol*nitré*. *Vid.* NitroThymic Acid; also NitroCymene.

Thymoyl. Very sparingly soluble in water.
$C_{24}N_{16}O_4 = \left.C_{24}H_{16}O_2''\right\}O_2$
Sparingly soluble in alcohol. Very soluble in ether, but this solution undergoes alteration after a time. Sparingly soluble in alkaline solutions. Very soluble in warm concentrated sulphuric and nitric acids, from which it is precipitated unchanged on the addition of water. (Lallemand.)

Thymoylamid. Soluble in alcohol. (Lallemand.)
$C_{24}H_{17}NO_2 = N\left\{\begin{matrix}C_{24}H_{16}O_2'' \\ H\end{matrix}\right.$

Thymoylic Acid. Very sparingly soluble in water. All of its salts are soluble in water, excepting those of lead and silver. (Lallemand, *Ann. Ch. et Phys.*, (3.) **49**. 166.)

Thymoylate of Lead. Insoluble in water.
$C_{48}H_{28}O_{16}, 3\,PbO$

Thymoylate of Potash. Soluble in water, and in absolute alcohol.

Thymoylate of Silver. Insoluble in water. (Lallemand, *loc. cit.*)

Thymoylol. Sparingly soluble in warm water.
$C_{24}H_{18}O_4 = \left.\begin{matrix}C_{24}H_{16}'' \\ H_2\end{matrix}\right\}O_4$
Very soluble in alcohol, and ether, especially when these are warm. (Lallemand, *Ann. Ch. et Phys.*, (3.) **49**. 165.)

Thymylic Acid. Soluble in about 333 pts.
(*Thymol. Hydrate of Thymyl. Isomeric with Hydrate of Cumicyl.*)
$C_{20}H_{14}O_2 = C_{20}H_{13}O, HO$
of water. Very readily soluble in alcohol, ether, and glacial acetic acid. According to Stenhouse, it is precipitated from the alcoholic solution in drops on the addition of water; but, according to Lallemand, no such precipitation occurs. Soluble, with combination, in aqueous solutions of the caustic alkalies. (Lallemand.) Decomposed by boiling with strong acids, and alkalies. (Stenhouse.)

Thymylate *of protoxide* **of Mercury.**

I.) *basic.* Insoluble in water, alcohol, or acetic acid. Unacted upon by dilute sulphuric, or nitric acids.
$C_{20}H_{13}HgO_2, HgO$

Thymylate of Silver. Insoluble in water.

Thymylate of Soda. Very soluble in water, and alcohol. A solution of this salt produces precipitates with most metallic salts. (Lallemand.)
$C_{20}H_{13}NaO_2$

ThymylSulphAcetic Acid.
(*SulphAceto Thymic Acid.*)
$C_{24}H_{16}S_2O_{10}$
Soluble in water. All of its salts are soluble in water, and alcohol, though somewhat less soluble than the corresponding thymylsulphates.

ThymylSulphAcetate of Baryta. Soluble in water: the solution undergoing partial decomposition when rapidly evaporated. Soluble in alcohol. (Lallemand, *Ann. Ch. et Phys.*, (3.) **49**. 151.)
$C_{24}H_{15}BaS_2O_{10}$

ThymylSulphuric Acid. Permanent. Very soluble in water. All of its salts are very soluble in water, and absolute alcohol, and sparingly soluble in ether.
(*Sulpho Thymic Acid.*)
$C_{20}H_{14}S_2O_8 + 2\,Aq = C_{20}H_{13}O, HO, 2\,SO_3 + 2\,Aq$

ThymylSulphate of Ammonia. Readily soluble in water, and absolute alcohol. Sparingly soluble in ether. (Lallemand, *Ann. Ch. et Phys.*, (3.) **49**. 150.)

ThymylSulphate of Baryta. Permanent. Soluble in water, and in absolute alcohol.
$C_{20}H_{13}BaS_2O_8$

ThymylSulphate of Lead. Soluble in water, and in absolute alcohol.
$C_{20}H_{13}PbS_2O_8$

ThymylSulphate of Potash. Readily soluble in water, and in absolute alcohol. Sparingly soluble in ether. (Lallemand, *loc. cit.*)

ThymylSulphate of Soda. Readily soluble in water, and absolute alcohol. Sparingly soluble in ether. (Lallemand, *loc. cit.*)

ThymylSulphurous Acid. Deliquescent. Its salts are all soluble in water.
(*SulphoCymenic Acid.
SulphoCamphic Acid.
SulphoCymolic Acid.
CymeneSulphurous Acid.*)
$C_{20}H_{14}S_2O_6 = C_{20}H_{13}O, HO, 2\,SO_2$

ThymylSulphite of Baryta.

I.) Readily soluble in water, alcohol, and ether.
$C_{20}H_{13}BaS_2O_6 + 2\,Aq, 3\,Aq, \&\ 4\,Aq$

II.) Very much more soluble than the preceding in water, and alcohol. (Gerhardt & Cahours.)
$C_{40}H_{27}BaS_2O_6$

ThymylSulphite of Copper(CuO). Easily soluble in water, and alcohol. (Sieveking.)

ThymylSulphite of Lead. Soluble in water.
$C_{20}H_{13}PbS_2O_6 + 4\,Aq$

ThymylSulphite of Lime. Very soluble in water, and alcohol. (Sieveking.)
$C_{20}H_{13}CaS_2O_6 + 3\,Aq$

ThymylSulphite of Silver. Soluble in water, the solution undergoing decomposition when evaporated.

ThymylSulphite of Soda. Very readily soluble in water, and alcohol. (Sieveking.)
$C_{20}H_{13}NaS_2O_6 + 5\,Aq$

Tin. Permanent. Soluble in chlorhydric acid, though scarcely at all if this be dilute and cold. Soluble in sulphuric acid, either dilute or concentrated. Most readily soluble in cold aqua-regia. Concentrated nitric acid attacks it violently, but forms an insoluble oxide. Very dilute and cold nitric acid dissolves it, however, completely. When digested in an alkaline lye it gradually dissolves.
Sn

Tin is not attacked by pure concentrated nitric acid of 1.512 @ 1.419 sp. gr.; less concentrated acids attack it violently. It is attacked, however, by the concentrated acid when this contains nitrous acid. (Millon, *Ann. Ch. et Phys.*, (3.) **6**. pp. 95, 99.) As is well known, when tin is treated with pure nitric acid, the metal is simply changed to insoluble stannic acid, nitric oxide being given off. If granulated tin is put into very weak nitric acid, say of 1.15 sp. gr., a small quantity is quietly taken up, but in a short time it is thrown down again as a white powder, containing no nitric acid. If, however, a very little chloride of ammonium is first added to the dilute acid, the reaction is different; nitrous oxide is given off, and the tin remains permanently in solution. A small proportion of chlorhydric acid answers the same purpose as the ammonia salt, for nitric acid is deoxidized, and ammonia formed. Nitrate of ammonia will not replace the chloride in this experiment. In an experiment where tin was treated with a mixture of equal parts of nitric acid of 1.39 sp. gr., and chlorhydric acid of 1.16 sp. gr., enough of the metal was taken up to make a dark, syrupy liquid of 2.24 sp. gr. Analysis showed this solution to contain about 24 equivalents of tin to 3 equivalents of nitric acid, 6 equivalents of chlorhydric acid, and 2 equivalents of chloride of ammonium. Here we have 8 equivalents of tin retained in solution by 3 equivalents of acid. Another sample made with a mixture of 4 pts. of nitric acid to 3 pts. of chlorhydric acid, was of 2.443 sp. gr., and contained 4 equivalents of tin to 1 of acid. (Ordway, *Am. J. Sci.*, 1857, (2.) **23.** 220.)

Like zinc, iron, etc., tin is much more readily acted upon by acids to which small quantities of metallic salts have been added than by the acids alone. This influence is most marked with chlorhydric acid, among the acids, and with bichloride of platinum and tartar emetic, among the metallic solutions; arsenious acid, &c. [see Zinc], not exerting any notable influence. The following experimental results were obtained: I.) 19.672 grms. of sheet tin placed in pure fuming chlorhydric acid diluted with an equal volume of water, at 21°, lost 0.562 grm. II.) 19.841 grms. of the tin in similar acid, to which had been added 15 drops of a saturated aqueous solution of tartar emetic, lost 6.296 grms. III.) 18.974 grms. of the tin in acid, like that of No. I., to which had been added 15 drops of an aqueous solution of bichloride of platinum [1 pt. of $Pt\,Cl_2$ in 10 pts. of water], lost 7.495 grms. In expressing the action of the pure chlorhydric acid upon the tin by 1, the action of the same acid plus tartar emetic may be expressed by 11, and that of the acid plus bichloride of platinum by 13. When the experiment is made at the temperature of boiling water, the difference between the platinum and antimony is in favor of the latter, and it is found that, at this temperature, the tartar emetic renders the action of chlorhydric acid upon tin 5 times more rapid, while the bichloride of platinum increases it only threefold. The influence of these small quantities of metal is still more decided when granulated tin and the chlorhydric acid of commerce are employed. 100 grammes of granulated tin were dissolved in twenty minutes by 500 grms. of commercial chlorhydric acid, to which had been added 40 drops of a saturated aqueous solution of tartar emetic; another portion of the same acid, placed under similar circumstances, but without addition of any foreign salt, when poured upon 100 grms. of granulated tin having dissolved only 19 grms. in the course of three hours. Thus, when aided by a few millionths of antimony, the chlorhydric acid dissolved a larger portion of tin in one ninth the time required by the pure acid. When the action of the boiling acid is compared with that of the cold acid, to which tartar-emetic has been added, it is found that the latter acts almost as rapidly as the former; so that in the manufacture of protochloride of tin it is probable that heat might be replaced by a small quantity of tartar-emetic, or other salt of antimony, or, on the other hand, by means of this addition the process may be made 8 or 10 times quicker. The phenomena presented by sulphuric acid, more or less dilute, in its action upon tin, do not appear to be interesting in this connection; the organic acids also are in the same predicament; in any event, the latter only act very slowly, if at all. (Millon, *C. R.*, 1825, **21.** pp. 47, 48.) In connection with Millon's experiments, compare Barreswil's observations. (*C. R.*, **21.** 292.) Tin is dissolved by the hot aqueous solutions of several salts; a boiling solution of 1 pt. of alum in 4 pts. of water, for example, dissolving it somewhat readily. So also with solutions of bisulphate of potash, chloride of ammonium (1 pt. in 4 pts. of water), normal tartrate of potash, and tartrate and borate of potash. A solution of acetate of potash also dissolved traces of it; but it is not attacked by solutions of sulphate of magnesia, sulphate of soda, nitrate of potash, or monosulphate of potash. (Cludius, *J. pr. Ch.*, 1836, **9.** 161.) Soluble to a certain extent in boiling aqueous solutions of several salts, as alum, [bi ?] sulphate of potash, and chloride of ammonium. Other salts oxidize without perceptibly dissolving it; in this class are many of the salts of the alkalies and alkaline earths, excepting nitrate, acetate, and tartrate of potash, and phosphate and borate of soda. (Berzelius, *Lehrb.*, **2.** 589.)

TINKAL. *Vid. bi*Borate of Soda.

TITANIC ACID. (*Titanic Oxide. Bin-Oxide of Titanium.*) $Ti\,O_2$ There are two isomeric modifications (according to Berzelius):

α) *Soluble.*

a = *hydrated.* Insoluble in water. Easily soluble in acids. Slightly soluble in aqueous solutions of the alkaline carbonates. A complete solution in an alkaline carbonate can only be obtained by adding the solution of the titanium salt, drop by drop, to the alkaline solution, and allowing the precipitate to dissolve entirely before adding a new portion of the titanium salt. After the acid has been some time precipitated, it loses its solubility in great measure. On boiling its solution in carbonate of ammonia for some time the acid is reprecipitated; the same result may be obtained with the solution in the fixed alkaline carbonates, if these are first mixed with chloride of ammonium. (Berzelius's *Lehrb.*, **2.** 389.) After having been washed with hot water, it is less soluble than when washed with cold water. Even when moist it is very sparingly soluble in sulphurous acid, and the portion dissolved is completely reprecipitated on boiling the solution. (Berthier, *Ann. Ch. et Phys.*, (3.) **7.** 76.) Demoly also distinguishes two modifications of titanic acid: "ordinary," being the ordinary precipitated hydrate, soluble in acids, to which he assigns the formula, $3\,Ti\,O_2 + 5\,H\,O$, and metatitanic acid, being that which has been dried at 140°, or in vacuo, and is insoluble in acids; the formula of this he writes, $Ti_3\,O_6 + 2\,H\,O$. The salts of ordinary titanic acid are soluble in water, but those of metatitanic acid are insoluble.

β) *Insoluble.*

a = *ignited.* Insoluble in water, acids, excepting fluorhydric acid, or aqueous solutions of the caustic or carbonated alkalies. When digested with concentrated sulphuric acid at a gentle heat, until the excess of acid is evaporated, a salt remains which is soluble in water. (Berzelius, *Lehrb.*) Anhydrous titanic acid, which has not been ignited, is soluble in dilute acids. When solutions of titanic acid in chlorhydric or sulphuric acid are boiled they undergo decomposition, the titanic acid being precipitated completely from

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the sulphuric acid solution, in its insoluble modification. (H. Rose, *Pogg. Ann.*, **83.** 150.)

Titanate *of protoxide* of Iron.
FeO, TiO_2

Titanate *of sesquioxide* of Iron. Insoluble in water. Unacted upon by boiling sulphuric or chlorhydric acid. (Wœhler.)

Titanate of Lime. Occurs as the mineral *Perofskite.* Scarcely at all acted upon by chlorhydric or other acids, excepting hot sulphuric acid, which decomposes it, sulphate of lime separating out.
CaO, TiO_2

Titanate of Manganese. Insoluble in water.

Titanate of Potash.

I.) *mono.* Decomposed by water, with formation of a soluble basic and an insoluble acid salt.

II.) *basic.* Soluble in water.

III.) *acid.* Insoluble in water. Soluble in concentrated chlorhydric acid.

Titanate of Soda.

I.) Decomposed by water.
NaO, TiO_2

II.) *acid.* Insoluble in water.

Titanate of Zirconia.

Titanium. Soluble in aqua-regia. Most of the metallic compounds of titanium are insoluble in water. None of them are known to be soluble in alcohol.
Ti

Tolene.
$C_{20}H_{16}$

Toluamic Acid. Like benzamic acid, which it resembles, it dissolves readily in acids, with combination. (Cahours, *Ann. Ch. et Phys.*, (3.) **53.** 332.)
(*Toluylamic Acid.*)
$C_{16}H_9NO_4 = N\left\{\begin{matrix}C_{16}H_7O_2\\H_2\end{matrix}\right\}O_2$, or $C_{16}H_8NO_3, HO$

Toluic Acid. Readily soluble in boiling, somewhat less soluble in cold water. Soluble in almost all proportions in alcohol, ether, and wood-spirit. (Noad.)
(*Toluylic Acid.*)
$C_{16}H_8O_4 = C_{16}H_7O_3, HO$

An isomeric modification (AlphaToluic Acid) observed, by Strecker & Cannizzaro, is sparingly soluble in cold, abundantly soluble in boiling water. Largely soluble in alcohol, and ether. Its salts, with lime and baryta, are very soluble in water, the ammonia-salt soluble in water, the salts of copper (CuO), and silver, precipitates, the latter soluble in boiling water.

Toluate of Ammonia. Soluble in water.

Toluate of Baryta. Soluble in water.
$C_{16}H_7BaO_4$

Toluate of Copper. Very sparingly soluble in water. Soluble in ammonia-water.
$C_{16}H_7CuO_4$

Toluate of Ethyl. Sparingly soluble, or insoluble, in water.
$C_{16}H_7(C_4H_5)O_4$

Toluate of Lime. Soluble in water.

Toluate of Phenyl. Soluble in a mixture of alcohol and ether.
$C_{16}H_7(C_{12}H_5)O_4$

Toluate of Potash. Readily soluble in water.

Toluate of Silver. Soluble in warm, less soluble in cold water.
$C_{16}H_7AgO_4$

Toluate of Soda. Still more soluble than the potash-salt.

Tolene (in Balsam of Tolu).
$C_{20}H_{16}$

TolEugenic Acid (Anhydrous). Insoluble in water. Somewhat readily soluble in boiling alcohol, and still more easily in ether. (Cahours.)
(*Toleugenyl.*)
$C_{36}H_{18}O_6 = \left.\begin{matrix}C_{20}H_{11}O_2\\C_{16}H_7O_2\end{matrix}\right\}O_2$

Toluene. *Vid.* Hydride of Toluenyl.

Toluene*chloré*, &c. *Vid.* Hydride of Chloro-Toluenyl, &c.

Toluenol*trichloré*. *Vid.* ChloroToluric Acid.

Toluenyl. Not isolated.
(*Tolyl.*)
$C_{14}H_7$

Toluenylamin. *Vid.* Toluidin.

*Tri*Toluenylamin. Sparingly soluble in water, or in cold alcohol; more soluble in boiling water, and still more readily in ether. (Cannizzaro.)
(*TriBenzylamin.*)
$C_{42}H_{21}N = N\left.\right\}(C_{14}H_7)_3$

ToluenylSulphaminic Acid. *Vid.* Thio-Toluic Acid.

ToluenylSulphurous Acid. Very deliquescent. Soluble in water, the solution undergoing decomposition when evaporated.
(*SulphoToluic Acid.*
SulphoToluenic Acid.
SulphoBenzoenic Acid.
SulphoDracylic Acid.
ToluolSulphuric Acid.
Sulphite of Toluenyl.)
$C_{14}H_8S_2O_6 + 2Aq = C_{14}H_7O, HO, 2SO_2 + 2Aq$

ToluenylSulphite of Ammonia. Soluble in water.

ToluenylSulphite of Baryta. Permanent. Very easily soluble in water. (Deville.)
$C_{14}H_7BaS_2O_6$

ToluenylSulphite *of protoxide* of Copper. Appears to be soluble in water.

ToluenylSulphite of Lead. Very soluble in water.

ToluenylSulphite of Potash. Very soluble in water.

ToluenylSulphite of Silver. Appears to be soluble in water.

ToluEugenyl. Insoluble in water. Tolerably easily soluble in boiling alcohol; more readily soluble in ether. (Cahours, *Ann. Ch. et Phys.*, (3.) **52.** 204.)
(*Anhydride of EugenylToluic Acid.*)
$C_{36}H_{18}O_6 = \left.\begin{matrix}C_{20}H_{11}O_3\\C_{16}H_7O_3\end{matrix}\right\}O_2$

Toluidin. Sparingly soluble in cold, more readily soluble in warm water. Tolerably soluble in alcohol, ether, wood-spirit, acetone, and the fatty and essential oils. Readily soluble in bisulphide of carbon. (Muspratt & Hofmann.)
(*Toluenylamin.*
ToluylAmmonia.)
$C_{14}H_9N = N\left\{\begin{matrix}C_{14}H_7\\H_2\end{matrix}\right.$

Toluidine*bromé*. *Vid.* BromoToluidin.

Toluol. *Vid.* Hydride of Toluenyl.

ToluoSalicyl. Insoluble in cold, sparingly soluble in boiling water. Sparingly soluble in cold, tolerably soluble in boiling alcohol; more readily soluble in ether. Unacted upon by boiling potash-lye. (Cahours, *Ann. Ch. et Phys.*, (3.) **52.** 195.)
(*Salicylide of Toluyl. Anhydride of ToluylSalicylous Acid.*)
$C_{30}H_{12}O_8 = \left.\begin{matrix}C_{14}H_5O_4\\C_{16}H_7O_3\end{matrix}\right\}$ or $\left.\begin{matrix}C_{16}H_7O_2\\C_{14}H_5O_2\end{matrix}\right\}O_2$

Toluric Acid. Sparingly soluble in cold, abundantly soluble in boiling water. Readily
$C_{20}H_{11}NO_6 = N\left\{\begin{matrix}C_2O_2''\\C_{16}H_7O_2 . O, HO\\C_2H_3\end{matrix}\right.$

soluble in cold, and in all proportions in boiling alcohol. Very difficultly and sparingly soluble in pure ether; but dissolves in a mixture of ether and alcohol. Soluble, without decomposition, in cold concentrated chlorhydric acid, but the solution is decomposed by boiling. Easily soluble, with combination, in alkaline solutions. (Kraut, *Ann. Ch. u. Pharm.*, **98.** 365.)

Tolurate of Baryta. Easily soluble in hot water. (Kraut, *loc. cit.*)
$C_{20}H_{10}BaNO_6 + 5 Aq$

Tolurate *of protoxide* **of Iron.** Ppt. Soluble in alcohol. (Kraut, *loc. cit.*)

Tolurate of Lead. Ppt.

Tolurate of Lime. Easily soluble in hot, sparingly soluble in cold water. (Kraut, *loc. cit.*)
$C_{20}H_{10}CaNO_6 + 8 Aq$

Tolurate of Silver. Abundantly soluble in boiling, less soluble in cold water. (Kraut, *loc. cit.*)
$C_{20}H_{10}AgNO_6$

Tolurate of Soda. Soluble in water.

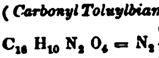
Toluylic Acid. *Vid.* Toluic Acid.

Toluylammonia. *Vid.* Toluidin.

Toluylamic Acid. *Vid.* Toluamic Acid.

*Alpha***Toluylamin.** Soluble in hot, less soluble in cold water. (Strecker.)

ToluylUrea.
(*Carbonyl Toluylbiamid.*)


$C_{16}H_{10}N_2O_4 = N_2\left\{\begin{array}{l}C_2O_2''\\C_{16}H_7O_2\\H_2\end{array}\right.$

Tolyl. Same as Toluenyl, *q. v.*
$C_{14}H_7$

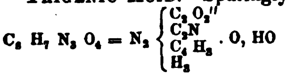
Traubensœure. *Vid.* ParaTartaric Acid.

Trehalose. Easily soluble in water. Almost insoluble in cold, tolerably easily soluble in boiling alcohol. Insoluble in ether. Decomposed by boiling dilute sulphuric acid.


$C_{12}H_{11}O_{11} = \left.\begin{array}{r}C_{12}H_8O_6''\\H_2\end{array}\right\}O_4 + Aq$

Tri or TrisAcetate (&c.) **of** *X*. See under Acetate (&c.) of *X*, as *tris*Acetate of *X*, *tri*Sulphate of *X*, and the like.

Trigenic Acid. Sparingly soluble in water. Nearly insoluble in alcohol. (Liebig.) Soluble in chlorhydric acid.


$C_8H_7N_3O_4 = N_3\left\{\begin{array}{l}C_2O_2''\\C_2N\\C_4H_3\\H_3\end{array}\right. . O, HO$

Trigenate of Silver. Soluble in boiling, less soluble in cold water.
$C_8H_6AgN_3O_4$

Trityl(of Gerhardt). *Vid.* Propyl.

Tritylamin. *Vid.* Propylamin.

Tritylene(of Gerhardt). *Vid.* Propylene.

Tritylene*chloré*, &c. *Vid.* Chloro (&c.) Propylene.

Tritylic Alcohol. *Vid.* Hydrate of Propyl.

TritylSulphuric Acid. *Vid.* SulphoPropylic Acid.

Tropeolic Acid(from *Tropæolum majus*). Soluble in water, alcohol, and ether. (Mueller.)

Tungstic Acid.

a.) *Ordinary, insoluble modification.*

a. = anhydrous. Soluble in water, especially when this is hot. Scarcely at all soluble in water which contains any portion of acid. (Berzelius.) It appears to be insoluble in all acids, excepting concentrated chlorhydric and fluorhydric acids, in which it is very sparingly soluble. With the exception of the alkaline salts, all of its compounds are insoluble in water.
WO_3

Somewhat soluble in aqueous solutions of the alkalies, even ammonia, especially when these are boiling. (Riche, *Ann. Ch. et Phys.*, (3.) **50.** 35.) Laurent (*Ann. Ch. et Phys.*, (3.) **21.** 58) argues, that there are several isomeric compounds, as "para," "iso," and "poly," tungstic acids, but his assertions have been disproved by Lotz and Riche. Laurent's statements are so vague, that I have made no effort to record them here.

b = hydrated. Riche, (*Ann. Ch. et Phys.*, (3.) **50.** 35) describes two hydrates of common or "insoluble" modification of tungstic acid, viz. HO, WO_3, and $2 HO, WO_3$, both of which are insoluble in water. The bihydrate dissolves, however, with combination, in aqueous solutions of the tungstates while the monohydrate is insoluble in these. According to Anthon (*J. pr. Ch.*, **9.** 6, cited in *Wittstein's Handw.*) the dry hydrate, $WO_3 + 2 HO$, is soluble in 250 @ 300 pts. of cold water, and in 30 pts. of boiling water; and nothing is precipitated from the aqueous solution on the addition of acids. When freshly precipitated, it is soluble in aqueous solutions of the caustic and carbonated alkalies.

β. Soluble modification. Known only in cold aqueous solution; this solution being decomposed when boiled, or when evaporated so far that the solution is very concentrated.
(*Meta Tungstic Acid.*)

The salts of metatungstic acid are slowly decomposed when dissolved in cold water; but immediately when treated with alkaline solutions. The alkaline metatungstates are much more soluble in water than those of ordinary tungstic acid. (Riche, *Ann. Ch. et Phys.*, (3.) **50.** 43.) The metatungstates of the alkaline earths and of the metals appear to be soluble in water, excepting those of dinoxide of mercury (insoluble), and of lead (sparingly soluble). (Lotz, *Ann. Ch. u. Pharm.*, **91.** 74.) The alkaline tungstates ("ordinary") are soluble in water, but the others, with the exception of the magnesia salt, appear to be all insoluble in water.

Tungstate of Alumina.

I.) *normal.* Insoluble in water, or in an aqueous solution of tungstate of soda. Easily soluble in solutions of alum, of caustic soda, and ammonia, and of phosphoric, oxalic, and tartaric acids. (Lotz, *Ann. Ch. u. Pharm.*, **91.** 66.)

II.) Soluble in an aqueous solution of alum.
$Al_2O_3, 7 WO_3 + 9 Aq$ (Lotz, *loc. cit.*)

Tungstate of Ammonia.

I.) Very sparingly soluble in water. (Riche, *Ann. Ch. et Phys.*, (3.) **50.** 67.)
$NH_4O, 8 HO, 4 WO_3 + Aq$

II.) Soluble in water. (Riche, *loc. cit.*)
$NH_4O, 8 HO, 4 WO_3 + 8 Aq$

III.) 100 pts. of boiling water dissolve 10.4 pts. of it at the temperature of boiling, and 3 pts. at the ordinary temperature; it is much more readily soluble in ammonia-water. (Riche, *loc. cit.*, p. 53.)
$NH_4O, 3 HO, 4 WO_3 + 2 Aq$; same as the old "$NH_4O, 3 WO_3 + 2 Aq$" (Riche).

IV.) Permanent. Difficultly and slowly soluble in water. When not powdered, it seems to be almost entirely insoluble in cold water. Soluble in 26.1 pts. of water at 10.7°,
"Bitungstate" of Berzelius & Anthon "($NH_4O, 2 WO_3 + Aq$)" $3 NH_4O, 7 WO_3 + 6 Aq$; or $2 (NH_4O, 2 WO_3)$; $NH_4O, 3 WO_3 + 6 Aq$(of Lotz).

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and in 5.8 pts. of boiling water. On boiling the aqueous solution ammonia is evolved and a more soluble salt is formed. (Lotz, *Ann. Ch. u. Pharm.*, **91.** 52.) Permanent. Soluble in 25 @ 28 pts. of cold water. Insoluble in alcohol. (Anthon.)

V.) Soluble in water. (Lotz.)
$2\,(NH_4O, 2\,WO_3)\,;\ NH_4O, 3\,WO_3 + 3\,Aq$

β or *Meta*TUNGSTATE OF AMMONIA.

I.) *normal.* Readily soluble in water, being
$NH_4O, HO, 2\,W_2O_6 + 8\,Aq$
much more soluble than the ordinary tungstate of ammonia. (Riche, *Ann. Ch. et Phys.*, (3.) **50.** 64.)

II.) *acid.* Much more soluble in water than
(*Octahedral.*) $NH_4O, 3\,HO, 3\,W_2O_6 + 10\,Aq$ (of Riche). $2\,(NH_4O. 4\,WO_3) + 15\,Aq$; i. e. $NH_4O, 3\,HO, 4\,WO_3 + 9\,Aq$ (of Lotz). "$NH_4O, 3\,WO_3 + 5\,Aq$" (of Margueritte). "$(NH_4)_{\frac{5}{6}}\,H_{\frac{1}{6}}\,W_3O_{10} + 5\,Aq$, or metatungstate" (of Laurent).
the normal metatungstate of ammonia. 100 pts. of cold water dissolve 288 pts. of it; soluble in all proportions in hot water. Insoluble in alcohol or ether. (Riche, *Ann. Ch. et Phys.*, (3.) **50.** 66.)

Efflorescent. Very readily soluble in water. Soluble in 0.84 pts. of water at 1.5°; and much more soluble in warm water. The aqueous solution saturated at 40° becomes almost entirely solid on cooling. Sparingly soluble in ordinary spirit; but almost, if not entirely, insoluble in absolute alcohol. (Lotz, *Ann. Ch. u. Pharm.*, **91.** 72.)

TUNGSTATE OF AMMONIA & OF CADMIUM.
$4\,(3\,CdO, 7\,WO_3)\,;\ 3\,NH_4O, 7\,WO_3 + 35\,Aq$
Soluble in water acidulated with nitric acid. (Lotz.)

TUNGSTATE OF AMMONIA & OF MAGNESIA.
$2\,(MgO, 2\,WO_3)\,;\ NH_4O, 3\,WO_3 + 10\,Aq$
Very difficultly soluble in water. Soluble in water acidulated with nitric acid. (Lotz.)

TUNGSTATE OF AMMONIA & *of protoxide* OF MERCURY.
"$NH_4O, HgO, 2\,WO_3 + Aq$"
Insoluble in water. Decomposed by acids and by alkaline solutions. (Anthon.)

TUNGSTATE OF AMMONIA & *of binoxide* OF MOLYBDENUM.

I.) *basic.* Insoluble in water. (Berzelius.)

TUNGSTATE OF AMMONIA & OF POTASH (of Margueritte).
$NH_4O, KO, 4\,WO_3 + 6\,Aq$

TUNGSTATE OF AMMONIA & OF SODA.
$2\,(NH_4O, 2\,WO_3)\,;\ NaO, WO_3$
Very sparingly soluble, or insoluble, in cold water. (Lotz.)

TUNGSTATE OF AMMONIA & OF ZINC.
$NH_4O, 3\,WO_3\,;\ 2\,(ZnO, 2\,WO_3) + 13\,Aq$
Somewhat soluble in boiling water. Easily soluble in aqueous solutions of tungstate of ammonia, and sulphate of zinc, and in phosphoric, oxalic, tartaric, and dilute nitric acids. (Lotz.)

TUNGSTATE OF BARYTA.

I.) *mono.* Insoluble in water, or in boiling
"BaO, WO_3"
phosphoric acid. Soluble in boiling, less soluble in cold, oxalic acid. (Anthon.)

II.) *bi.* Insoluble in cold, very sparingly solu-
$BaO, 2\,WO_3 \,\&\, + 3\,Aq$
ble in boiling water. Partially soluble in boiling oxalic acid. (Anthon.) Recently precipitated tungstate of baryta is soluble in an aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 316.)

III.) $3\,BaO, 7\,WO_3$

IV.) When recently precipitated, it is slightly
$3\,BaO, 4\,HO, 7\,WO_3 + 4\,Aq$
soluble in water acidulated with nitric acid. (Lotz.)

TUNGSTATE OF *ter*BROMIDE OF TUNGSTEN.
$2\,WBr_3, WO_3$

TUNGSTATE OF CADMIUM.

I.) *mono.* Insoluble in water. Soluble in am-
"$CdO, WO_3 \,\&\, + 2\,Aq$"
monia-water, and in hot phosphoric and oxalic acids. (Anthon.)

II.) *bi.* Insoluble in water. Soluble in am-
"$CdO, 2\,WO_3$"
monia-water, and in hot phosphoric, oxalic, and acetic acids. (Anthon.)

TUNGSTATE OF CHLORIDE OF TUNGSTEN.

I.) Rapidly decomposed by water. Readily
$WCl_3, 2\,WO_3$
soluble, with decomposition, in ammonia-water. (Wœhler.)

II.) (Bonnet.)
$2\,WCl_3, WO_3$

TUNGSTATE *of sesquioxide* OF CHROMIUM.

I.) *normal.* Soluble in an aqueous solution of
$Cr_2O_3, 3\,WO_3 + 7\,Aq \,\&\, 13\,Aq$
terchloride of chromium, and in phosphoric, oxalic, and tartaric acids. (Lotz.)

II.) Insoluble in water, or an aqueous solution
$Cr_2O_3, 8\,WO_3 + 9\,Aq$
of tungstate of ammonia. Soluble in a solution of terchloride of chromium. (Lotz.)

TUNGSTATE OF COBALT.

I.) Insoluble in water, or cold nitric acid. Sol-
"$CoO, WO_3 \,\&\, + 2\,Aq$"
uble in ammonia-water, and in warm acetic and phosphoric acids, partially soluble in oxalic acid. (Anthon.)

II.) *bi.* Insoluble in water. Imperfectly solu-
"$CoO, 2\,WO_3 \,\&\, + 3\,Aq$"
ble in oxalic acid. Soluble in ammonia-water, and in phosphoric and acetic acids. (Anthon.)

TUNGSTATE *of protoxide* OF COPPER.

I.) *mono.* Insoluble in water, or oxalic acid.
"$CuO, WO_3 + 2\,Aq$"
Soluble in ammonia-water, and in phosphoric and acetic acids. (Anthon.)

II.) *bi.* Insoluble in water, or nitric acid. Sol-
"$CuO, 2\,WO_3 + 4\,Aq$"
uble in ammonia-water. (Anthon.)

TUNGSTATE *of protoxide* OF IRON.

I.) Insoluble in water. Soluble in chlorhydric,
"$FeO, WO_3 \,\&\, + 3\,Aq$"
sulphuric, and nitric acids, without decomposition, in the cold, but with complete decomposition and separation of WO_3 on boiling. Soluble in hot phosphoric and oxalic acids. (Anthon.)

II.) *bi.* Insoluble in water. Soluble in hot
"$FeO, 2\,WO_3 + 2\,Aq$"
phosphoric and oxalic acids. Decomposed by dilute chlorhydric acid, and by a solution of caustic potash. (Anthon.)

TUNGSTATE *of sesquioxide* OF IRON. Easily soluble in an aqueous solution of terchloride of iron, even in the cold; also soluble in a boiling solution of tungstate of ammonia. (Lotz.)

TUNGSTATE *of protoxide* OF IRON & OF MANGANESE.
$3\,(FeO, WO_3)\,;\ MnO, WO_3$
Partially soluble in concentrated chlorhydric acid.

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Tungstate of Lead.

I.) "PbO, WO_3" Insoluble in water, or in cold nitric acid. Decomposed by hot nitric acid. Soluble in an aqueous solution of caustic potash. (Anthon.) The native compound (*Scheelenite*) is soluble in potash-lye, and is decomposed by nitric acid, tungstic acid separating out.

II.) $2(PbO, 2WO_3); PbO, WO_3 + 10Aq$ Insoluble in water, even when this is acidulated with nitric acid, or in aqueous solutions of tungstate of ammonia, or nitrate of lead. Soluble in a solution of caustic soda, and in boiling phosphoric acid. (Lotz, *Ann. Ch. u. Pharm.*, **91.** 65.) "Tungstate of lead" is soluble in a saturated aqueous solution of chloride of sodium. (Becquerel, *C. R.*, 1845, **20.** 1523.)

β or *Meta*Tungstate of Lead. $PbO, 4WO_3 + 6HO$? Sparingly soluble in water. Easily soluble in nitric acid. (Lotz, *loc. cit.*, p. 74.)

Tungstate of Lime. "CaO, WO_3" Permanent. Insoluble in water. A boiling aqueous solution of caustic potash removes a portion of the acid.

When recently precipitated, it is soluble in an aqueous solution of chloride of ammonium. (Wackenroder, *Ann. Ch. u. Pharm.*, **41.** 316.) The native compound (*Scheelite*) is decomposed by chlorhydric and nitric acids, with separation of a yellow powder, which is soluble in ammonia-water.

Tungstate of Lithia.

I.) *mono.* "LiO, WO_3" Permanent. Very soluble in water. (Anthon.)

II.) *bi.* "$LiO, 2WO_3$" Permanent. Rather less soluble in water than the soda salt. (Anthon.)

Tungstate of Magnesia. "MgO, WO_3" Permanent. Readily soluble in water.

Tungstate of Manganese.

I.) *mono.* "MnO, WO_3" \& $+ 2Aq$ Insoluble in water. Soluble in warm phosphoric and oxalic acids, also sparingly soluble in acetic acid. Insoluble in cold chlorhydric acid. (Anthon.)

II.) *bi.* "$MnO, 2WO_3 + 8Aq$" Insoluble in water. Soluble in aqueous solutions of phosphoric, oxalic, and nitric acids. (Anthon.)

III.) $2(MnO, 2WO_3); MnO, WO_3 \,\&\, + 8Aq \,\&\, 11Aq$ When recently precipitated, it is soluble in a small amount of water acidulated with nitric acid. (Lotz.)

Tungstate *of dinoxide* of Mercury. "Hg_2O, WO_3" Insoluble in water. (Berzelius.)

β or *Meta*Tungstate *of dinoxide* of Mercury. Insoluble in water. Easily soluble in nitric acid. (Lotz, *Ann. Ch. u. Pharm.*, **91.** 74.)

Tungstate *of protoxide* of Mercury.

I.) Insoluble in water. (Anthon.)
"$3HgO, 2WO_3$"

II.) Insoluble in water. (Anthon.)
"$2HgO, 3WO_3$"

Tungstate *of binoxide* of Molybdenum. $MoO_2, 2WO_3$ Permanent. Soluble in water. Insoluble in an aqueous solution of chloride of ammonium, or in alcohol of 0.87 sp. gr. (Berzelius.)

Tungstate of Nickel.

I.) *mono.* "$NiO, WO_3 + 6Aq$" Insoluble in water, or oxalic acid. Soluble in warm ammonia-water, and in boiling phosphoric and acetic acids. (Anthon.)

II.) *bi.* "$NiO, 2WO_3 \,\&\, + 4Aq$" Insoluble in water. Slightly soluble in oxalic acid. Completely soluble in phosphoric and acetic acids. (Anthon.)

III.) $2(NiO, 2WO_3); NiO, WO_3 \,\&\, + 14Aq$ Soluble in a small quantity of water acidulated with nitric acid, and in an aqueous solution of sulphate of nickel. Insoluble in a solution of tungstate of ammonia. (Lotz.)

Tungstate of Potash.

I.) *mono.*

a = *anhydrous.* KO, WO_3 Very soluble in water, with reduction of temperature; much more readily in hot than in cold. 100 pts. of boiling water dissolve about 152.2 pts. of it; and 100 pts. of cold water about 52 pts. The aqueous solution is not miscible with alcohol, but when left in contact with alcohol the latter gradually combines with the water, and the salt is precipitated. Almost entirely insoluble in alcohol. (Riche, *Ann. Ch. et Phys.*, (3.) **50.** 48.)

b = *hydrated.* $KO, WO_3 + Aq$ Not deliquescent when pure. (Riche.)

c = "$KO, WO_3 + 5Aq$"(of Anthon). Hygroscopic. Soluble in 1 pt. of cold, and in 0.5 pt. of boiling water. It is precipitated from the aqueous solution on addition of sulphuric, chlorhydric, or nitric acids. (Anthon.) Insoluble in alcohol.

II.) *bi.* "$KO, 2WO_3 + 2Aq$" Permanent. Soluble in 100 pts. of water at 16°, and in 8.5 pts. of boiling water. On the addition of acids, it is partially precipitated from the aqueous solution. (Anthon.) Insoluble in alcohol.

III.) *Insoluble Tungstate of Potash* ("*not, however, a salt of insoluble* WO_3"). $KO, 2WO_3 + 8Aq$ Very sparingly soluble in water. 100 pts. of water dissolve 6.6 pts. of it at boiling, and 2.15 pts. in the cold. (Riche, *Ann. Ch. et Phys.*, (3.) **50.** 50.)

IV.) β or *Meta*Tungstate of Potash. KO, W_2O_6 (Same as the old "Pentacid Tungstate," = "$KO, 5WO_3 + 8Aq.$") Permanent. Very soluble in cold, soluble in all proportions in boiling water. The aqueous solution is partially decomposed on prolonged ebullition. (Riche, *Ann. Ch. et Phys.*, (3.) **50.** 61.)

V.) Soluble in water.
"$KO, 5WO_3 + 6Aq$"(of Margueritte).

Tungstate of Potash & *of binoxide* of Tungsten. Insoluble in water, alcohol, acids, or alkaline solutions. (Laurent.)

Tungstate of Silver.

I.) *bi.* "$AgO, 2WO_3$" Insoluble in water. Scarcely at all soluble in phosphoric or acetic acids; more readily soluble in oxalic acid, and in aqueous solutions of caustic ammonia, and potash. (Anthon.)

Tungstate of Soda.

I.) *mono.* $NaO, WO_3 + 2Aq$ Permanent. Soluble in 4 pts. of cold, and in 2 pts. of boiling water (Vauquelin & Hecht); in 1 1 pt. of cold, and in 0.5 pt. of boiling water. (Anthon.) 100 pts. of water at 100° dissolve 123.58 pts. of it; at 15°, 55.52 pts.; and at 0°, 40.92 pts. of it. Insoluble in alcohol. Decom-

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posed by acids. Carbonic acid precipitates an insoluble tungstate (analogous to the potash salt No. III.) from the aqueous solution. (Riche, *Ann. Ch. et Phys.*, (3.) **50.** 52.)

II.) *bi.* Permanent. Soluble in 8 pts. of cold water. Insoluble in alcohol. (Anthon.) Malaguti has obtained a salt with 4½ equivalents, H O, which is less soluble than Anthon's.

$NaO, 2WO_3 + 4Aq$

III.) *β* or *Meta*TUNGSTATE OF SODA. (Same as Margueritte's Bitungstate.) Soluble in water. (Riche.)

NaO, W_2O_6

IV.) "$NaO, 4WO_3 + 8Aq$"(of Margueritte).

TUNGSTATE OF SODA & OF TUNGSTEN. Soluble, with decomposition, in fluorhydric acid, but is unacted upon by other acids, even boiling aqua-regia, or by alkaline solutions. (Wœhler.)

$NaO, WO_3; WO_2, WO_3$

TUNGSTATE OF STRONTIA.

I.) *mono.* Insoluble in water. (Anthon.)

SrO, WO_3

II.) *bi.* Insoluble in cold water; completely soluble in hot water, and in oxalic and phosphoric acids. (Anthon.)

"$SrO, 2WO_3 + 5Aq$"

III.) When recently precipitated, it is soluble in a small amount of water acidulated with nitric acid. (Lotz.)

$8SrO, 7WO_3 + 4Aq$

TUNGSTATE OF THORIA. Insoluble in water. (Berzelius.) Ppt., from acid as well as neutral tungstates. (Berzelius, *Pogg. Ann.*, 1829, **16.** 412.)

ThO, WO_3

TUNGSTATE *of protoxide* OF TIN. Insoluble in water. Soluble in oxalic acid, and in an aqueous solution of caustic potash. Slowly soluble in hot phosphoric acid. (Anthon.)

"$SnO, WO_3 + 6Aq$"

TUNGSTATE *of binoxide* OF TIN. Insoluble in an aqueous solution of tungstate of ammonia. Soluble in a solution of chloride of tin, in phosphoric and in tartaric acids. (Lotz.)

TUNGSTATE OF TUNGSTEN. Slowly, but completely, soluble in an aqueous solution of caustic potash.

(*Blue Oxide of Tungsten.*) $WO_2, WO_3 = W_2O_5$

TUNGSTATE *of protoxide* OF URANIUM. Insoluble in concentrated sulphuric acid. Soluble in chlorhydric acid.

$2UrO, 3WO_3 + 6Aq$

TUNGSTATE *of sesquioxide* OF URANIUM. Insoluble in water. Soluble in strong acids, and in an aqueous solution of carbonate of ammonia. (Berzelius.)

Ur_2O_3, WO_3

TUNGSTATE OF VANADIUM. Slightly soluble in water.

TUNGSTATE OF YTTRIA. Very sparingly soluble in water; rather more soluble in an aqueous solution of tungstate of soda. (Berzelius.)

$YrO, WO_3 + 2Aq$

TUNGSTATE OF ZINC. Insoluble in water.

ZnO, WO_3

TUNGSTEN. Unacted upon by any of the acids, by aqua-regia, or alkaline solutions.

W

But is easily dissolved by a mixture of potash-lye and hypochlorite of soda. (Wœhler & v. Uslar.) None of the metallic compounds of tungsten are known to be soluble in alcohol.

TUNGSTIDE OF LEAD.

TUNGSTITE OF *X*. *Vid.* Tungstate of *X*, & of Tungsten.

TUNICIN. Insoluble in water, alcohol, ether, or glacial acetic acid. (Berthelot.) Slowly soluble in concentrated nitric acid. (Schmidt.) Difficultly soluble in an aqueous solution of cupramin. (Schlossberger.) Unacted upon by boiling dilute acids, or by boiling potash-lye. (Berthelot.) Soluble in cold concentrated sulphuric acid. (Dumas.)

$C_{12}H_{10}O_{10}$

TURPENTINE. See under ESSENCES, & RESINS.

TURPETH MINERAL. *Vid. basic*Sulphate of Mercury($3HgO, SO_3$). (Kane.)

TYROSIN. Very sparingly soluble in cold, tolerably soluble in boiling water.

$$C_{18}H_{11}NO_6 = N\left\{\begin{matrix}C_{14}H_5O_2\\ C_2HO_2\\ C_2H_3\\ H\end{matrix}\right. . O, HO$$

Difficultly soluble in water. (Liebig.) Sparingly soluble in cold, abundantly soluble in hot water. (De la Rue; Hinterberger.) Less soluble than cucin in cold water. Soluble in 1900 pts. of water at 16°, and in 150 pts. of boiling water. Soluble in 13500 pts. of cold alcohol of 90%, and the solubility does not increase to any extent when the temperature is elevated. Insoluble in ether. (Stædeler, in *Kolbe's Lehrb.*, **2.** 307.) Insoluble in absolute alcohol. (Liebig.) Scarcely at all soluble in absolute alcohol (Bopp), more readily soluble when this contains acids or alkalies. (Strecker.) Insoluble in ether. (Hinterberger.) Readily soluble in alkaline solutions (Liebig); also in solutions of the alkaline earths, with combination in both cases. (Wicke.) Soluble, without decomposition, in ammonia-water, from which it is precipitated on the addition of alcohol. (De la Rue; Hinterberger.) Soluble, with combination, in concentrated sulphuric acid, in chlorhydric acid, and the mineral acids in general. Easily soluble, with decomposition, in nitric acid. Its solubility in water is not much augmented by the addition of acetic acid.

TYROSINBARIUM.

I.) Soluble in water.

$C_{18}H_{10}BaNO_6$

II.) Rather difficultly soluble in water. More abundantly soluble in cold than in hot water. Alcohol precipitates it from its aqueous solution.

$C_{18}H_9Ba_2NO_6 + 4Aq$

TYROSINCALCIUM. Soluble in water.

$C_{18}H_9Ca_2NO_6$

TYROSINSILVER.

I.) Sparingly soluble in water. Easily soluble in nitric acid and in ammonia-water.

$C_{18}H_{10}AgNO_6 + Aq$

II.) Difficultly soluble in water. Decomposed when boiled with water.

$C_{18}H_9Ag_2NO_6 + 2Aq$

TYROSINSODIUM. Soluble in water.

$C_{18}H_9Na_2NO_6$

TYROSINSULPHURIC ACID.

I.) *Monobasic.*

$C_{18}H_{11}NS_2O_{12} = C_{18}H_{10}NO_5, HO, S_2O_6$

a = *Crystalline.* Exceedingly difficultly soluble in cold water, and only slowly soluble in boiling water. Boiling alcohol only dissolves traces of it. On the addition of chlorhydric or nitric acid, it is precipitated from the aqueous solution.

b = *Starchlike powder.* Much more readily soluble, both in water and ordinary spirit, than *a*. On the addition of strong chlorhydric acid to the aqueous solution *a* is precipitated. The salts of monobasic tyrosinsulphuric acid are generally soluble in water. (Stædeler.)

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TyrosinSulphate of Ammonia. Soluble in water.
$C_{18} H_{10} (N H_4) N O_6, S_2 O_6 + 2 Aq$

TyrosinSulphate of Baryta. Soluble in water.
$C_{18} H_{10} Ba N O_6, S_2 O_6 + 4 Aq$

TyrosinSulphate of Lime. Soluble in water.
$C_{18} H_{10} Ca N O_6, S_2 O_6 + 5 Aq$

II.) *Bibasic.*
$C_{18} H_{11} N S_2 O_{12} = C_{18} H_9 N O_4, 2 H O, S_2 O_6$

***Di*TyrosinSulphate of Baryta.** Difficultly soluble in cold, tolerably abundantly soluble in boiling water.
$C_{18} H_9 Ba_2 N O_6, S_2 O_6 + 6 Aq$

U.

Ulmin. Of the products formed by the action of acids upon organic substances, as cellulose, sugar, gum, starch, &c., a portion is soluble in ammonia-water. Another portion "*ulmin*" is not soluble in ammonia-water, nor in solutions of the caustic alkalies. "*Ulmic acid*," when moist, is soluble in pure water, and in alkaline solutions, but is less soluble after having been strongly dried, or digested in concentrated chlorhydric acid. It is insoluble in acids, or in an aqueous solution of sulphate of potash; its compounds with copper and silver, are precipitates. For the ulmic products formed by the action of alkalies upon sugar, starch, gum, &c., see Melassic Acid; and for those formed by the putrefaction of organic matter, like the leaves and roots of plants, see Crenic Acid.
(*Ulmic Acid. Gein. Humic Acid. Geic Acid.*)

Umbellic Acid. *Vid.* Anisic Acid.

Uramilic Acid. *Vid.* Dialurate of Ammonia(*acid*).

Uramil. *Vid.* Dialuramid.

Uranic Acid. *Vid. Sesqui*Oxide of Uranium.

Uranate of Ammonia. Sparingly soluble in pure water. Easily soluble in an aqueous solution of sesquicarbonate of ammonia. Insoluble in ammonia-water, or in a weak aqueous solution of chloride of ammonium. (Compare Péligot, *Ann. Ch. et Phys.*, (3.) **5.** pp. 11, 45.)
$N H_4 O, 2 Ur_2 O_3 + Aq$

Uranate of Baryta. Insoluble in water. (Berzelius.)
$Ba O, 2 Ur_2 O_3$

Uranate of Cobalt. Insoluble in water. Soluble in an aqueous solution of basic acetate of lead. (Persoz, *J. pr. Ch.*, 1834, **3.** 216.) Soluble in nitric acid. Insoluble in an aqueous solution of nitrate of potash. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** 222.)

Uranate of Lead. When dried at 100°, it is readily soluble, with combination, in acetic acid; but after having been ignited, it is but difficultly soluble in acetic acid. (Wertheim, *Ann. Ch. et Phys.*, (3.) **11.** 69.) Uranate of lead is completely insoluble in an aqueous solution of basic acetate of lead. (Persoz, *J. pr. Ch.*, 1834, **3.** 216.)
$Pb O, 2 Ur_2 O_3$

Uranate of Lime.

Uranate of Magnesia.
$Mg O, 2 Ur_2 O_3$

Uranate of Nickel. Insoluble in water. Soluble in an aqueous solution of basic acetate of lead. (Persoz, *J. pr. Ch.*, 1834, **3.** 216.)

Uranate of Potash. Insoluble in, and unacted upon by, boiling water. (Berzelius, *Lehrb.*) Insoluble in an aqueous solution of monocarbonate of potash, but readily and completely soluble in solutions of the alkaline bicarbonates, with combination. Soluble in chlorhydric acid. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** pp. 220, 204.)
$K O, 2 Ur_2 O_3$

Uranate of Silver. Ppt.
$Ag O, 2 Ur_2 O_3$

Uranate of Soda.
$Na O, 2 Ur_2 O_3$

Uranate of Zinc. Insoluble in water. Soluble in an aqueous solution of basic acetate of lead. (Persoz, *J. pr. Ch.*, 1834, **3.** 216.) . Soluble in nitric acid. Insoluble in an aqueous solution of nitrate of potash, or of nitrate of ammonia. (Ebelmen, *Ann. Ch. et Phys.*, (3.) **5.** 221.)

Uranium. Permanent. Unacted upon by water at the ordinary temperature. Easily soluble in dilute acids. (Péligot, *Ann. Ch. et Phys.*, (3.) **5.** pp. 19, 20.)
Ur

Uric Acid. Permanent. Almost insoluble in cold, sparingly soluble in warm water. Soluble in 14000 @ 15000 pts. of water at 20° (Bensch); in 10000 pts. of cold water (Proust); in 5000 pts. of cold water (Du Menil); in 2800 pts. of cold water (Gœbel); in 1720 pts. of cold water (W. Henry); in 1800 @ 1900 pts. of boiling water (Bensch); in 1300 pts. of boiling water (Du Menil); in 1400 pts. of boiling water (W. Henry); in 760 pts. of boiling water (Gœbel); in 500 pts. of boiling water (Pearson); and in 300 pts. of boiling water. (Scheele.)
(*Lithic Acid. Lithic Oxide. Harnsæure.*)
$C_{10} H_4 N_4 O_6 + 4 Aq$

Difficultly soluble in boiling water, but dissolves somewhat readily in hot aqueous solutions of several salts containing weak acids, like the alkaline acetates, for example, — the acetic acid being set free, to a certain extent, while the uric acid combines with the alkali; on cooling, however, nearly pure uric acid separates out. (Lipowitz, *Ann. Ch. u. Pharm.*, **38.** 350.) It dissolves readily in the alkaline carbonates, borates, phosphates, lactates, and acetates, since it abstracts some of the alkali from these salts, and is thus rendered more soluble. (Lehmann's *Physiol. Chem.*)

Soluble, with combination, in aqueous solutions of the caustic alkalies. Insoluble in a concentrated solution of carbonate of potash; but it dissolves sparingly in a solution of 1 pt. of carbonate of potash in 8 pts. of water, being soon converted into acid urate of potash; it is more quickly dissolved by a solution of 1 pt. $K O, C O_2$ in 24 pts. of water, and in this case a considerable quantity of the acid urate remains in solution. It is rapidly soluble in a solution of 1 pt. $K O, C O_2$ in 100 @ 200 pts. of water. (Weltzar.) At the temperature of boiling, a solution of 1 pt. of mono- or bicarbonate of potash or soda in 90 pts. of water dissolves 2 pts. of uric acid, carbonic acid being meanwhile evolved; the alkaline urate thus formed crystallizes out on cooling. After having become dry, however, the alkaline urates are difficultly soluble in water. The best method of obtaining the above-mentioned solution is to dissolve, in the first place, the alkaline carbonate in boiling water, and then add the uric acid; for if a mixture of uric acid and the carbonate, especially carbonate of soda, be treated with water, and the whole then heated, only a little of the urate will be dissolved, the greater portion of it remaining

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suspended in the liquor, an insoluble acid salt and a soluble basic salt being apparently formed. At lower temperatures very much more of the alkaline carbonate is required in order to dissolve uric acid, no carbonic acid being evolved in this case, a compound being formed directly from the acid and carbonate. (Lipowitz, *Ann. Ch. u. Pharm.*, **38.** 349.) A mixture of 1 pt. of uric acid and 1 pt. of carbonate of lithia dissolves easily in 90 pts. of water at a temperature of about 50°, and the solution remains perfectly clear on cooling. At the temperature of boiling, 1 pt. of the lithia in 90 pts. of water dissolves almost 4 pts. of uric acid, much carbonic acid being evolved; and, on cooling, a gelatinous mass separates, which, however, dissolves very easily when the liquor is again heated. Caustic lithia dissolves about 6 pts. of uric acid. (Lipowitz, *Ann. Ch. u. Pharm.*, **38.** 352; compare v. Schilling, *Ann. Ch. u. Pharm.*, 1862, **122.** 241.)

Soluble in an aqueous solution of borax, especially when this is dilute. (Bœttger.) Soluble in an aqueous solution of biborate of soda, though to a less extent than in the alkaline carbonates, a solution of 1 pt. of borax in 90 pts. of water being able to dissolve no more than 1 pt. of uric acid; this solution occurs, however, as Bœttger has already shown, at a temperature lower than that of boiling. On cooling this solution most of the uric acid separates out as a compound of uric acid and soda. A solution of borax mixed with boracic acid dissolves the same quantity of uric acid as the solution of simple borax, but on cooling this solution the uric acid separates out completely in combination with soda. (Lipowitz, *loc. cit.*, p. 350.)

Very readily soluble in a warm aqueous solution of ordinary phosphate of soda ($2NaO, HO, PO_5$). (Liebig.) Soluble in an aqueous solution of phosphate of soda. When the diphosphate of soda is somewhat basic, as is usually the case, it dissolves at the temperature of boiling no inconsiderable quantity of uric acid, a compound of uric acid and soda being deposited as the solution cools, though some uric acid still remains in solution. An acid solution of phosphate of soda dissolves less uric acid, and, moreover, deposits all of it, as a soda salt, on cooling. (Lipowitz, *Ann. Ch. u. Pharm.*, **38.** 351.)

For experiments on the solubility of uric acid in various saline solutions, see Ure, in *J. Ch. Méd.*, **18.** 63.

Insoluble in alcohol, or ether. Almost insoluble in dilute acids. Soluble in concentrated sulphuric acid, from which it is precipitated on the addition of water. (Weltzar; Dœbereiner.) Somewhat more readily soluble in concentrated chlorhydric acid than in water.

Soluble in an aqueous solution of cane-sugar, and may be reprecipitated therefrom by adding chlorhydric acid. (Vasmer.) The observed solubility of uric acid in aqueous solutions of the fermentable sugars is very insignificant, but, on the other hand, its solubility in solutions of the nonfermentable sugars is not inconsiderable; a tolerably dilute and warm solution of glycerin in particular dissolving a considerable quantity of it, but on cooling this solution the greater part of the uric acid is again deposited. Mannite also dissolves a portion of it, but not so much as glycerin. (Lipowitz, *Ann. Ch. u. Pharm.*, **38.** 355.) Insoluble in creosote. (Reichenbach.)

The urates of the fixed alkalies and alkaline earths are difficultly soluble in cold, but more easily soluble in hot water; those of the other metallic oxides, and the ammonia-salt are insoluble. All of the urates are decomposed by acids even by acetic acid.

Urate of Ammonia.

I.) *acid.* Soluble in 1608 pts. of water at 15°; more abundantly soluble in hot water. (Bensch.) Sparingly soluble in ammonia-water. Soluble in 480 pts. of water. (Proust.)

$C_{10}H_3(NH_4)N_4O_6$

Urate of Ammonia & of Glycocoll. Soluble in hot water, less soluble in cold water; and still less soluble in alcohol. (Horsford, *Am. J. Sci.*, (2.) **4.** 69.)

"$NH_4O, C_5H_2N_2O_2; C_4H_4NO_3, C_5H_2N_2O_3$"

Urate of Baryta.

I.) *normal.* Soluble in 7900 pts. of cold water, and in 2700 pts. of boiling water. (Allan & Bensch.)

$C_{10}H_2Ba_2N_4O_6 + 4Aq$

II.) *acid.* Insoluble in water, alcohol, or ether. (Bensch.) Sparingly soluble in water. (Wetzlar; Kodweis.)

$C_{10}H_3BaN_4O_6 + 2Aq$

Urate of Cinchonin. Sparingly soluble in water, or in boiling alcohol, or ether. (Elderhorst.)

$C_{10}H_3(N_2\{C_{40}H_{24}O_2^{vi}.H)N_4O_6 + 8Aq$

Urate of Copper.

I.) *basic.* Ppt.

$C_{10}H_2Cu_2N_4O_6; CuO + 5Aq$

Urate of Lead.

I.) *normal.*

$C_{10}H_2Pb_2N_4O_6$

II.) *acid.*

$C_{10}H_3PbN_4O_6 + 2Aq$

Entirely insoluble in water or alcohol. (Allan & Bensch.)

Urate of Lime.

I.) *normal.* Soluble in 1500 pts. of cold, and in 1440 pts. of boiling water. Soluble in a hot aqueous solution of chloride of calcium. (Allan & Bensch.)

$C_{10}H_2Ca_2N_4O_6$

II.) *acid.* Soluble in 603 pts. of cold, and in 276 pts. of boiling water. Much more readily soluble in an aqueous solution of chloride of potassium. (Bensch.)

$C_{10}H_3CaN_4O_6 + 3Aq$

Urate of Lithia.

I.) *acid.* When not too strongly dried, it is easily soluble in 60 pts. of water at 50°, and does not separate out again as the solution cools. When completely dried at a higher temperature, it becomes proportionably less soluble in water, like the other alkaline urates, but still remains, in any event, the most soluble of any of the urates. (Lipowitz, *Ann Ch. u. Pharm.*, 1841, **38.** 352.)

$C_{10}H_3LiN_4O_6$

When dried at 100°, one pt. of it is
soluble in 367.82 pts. of water at 20° (about)
" 115.79 " 39°
" 38.97 " boiling.

Soluble in alcohol, but may be washed with alcohol. (v. Schilling, *Ann. Ch. u. Pharm.*, 1862, **122.** pp. 244, 242.)

Urate of Magnesia.

I.) *acid.* Soluble in 3500 @ 4000 pts. of cold, and in 150 @ 170 pts. of boiling water. (Bensch.)

$C_{10}H_3MgN_4O_6 + 6Aq$

Urate of Mercury(HgO).

I.) *acid.* Ppt.

Urate of Morphine. Soluble in boiling, less soluble in cold water.

Urate of Potash.

I.) *normal.* Soluble in 44 pts. of cold, and in 30 @ 40 pts. of boiling water.
$C_{10}H_2K_2N_4O_6$

Soluble in 36 pts. of water at 15°, with partial decomposition. Sparingly soluble in alcohol. Insoluble in ether. (Allan & Bensch.) Soluble in potash-lye, from which solution carbonic acid precipitates the acid salt.

II.) *acid.* Soluble in 780 @ 800 pts. of water at 20°, and in 70 @ 80 pts. of boiling water. (Bensch.) Insoluble in alcohol or ether. Much less soluble in an aqueous solution of carbonate of potash than in pure water. (Compare Uric Acid.)
$C_{10}H_3KN_4O_6$

Urate of Quinine. Soluble in boiling, or even in warm water. Less readily soluble in cold water.

Urate of Sarcin. Tolerably easily soluble in water. Decomposed by acids. (Strecker.)
$C_{20}H_8N_8O_8 = C_{10}H_8\left(N_2\left\{\begin{matrix}C_6H_3'' \\ (C_2N)_2 . HO_2 \\ H_2\end{matrix}\right.\right)N_4O_6$

Urate of Silver. Ppt.

Urate of Soda.

I.) *normal.* Soluble in 77 pts. of cold, and in 75 pts. of boiling water; in 80 @ 90 pts. of boiling water.
$C_{10}H_2Na_2N_4O_6 + 2\,Aq$

Soluble in 62 pts. of water at 15°, with partial decomposition. (Allan & Bensch.) Very sparingly soluble in alcohol. Insoluble in ether. Carbonic acid precipitates the acid salt from its solution in alkalies.

II.) *acid.* Soluble in 1100 @ 1200 pts. of water at 15°, and in 123 @ 125 pts. of boiling water. (Bensch.) Very much less soluble in an aqueous solution of carbonate of soda than in pure water. (Welzlar.)

Urate of Strontia.

I.) *normal.* Soluble in 4300 pts. of cold, and in 2297 (1790?) pts. of boiling water. (Allan & Bensch.)
$C_{10}H_2Sr_2N_4O_6 + 4\,Aq$

II.) *acid.* Soluble in 603 pts. of cold, and in 276 pts. of boiling water; in 2300 pts. of hot, and in 5300 pts. of cold water. Insoluble in alcohol or ether.

Urea. Soluble in less than 1 pt. of water at 15°, with reduction of temperature, and in all proportions in water at 100°. (Prout.) A dilute aqueous solution undergoes decomposition in time, when left to itself; also more rapidly when boiled, but a concentrated solution may be preserved unchanged.
(*Carbamid. Harnstoff.* Isomeric with Cyanate of Ammonia.)
$C_2H_4N_2O_2 = N_2\left\{\begin{matrix}C_2O_2'' \\ H_4\end{matrix}\right.$

Soluble in 1 pt. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, 8. 201, in *Canstatt's Jahresbericht für* 1854, p. 76.)

Soluble in 5 pts. of cold alcohol of 0.816 sp. gr., and in less than 1 pt. of boiling alcohol (Prout); in 4 @ 5 pts. of cold, and in 2 pts. of boiling alcohol. Ether only dissolves traces of it. (Wittstein's *Handw.*) Very sparingly soluble in ether. Insoluble in oil of turpentine.

Most of the salts of urea are soluble in alcohol.

UreoCarbonic Acid. *Vid.* Allophanic Acid.
$C_4H_4N_2O_6$

Ureous Acid. *Vid.* Xanthic Oxide.

Uret.
$N\left\{\begin{matrix}C_2O_2'' \\ H_2\end{matrix}\right.$

***Bi*Uret.** Easily soluble in water, and still more readily in alcohol. Soluble, without decomposition, in concentrated sulphuric and nitric acids. (Wiedemann.)
$C_4H_5N_3O_4 = N_3\left\{\begin{matrix}(C_2O_2'')_2 \\ H_5\end{matrix}\right.$

Urethamylane. *Vid.* Carbamate of Amyl.

Urethan. *Vid.* Carbamate of Ethyl.

Urethane*Sulfuré*. *Vid.* Hydrate of SulphoCarbonylEthylammonium.

Urethylan. *Vid.* Carbamate of Methyl.

Uroerythrin. Insoluble in alcohol or ether, even when these are acidulated.

Uroglaucin (of Heller). Permanent. Insoluble in water, cold alcohol, or ether. Difficultly soluble in hot alcohol. (Heller.)
(*Urocyanin*(of Martin).)

Urorhodin. Insoluble in water. Soluble in cold alcohol of 0.830 sp. gr., and in ether. (Heller.)

Uroxanic Acid. Sparingly soluble in cold water; more abundantly soluble, with decomposition, in boiling water. Readily soluble in ammonia-water.
$C_{10}H_{10}N_4O_{12}$

Uroxanate of Ammonia. Soluble in water. Sparingly soluble in alcohol.

Uroxanate of Baryta. Soluble in water, from which it is precipitated on the addition of alcohol.

Uroxanate of Lead. Insoluble in water.

Uroxanate of Lime. Soluble in water, from which it is precipitated on the addition of alcohol.

Uroxanate of Potash. Very easily soluble in hot, and quite readily soluble in cold water. Insoluble in alcohol.
$C_{10}H_8K_2N_4O_{12} + 6\,Aq$

Uroxanate of Silver. Ppt.

Uroxin. *Vid.* Alloxantin.

Ursin. Soluble in water, alcohol, ether, and dilute acids. (Parrish's *Pharm.*, pp. 422, 426.)

Ursone. Insoluble in water, dilute acids, or alkaline solutions. Difficultly soluble in alcohol, and ether.
$C_{20}H_{17}O_2$

Usnic Acid. Insoluble in water. Very sparingly soluble in boiling spirit; but soluble in hot concentrated alcohol. Slowly soluble in cold, easily soluble in boiling ether. Soluble in oil of turpentine, and the fatty oils. Insoluble in chlorhydric acid. Soluble in concentrated sulphuric acid, from which it is precipitated on the addition of water. Easily soluble in concentrated aqueous solutions of the alkalies. With the exception of the alkaline salts, most of the usnates are insoluble in water; but they dissolve in alcohol; ether decomposes them.
(*Usnein. Parietin*(of Thomson).
$C_{38}H_{16}O_{14} = C_{38}H_{15}O_{13}, HO$

Usnate of Ammonia. Soluble in water, and alcohol.

Usnate of Baryta. Easily soluble in alcohol.
$C_{38}H_{15}BaO_{14}$

Usnate *of protoxide* of Copper. Ppt.
$C_{38}H_{15}CuO_{14}$

Usnate of Lead. Ppt.

Usnate of Potash. Difficultly soluble in water; the aqueous solution being decomposed on the addition of much
$C_{38}H_{15}KO_{14}$

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water, with separation of an insoluble acid salt. Soluble in spirit.

Usnate of Silver. Ppt.

Usnate of Soda. Soluble in water, and alcohol.

Uvic Acid. *Vid.* ParaTartaric Acid.

V.

Vaccinic Acid. Not isolated.
$C_{20} H_{20} O_6 = C_{20} H_{18} O_4, 2 H O$

Vaccinate of Baryta. Efflorescent. Soluble in water. (Lerch.)
$C_{20} H_{18} Ba_2 O_6$

Valene. *Vid.* Valerol.

ValerAcetoNitril(of Schlieper). Much more soluble than ether in water. Miscible in all proportions in alcohol, and ether. (Schlieper.)
$C_{20} H_{24} N_2 O_6$

Valeral. *Vid.* Hydride of Valeryl.

Valeraldid. *Vid.* Hydride of Valeryl.

ValeraldidAmmonia. *Vid.* Valerylide of Ammonia.

Valeraldin. Insoluble in water. Soluble in alcohol, and ether. (Beissenhirtz, *Ann. Ch. u. Pharm.*, **90.** 109.)
$C_{20} H_{21} N S_4$

Valeramid. Very easily soluble in water.
(*Valerylamid.*)
$C_{16} H_{11} N O_2 = N \left\{ \begin{matrix} C_{10} H_9 O_2 \\ H_2 \end{matrix} \right.$

Valeramin. *Vid.* Amylamin.

ValerAnilid. *Vid.* PhenylValeramid.

Valeric, or Valerianic Acid(Anhydrous). Slowly combines with water when exposed to moist air. This transformation is more rapid, though still slow, in warm water; but very rapid in a boiling aqueous solution of caustic potash. Alcohol also decomposes it; but it is soluble, without decomposition, in ether. (Chiozza, *Ann. Ch. et Phys.*, (3.) **39.** pp. 197, 198.)
(*Valeric Valerate. Valeric Anhydride.*)
$C_{20} H_{18} O_6 = \left. \begin{matrix} C_{10} H_9 O_2 \\ C_{10} H_9 O_2 \end{matrix} \right\} O_2$

Valeric Acid. Soluble in 16 pts. of cold water (Grote); in 20 pts. of cold water (Wittstein); in 30 pts. of water at 18.2° (Chevreul); in 30 pts. of water at 12° (Trommsdorff), the solution containing 3.22% of it; in 30 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht für* 1854, p. 76.)
(*Valerianic Acid. Baldrianic Acid. Delphinic Acid. Phocenic Acid.*)
$C_{10} H_{10} O_4 = C_{10} H_9 O_3, H O, \& + 2 Aq$

Miscible in all proportions with alcohol, of 0.794 sp. gr., ether (Chevreul), and oil of turpentine. (Trautwein.) Partially soluble in oil of turpentine. (Grote.) Insoluble in oil of turpentine, or in olive-oil. (Trommsdorff.) Readily soluble in large quantity in acetic acid of 1.07 sp. gr. (Trommsdorff.) Soluble in concentrated sulphuric acid, from which it is partially precipitated on the addition of water. Sparingly soluble in cold nitric acid. (Chevreul.)

Many of the valerates are soluble in water, and some of them in alcohol also. (Trautwein.)

Valerate of Allyl. Insoluble in water. Readily soluble in alcohol, and ether. (Hofmann & Cahours, *J. Ch. Soc.*, **10.** 322.)
$C_{16} H_{14} O_4 = C_{10} H_9 (C_6 H_5) O_4$

Valerate of Alumina. Boiling water dissolves only a trace of it. Insoluble in alcohol. Very sparingly soluble in valeric acid. (Trommsdorff.)

Valerate of Ammonia. Readily soluble in water, and alcohol. (Trautwein.) Very deliquescent and soluble in water. (Chevreul.)

Valerate of Amyl. Soluble in alcohol.
(*Apple Oil.*)
$C_{20} H_{20} O_4 = C_{10} H_9 (C_{10} H_{11}) O_4$

Valerate of Atropin. Very soluble in water; but this solution, neutral at first, becomes acid when evaporated. Its solution is decomposed when heated above 50°. Decomposed by acids, even the weakest. (Miette, *C. R.*, 1857, **45.** 1053.) Extremely soluble in water; less soluble in alcohol, and still less soluble in ether. (Callman, *C. R.*, 1858, **47.** 417.)
$C_{10} H_9 (N C_{34} H_{23} O_6 . H) O_4 + Aq$

Valerate of Baryta. Efflorescent. Soluble in 2 pts. of water at 15°, and in 1 pt. of water at 20°. (Chevreul.) Difficultly soluble in absolute alcohol. (Schlieper.)
$C_{10} H_9 Ba O_4 + 2 Aq$

Valerate of Benzol. Soluble in ether. (Wicke.)
$C_{34} H_{24} O_6 = C_{20} H_{18} (C_{14} H_6'') O_8$

Valerate of Benzoyl. *Vid.* BenzoValeric Acid.

Valerate of Bismuth. Neither dissolved nor decomposed by cold or boiling water. (Wittstein.)
$8 Bi O_3, 2 C_{10} H_9 O_3 + 4 Aq$

Valerate of Butyl.
$C_{18} H_{18} O_4 = C_{10} H_9 (C_8 H_9) O_4$

Valerate of Cadmium. Soluble in water, and alcohol. (Bonaparte.)

Valerate of Cerium. Ppt.

Valerate of Cinchonidin(of Pasteur). Soluble in water, and spirit. (Leers, *Ann. Ch. u. Pharm.*, **82.** 161.)

Valerate of Cinchonin.

Valerate of Cobalt. Permanent. Readily soluble in water, and alcohol. (Trommsdorff.)

Valerate of Copper(Cu O). Easily soluble in water, and alcohol. (Trommsdorff.)
$C_{10} H_9 Cu O_4 + Aq$

Valerate of Didymium. Soluble in water. (Bonaparte.)

Valerate of Ethyl. Insoluble in water. Very easily soluble in alcohol, ether, and the oils. (Grote & Otto.)
$C_{14} H_{14} O_4 = C_{10} H_9 (C_4 H_5) O_4$

Valerate of Glucina. Permanent. Soluble in water. (Trommsdorff.)

Valerate of Glyceryl. *Vid.* Valerin.

Valerate *of protoxide* **of Iron.** Somewhat soluble in water.

Valerate *of sesquioxide* **of Iron.** Insoluble in cold, gradually decomposed by hot water. Soluble in alcohol. Readily soluble in chlorhydric and other acids. (Wittstein.)
$C_{30} H_{27} Fe_2''' O_{12}$

Valerate of Lead.

I.) *normal.* Readily soluble in water. (Trommsdorff.)
$C_{10} H_9 Pb O_4$

II.) *basic.* Sparingly soluble in water. (Chevreul.)
$C_{10} H_9 Pb O_4, 2 Pb O$

Valerate of Lime. Effloresces in warm air. Readily soluble in water, and in boiling hydrated alcohol. Sparingly soluble in absolute alcohol. (Trommsdorff.)
$C_{10} H_9 Ca O_4$

Valerate of Lithia. Soluble in water.
$C_{10}H_9LiO_4 + 2 Aq$

Valerate of Magnesia. Effloresces in warm air. Tolerably soluble in water. Sparingly soluble in alcohol. (Trommsdorff.)

Valerate of Manganese. Readily soluble in water. (Trommsdorff.)

Valerate *of dinoxide* **of Mercury.**

Valerate *of protoxide* **of Mercury.** Insoluble in cold, soluble in boiling water. (Trommsdorff.)

Valerate of Methyl.
$C_{12}H_{12}O_4 = C_{10}H_9(C_2H_3)O_4$

Valerate of Morphine.

Valerate of Nickel.

I.) Readily soluble in boiling water.

II.) Sparingly soluble in boiling water. Soluble in alcohol. (Trommsdorff.)

Valerate of Potash. Very deliquescent.
$C_{10}H_9KO_4$ Readily soluble in water, and alcohol. Soluble in less than 3.9 pts. of alcohol, of 0.792 sp. gr., at 20°. (Chevreul.)

Valerate of Quinine.

I.) *amorphous.* Scarcely soluble in 1000 pts. of water. Easily soluble in alcohol, and ether. (Wittstein.)
$2\left(N_2\left\{C_{40}H_{24}O_4^{vi}\right.\right), C_{10}H_{10}O_4 + 4 Aq$

II.) *crystalline.* Permanent. Soluble in 110 pts. of cold, and in 40 pts. of boiling water. Soluble in 6 pts. of cold or boiling alcohol of 80%. Very easily soluble in ether. When the aqueous solution is evaporated at a temperature superior to 50°, the pitch-like, difficultly soluble, amorphous hydrate separates out, instead of crystals. (Wittstein.)
$2\left(N_2\left\{C_{40}H_{24}O_4^{vi}\right.\right), C_{10}H_{10}O_4 + 24 Aq$

1 pt. of valerate of quinine is soluble in 96 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht für* 1854, p. 75.)

Valerate of Silver. Very insoluble in water. (Lehmann's *Physiol. Chem.*) Soluble in water. (Ettling.) May be washed with cold water. (Gerhardt.)
$C_{10}H_9AgO_4$

Valerate of Soda. Extremely deliquescent. Easily soluble in water, and in alcohol, even when this is absolute. (Chevreul.)

Valerate of Strontia. Efflorescent. Very readily soluble in water, and alcohol. (Chevreul.)

Valerate *of protoxide* **of Uranium.** Ppt.

Valerate *of sesquioxide* **of Uranium.** Readily soluble in water, alcohol, and ether. (Buonaparte.)

Valerate of Zinc. Permanent. Soluble in 50 [5.0 in Gmelin] pts. of cold, and in 40 pts. of boiling water. (Duclou.) Soluble in 96 pts. of water at 18.75°. (Abl, from *Œsterr. Zeitschrift für Pharm.*, **8.** 201, in *Canstatt's Jahresbericht für* 1854, p. 76.)
$C_{10}H_9ZnO_4$

In an earlier memoir, Wittstein states that 1 pt. of the anhydrous salt is soluble in 160 pts. of cold water, but he subsequently corrected this, saying that 90 pts. of water will dissolve 1 pt. of the salt. This observer also obtained a salt containing 12 equivalents of water of crystallization, which is soluble in only 44 pts. of water. (Wittstein's *Handw.*)

Soluble in 60 pts. of cold alcohol of 80%. These cold solutions become turbid on being heated, clearing up again on cooling, hence its solubility in water, and alcohol, diminishes as the temperature rises. On the other hand, it is soluble in 500 pts. of cold, and in 20 pts. of boiling ether. (Wittstein.) Soluble in 17.4 [14.5 in *Gm.*] pts. of cold, and in 16.7 pts. of boiling alcohol. (Duclou.)

The aqueous solution is decomposed by prolonged ebullition to an insoluble basic, and a soluble acid, salt.

Valerate of Zirconia. Partially soluble in water. Soluble in valeric acid. (Trommsdorff.)

Valerene. *Vid.* Amylene; also Borneene.

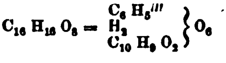
Valeriamylic Acid. *Vid.* Valerate of Amyl.

Valerianic Acid. *Vid.* Valeric Acid.

Valerianic Aldehyde. *Vid.* Hydride of Valeryl.

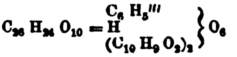
Valeric Anhydride. } *Vid.* Valeric Acid
Valeric Valerate. } (Anhydrous).

*Mono***Valerin.** With ½ a volume of water it forms a limpid mixture, from which it separates completely on the addition of another ½ volume of water. 8 or 10 volumes of water precipitate the limpid mixture in a similar manner, but with 100 volumes of water it forms a solution, or rather, an emulsion. (Berthelot.)



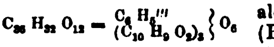
$C_{16}H_{16}O_8 = \left.\begin{array}{l} C_6H_5''' \\ H_2 \\ C_{10}H_9O_2 \end{array}\right\} O_6$

*Di***Valerin.** Does not form a limpid mixture with ½ a volume of water; but with 8 @ 10 volumes of water it forms an emulsion, from which the divalerin soon separates, however. It is not soluble, even in a large amount of water. (Berthelot.)



$C_{26}H_{24}O_{10} = \left.\begin{array}{l} C_6H_5''' \\ H \\ (C_{10}H_9O_2)_2 \end{array}\right\} O_6$

*Tri***Valerin.** Insoluble in water. Soluble in alcohol, and ether. (Berthelot, *Ann. Ch. et Phys.*, (3.) **41.** 253.) According to Berthelot, the "delphinin" ("phocenin," "valerin") of Chevreul is a mixture of the three valerins. It dissolves abundantly in hot alcohol. (Chevreul.)



$C_{36}H_{32}O_{12} = \left.\begin{array}{l} C_6H_5''' \\ (C_{10}H_9O_2)_3 \end{array}\right\} O_6$

Valero*di***Chlorhydrin.** Insoluble in water.
$C_{16}H_{14}Cl_2O_4$ (Berthelot.)

Valerol. Sparingly soluble in water. Readily soluble in alcohol, ether, and the essential oils. Also soluble in concentrated sulphuric acid; on adding water to this solution a portion of the valerol is precipitated, but a portion remains combined with the acid. Unacted upon by cold, decomposed by warm nitric acid. (Gerhardt, *Ann. Ch. et Phys.*, (3.) **7.** 278.)
$C_{12}H_{10}O_2$

Valerone. Insoluble in water. Readily soluble in alcohol, and ether.
(*Valone. Valerylide of Butyl. Oxide of Valeroyl & of Butyl.*)

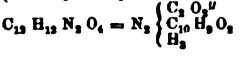
$C_{18}H_{18}O_2 = \left.\begin{array}{l} C_{10}H_9 \\ C_8H_9 \end{array}\right\} O_2$

ValeroNitril. *Vid.* Cyanide of Butyl.

Valerylide of Ammonium. *Vid.* Oxide of Ammonium & of Valeroyl.

Valerylide of Butyl. *Vid.* Valerone.

Valeryl Urea. Almost insoluble in cold, somewhat soluble in boiling water. Almost insoluble in alcohol. (Moldenhauer, *Ann. Ch. u. Pharm.*, **94.** 102.)
(*Carbonyl Valerylbiamide.*)



$C_{12}H_{12}N_2O_4 = N_2\left\{\begin{array}{l} C_2O_2'' \\ C_{10}H_9O_2 \\ H_2 \end{array}\right.$

Valyl. *Vid.* Butyl.

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Vanadic Acid. Slightly soluble in water, VO_3 requiring about 1000 pts. of boiling water for its solution. (Berzelius.) Less soluble in water than molybdic acid. Insoluble in absolute alcohol. Sparingly soluble in alcohol of 0.80 sp. gr. Insoluble in glacial acetic acid. Readily soluble in the stronger acids. Very slightly soluble in formic acid. (Berzelius.) When the solution in strong mineral acids is diluted with water, and then boiled, vanadic acid separates out. (H. Rose, *Pogg. Ann.*, **83.** 151.) Easily reduced by red nitric acid, sulphurous acid, several organic acids, especially oxalic and tartaric acids, sugar, alcohol, etc., when gently heated therewith. Soluble in chlorhydric acid, with subsequent decomposition and evolution of chlorine. (Berzelius, *Lehrb.*) Most of the bivanadiates are readily soluble in water, but they dissolve less easily in aqueous solutions of the caustic alkalies, chloride of ammonium, and other salts; they are all insoluble in alcohol. The other vanadiates are but sparingly soluble in water, and insoluble in alcohol.

Vanadiate of Alumina. Somewhat soluble $Al_2O_3, 3VO_3$ in water. But less soluble than the glucina salt.

Vanadiate of Ammonia.

I.) *White modification.* Soluble in boiling, NH_4O, VO_3 sparingly and very slowly soluble in cold water. Insoluble in alcohol, and only slightly soluble in a saturated aqueous solution of chloride of ammonium.

II.) *Yellow modification.* Soluble in water, from which it is precipitated on the addition of alcohol.

III.) *bi.* Soluble in water, from which it is $NH_4O, 2VO_3$ precipitated on the addition of alcohol.

Vanadiate *of teroxide* **of Antimony.** Soluble in an aqueous solution of tartar-emetic. (Prideaux.)

Vanadiate of Baryta.

I.) *mono.* Before ignition it is sparingly solu- $BaO, VO_3 + 8Aq$ ble in water. Soluble in concentrated sulphuric acid.

II.) *bi.* Rather difficultly soluble in water; and $BaO, 2VO_3$ still less soluble in alcohol.

III.) *basic.* Insoluble, or very sparingly soluble, in water.

Vanadiate of Cadmium.

I.) *mono.* Somewhat soluble.
CdO, VO_3

II.) *bi.* Soluble in water. (Berzelius.)

Vanadiate of Cobalt.

I.) *mono.* Insoluble in water.
CoO, VO_3

II.) *bi.* Soluble in water. Insoluble in alcohol. (Berzelius.)

Vanadiate *of protoxide* **of Copper.**

I.) *mono.* Soluble in water. Insoluble in al- CuO, VO_3 cohol.

II.) *bi.* Soluble in water. (Berzelius.)
$CuO, 2VO_3$

III.) *basic.* Insoluble in water. Soluble in chlorhydric and nitric acids. (Hess.)

Vanadiate of Glucina.

I.) *normal.* Both are sparingly soluble in
$Gl_2O_3, 3VO_3$ water.
II.) *acid.*

Vanadiate *of protoxide* **of Iron.**

I.) Ppt. Soluble in chlorhydric acid.
FeO, VO_3

II.) *acid.* Ppt.

Vanadiate *of sesquioxide* **of Iron.**

I.) *normal.* Slightly soluble in water. (Ber- $Fe_2O_3, 3VO_3$ zelius.)

II.) *acid.* Ppt.

Vanadiate of Lead.

I.) *mono.* Slightly soluble, with decomposition, PbO, VO_3 in water. Easily soluble in cold, or slightly warmed, dilute nitric acid. (Berzelius.)

II.) *bi.* Slightly soluble in water. (Berzelius.)
$PbO, 2VO_3$

Vanadiate of Lime.

I.) *mono.* More soluble in water than the CaO, VO_3 strontia salt. Somewhat soluble in alcohol.

II.) *bi.* Permanent. Very readily soluble in $CaO, 2VO_3$ water.

III.) *basic.*

Vanadiate of Lithia.

I.) *mono.* Very soluble in water.
LiO, VO_3

II.) *bi.* Efflorescent. Soluble in water. In- $LiO, 2VO_3$ soluble in absolute alcohol, but somewhat soluble in ordinary alcohol.

Vanadiate of Magnesia.

I.) *mono.* Very soluble in water; being as MgO, VO_3 readily soluble as the normal salts of the fixed alkalies.

II.) *bi.* Less soluble in water than the mono- $MgO, 2VO_3$ salt (No I.). Alcohol precipitates it, in great part, from the aqueous solution. (Berzelius, *Lehrb.*)

Vanadiate of Manganese.

I.) *mono.* Sparingly soluble in cold, more MnO, VO_3 readily soluble in hot water. Insoluble in alcohol. (Berzelius.)

II.) *bi.* Difficultly soluble in cold water. In- $MnO, 2VO_3$ soluble in alcohol. (Berzelius.)

Vanadiate *of dinoxide* **of Mercury.**

I.) *mono.* Soluble.
Hg_2O, VO_3

II.) *bi.* Ppt.

Vanadiate *of protoxide* **of Mercury.**

I.) *mono.* Slightly soluble in water.
HgO, VO_3

II.) *bi.* Soluble in water, and alcohol. (Ber- $HgO, 2VO_3$ zelius.)

Vanadiate of Nickel.

I.) *mono.* Soluble in water. Insoluble in al- NiO, VO_3 cohol.

II.) *bi.* Soluble in water, and in ammonia- $NiO, 2VO_3$ water. Insoluble in alcohol. (Berzelius.)

Vanadiate of Potash.

I.) *mono.* Very soluble in water, though dis- KO, VO_3 solving very slowly in cold water. In boiling water it dissolves more rapidly. (Berzelius, *Lehrb.*, **3.** 184) Still more difficultly soluble in a cold aqueous solution of caustic potash than in pure water. [*Gm.*]

II.) *bi.* Sparingly soluble in cold, much more $KO, 2VO_3$ soluble in boiling water. When treated with a small quantity of hot water, this dissolves out some KO, VO_3, and some $KO, 2VO_3$, leaving undissolved an acid salt; this behavior is more strongly marked, if the salt has been fused or dehydrated before treating it with the hot water. Insoluble in alcohol.

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III.) *peracid.* Insoluble in water.

Vanadiate of Silver.

I.) *mono.* Ppt.
AgO, VO_3

II.) *bi.* Slightly soluble in cold, more readily soluble in hot water. Easily soluble in dilute nitric acid; also soluble, with combination, in very dilute ammonia-water. (Berzelius.)
$AgO, 2VO_3$

Vanadiate of Soda.

I.) *mono.* Soluble in water.
NaO, VO_3

II.) *bi.* Efflorescent. More soluble than the potash salt in water. Insoluble in alcohol.
$NaO, 2VO_3$

Vanadiate of Strontia.

I.) *mono.* Somewhat more soluble than the baryta salt in water.
SrO, VO_3

II.) *bi.* Permanent. More soluble than the baryta salt in water.
$SrO, 2VO_3 + 9Aq$

III.) *basic.*

Vanadiate of Thoria.

I.) *mono.* Insoluble in water.
ThO, VO_3

II.) *bi.* Soluble in water.

Vanadiate *of protoxide* **of Tin.** Soluble in water. (Berzelius, *Lehrb.*)
SnO, VO_3

Vanadiate *of binoxide* **of Tin.** Soluble in water. (*Ibid.*)
$SnO_2, 2VO_3$

Vanadiate *of sesquioxide* **of Uranium.**

I.) *normal.* Insoluble in water. (Berzelius.)
Ur_2O_3, VO_3

II.) *acid.* Insoluble in water.

Vanadiate of Vanadium.

I.) "*Green Oxide of V.*" Completely soluble in pure water. Sparingly soluble in water which contains a salt like chloride of ammonium in solution. Sparingly soluble in alcohol of 0.86 sp. gr., but insoluble in absolute alcohol.
$VO_2, 2VO_3$

II.) "*Yellowish Green Oxide of V.*" More sparingly soluble than No. I. in water, and is more completely precipitated on the addition of salammoniac.
$VO_2, 4VO_3$

III.) "*Orange Yellow Oxide of V.*" Much more easily soluble than vanadic acid. Soluble in 22.5 pts. of water. (Berzelius, *Lehrb.*, **2.** 342.)

Vanadiate of Yttria.

I.) *mono.* Ppt. Somewhat soluble in water.
YO, VO_3

II.) *bi.* Soluble in water.

Vanadiate of Zinc.

I.) *mono.* Insoluble in water, even when this is boiling. (Berzelius.)
ZnO, VO_3

II.) *bi.* Easily soluble in water. (Berzelius.)

Vanadiate of Zirconia.

I.) *normal.* Soluble in water.
$Zr_2O_3, 3VO_3$

II.) *acid.* Soluble in water. (Berzelius, *Lehrb.*)

Vanadious Acid. *Vid. bin*Oxide of Vanadium. Of the metallic vanadites only those of the alkalies are soluble in water.
VO_2

Vanadite of Ammonia. Easily soluble in pure water. Insoluble, or only very sparingly soluble, in ammonia-water.
NH_4O, VO_2

Vanadite of Manganese. Decomposed by water which contains air.

Vanadite *of protoxide* **of Mercury.** Insoluble in water.

Vanadite of Potash. Permanent. Very soluble in water. Insoluble in alcohol, or in a cold aqueous solution of caustic potash.
KO, VO_2

Vanadium. Permanent. Unacted upon by water, or by sulphuric, chlorhydric, or fluorhydric acid, or by alkaline solutions. Soluble in nitric acid, and aqua-regia.
Va

Vanillin (from the fruit of *Vanilla aromatica.*) Almost insoluble in cold, readily soluble in boiling water. (Gobley; A. Vée.) Readily soluble in alcohol, ether, and in the fatty and volatile oils. (Gobley.) Soluble in dilute acids, without decomposition. Also soluble, with yellow color, in concentrated sulphuric acid. Easily soluble, without decomposition, in an aqueous solution of caustic potash. (Gobley.)
$C_{20}H_6O_4$

Variolarin (from *Variolaria dealbata*). Insoluble in water. Easily soluble in alcohol, and ether. (Robiquet.)
(*Same as Lecanoric Acid?*)

Vasculose. Insoluble in water, alcohol, ether, concentrated acids, or an aqueous solution of cupramin. Soluble in boiling concentrated potash-lye. (Fremy.)

Veratric Acid. Sparingly soluble in cold, more soluble in boiling water. Very abundantly soluble in boiling alcohol. Insoluble in ether.
$C_{18}H_{10}O_8 = C_{18}H_9O_7, HO$

Veratrate of Ammonia. Soluble in water, and alcohol.

Veratrate of Ethyl. Scarcely at all soluble in water. Easily soluble in alcohol. (Will.)
$C_{18}H_9(C_4H_5)O_8$

Veratrate of Lead. Insoluble in water.

Veratrate of Lime. Soluble in alcohol.

Veratrate of Potash. Permanent. Soluble in water, and alcohol.

Veratrate of Silver. Somewhat soluble in water, and alcohol. (Merck.) Decomposed by boiling water. Soluble in ammonia-water. (Schrœtter.)
$C_{18}H_9AgO_8$

Veratrate of Soda. Permanent. Soluble in water, and alcohol.

Veratrine. Efflorescent. Insoluble in boiling water. Readily soluble in alcohol; and especially in ether. Easily soluble, with combination, in weak acids, even carbonic acid water. (Langlois.) Soluble in concentrated chlorhydric acid. Insoluble in alkaline solutions.
$C_{64}H_{52}N_2O_{16} = N_2 \left\{ C_{64}H_{52}O_{16}{}^{\text{vi}} \right.$

Soluble in 3 pts. of cold alcohol.
" 2 " boiling "
" 50 " ether.
(Wittstein's *Handw.*)

100 pts. of chloroform dissolve 11.6 pts. of it. (Schlimpert, *Kopp & Will's J. B. für* 1859, p. 405.) 100 pts. of chloroform dissolve 58.49 pts. of it. (Michael Pettenkofer, *Kopp & Will's J. B. für* 1858, p. 363.) 100 pts. of olive-oil dissolve 1.78 pts. of it. (Pettenkofer, *Ibid.*)

The salts of veratrin are in general freely soluble in glycerin. (Parrish's *Pharm.*, p. 236.)

Veratral. Unacted upon by alkalies.
$C_{16}H_{10}O_4$

*Bi***VinAmylamin.** *Vid. bi*EthylAmylamin.

VinAmylAnilin. *Vid.* EthylAmylAnilin.

VinAmylicEther. *Vid.* Oxide of Amyl & of Ethyl.

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Vinemyl Anilin. *Vid.* EthylAmyl Anilin.

Vinic Butyrate. *Vid.* Butyrate of Ethyl.

Vinic Acid. *Vid.* ParaTartaric Acid.

Vinic Ether. *Vid.* Oxide of Ethyl.

Vinic Oxalate. *Vid.* Oxalate of Ethyl.

Vinic Sulphate. *Vid.* Sulphate of Ethyl.

Vinic Sulphite. *Vid.* Sulphite of Ethyl.

VinoBenzylic Ether. *Vid.* Oxide of Ethyl & of Toluenyl.

VinoButylic Ether. *Vid.* Oxide of Butyl & of Ethyl.

VinoCacodyl. *Vid.* Arsen*bi*Ethyl.

VinoComenic Acid. *Vid.* EthylComenic Acid.

VinoMellitic Acid. *Vid.* EthylMellitic Acid.

VinoMethylid. *Vid.* Oxide of Ethyl & of Methyl.

VinoMethylic Oxalate. *Vid.* Oxalate of
$C_{10}H_8O_8$ Ethyl & of Methyl.

VinoMethylicOxySulphoCarbonate. *Vid.*
$C_8H_8O_2S_4$ OxySulphoCarbonate of Ethyl and of Methyl.

Vinyl(of Kolbe). *Vid.* Acetoyl.
(*"Acetyl"(of Berzelius).*)
C_4H_3

*Tetra***Vinylium.** Not isolated.
(*Tetraacetylium. Tetraacetosylium. Tetrellallylammonium.*)

Violin(from *Viola odorata*). More readily soluble in water, but less soluble in spirit than emetin. Insoluble in ether or oils. (Boullay.)

Viridic Acid. Readily soluble in water,
$C_{28}H_{14}O_{16} = C_{28}H_{12}O_{14}, 2HO$ and in dilute acetic acid. Soluble in concentrated sulphuric acid.

Viridate of Baryta. Ppt.
$C_{28}H_{12}Ba_2O_{16} + 2Aq$

Viridate *of dinoxide* **of Copper.** Ppt., in alcohol. Soluble in boiling water.

Viridate of Lead. Ppt.
$C_{28}H_{12}Pb_2O_{16} + 2Aq$

Viscin(from *Atractylis gummifera*). Insoluble in water. Sparingly soluble in alcohol. Easily soluble in hot ether, and in oil of turpentine. Insoluble in fatty oils. (Macaire.)

Vitellin. Resembles albumen very closely,
(*From the yolk of egg.*) occurring, like this, both in a soluble and an insoluble modification. The soluble modification is not precipitated from its aqueous solution by organic acids, or by ordinary phosphoric acid, but is thrown down by sulphuric and chlorhydric acids; its solution begins to become opalescent at 60°, and at 73° @ 76° deposits flakes. It is only distinguished from soluble albumen by the circumstances, that (without the addition of acetic acid or salts) when heated it forms flakes and clots, that it is not precipitated by the salts of lead or copper, and that it is thrown down by ether. Coagulated vitellin has the same properties as coagulated albumen. (Lehmann.) (Compare Dumas & Cahours, *Ann. Ch. et Phys.*, (3.) **6.** 422.)

Vitriolized Tartar. *Vid.* Sulphate of Potash.

Vulpic Acid. *Vid.* Chrysophanic Acid.

W.

Water. Miscible with alcohol. Soluble in
HO 36 pts. of ether.
Soluble in 30 @ 33 volumes of acetate of ethyl. (Becker.) Soluble in 5 volumes of iodhydrin. (Berthelot & De Luca, *Ann. Ch. et Phys.*, (3.) **43.** 280.) Slightly soluble in most of the fatty oils.

Only minute traces of water are dissolved by anhydrous liquid sulphurous acid at temperatures below —10°, at the ordinary pressure. Even at the temperature of +10°, and under a pressure of several atmospheres, not more than 0.005 pts. of water are dissolved. (Pierre, *Ann. Ch. et Phys.*, (3.) **23.** 431.)

Waterglass. See Silicate of Soda; and Silicate of Potash.

Waxes. Are insoluble in water. Rather difficultly soluble in alcohol, and in alkaline solutions. Easily soluble in ether, and oils. They are soluble in benzin (Mansfield, *J. Ch. Soc.*, **1.** 261), in chloroform (Parrish's *Pharm.*, p. 318), and in oils, both fixed and essential.

Wax of Andiquies(a New Granadian insect). Is composed of palm wax and sugar-cane wax. (Lewy, *Ann. Ch. et Phys.*, (3.) **13.** 454.)

Angelica Wax(from *Archangelica officinalis*). Insoluble in water. More readily soluble in alcohol, and ether than beeswax. Sparingly soluble in potash-lye. (Buchner.)

Beeswax. Contains Cerotic Acid and Myricin, *q. v.*, the relative proportions of these ingredients being subject to variations. Beeswax is completely insoluble in water; partially soluble in alcohol; cold alcohol dissolving but little, while boiling alcohol dissolves the greater part of it, to deposit it again on cooling. The portion difficultly soluble in boiling alcohol requires 200 pts. of this, and 99 pts. of cold ether, for its solution. The portion easily soluble in hot alcohol is easily soluble in ether. Soluble in warm acetone, a portion separating out as the solution cools; water produced a precipitate in the cold solution. (Chenevix, *Ann. de Chim.*, 1809, **69.** 50.) Soluble in hot oil of bay (Brandes), in oil of mandarin. (Luca.) Soluble in all proportions in the fatty and essential oils.

Bicuyba Wax(from *Myristica bicuhyba*). Soluble in boiling alcohol. (Lewy, *loc. cit.*)

Carnanba Wax(from Brazil). Soluble in boiling, less soluble in cold alcohol, and ether. (Brandes; Lewy, *loc. cit.*, p. 449.) Miscible in all proportions with fatty oils. (Brandes.)

Chinese Wax. *Vid.* Cerotate of Ceryl.

Wax of Chlorophyll.

Wax of Cork. Insoluble in water. Soluble
(*Cerin.*) in alcohol, ether, and easily in alkaline
$C_{80}H_{40}O_6$ solutions.

Japan Wax(from *Rhus succedanea*). Almost
(*Probably identical with Palmitin.*) insoluble in cold alcohol, easily and completely soluble in hot absolute alcohol, and still more easily in warm ether. Tolerably easily saponified by potash-lye. (Meyer & Sthamer.)

Wax of Myrica(from several species of *myrica*).

Wax of Ocuba(from several species of *myristica.*) Soluble in boiling alcohol. (Lewy, *loc. cit.*)

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Ozokerit Wax. Soluble in ether.
$C_{40} H_{40}$"

Wax of the Palm-Tree(from *Ceroxylon andicola*). Insoluble in water. Sparingly soluble in boiling, and still less soluble in cold alcohol. (Lewy, *Ann. Ch. et Phys.*, (3.) **13.** 448.)

Wax of the Sugar-Cane. *Vid.* Cerosin.

"**White Precipitate.**" *Vid.* Chloride of Mercurammonium.

Wood Ether. *Vid.* Oxide of Methyl.

Wood Naphtha. } *Vid.* Hydrate of Methyl.
Wood Spirit. }

X.

Xanthamid. *Vid.* Hydrate of SulphoCarbonylEthylammonium.

XanthAmylamid. Insoluble in water. Very soluble in alcohol, and ether. Soluble in cold concentrated sulphuric acid, in which solution the addition of water produces a precipitate. Unacted upon by boiling chlorhydric acid. (M. W. Johnson, *J. Ch. Soc.*, **5.** 145.)
(SulphoCarbamate of Amyl. AmylXanthogenamid.)
$C_{12} H_{13} N S_2 O_2$

XanthAmylamic Acid. *Vid.* OxySulphoCarbonate of Amyl.

Xanthein. Soluble in water, alcohol, and ether. (Fremy & Cloez.)
(Properly AnthoXanthein.)

Xanthelene. *Vid.* OxySulphoCarbonate of Ethyl(No. II.).

Xanthic Acid. } *Vid.* OxySulphoCarbonate of Ethyl.
Xanthic Ether. }

Xanthic Oxide. Insoluble in cold, soluble to a slight extent in boiling water. (Marcet.) Completely, though difficultly, soluble in boiling water. Soluble in 723 pts. of boiling, and in 1950 pts. of cold water. (Cited by Weltzien.) Insoluble in alcohol or ether. (Marcet.) Soluble in concentrated sulphuric acid, from which solution it is not precipitated on the addition of water. Also soluble in nitric acid. Insoluble, or nearly insoluble, in chlorhydric and oxalic acids. (Liebig & Wœhler.) Very sparingly soluble in dilute acids, or in acetic acid. (Marcet.) Soluble in aqueous solutions of the caustic alkalies. More soluble than uric acid in ammonia-water. Soluble in an aqueous solution of carbonate of potash, but not in solutions of the alkaline bicarbonates. (Marcet.)
(Urous Acid. Xanthin (improperly).)
$C_{10} H_4 N_4 O_4$

Xanthil. Insoluble in water. Soluble in alcohol, and ether. Unacted upon by alkaline solutions. (Courbe.)
$C_4 H_5 O_8$?

"**Xanthin.**" *Vid.* Xanthic Oxide.

Xanthin(of Kuhlmann). Easily soluble in water, and alcohol. Almost insoluble in ether. Soluble in dilute acids. (Kuhlmann.)
(Yellow coloring matter of Madder.)

Xanthin(of Fremy & Cloez). Insoluble in water. Soluble in boiling, insoluble in cold alcohol, and ether. (Fremy & Cloez.)
(Properly AnthoXanthin. Yellow coloring matter of Flowers.)

Xanthobetic Acid. Hygroscopic. Easily soluble in water, and absolute alcohol. The alkaline and alkaline earthy salts of xanthobetic acid are soluble in water. (L. Meier.)

XanthoCobalt. Its salts are rather more soluble, both in hot and cold water, than those of roseo-, purpureo-, or luteo-cobalt. Solutions of its salts are decomposed by boiling, though sometimes with difficulty. When heated with mineral acids they are decomposed; but when solutions of them are slightly acidulated with acetic acid, they may be evaporated without much decomposition. (Gibbs & Genth, *Smithsonian Contrib.*, vol. **9.**)

Xanthogenamid. *Vid.* Hydrate of SulphoCarbonylEthylammonium.

Xanthogenic Acid. *Vid.* OxySulphoCarbonate of Ethyl.

Xanthoil. Scarcely soluble in water. Readily soluble in alcohol, even when this is very dilute. (Zeise.)

Xanthopenic Acid. Ppt.

Xanthopenate of Potash. Soluble in water, at least when this is alkaline. (Wœhler.)

Xanthophyll. Insoluble in water. Difficultly soluble in alcohol; more easily soluble in ether. Also sparingly soluble in an aqueous solution of caustic potash. Decomposed by concentrated sulphuric acid. (Berzelius, *Ann. der Pharm.*, 1837, **21.** 260.)
(Yellow coloring matter of autumn leaves.)

Xanthopicrit(from the bark of *Xanthoxylum Clava-Herculis*). Permanent. Somewhat difficultly soluble in water. Easily soluble in alcohol. Insoluble in ether. (Chevallier & Pelletan.)

XanthoProteic Acid. Insoluble in water, alcohol, or ether. Soluble in concentrated acids, and in alkaline solutions.
(XanthoProtein.)
$C_{34} N_{26} N_4 O_{14}$ (?)

XanthoProteate of Ammonia.

XanthoProteate of Baryta. Readily soluble in water. Insoluble in alcohol or ether.

XanthoProteate of Copper(Cu O). Ppt.

XanthoProteate *of protoxide* **of Iron.** Ppt.

XanthoProteate of Lead. Ppt.

XanthoProteate of Lime.

I.) Soluble in water.

II.) *basic.* Insoluble in water.

XanthoProteate of Potash.

XanthoProteate of Silver. Ppt.

XanthoProteate of Soda.

XanthoRhamnin. Readily soluble in water, and alcohol. Entirely insoluble in ether. (Kane, *Proc. R. Irish Acad.*, **2.** 224.)
$C_{28} H_{12} O_4$ (?)

Xanthoxylene.
$C_{10} H_8$

Xanthoxylin. Insoluble in water, even when this is boiling. Easily soluble in alcohol, and ether. (Stenhouse, *Ann. Ch. u. Pharm.*, **104.** 238.)
$C_{10} H_6 O_4$

Xanthurin. Decomposed by an alcholic solution of caustic potash. (Courbe.)
$C_8 H_8 O_4 S =$ "$C_4 H_5 O, C_4 H_3 O_3 S$"

Xanthurin Gas. 1 volume of alcohol absorbs 12 vols. of it; 1 vol. of ether, 20 vols.; 1 vol. of oil of turpentine, 10 vols. Slowly absorbed by potash-lye. (Courbe.)
(Xanthin Gas.)
"$C_4 H_2 S_4 O_4$"

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Xylene. (*Xylol. Hydride of Xylyl.*) $C_{16}H_{10}$ Insoluble in water. Readily soluble in alcohol, and ether. Slowly soluble in concentrated sulphuric acid. (Vœlckel.)

Xylenyl Alcohol. *Vid.* Phloretol.

XylenylSulphurous Acid. (*Sulph Oxylolic Acid. XylolSulphuric Acid.*) $C_{16}H_{10}S_2O_6$ Very deliquescent. Exceedingly soluble in water, and in concentrated sulphuric acid. Soluble in xylene. (Church, *Phil. Mag.*, **9.** 455.)

XylenylSulphite of Baryta. $C_{16}H_9BaS_2O_6$ Soluble in water, especially if this is hot. (Church, *loc. cit.*)

Xylidin.
(*Xylidamin. Xylylamin.*)
$C_{16}H_{11}N = N\left\{\begin{matrix}C_{16}H_9\\H_2\end{matrix}\right.$

Xylite. *Vid.* Lignone.

Xylite Oil. $C_{12}H_9O$ Nearly insoluble in water. Readily soluble in wood-spirit, ether, alcohol, and lignone. (Weidmann & Schweitzer.)

Xylite Resin.

a = Brown. $C_{24}H_{18}O_3$ Insoluble in water or potash-lye. Readily soluble in alcohol, ether, and lignone. (Weidmann & Schweitzer.)

b = Yellow. Nearly insoluble in weak spirit. Soluble in strong alcohol, and in ether. (W. & S.)

Xylitic Naphtha. $C_{12}H_{12}O_3$ Very sparingly soluble in water. Readily soluble in alcohol, ether, and lignone. (Weidmann & Schweitzer.)

Xylyl. Not isolated.
$C_{16}H_9$

Xyloidin. (*Pyroxam. NitrAmidin.*) $C_{12}H_9NO_{14} = \left.\begin{matrix}C_{12}H_7(NO_4)O_4''\\H_2\end{matrix}\right\}O_6$ Insoluble in water, alcohol, ether, or a mixture of alcohol and ether. Easily soluble in acetic acid, even when this is cold. Soluble, with decomposition, in chlorhydric acid. Easily soluble in nitric acid, both concentrated and dilute. Insoluble in a dilute solution of caustic potash. (Béchamp, *Ann. Ch. et Phys.*, (3.) **46.** 349.) Becomes soft and adhesive when boiled with water and dilute sulphuric acid, without dissolving to any appreciable extent. Very sparingly soluble, or insoluble, in alcohol. Dissolves to a gelatinous solution in a mixture of alcohol and ether. Soluble in warm concentrated chlorhydric acid, and is precipitated therefrom on the addition of water. Also soluble in concentrated sulphuric acid, but is not reprecipitated on the addition of water. Soluble, with decomposition, in cold dilute nitric acid. Soluble to a thick slime in acetic acid; this solution coagulates on the addition of water. (Wittstein's *Handw.*)

Xylol. *Vid.* Xylene.

Xyloretin. $C_{40}H_{32}O_4$ Insoluble in water. Readily soluble in strong alcohol, and ether. (Forchammer.)

Xylostein (from the berries of *Lonicera xylosteum*). Sparingly soluble in cold, abundantly soluble in boiling water. Very easily soluble in alcohol, and in ether. Decomposed by acids.

Xylylamin. *Vid.* Xylidin.

Y.

Yellow Prussiate of Potash. *Vid.* Ferrocyanide of Potassium.

Yttrium. Y Unacted upon by air or water at the ordinary temperature. Soluble in dilute acids, and somewhat more difficultly in potash-lye. Insoluble in ammonia-water. (Wœhler.)

Z.

Zein (gluten of *Zea mais*). Insoluble in water. Soluble in alcohol. Partially soluble in ether, oil of turpentine, and alkaline solutions. Unacted upon by concentrated chlorhydric acid. Soluble in concentrated sulphuric acid. Decomposed by concentrated nitric acid. (Gorham; Bizio.)

Zinc. Zn Unacted upon by cold water free from air. Slowly oxydized by boiling water, the latter being decomposed. (H. Deville; Cooke.) Easily soluble in dilute chlorhydric, sulphuric, and nitric acids; and in almost all the acids which are soluble in water, when these are not too dilute. Slowly soluble in warm aqueous solutions of caustic potash, and ammonia, and even in a boiling aqueous solution of chloride of ammonium.

Soluble in a neutral aqueous solution of protochloride of iron, especially if this is heated to boiling, some metallic iron being meanwhile deposited. (Capitaine, *C. R.*, 1839, **9.** 737.) Soluble in an aqueous solution of normal sulphate of nickel, some oxide of nickel being precipitated meanwhile. (Tupputi, *Ann. de Chim.*, 1811, **78.** 149.) A strong hot aqueous solution of chloride of zinc is capable of oxydizing and dissolving an excess of zinc, and the solution may remain perfect on cooling, but on diluting it with water oxychloride of zinc is immediately precipitated. (Ordway, *Am. J. Sci.*, (2.) **23.** 222.)

Zinc is not attacked by pure nitric acid of 1.512 @ 1.419 sp. gr. at a temperature of —18° or less, the metal covering itself with a yellowish white coat, which prevents further action; at a higher temperature this coating dissolves, and the metal is at once attacked by the acid. Nitric acid of 1.419 @ 1.401 sp. gr., or even somewhat more dilute, does not attack zinc at the temperature of a freezing mixture, though at 0°, and above, the action is violent. Pure nitric acid, more dilute than this, attacks zinc, even at the temperature of a mixture of ice and salt. (Millon, *Ann. Ch. et Phys.*, (3.) **6.** 99.) Soluble in carbonic acid water. (Berzelius, *Lehrb.*, **3.** 689.) When pure zinc is melted at the lowest possible temperature, and the molten mass immediately poured into cold water, the metal obtained is but slowly acted upon by dilute sulphuric acid. If another portion of zinc thus melted is poured on to a warm plate, it is somewhat more soluble in sulphuric acid than the preceding, but still dissolves with difficulty. But if the same melted zinc be heated nearly to redness, and then poured into cold water, it is readily soluble in dilute sulphuric acid, and if poured on to a warm plate, it is still more soluble in sulphuric acid. (Bolley, *Ann. Ch. u. Pharm.*, **95.** 303.) Zinc which contains $\frac{1}{10}$ pt. of iron, lead, copper, or tin, is much more soluble in dilute acids than pure zinc. (De la Rive.) The power of acids, &c., to dissolve zinc is greatly influenced by the presence of small quantities of various metallic solutions. In the following experiments six nearly equal portions of commercial zinc, in thin sheets, were each treated, during ten minutes, with 0.15 litre of a mixture of 1 pt. of monohydrated sulphuric acid, and 12 pts. of water; in flask No. I., which contained nothing but the dilute sulphuric acid, the 10.119 grms. of zinc taken lost 0.028 grm.; in No. II., which, beside the acid, received 4 drops of a solution of 1 pt. of bichloride of platinum in 10 pts. of water, 10.466 grms. of zinc lost 4.298 grms.; in No. III., which, beside the acid, contained 10 drops of a saturated solution of tartar emetic, 10.600 grms. of zinc lost 0.8 grm.; in No. IV., which, beside the acid, contained 10 drops of a saturated solution of sulphate of copper, 9.808 grms. of zinc lost 1.284 grms.; in No. V., which, beside the acid, contained 15 drops of a saturated solution of arsenious acid, 10.857 grms. of zinc lost 3 706 grms.; in No. VI., which, beside the acid, contained 15 drops of a saturated solution of sulphate of silver, 10.349 grms. of zinc lost 0.071 grm. It was impossible to employ in each experiment exactly the same quantity of zinc, but the results may be conveniently compared by reducing the numbers above given, for the original weight of zinc taken, and the loss of zinc, to a common expression, taking as unity the action of the pure dilute acid upon the metal, — as in the following table:

Action of pure dilute $S O_3$	. .	1
" do. with	$Pt Cl_2$	149
" " "	$As O_3$	123
" " "	$Cu O, S O_3$	45
" " "	$C_8 H_4 Sb_3 K O_{14}$	29
" " "	$Ag O, S O_3$	2.4

On adding the foregoing saline solutions, it is observed, that the action of bichloride of platinum is immediate, and subsequently tends to decrease; the influence of arsenious acid, on the other hand, is rather slowly established, but it increases rapidly, and soon equals that of the platinum salt; the sulphate of copper, tartar emetic, and sulphate of silver, also produce an increasing acceleration. In the case of sulphate of silver this increase was measured; in two experiments, which lasted an hour, instead of ten minutes, the following results were obtained: in No. I., 10.091 grms. of zinc, treated with the unadulterated dilute sulphuric acid, lost 1.187 grms.; in No. II., treated with sulphuric acid, + 15 drops of a saturated solution of sulphate of silver, 10.278 grms. of zinc lost 5.527 grms. Thus the acceleration produced by sulphate of silver is expressed by the number 2.4 when the reaction lasts ten minutes, and by 4.6 when it lasts an hour. Solutions of salts of cobalt, nickel, tin, cadmium, chrome, lead, antimony, and bismuth, all accelerate the evolution of hydrogen when added to a mixture of zinc and dilute sulphuric acid, but the amount of their influence was not determined, since the examples above given appear to offer the most striking cases, both of slow and of rapid acceleration. When a few drops of protochloride of mercury (Hg Cl) are added to dilute sulphuric acid, which is acting upon zinc, the latter becomes covered with a coat of amalgam, as is well known, and is thus protected from the further action of the acid. In an experiment, made for the purpose of determining the amount of this preservation of zinc by mercury, 20.978 grms. of sheet zinc were left during seventy hours in contact with a quantity of dilute sulphuric acid (1 pt. of $H O, S O_3 + 10$ pts. of water) sufficient to dissolve the whole of it in about an hour and a half, the loss of zinc during these seventy hours having been only 0.343 grm. It appears, therefore, that a small quantity of mercury acts in a manner diametrically opposed to that of a small quantity of platinum or arsenic. These differences become still more frequent and striking when different metals are treated with equal small portions of a given metallic solution; iron, for example, may be preserved by the addition of a solution which is capable of increasing the solution of zinc a hundred-fold.

In order to determine the influence which might be exerted upon the action of the metallic solution by varying the proportion of the latter, the following experiments were made: in No. I., in which to the dilute sulphuric acid (1 pt. $H O, S O_3 + 12$ pts. $H O$) 1 drop of bichloride of platinum was added, 10.379 grms. of zinc lost, in five minutes, 1.848 grm.; and in No. II., where 10 drops of $Pt Cl_2$ were added to a similar acid, 10.257 grms. of zinc lost, in five minutes, 3.871 grms., the quantity of bichloride of platinum in becoming ten times greater, having produced an action about twice as energetic as before.

With regard to the persistence of the influence exerted by these small quantities of metallic solutions, an idea may be gained from the following experiments: 1st.) Three quantities of zinc, sensibly equal in weight, were immersed separately in dilute sulphuric acid (1 pt. $H O, S O_3 + 12$ pts. of $H O$), and then withdrawn, the first piece after five minutes, the second after 10 minutes, and the third after 15 minutes. 2d.) Three portions of zinc, sensibly equal in weight to the preceding, were immersed in similar sulphuric acid, to which had been added 4 drops of bichloride of platinum, and subsequently withdrawn after the lapse of the same intervals of time as in the preceding experiment.

First Series. $S O_3$ alone.

					grms.
Zinc taken	15.104	grms.;	loss in 5	minutes	0.025
"	15.041	"	" 10	"	0,058
"	15.215	"	" 15	"	0.120

Second Series. $S O_3 + 4$ drops of $Pt Cl_2$.

Zinc taken	15.352	grms.;	loss in 5	minutes	3.653
"	15.326	"	" 10	"	6.325
"	15.237	"	" 15	"	7.206

The action of dilute sulphuric acid on zinc is a rapidly increasing action; but this is no longer the case when the acid contains traces of bichloride of platinum. Thus, when the initial action is no longer considered, we are far from finding very considerable differences after the addition of bichloride of platinum. If, for example, the times necessary for complete solution are considered, it will be found that the bichloride of platinum only renders the solution five or six times more rapid. The state of concentration of the acid is also an important point to be considered. An acid diluted with 10 instead of 12 pts. of water exhibits less characteristic effects, and, with increasing concentration of the acid, these effects are gradually effaced.

The action of other mineral acids and of organic acids upon zinc is influenced, like that of dilute sulphuric acid, by the presence of small portions of metals; but the amount of this influence varies with each acid. These differences may be appreciated by the following numbers, determined with chlorhydric acid. The chlorhydric acid must be very dilute, in order that the addition of small quantities of metallic salts shall strongly influence its action; no less than 40 vols.

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of water being necessary for 1 vol. of strong chlorhydric acid. In the following experiments, conducted like those with sulphuric acid, the contact of the zinc and acid lasted an hour: in No. I. dilute chlorhydric acid, without any addition, acting upon 5.64 grms. of zinc, the latter lost 0.059 grm.; in No. II., using dilute chlorhydric acid, + 4 drops of bichloride of platinum, 5.691 grms. of zinc lost 2.586 grms.; in No. III., using dilute chlorhydric acid, + 20 drops of a saturated solution of arsenious acid, 5.664 grms. of zinc lost 2.258 grms.; in No. IV., using dilute chlorhydric acid, + 15 drops of tartar emetic, 5.656 grms. of zinc lost 2.054 grms. Reducing these, as before, to a common standard, we have,

Action of	pure	dilute acid . .		1
"	"	"	+ $Pt\,Cl_2$	43
"	"	"	+ $As\,O^3$	38
"	"	"	+ $C_8\,H_4\,Sb_2\,K\,O_{14}$	35

Whence it appears that bichloride of platinum is far from producing so strong an acceleration in this case as with sulphuric acid; and that tartar emetic, which, with sulphuric acid, acts five times less strongly than bichloride of platinum, exerts, in presence of chlorhydric acid, an influence almost equal to that of the latter salt.

Neither dilute nor concentrated solutions of oxalic acid convert zinc [completely] into oxalate, even at the temperature of ebullition. But if the least trace of bichloride of platinum be added, the metal is completely converted to oxalate, even in the cold, although oxalate of zinc is insoluble. The bichloride of platinum is the only one of the substances in question which acts in this case in a well-defined manner; sulphate of copper, arsenious acid, etc., appearing to exert no influence.

Glacial acetic acid, diluted with one volume of water, attacks zinc feebly; but a single drop of bichloride of platinum communicates a most remarkable intensity to the reaction. On comparing the amounts of zinc dissolved in the two cases, it was found that 200 times more had passed into solution by virtue of the bichloride of platinum. In the case of this weak acid, protochloride of mercury (Hg Cl) exerts no preserving influence; arsenious acid develops its accelerating action only after a very long time; sulphate of copper and tartar emetic accelerate the action, but much less than the platinum salt. Dilute butyric acid behaves precisely like acetic acid. Citric acid exhibits these accelerations very clearly. When dissolved in 5 or 6 pts. of water its action upon zinc is very feeble, but the addition of bichloride of platinum, sulphate of copper, or arsenious acid occasions a very abundant evolution of hydrogen; sulphate of silver exerts no appreciable influence; protochloride of mercury (Hg Cl) preserves the metal very well. Tartaric acid dissolved in 7 or 8 pts. of water presents phenomena analogous to those exhibited by citric acid, excepting only sulphate of silver, which considerably accelerates the conversion of zinc into tartrate. Racemic acid behaves also like the two preceding acids; as with tartaric acid, sulphate of silver accelerates the formation of racemate of zinc, but arsenious acid only acts very slowly.

An energetic action upon zinc is also produced by various saline solutions after these have been mixed with small quantities of the metallic solutions above mentioned. In this category may be enumerated aqueous solutions of the chlorides of potassium and sodium, the sulphates of soda, potash, and magnesia, and the hydrates of soda, potash, and ammonia; it being only necessary to add some drops of bichloride of platinum in order that these solutions shall cause a very sensible evolution of hydrogen from granulated zinc, even in the cold, while at the temperature of boiling hydrogen is produced in abundance.

Sea-water, river-water, and even distilled water, are decomposed by zinc when in presence of small quantities of some of these metallic solutions. The distilled water furnishing less hydrogen than the waters which contain saline matter. The disengagement of hydrogen commences immediately, but continues for a long time; thus, a flask of the capacity of 8 ounces, containing some granulated zinc, was filled with distilled water, to which had been added six drops of bichloride of platinum; hydrogen was immediately evolved, 300 c.c. being formed in the course of 24 hours, the development continued at about this rate during the second and third day, while at the end of eight days only 200 c.c., or thereabouts, of gas were formed in the course of 24 hours; at the end of twenty days, however, the production of hydrogen still continued. It must be remarked, in this connection, that bichloride of platinum and sulphate of copper are the only metallic salts capable of causing zinc to decompose, and be dissolved by distilled water; neither arsenious acid, tartar emetic, nor sulphate of silver producing a single bubble of hydrogen. Bichloride of platinum, moreover, acts much more energetically than sulphate of copper; and among the saline solutions, the solution of sulphate of soda affords the most abundant disengagement of hydrogen. In a case where a saturated solution of chloride of sodium, together with some bichloride of platinum, furnished 127 c.c. of hydrogen, a saturated solution of sulphate of soda, furnished, under analogous conditions, 224 c.c.

Upon the reactions above described light exerts a decided influence. This influence may be most readily proved by means of the slow reactions, as those with saline solutions. As a general rule, the disengagement of hydrogen is slower when light is avoided. But in certain cases the diminution of action exhibits very peculiar characteristics; thus, if two flasks of equal size, one of which is protected from the light by envelopes of black paper and tin foil, while the other receives the direct light of the sky, are taken, and equal portions of sheet zinc and a saturated solution of chloride of sodium, plus bichloride of platinum, introduced into each, the two flasks being placed side by side in a basin of water, in order to maintain equilibrium of temperature; a more rapid evolution of hydrogen will be observed at first in the covered flask, but suddenly the gas ceases to be evolved from this flask, and, after the lapse of several hours, it is useless to remove the envelopes, for hydrogen is no longer formed. In the other, uncovered flask, however, the disengagement of gas, though much slower in the beginning, goes on without interruption, and may last during several months.

When, in the acid or saline solutions above mentioned, or even in the pure water, the zinc comes in contact with the small portion of metallic solution which has been added, it is easy to see that the metal of the latter is precipitated upon the zinc. As by this means there is formed a small quantity of chloride, or other salt, of zinc, corresponding to the bichloride of platinum, or other salt employed, the question arises, whether the salt thus formed participates in the reactions under discussion. But it is clear that this influence, if appreciable, must be very feeble, for if after the precipitation of the platinum, or other metal, the sheet of zinc upon which it has fallen is thoroughly washed, and then placed in a fresh acid or saline solution, in which the salt resulting from the precipitation can no longer form, the disengagement of hydrogen will go on just as if the solution had not been changed. (Millon, *C. R.*, 1845, **21.** pp. 37-45.) In connection with Millon's observations, compare the remarks of Barreswil (*C. R.*, **21.** 292), who urges that these reactions may all be explained by referring to galvanic action, induced by the precipitated metal. According to B., the action of chlorhydric acid upon zinc may be accelerated as well by placing a platinum wire in contact with the zinc, as by adding a solution of bichloride of platinum. Again, the addition of a metallic salt accelerates the solution of zinc by acids, etc., only in those cases where the metal, as it is precipitated upon the zinc, forms a loose spongy coating; for if a compact adherent layer of any metal incapable of decomposing water is formed upon the zinc, the latter is, as it were, varnished, and being no longer in contact with the acid, cannot be acted upon thereby.

Most of the salts of zinc are soluble in water, and all which are insoluble in water dissolve in chlorhydric acid, and in a hot aqueous solution of chloride of ammonium.

ZincAcetamid. Decomposed by water.
$N \left\{ \begin{matrix} C_4\,H_3\,O_2 \\ H \\ Zn \end{matrix} \right.$

ZincAmid. Instantly decomposed by water, and alcohol. Insoluble in ether. (Frankland.)
$N \left\{ \begin{matrix} H_2 \\ Zn \end{matrix} \right.$

ZincAmyl. Decomposed by water. (Frankland.)
(*Amylide of Zinc.*)
$C_{10}\,H_{11}\,Zn$

ZincAnilin. Decomposed by water.
(*Zinc Phenylamin.*)
$N \left\{ \begin{matrix} C_{12}\,H_5 \\ Zn \\ H \end{matrix} \right.$

Zincate of Potash. Readily soluble in water, the solution undergoing decomposition when boiled. (Laux.) Decomposed by pure water. Soluble in alkaline liquors. It may sometimes be crystallized by adding alcohol to the weak alkaline solution. (Fremy, *Ann. Ch. et Phys.*, (3.) **12.** 382.)

Zincate of Soda. Soluble in water. (Dumas, *Tr.*)

ZincEthyl. Decomposed by water, and dilute acids. Soluble in anhydrous ether. (Frankland, *J. Ch. Soc.*, **2.** 293.)
(*ZincEthylium. Ethylide of Zinc.*)
$C_4\,H_5\,Zn$

Zincide of Iron. Soluble in cold acetic acid. (Berthier.)

ZincMethyl. Decomposed at once by water.
(*Methylide of Zinc.*)
$C_2\,H_3\,Zn$

Zinc Oximid.
$N_2 \left\{ \begin{matrix} C_4\,H_4'' \\ H_2 \\ Zn_2 \end{matrix} \right.$

ZincPhenylimid. *Vid.* ZincAnilin.

Zirconia. *Vid.* Oxide of Zirconium.

Zirconium. Insoluble in water. Unacted upon by concentrated chlorhydric or sulphuric acid at the ordinary temperature, and only slightly acted upon by them after long-continued boiling. Nor is it any more strongly attacked by nitric acid, or aqua-regia. Easily soluble in fluorhydric acid, and with violence in a mixture of fluorhydric and nitric acids. Insoluble in aqueous solutions of the caustic alkalies, either cold or boiling. (Berzelius, *Lehrb.*)
Zr

Zuckersæure. *Vid.* Saccharic Acid.

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ERRATA.

Page 2, column 2, line 29 from bottom, for 1.0539 read 1.0534.*

Page 3, col. 2, line 32 from bottom, for "one" read three.

Page 5, col. 1, line 15, for "one" read three.

Page 6, col. 1, line 31 from bottom, for "one" read three.

Page 6, col. 2, line 6 from bottom, for "one" read three.

Page 7, col. 1, line 12 (and in several other places in the first sheets of the work), for "Thompson" read Thomson.

Page 7, col. 1, line 27 from bottom, for 1.0366 read 1.0356,* and for 1.1330 read 1.1390.*

Page 8, col. 1, line 21 from bottom, for 1.1180 read 1.1190.*

Page 9, col. 1, strike out lines 5–8 from bottom.

Page 10, col. 2, line 30 from bottom, for 1.1755 read 1.1745.*

Page 49, col. 1, transpose line 10 to its proper place on p. 48, col. 2; also transpose lines 11 and 12 to the top of the column.

Page 91, col. 1, transpose lines 21–25 to their proper place, below line 6; also transpose lines 32–35 to below line 20.

Page 101, col. 1. At line 30 from bottom insert, 1 vol. of concentrated sulphuric acid, at 11° and a pressure of $0^{m}.757$, absorbs exactly one volume of $C\,O_2$. (Persoz, *C. R.*, 1841, **12**. 513.)

Page 145, col. 1, lines 32–35. The statement concerning basic chloride of aluminum is incorrect. Soluble compounds as basic as $Al_2\,Cl_6$, $4\,Al_2\,O_3$ have been obtained by Ordway.

Page 156, col. 1, line 24 from bottom, for "one" read three.

Page 161, col. 1, line 42, for "one" read three.

Page 195, col. 1. Transpose lines 32 and 33 to their proper place, above line 16 from bottom.

Page 216, col. 1, line 23 from bottom, for "carbonate" read chromate.

Page 216, col. 2, line 7, for "zinc" read silver.

Page 237, col. 1, line 28, for "$C_4\,H\,N_2$" read $C_4\,H\,N_3$.

Page 337, col. 2, line 22, for "0.401" read 1.401.

Page 375, col. 1, lines 12 and 16 from bottom, for "6" read 2.

Page 382, col. 1, line 17, for "1.27" read 1.37.

Page 382, col. 1, line 37, for "arsenic" read arsenious.

Page 414, col. 1, line 25, insert, Easily soluble in wood-spirit.

Page 582, col. 1. Instead of lines 1 to 4 from bottom, read

570	1.778
580	1.780
590	1.781
600	1.782

(Anthon, *J. pr. Ch.*, 1836, **7**. 70.)

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* The items marked with an asterisk have been pointed out to me as apparent errors; they all occur in the original authorities. F. H. S.

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APPENDIX.

TABLE FOR THE COMPARISONS OF THE CENTIGRADE, REAUMUR, AND FAHRENHEIT THERMOMETERS.

$$n^\circ \text{ C.} = \tfrac{4}{5}\, n^\circ \text{ R.} = \tfrac{9}{5}\, n^\circ + 32^\circ \text{ F.}$$
$$n^\circ \text{ R.} = \tfrac{5}{4}\, n^\circ \text{ C.} = \tfrac{9}{4}\, n^\circ + 32^\circ \text{ F.}$$
$$n^\circ \text{ F.} = \tfrac{5}{9}\,(n^\circ - 32^\circ) \text{ C.} = \tfrac{4}{9}\,(n^\circ - 32^\circ) \text{ R.}$$

C.	R.	F.	C.	R.	F.	C.	R.	F.
-40	-32	-40	-25	-20	-13	-10	-8	14
-39.4444	-31.5556	-39	-24.4444	-19.5556	-12	-9.4444	-7.5556	15
-39	-31.2	-38.2	-24	-19.2	-11.2	-9	-7.2	15.8
-38.8889	-31.1111	-38	-23.8889	-19.1111	-11	-8.8889	-7.1111	16
-38.75	-31	-37.75	-23.75	-19	-10.75	-8.75	-7	16.25
-38.3333	-30.6667	-37	-23.3333	-18.6667	-10	-8.3333	-6.6667	17
-38	-30.4	-36.4	-23	-18.4	-9.4	-8	-6.4	17.6
-37.7778	-30.2222	-36	-22.7778	-18.2222	-9	-7.7778	-6.2222	18
-37.5	-30	-35.5	-22.5	-18	-8.5	-7.5	-6	18.5
-37.2222	-29.7778	-35	-22.2222	-17.7778	-8	-7.2222	-5.7778	19
-37	-29.6	-34.6	-22	-17.6	-7.6	-7	-5.6	19.4
-36.6667	-29.3333	-34	-21.6667	-17.3333	-7	-6.6667	-5.3333	20
-36.25	-29	-33.25	-21.25	-17	-6.25	-6.25	-5	20.75
-36.1111	-28.8889	-33	-21.1111	-16.8889	-6	-6.1111	-4.8889	21
-36	-28.8	-32.8	-21	-16.8	-5.8	-6	-4.8	21.2
-35.5556	-28.4444	-32	-20.5556	-16.4444	-5	-5.5556	-4.4444	22
-35	-28	-31	-20	-16	-4	-5	-4	23
-34.4444	-27.5556	-30	-19.4444	-15.5556	-3	-4.4444	-3.5556	24
-34	-27.2	-29.2	-19	-15.2	-2.2	-4	-3.2	24.8
-33.8889	-27.1111	-29	-18.8889	-15.1111	-2	-3.8889	-3.1111	25
-33.75	-27	-28.75	-18.75	-15	-1.75	-3.75	-3	25.25
-33.3333	-26.6667	-28	-18.3333	-14.6667	-1	-3.3333	-2.6667	26
-33	-26.4	-27.4	-18	-14.4	-0.4	-3	-2.4	26.6
-32.7778	-26.2222	-27	-17.7778	-14.2222	0	-2.7778	-2.2222	27
-32.5	-26	-26.5	-17.5	-14	0.5	-2.5	-2	27.5
-32.2222	-25.7778	-26	-17.2222	-13.7778	1	-2.2222	-1.7778	28
-32	-25.6	-25.6	-17	-13.6	1.4	-2	-1.6	28.4
-31.6667	-25.3333	-25	-16.6667	-13.3333	2	-1.6667	-1.3333	29
-31.25	-25	-24.25	-16.25	-13	2.75	-1.25	-1	29.75
-31.1111	-24.8889	-24	-16.1111	-12.8889	3	-1.1111	-0.8889	30
-31	-24.8	-23.8	-16	-12.8	3.2	-1	-0.8	30.2
-30.5556	-24.4444	-23	-15.5556	-12.4444	4	-0.5556	-0.4444	31
-30	-24	-22	-15	-12	5	0	0	32
-29.4444	-23.5556	-21	-14.4444	-11.5556	6	0.5556	0.4444	33
-29	-23.2	-20.2	-14	-11.2	6.8	1	0.8	33.8
-28.8889	-23.1111	-20	-13.8889	-11.1111	7	1.1111	0.8889	34
-28.75	-23	-19.75	-13.75	-11	7.25	1.25	1	34.25
-28.3333	-22.6667	-19	-13.3333	-10.6667	8	1.6667	1.3333	35
-28	-22.4	-18.4	-13	-10.4	8.6	2	1.6	35.6
-27.7778	-22.2222	-18	-12.7778	-10.2222	9	2.2222	1.7778	36
-27.5	-22	-17.5	-12.5	-10	9.5	2.5	2	36.5
-27.2222	-21.7778	-17	-12.2222	-9.7778	10	2.7778	2.2222	37
-27	-21.6	-16.6	-12	-9.6	10.4	3	2.4	37.4
-26.6667	-21.3333	-16	-11.6667	-9.3333	11	3.3333	2.6667	38
-26.25	-21	-15.25	-11.25	-9	11.75	3.75	3	38.75
-26.1111	-20.8889	-15	-11.1111	-8.8889	12	3.8889	3.1111	39
-26	-20.8	-14.8	-11	-8.8	12.2	4	3.2	39.2
-25.5556	-20.4444	-14	-10.5556	-8.4444	13	4.4444	3.5556	40

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C.	R.	F.	C.	R.	F.	C.	R.	F.
5	4	41	25	20	77	45	36	113
5.5556	4.4444	42	25.5556	20.4444	78	45.5556	36.4444	114
6	4.8	42.8	26	20.8	78.8	46	36.8	114.8
6.1111	4.8889	43	26.1111	20.8889	79	46.1111	36.8889	115
6.25	5	43.25	26.25	21	79.25	46.25	37	115.25
6.6667	5.3333	44	26.6667	21.3333	80	46.6667	37.3333	116
7	5.6	44.6	27	21.6	80.6	47	37.6	116.6
7.2222	5.7778	45	27.2222	21.7778	81	47.2222	37.7778	117
7.5	6	45.5	27.5	22	81.5	47.5	38	117.5
7.7778	6.2222	46	27.7778	22.2222	82	47.7778	38.2222	118
8	6.4	46.4	28	22.4	82.4	48	38.4	118.4
8.3333	6.6667	47	28.3333	22.6667	83	48.3333	38.6667	119
8.75	7	47.75	28.75	23	83.75	48.75	39	119.75
8.8889	7.1111	48	28.8889	23.1111	84	48.8889	39.1111	120
9	7.2	48.2	29	23.2	84.2	49	39.2	120.2
9.4444	7.5556	49	29.4444	23.5556	85	49.4444	39.5556	121
10	8	50	30	24	86	50	40	122
10.5556	8.4444	51	30.5556	24.4444	87	50.5556	40.4444	123
11	8.8	51.8	31	24.8	87.8	51	40.8	123.8
11.1111	8.8889	52	31.1111	24.8889	88	51.1111	40.8889	124
11.25	9	52.25	31.25	25	88.25	51.25	41	124.25
11.6667	9.3333	53	31.6667	25.3333	89	51.6667	41.3333	125
12	9.6	53.6	32	25.6	89.6	52	41.6	125.6
12.2222	9.7778	54	32.2222	25.7778	90	52.2222	41.7778	126
12.5	10	54.5	32.5	26	90.5	52.5	42	126.5
12.7778	10.2222	55	32.7778	26.2222	91	52.7778	42.2222	127
13	10.4	55.4	33	26.4	91.4	53	42.4	127.4
13.3333	10.6667	56	33.3333	26.6667	92	53.3333	42.6667	128
13.75	11	56.75	33.75	27	92.75	53.75	43	128.75
13.8889	11.1111	57	33.8889	27.1111	93	53.8889	43.1111	129
14	11.2	57.2	34	27.2	93.2	54	43.2	129.2
14.4444	11.5556	58	34.4444	27.5556	94	54.4444	43.5556	130
15	12	59	35	28	95	55	44	131
15.5556	12.4444	60	35.5556	28.4444	96	55.5556	44.4444	132
16	12.8	60.8	36	28.8	96.8	56	44.8	132.8
16.1111	12.8889	61	36.1111	28.8889	97	56.1111	44.8889	133
16.25	13	61.25	36.25	29	97.25	56.25	45	133.25
16.6667	13.3333	62	36.6667	29.3333	98	56.6667	45.3333	134
17	13.6	62.6	37	29.6	98.6	57	45.6	134.6
17.2222	13.7778	63	37.2222	29.7778	99	57.2222	45.7778	135
17.5	14	63.5	37.5	30	99.5	57.5	46	135.5
17.7778	14.2222	64	37.7778	30.2222	100	57.7778	46.2222	136
18	14.4	64.4	38	30.4	100.4	58	46.4	136.4
18.3333	14.6667	65	38.3333	30.6667	101	58.3333	46.6667	137
18.75	15	65.75	38.75	31	101.75	58.75	47	137.75
18.8889	15.1111	66	38.8889	31.1111	102	58.8889	47.1111	138
19	15.2	66.2	39	31.2	102.2	59	47.2	138.2
19.4444	15.5556	67	39.4444	31.5556	103	59.4444	47.5556	139
20	16	68	40	32	104	60	48	140
20.5556	16.4444	69	40.5556	32.4444	105	60.5556	48.4444	141
21	16.8	69.8	41	32.8	105.8	61	48.8	141.8
21.1111	16.8889	70	41.1111	32.8889	106	61.1111	48.8889	142
21.25	17	70.25	41.25	33	106.25	61.25	49	142.25
21.6667	17.3333	71	41.6667	33.3333	107	61.6667	49.3333	143
22	17.6	71.6	42	33.6	107.6	62	49.6	143.6
22.2222	17.7778	72	42.2222	33.7778	108	62.2222	49.7778	144
22.5	18	72.5	42.5	34	108.5	62.5	50	144.5
22.7778	18.2222	73	42.7778	34.2222	109	62.7778	50.2222	145
23	18.4	73.4	43	34.4	109.4	63	50.4	145.4
23.3333	18.6667	74	43.3333	34.6667	110	63.3333	50.6667	146
23.75	19	74.75	43.75	35	110.75	63.75	51	146.75
23.8889	19.1111	75	43.8889	35.1111	111	63.8889	51.1111	147
24	19.2	75.2	44	35.2	111.2	64	51.2	147.2
24.4444	19.5556	76	44.4444	35.5556	112	64.4444	51.[illegible]	[illegible]

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C.	R.	F.	C.	R.	F.	C.	R.	F.
65	52	149	85	68	185	105	84	221
65.5556	52.4444	150	85.5556	68.4444	186	105.5556	84.4444	222
66	52.8	150.8	86	68.8	186.8	106	84.8	222.8
66.1111	52.8889	151	86.1111	68.8889	187	106.1111	84.8889	223
66.25	53	151.25	86.25	69	187.25	106.25	85	223.25
66.6667	53.3333	152	86.6667	69.3333	188	106.6667	85.3333	224
67	53.6	152.6	87	69.6	188.6	107	85.6	224.6
67.2222	53.7778	153	87.2222	69.7778	189	107.2222	85.7778	225
67.5	54	153.5	87.5	70	189.5	107.5	86	225.5
67.7778	54.2222	154	87.7778	70.2222	190	107.7778	86.2222	226
68	54.4	154.4	88	70.4	190.4	108	86.4	226.4
68.3333	54.6667	155	88.3333	70.6667	191	108.3333	86.6667	227
68.75	55	155.75	88.75	71	191.75	108.75	87	227.75
68.8889	55.1111	156	88.8889	71.1111	192	108.8889	87.1111	228
69	55.2	156.2	89	71.2	192.2	109	87.2	228.2
69.4444	55.5556	157	89.4444	71.5556	193	109.4444	87.5556	229
70	56	158	90	72	194	110	88	230
70.5556	56.4444	159	90.5556	72.4444	195	110.5556	88.4444	231
71	56.8	159.8	91	72.8	195.8	111	88.8	231.8
71.1111	56.8889	160	91.1111	72.8889	196	111.1111	88.8889	232
71.25	57	160.25	91.25	73	196.25	111.25	89	232.25
71.6667	57.3333	161	91.6667	73.3333	197	111.6667	89.3333	233
72	57.6	161.6	92	73.6	197.6	112	89.6	233.6
72.2222	57.7778	162	92.2222	73.7778	198	112.2222	89.7778	234
72.5	58	162.5	92.5	74	198.5	112.5	90	234.5
72.7778	58.2222	163	92.7778	74.2222	199	112.7778	90.2222	235
73	58.4	163.4	93	74.4	199.4	113	90.4	235.4
73.3333	58.6667	164	93.3333	74.6667	200	113.3333	90.6667	236
73.75	59	164.75	93.75	75	200.75	113.75	91	236.75
73.8889	59.1111	165	93.8889	75.1111	201	113.8889	91.1111	237
74	59.2	165.2	94	75.2	201.2	114	91.2	237.2
74.4444	59.5556	166	94.4444	75.5556	202	114.4444	91.5556	238
75	60	167	95	76	203	115	92	239
75.5556	60.4444	168	95.5556	76.4444	204	115.5556	92.4444	240
76	60.8	168.8	96	76.8	204.8	116	92.8	240.8
76.1111	60.8889	169	96.1111	76.8889	205	116.1111	92.8889	241
76.25	61	169.25	96.25	77	205.25	116.25	93	241.25
76.6667	61.3333	170	96.6667	77.3333	206	116.6667	93.3333	242
77	61.6	170.6	97	77.6	206.6	117	93.6	242.6
77.2222	61.7778	171	97.2222	77.7778	207	117.2222	93.7778	243
77.5	62	171.5	97.5	78	207.5	117.5	94	243.5
77.7778	62.2222	172	97.7778	78.2222	208	117.7778	94.2222	244
78	62.4	172.4	98	78.4	208.4	118	94.4	244.4
78.3333	62.6667	173	98.3333	78.6667	209	118.3333	94.6667	245
78.75	63	173.75	98.75	79	209.75	118.75	95	245.75
78.8889	63.1111	174	98.8889	79.1111	210	118.8889	95.1111	246
79	63.2	174.2	99	79.2	210.2	119	95.2	246.2
79.4444	63.5556	175	99.4444	79.5556	211	119.4444	95.5556	247
80	64	176	100	80	212	120	96	248
80.5556	64.4444	177	100.5556	80.4444	213	120.5556	96.4444	249
81	64.8	177.8	101	80.8	213.8	121	96.8	249.8
81.1111	64.8889	178	101.1111	80.8889	214	121.1111	96.8889	250
81.25	65	178.25	101.25	81	214.25	121.25	97	250.25
81.6667	65.3333	179	101.6667	81.3333	215	121.6667	97.3333	251
82	65.6	179.6	102	81.6	215.6	122	97.6	251.6
82.2222	65.7778	180	102.2222	81.7778	216	122.2222	97.7778	252
82.5	66	180.5	102.5	82	216.5	122.5	98	252.5
82.7778	66.2222	181	102.7778	82.2222	217	122.7778	98.2222	253
83	66.4	181.4	103	82.4	217.4	123	98.4	253.4
83.3333	66.6667	182	103.3333	82.6667	218	123.3333	98.6667	254
83.75	67	182.75	103.75	83	218.75	123.75	99	254.75
83.8889	67.1111	183	103.8889	83.1111	219	123.8889	99.1111	255
84	67.2	183.2	104	83.2	219.2	124	99.2	255.2
84.4444	67.5556	184	104.4444	83.5556	220	124.4444	99.5556	256

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C.	R.	F.	C.	R.	F.	C.	R.	F.
125	100	257	145	116	293	165	132	329
125.5556	100.4444	258	145.5556	116.4444	294	165.5556	132.4444	330
126	100.8	258.8	146	116.8	294.8	166	132.8	330.8
126.1111	100.8889	259	146.1111	116.8889	295	166.1111	132.8889	331
126.25	101	259.25	146.25	117	295.25	166.25	133	331.25
126.6667	101.3333	260	146.6667	117.3333	296	166.6667	133.3333	332
127	101.6	260.6	147	117.6	296.6	167	133.6	332.6
127.2222	101.7778	261	147.2222	117.7778	297	167.2222	133.7778	333
127.5	102	261.5	147.5	118	297.5	167.5	134	333.5
127.7778	102.2222	262	147.7778	118.2222	298	167.7778	134.2222	334
128	102.4	262.4	148	118.4	298.4	168	134.4	334.4
128.3333	102.6667	263	148.3333	118.6667	299	168.3333	134.6667	335
128.75	103	263.75	148.75	119	299.75	168.75	135	335.75
128.8889	103.1111	264	148.8889	119.1111	300	168.8889	135.1111	336
129	103.2	264.2	149	119.2	300.2	169	135.2	336.2
129.4444	103.5556	265	149.4444	119.5556	301	169.4444	135.5556	337
130	104	266	150	120	302	170	136	338
130.5556	104.4444	267	150.5556	120.4444	303	170.5556	136.4444	339
131	104.8	267.8	151	120.8	303.8	171	136.8	339.8
131.1111	104.8889	268	151.1111	120.8889	304	171.1111	136.8889	340
131.25	105	268.25	151.25	121	304.25	171.25	137	340.25
131.6667	105.3333	269	151.6667	121.3333	305	171.6667	137.3333	341
132	105.6	269.6	152	121.6	305.6	172	137.6	341.6
132.2222	105.7778	270	152.2222	121.7778	306	172.2222	137.7778	342
132.5	106	270.5	152.5	122	306.5	172.5	138	342.5
132.7778	106.2222	271	152.7778	122.2222	307	172.7778	138.2222	343
133	106.4	271.4	153	122.4	307.4	173	138.4	343.4
133.3333	106.6667	272	153.3333	122.6667	308	173.3333	138.6667	344
133.75	107	272.75	153.75	123	308.75	173.75	139	344.75
133.8889	107.1111	273	153.8889	123.1111	309	173.8889	139.1111	345
134	107.2	273.2	154	123.2	309.2	174	139.2	345.2
134.4444	107.5556	274	154.4444	123.5556	310	174.4444	139.5556	346
135	108	275	155	124	311	175	140	347
135.5556	108.4444	276	155.5556	124.4444	312	175.5556	140.4444	348
136	108.8	276.8	156	124.8	312.8	176	140.8	348.8
136.1111	108.8889	277	156.1111	124.8889	313	176.1111	140.8889	349
136.25	109	277.25	156.25	125	318.25	176.25	141	349.25
136.6667	109.3333	278	156.6667	125.3333	314	176.6667	141.3333	350
137	109.6	278.6	157	125.6	314.6	177	141.6	350.6
137.2222	109.7778	279	157.2222	125.7778	315	177.2222	141.7778	351
137.5	110	279.5	157.5	126	315.5	177.5	142	351.5
137.7778	110.2222	280	157.7778	126.2222	316	177.7778	142.2222	352
138	110.4	280.4	158	126.4	316.4	178	142.4	352.4
138.3333	110.6667	281	158.3333	126.6667	317	178.3333	142.6667	353
138.75	111	281.75	158.75	127	317.57	178.75	143	353.75
138.8889	111.1111	282	158.8889	127.1111	318	178.8889	143.1111	354
139	111.2	282.2	159	127.2	318.2	179	143.2	354.2
139.4444	111.5556	283	159.4444	127.5556	319	179.4444	143.5556	355
140	112	284	160	128	320	180	144	356
140.5556	112.4444	285	160.5556	128.4444	321	180.5556	144.4444	357
141	112.8	285.8	161	128.8	321.8	181	144.8	357.8
141.1111	112.8889	286	161.1111	128.8889	322	181.1111	144.8889	358
141.25	113	286.25	161.25	129	322.25	181.25	145	358.25
141.6667	113.3333	287	161.6667	129.3333	323	181.6667	145.3333	359
142	113.6	287.6	162	129.6	323.6	182	145.6	359.6
142.2222	113.7778	288	162.2222	129.7778	324	182.2222	145.7778	360
142.5	114	288.5	162.5	130	324.5	182.5	146	360.5
142.7778	114.2222	289	162.7778	130.2222	325	182.7778	146.2222	361
143	114.4	289.4	163	130.4	325.4	183	146.4	361.4
143.3333	114.6667	290	163.3333	130.6667	326	183.3333	146.6667	362
143.75	115	290.75	163.75	131	326.75	183.75	147	362.75
143.8889	115.1111	291	163.8889	131.1111	327	183.8889	147.1111	363
144	115.2	291.2	164	131.2	327.2	184	147.2	363.2
144.4444	115.5556	292	164.4444	131.5556	328	184.4444	147.5556	[illegible]

C.	R.	F.	C.	R.	F.	C.	R.	F.
185	148	365	205	164	401	225	180	437
185.5556	148.4444	366	205.5556	164.4444	402	225.5556	180.4444	438
186	148.8	366.8	206	164.8	402.8	226	180.8	438.8
186.1111	148.8889	367	206.1111	164.8889	403	226.1111	180.8889	439
186.25	149	367.25	206.25	165	403.25	226.25	181	439.25
186.6667	149.3333	368	206.6667	165.3333	404	226.6667	181.3333	440
187	149.6	368.6	207	165.6	404.6	227	181.6	440.6
187.2222	149.7778	369	207.2222	165.7778	405	227.2222	181.7778	441
187.5	150	369.5	207.5	166	405.5	227.5	182	441.5
187.7778	150.2222	370	207.7778	166.2222	406	227.7778	182.2222	442
188	150.4	370.4	208	166.4	406.4	228	182.4	442.4
188.3333	150.6667	371	208.3333	166.6667	407	228.3333	182.6667	443
188.75	151	371.75	208.75	167	407.75	228.75	183	443.75
188.8889	151.1111	372	208.8889	167.1111	408	228.8889	183.1111	444
189	151.2	372.2	209	167.2	408.2	229	183.2	444.2
189.4444	151.5556	373	209.4444	167.5556	409	229.4444	183.5556	445
190	152	374	210	168	410	230	184	446
190.5556	152.4444	375	210.5556	168.4444	411	230.5556	184.4444	447
191	152.8	375.8	211	168.8	411.8	231	184.8	447.8
191.1111	152.8889	376	211.1111	168.8889	412	231.1111	184.8889	448
191.25	153	376.25	211.25	169	412.25	231.25	185	448.25
191.6667	153.3333	377	211.6667	169.3333	413	231.6667	185.3333	449
192	153.6	377.6	212	169.6	413.6	232	185.6	449.6
192.2222	153.7778	378	212.2222	169.7778	414	232.2222	185.7778	450
192.5	154	378.5	212.5	170	414.5	232.5	186	450.5
192.7778	154.2222	379	212.7778	170.2222	415	232.7778	186.2222	451
193	154.4	379.4	213	170.4	415.4	233	186.4	451.4
193.3333	154.6667	380	213.3333	170.6667	416	233.3333	186.6667	452
193.75	155	380.75	213.75	171	416.75	233.75	187	452.75
193.8889	155.1111	381	213.8889	171.1111	417	233.8889	187.1111	453
194	155.2	381.2	214	171.2	417.2	234	187.2	453.2
194.4444	155.5556	382	214.4444	171.5556	418	234.4444	187.5556	454
195	156	383	215	172	419	235	188	455
195.5556	156.4444	384	215.5556	172.4444	420	235.5556	188.4444	456
196	156.8	384.8	216	172.8	420.8	236	188.8	456.8
196.1111	156.8889	385	216.1111	172.8889	421	236.1111	188.8889	457
196.25	157	385.25	216.25	173	421.25	236.25	189	457.25
196.6667	157.3333	386	216.6667	173.3333	422	236.6667	189.3333	458
197	157.6	386.6	217	173.6	422.6	237	189.6	458.6
197.2222	157.7778	387	217.2222	173.7778	423	237.2222	189.7778	459
197.5	158	387.5	217.5	174	423.5	237.5	190	459.5
197.7778	158.2222	388	217.7778	174.2222	424	237.7778	190.2222	460
198	158.4	388.4	218	174.4	424.4	238	190.4	460.4
198.3333	158.6667	389	218.3333	174.6667	425	238.3333	190.6667	461
198.75	159	389.75	218.75	175	425.75	238.75	191	461.75
198.8889	159.1111	390	218.8889	175.1111	426	238.8889	191.1111	462
199	159.2	390.2	219	175.2	426.2	239	191.2	462.2
199.4444	159.5556	391	219.4444	175.5556	427	239.4444	191.5556	463
200	160	392	220	176	428	240	192	464
200.5556	160.4444	393	220.5556	176.4444	429	240.5556	192.4444	465
201	160.8	393.8	221	176.8	429.8	241	192.8	465.8
201.1111	160.8889	394	221.1111	176.8889	430	241.1111	192.8889	466
201.25	161	394.25	221.25	177	430.25	241.25	193	466.25
201.6667	161.3333	395	221.6667	177.3333	431	241.6667	193.3333	467
202	161.6	395.6	222	177.6	431.6	242	193.6	467.6
202.2222	161.7778	396	222.2222	177.7778	432	242.2222	193.7778	468
202.5	162	396.5	222.5	178	432.5	242.5	194	468.5
202.7778	162.2222	397	222.7778	178.2222	433	242.7778	194.2222	469
203	162.4	397.4	223	178.4	433.4	243	194.4	469.4
203.3333	162.6667	398	223.3333	178.6667	434	243.3333	194.6667	470
203.75	163	398.75	223.75	179	434.75	243.75	195	470.75
203.8889	163.1111	399	223.8889	179.1111	435	243.8889	195.1111	471
204	163.2	399.2	224	179.2	435.2	244	195.2	471.2
204.4444	163.5556	400	224.4444	179.5556	436	244.4444	195.5556	472

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C.	R.	F.	C.	R.	F.	C.	R.	F.
245	196	473	265	212	509	285	228	545
245.5556	196.4444	474	265.5556	212.4444	510	285.5556	228.4444	546
246	196.8	474.8	266	212.8	510.8	286	228.8	546.8
246.1111	196.8889	475	266.1111	212.8889	511	286.1111	228.8889	547
246.25	197	475.25	266.25	213	511.25	286.25	229	547.25
246.6667	197.3333	476	266.6667	213.3333	512	286.6667	229.3333	548
247	197.6	476.6	267	213.6	512.6	287	229.6	548.6
247.2222	197.7778	477	267.2222	213.7778	513	287.2222	229.7778	549
247.5	198	477.5	267.5	214	513.5	287.5	230	549.5
247.7778	198.2222	478	267.7778	214.2222	514	287.7778	230.2222	550
248	198.4	478.4	268	214.4	514.4	288	230.4	550.4
248.3333	198.6667	479	268.3333	214.6667	515	288.3333	230.6667	551
248.75	199	479.75	268.75	215	515.75	288.75	231	551.75
248.8889	199.1111	480	268.8889	215.1111	516	288.8889	231.1111	552
249	199.2	480.2	269	215.2	516.2	289	231.2	552.2
249.4444	199.5556	481	269.4444	215.5556	517	289.4444	231.5556	553
250	200	482	270	216	518	290	232	554
250.5556	200.4444	483	270.5556	216.4444	519	290.5556	232.4444	555
251	200.8	483.8	271	216.8	519.8	291	232.8	555.8
251.1111	200.8889	484	271.1111	216.8889	520	291.1111	232.8889	556
251.25	201	484.25	271.25	217	520.25	291.25	233	556.25
251.6667	201.3333	485	271.6667	217.3333	521	291.6667	233.3333	557
252	201.6	485.6	272	217.6	521.6	292	233.6	557.6
252.2222	201.7778	486	272.2222	217.7778	522	292.2222	233.7778	558
252.5	202	486.5	272.5	218	522.5	292.5	234	558.5
252.7778	202.2222	487	272.7778	218.2222	523	292.7778	234.2222	559
253	202.4	487.4	273	218.4444	523.4	293	234.4	559.4
253.3333	202.6667	488	273.3333	218.6667	524	293.3333	234.6667	560
253.75	203	488.75	273.75	219	524.75	293.75	235	560.75
253.8889	203.1111	489	273.8889	219.1111	525	293.8889	235.1111	561
254	203.2	489.2	274	219.2	525.2	294	235.2	561.2
254.4444	203.5556	490	274.4444	219.5556	526	294.4444	235.5556	562
255	204	491	275	220	527	295	236	563
255.5556	204.4444	492	275.5556	220.4444	528	295.5556	236.4444	564
256	204.8	492.8	276	220.8	528.8	296	236.8	564.8
256.1111	204.8889	493	276.1111	220.8889	529	296.1111	236.8889	565
256.25	205	493.25	276.25	221	529.25	296.25	237	565.25
256.6667	205.3333	494	276.6667	221.3333	530	296.6667	237.3333	566
257	205.6	494.6	277	221.6	530.6	297	237.6	566.6
257.2222	205.7778	495	277.2222	221.7778	531	297.2222	237.7778	567
257.5	206	495.5	277.5	222	531.5	297.5	238	567.5
257.7778	206.2222	496	277.7778	222.2222	532	297.7778	238.2222	568
258	206.4	496.4	278	222.4	532.4	298	238.4	568.4
258.3333	206.6667	497	278.3333	222.6667	533	298.3333	238.6667	569
258.75	207	497.75	278.75	223	533.75	298.75	239	569.75
258.8889	207.1111	498	278.8889	223.1111	534	298.8889	239.1111	570
259	207.2	498.2	279	223.2	534.2	299	239.2	570.2
259.4444	207.5556	499	279.4444	223.5556	535	299.4444	239.5556	571
260	208	500	280	224	536	300	240	572
260.5556	208.4444	501	280.5556	224.4444	537	300.5556	240.4444	573
261	208.8	501.8	281	224.8	537.8	301	240.8	573.8
261.1111	208.8889	502	281.1111	224.8889	538	301.1111	240.8889	574
261.25	209	502.25	281.25	225	538.25	301.25	241	574.25
261.6667	209.3333	503	281.6667	225.3333	539	301.6667	241.3333	575
262	209.6	503.6	282	225.6	539.6	302	241.6	575.6
262.2222	209.7778	504	282.2222	225.7778	540	302.2222	241.7778	576
262.5	210	504.5	282.5	226	540.5	302.5	242	576.5
262.7778	210.2222	505	282.7778	226.2222	541	302.7778	242.2222	577
263	210.4	505.4	283	226.4	541.4	303	242.4	577.4
263.3333	210.6667	506	283.3333	226.6667	542	303.3333	242.6667	578
263.75	211	506.75	283.75	227	542.75	303.75	243	578.75
263.8889	211.1111	507	283.8889	227.1111	543	303.8889	243.1111	579
264	211.2	507.2	284	227.2	543.2	304	243.2	579.2
264.4444	211.5556	508	284.4444	227.5556	544	304.4444	243.5556	580

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C.	R.	F.	C.	R.	F.	C.	R.	F.
305	244	581	323.3333	258.6667	614	342	273.6	647.6
305.5556	244.4444	582	323.75	259	614.75	342.2222	273.7778	648
306	244.8	582.8	323.8889	259.1111	615	342.5	274	648.5
306.1111	244.8889	583	324	259.2	615.2	342.7778	274.2222	649
306.25	245	583.25	324.4444	259.5556	616	343	274.4	649.4
306.6667	245.3333	584	325	260	617	343.3333	274.6667	650
307	245.6	584.6	325.5556	260.4444	618	343.75	275	650.75
307.2222	245.7778	585	326	260.8	618.8	343.8889	275.1111	651
307.5	246	585.5	326.1111	260.8889	619	344	275.2	651.2
307.7778	246.2222	586	326.25	261	619.25	344.4444	275.5556	652
308	246.4	586.4	326.6667	261.3333	620	345	276	653
308.3333	246.6667	587	327	261.6	620.6	345.5556	276.4444	654
308.75	247	587.75	327.2222	261.7778	621	346	276.8	654.8
308.8889	247.1111	588	327.5	262	621.5	346.1111	276.8889	655
309	247.2	588.2	327.7778	262.2222	622	346.25	277	655.25
309.4444	247.5556	589	328	262.4	622.4	346.6667	277.3333	656
310	248	590	328.3333	262.6667	623	347	277.6	656.6
310.5556	248.4444	591	328.75	263	623.75	347.2222	277.7778	657
311	248.8	591.8	328.8889	263.1111	624	347.5	278	657.5
311.1111	248.8889	592	329	263.2	624.2	347.7778	278.2222	658
311.25	249	592.25	329.4444	263.5556	625	348	278.4	658.4
311.6667	249.3333	593	330	264	626	348.3333	278.6667	659
312	249.6	593.6	330.5556	264.4444	627	348.75	279	659.75
312.2222	249.7778	594	331	264.8	627.8	348.8889	279.1111	660
312.5	250	594.5	331.1111	264.8889	628	349	279.2	660.2
312.7778	250.2222	595	331.25	265	628.25	349.4444	279.5556	661
313	250.4	595.4	331.6667	265.3333	629	350	280	662
313.3333	250.6667	596	332	265.6	629.6	350.5556	280.4444	663
313.75	251	596.75	332.2222	265.7778	630	351	280.8	663.8
313.8889	251.1111	597	332.5	266	630.5	351.1111	280.8889	664
314	251.2	597.2	332.7778	266.2222	631	351.25	281	664.25
314.4444	251.5556	598	333	266.4	631.4	351.6667	281.3333	665
315	252	599	333.3333	266.6667	632	352	281.6	665.6
315.5556	252.4444	600	333.75	267	632.75	352.2222	281.7778	666
316	252.8	600.8	333.8889	267.1111	633	352.5	282	666.5
316.1111	252.8889	601	334	267.2	633.2	352.7778	282.2222	667
316.25	253	601.25	334.4444	267.5556	634	353	282.4	667.4
316.6667	253.3333	602	335	268	635	353.3333	282.6667	668
317	253.6	602.6	335.5556	268.4444	636	353.75	283	668.75
317.2222	253.7778	603	336	268.8	636.8	353.8889	283.1111	669
317.5	254	603.5	336.1111	268.8889	637	354	283.2	669.2
317.7778	254.2222	604	336.25	269	637.25	354.4444	283.5556	670
318	254.4	604.4	336.6667	269.3333	638	355	284	671
318.3333	254.6667	605	337	269.6	638.6	355.5556	284.4444	672
318.75	255	605.75	337.2222	269.7778	639	356	284.8	672.8
318.8889	255.1111	606	337.5	270	639.5	356.1111	284.8889	673
319	255.2	606.2	337.7778	270.2222	640	356.25	285	673.25
319.4444	255.5556	607	338	270.4	640.4	356.6667	285.3333	674
320	256	608	338.3333	270.6667	641	357	285.6	674.6
320.5556	256.4444	609	338.75	271	641.75	357.2222	285.7778	675
321	256.8	609.8	338.8889	271.1111	642	357.5	286	675.5
321.1111	256.8889	610	339	271.2	642.2	357.7778	286.2222	676
321.25	257	610.25	339.4444	271.5556	643	358	286.4	676.4
321.6667	257.3333	611	340	272	644	358.3333	286.6667	677
322	257.6	611.6	340.5556	272.4444	645	358.75	287	677.75
322.2222	257.7778	612	341	272.8	645.8	358.8889	287.1111	678
322.5	258	612.5	341.1111	272.8889	646	359	287.2	678.2
322.7778	258.2222	613	341.25	273	646.25	359.4444	287.5556	679
323	258.4	613.4	341.6667	273.3333	647	360	288	680

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AUXILIARY TABLE

For the Comparison of Higher Temperatures.

C.	R.	F.	F.	R.	C.	F.	F.	F.	Directly.		By Addition.	
		Directly.	By Addition.			Directly.	By Addition.		C.	R.	C.	R.
400	320	752	720	300	375	707	675	700	371.1111	296.8889	388.8889	311.1111
500	400	932	900	400	500	932	900	800	426.6667	341.3333	444.4444	355.5556
600	480	1112	1080	500	625	1157	1125	900	482.2222	385.7778	500	400
700	560	1292	1260	600	750	1382	1350	1000	537.7778	430.2222	555.5556	444.4444
800	640	1472	1440	700	875	1607	1575	1100	593.3333	474.6667	611.1111	488.8889
900	720	1652	1620	800	1000	1832	1800	1200	648.8889	519.1111	666.6667	533.3333
1000	800	1832	1800	900	1125	2057	2025	1300	704.4444	563.5556	722.2222	577.7778
1100	880	2012	1980	1000	1250	2282	2250	1400	760	608	777.7778	622.2222
1200	960	2192	2160	1100	1375	2507	2475	1500	815.5556	652.4444	833.3333	666.6667
1300	1040	2372	2340	1200	1500	2732	2700	1600	871.1111	696.8889	888.8889	711.1111
1400	1120	2552	2520	1300	1625	2957	2925	1700	926.6667	741.3333	944.4444	755.5556
1500	1200	2732	2700	1400	1750	3182	3150	1800	982.2222	785.7778	1000	800
1600	1280	2912	2880	1500	1875	3407	3375	1900	1037.7778	830.2222	1055.5556	844.4444
								2000	1093.3333	874.6667	1111.1111	888.8889

Explanation of the Auxiliary Table.

By the aid of this table the three scales may be compared up to 1960° C., 1788° R., and 2680° F., (degrees not corresponding to the same temperature).

The conversion of degrees terminating in two zeros are found in the columns headed "Directly," *e. g.*:

1100° C. = 880° R. = 2012° F.
1500° F. = 815.5556° C. = 652.4444° R.

On the other hand, the conversions of degrees not terminating in two zeros are contained in the columns headed "By Addition."

In order to convert 1142° C. and 1536° F. respectively into F. degrees and R. degrees, we find:

In the Auxiliary Table	1100° C. = 880° R. = 1980° F.
To which are added from the principal table	42° C. = 33.6° R. = 107.6° F.
	1142° C. = 913.6° R. = 2087.6° F.
In the Auxiliary Table	1500° F. = 833.3333° C. = 666.6667° R.
In the principal table	36° F. = 2.2222° C. = 1.7778° R.
	1536° F. = 835.5556° C. = 668.4445° R.

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