

**FIRST OUTLINES OF A
DICTIONARY OF THE
SOLUBILITIES OF CHEMICAL
SUBSTANCES. PP. 457-713**

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First outlines of a dictionary of the solubilities of chemical substances. pp. 457-713 by Francis H. Storer

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FRANCIS H. STORER

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DICTIONARY OF SOLUBILITIES

OF

CHEMICAL SUBSTANCES.

BY FRANK H. STORER.

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1864.

Very slowly and slightly soluble in a boiling aqueous solution of chloride of ammonium. (H. Rose, *Tr.*)

b = hydrated. Decomposed to *a* on boiling $2 \text{SnO}, \text{H}_2\text{O}$ 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. (Merccr.) 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 stibethylum, and of hydrate of triethyltoluencylammonium. 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.

PEROXIDE OF TIN.

a = anhydrous. 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 $\text{SnO}_2, \text{H}_2\text{O}$ chlorhydric and sulphuric acids, even when these are dilute. Soluble in alkalis.

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 triethyltoluencylammonium. 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. *a*; 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 *a* 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) Insoluble in water, or in nitric or sulphuric (Anomalous Oxide. MetaStannic Acid.) 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,

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 alkalis; 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 alkalis 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.*)

ProtOXIDE OF TIN with binOXIDE OF TIN. (*SesquiOxide 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.

OXIDE OF TITANIUM. Insoluble in acids, (*Titanous Oxide.*) even fluorhydric.

SesquiOXIDE OF TITANIUM. When prepared (*Black Oxide of Titanium.*) in the moist way it is insoluble in water or ammonia-water, but quickly oxidizes to titanous 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.)

OXIDE OF TOLUENYL. Insoluble in water. (*Oxide of Benzyl. Oxide of Benzyl. Benzyl Ether. Toluenyl Ether. Benzol Ether.*) Decomposed by concentrated sulphuric acid and by phosphoric acid. (Caunizaro, *Ann.*

Ch. u. Pharm., 92. 115.)

OXIDE OF TUNGSTEN. Insoluble in water. (*Tungstous Oxide. Brown Oxide of Tungsten.*) 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. (Rieche.)

"BLUE OXIDE OF TUNGSTEN." *Vid. Tung-*
(*Tungstic Oxide.*) state of Tungsten.

OXIDE OF TURPENTINE-OIL. Soluble in wa-
(*Isomeric with Campholic Acid.*) ter, alcohol, and $C_{20}H_{32}O_4$, ether, and crystallizes from the hot solutions on cooling. (Sobrero.)

SubOXIDE OF URANIUM(?) Ppt. Decom-
 $U_2O_3(?)$ posed by water, and by exposure to the air. (Péligot, *Ann. Ch. et Phys.*, (3.) 5. 22.)

ProtOXIDE OF URANIUM.

(Formerly mistaken for metallic Uranium.)

α = *anhydrous.* When prepared in the dry way, U_2O_3 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.)

β = *hydrated.* Easily soluble in dilute acids, with combination. (Péligot, *loc. cit.*) Insoluble in aqueous solutions of the caustic alkalis, 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.)

SesquiOXIDE OF URANIUM.

(*Uranic Oxide*)

α = *anhydrous.* Easily soluble in nitric acid. U_2O_5 (Péligot, *Ann. Ch. et Phys.*, (3.) 5. 9.)

β = *hydrated.* Permanent. Insoluble in water. $U_2O_5 \cdot 11H_2O$ 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 di- 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 alkalis. (H. Rose, *Tr.*) Most of its compounds with acids are easily soluble in acids. For its compounds with bases, see URANIC ACID.

ProtOXIDE OF URANIUM with SesquiOXIDE OF URANIUM.

1. $U_2O_5 = U_2O_3 \cdot U_2O_5$
(*Olive-green Oxide of Uranium.*)
(*Trioxyde of Uranium.*)

α = *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

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. $U_2O_5 = 2UrO; Ur_2O_3$ Soluble in acids, with decomposition, forming salts of the proto- and sesquioxide. (Péligot, *Ann. Ch. et Phys.*, (3.) 5. 26.)

SubOXIDE OF VANADIUM. Insoluble in water, VO acids, or alkaline solutions, when out of contact with the air.

BinOXIDE OF VANADIUM.
(Vanadic Oxide. Vanadous Acid.)

a = anhydrous. After ignition it is only slowly, VO₂ through completely, soluble in acids.

b = hydrated. Insoluble in water. Soluble in VO₂H₂O 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.* Vanadium. (Yellow Oxide of Vanadium, diate 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. (Wehler.) 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 aqueous 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 precipi-

tate, at least for several days, unless ammonia be also added. (H. Rose, *Tr.*)

SubOXIDE OF ZINC. Exceedingly slowly soluble in boiling acids.

OXIDE OF ZINC. Insoluble in water. Readily ZnO + H₂O 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, iodic, 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. (Demarcay, *Ann. der Pharm.*, 1834. II. 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 amylin. (A. Wurtz.) Soluble in an aqueous solution of oxide of stibmethylene. (Friedländer.) 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 dintrate of lead. Unacted upon by boiling solutions of the nitrates of cobalt, nickel, and cerium. (Pérez, *Chim. Moléc.*, pp 365, 367, 368.) Insoluble in an aqueous solution of cane-sugar. (Peschier.) The presence of

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. (IL 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 Zr_2O_3 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.)

b = *hydrated*. Insoluble in water, or alcohol. $2Zr_2O_3 \cdot 3H_2O$ 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 temperature. After having been dried, it is more difficultly soluble in acids than when moist.

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.* *Per*Iodic Acid.

OXURIC ACID. (Probably impure Alloxanic Acid.) Very readily soluble in water, and alcohol. (Vanquelin.)

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 *dioxide* 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*). Al-
(*Berberis*.) most 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.

OXYAMMONIDE OF X. *Vid.* AmmonioOxide of X.

OXYBENZOIC ACID. Permanent. Sparingly
(*Isomeric with Salicylic and Ampelic Acid.*)
 $C_{14}H_6O_6 = C_{14}H_6O_6 \cdot H_2O$ 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.)

OXYBENZOATE OF LEAD.

$C_{14}H_2PbO_6$

OXYBROMIDE OF ANTIMONY. Insoluble in
(*Basic hydrobromate of Antimony*) water. (Scrullas.)

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.

$PbBr; PbO$

OXYBROMIDE of *protoxide* of MERCURY. In-
 $HgBr; 2HgO$ soluble in cold, sparingly soluble in hot water. Easily soluble in alcohol. (Læwig.) Insoluble in alcohol. (Rammelsberg.)

OXYBROMIDE OF PHOSPHORUS. Slowly de-
 $P_2O_5Br_3$ composed by water. (Ritter, *Ann. Ch. u. Pharm.*, 95. 210.)

OXYBROMIDE OF TELLURETHYL.

$C_4H_6TeO; C_4H_6TeBr$

OXYBROMIDE OF TUNGSTEN.

$W_2O_5; W_2Br_5$
 WBr_2O (Rieche).

OXYCHLORAMIDIDE OF MERCURY. *Vid.* Chloride of *tetra*MercurAmmonium.

OXYCHLORIDE OF ANTIMONY. All the chlo-
(*Powder of Algaroth*.) rine 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.)

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. (IL Rose, *Pogg. Ann.*, 83. 145.) Soluble in hot nitric acid. (Jacquelin.)

OXYCHLORIDE OF CALCIUM. Decomposed by $CaCl; 3CaO + 10Aq$ water, and alcohol. (H. Rose.)

OXYCHLORIDE OF CERIUM. Insoluble in acids.

OXYCHLORIDE OF CHROMIUM.

I.) $Cr_2O_3Cl + Aq$ 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.) $\text{Cr}_2\text{O}_3 \cdot \text{Cl}_2 + \text{Aq}$ [Compare basic sesquichloride of Chromium.]

OXYCHLORIDE OF CITRYL. *Vid.* Oxychloro-citric Acid.

OXYCHLORIDE OF DINARIDE OF COPPER.
 $\text{Cu}_2 \text{Cl}_2 \cdot 2 \text{CuO}$

OXYCHLORIDE OF PROTOXIDE OF COPPER.

I.)

$a = \text{Cu Cl}_2 \cdot 2 \text{CuO}$

$b = \text{ditto} + \text{Aq}$ 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.)

$c = \text{ditto} + 3 \text{Aq} + 4 \text{H}_2\text{O}$

II.)

$a = \text{Cu Cl}_2 \cdot 3 \text{CuO}$

$b = \text{ditto} + 4 \text{Aq}$ Insoluble in water. Easily soluble in acids.

$c = \text{ditto} + 5 \text{Aq}$ 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.)

$d = \text{ditto} + 8 \text{Aq}$

III.) $\text{Cu Cl}_2 \cdot 4 \text{CuO}$, & $+ 6 \text{Aq}$ Insoluble in water.

OXYCHLORIDE OF DIDYMIUM. Insoluble in HCl ; $2 \text{DiO} + 3 \text{Aq}$ water. Soluble in dilute acids. (Marignac, *Ann. Ch. et Phys.*, (3.) 38, 161.)

OXYCHLORIDE OF ETHENE. *Vid.* Oxide of Chloroethyl.

OXYCHLORIDE OF ETHYLIDENE. Not decomposed by cold water, but is quickly decomposed on heating. (Lieben.)

OXYCHLORIDE OF GOLD. Soluble in water, and in an aqueous solution of caustic potash. (Fremy, *Ann. Ch. et Phys.*, (3.) 31, 481.)

OXYCHLORIDE OF IRIIDIUM. Ppt.

OXYCHLORIDE OF IRON. *Vid.* basic sesquichloride of Iron.

OXYCHLORIDE OF LEAD.

I.) $3 \text{Pb Cl}_2 \cdot \text{PbO}$ Swells up in water.

II.) $\text{Pb Cl}_2 \cdot \text{PbO}$

III.) $\text{Pb Cl}_2 \cdot 2 \text{PbO}$ Easily soluble in acids.

IV.) $\text{Pb Cl}_2 \cdot 3 \text{PbO}$ Almost insoluble in water. Slightly soluble in aqueous solutions of the caustic alkalis. Decomposed by acids. (Vauquelin.)

V.) $\text{Pb Cl}_2 \cdot 5 \text{PbO}$

VI.) $\text{Pb Cl}_2 \cdot 6 \text{ or } 7 \text{ PbO} (?)$ Completely soluble in an aqueous solution of caustic potash. Nitric acid dissolves the oxide of lead, leaving the normal salt.

OXYCHLORIDE OF LIME. *Vid.* Oxychloride of Calcium.

OXYCHLORIDE OF MERCURY (HgO).
(Improperly Chloro Mercurate of Mercury.)

I.) $\text{HgO}_2 \cdot 2 \text{HgCl}$ 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.) $2 \text{HgO} \cdot \text{HgCl}$ Almost insoluble in water. Decomposed by boiling water; also by long-continued contact with cold water.

III.) $3 \text{HgO} \cdot \text{HgCl}$ Very sparingly soluble in cold, more soluble in hot water. (Guibourt; Donavan.) Decomposed by boiling water. (Millon.)

IV.) $4 \text{HgO} \cdot \text{HgCl}$ 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.) $5 \text{HgO} \cdot \text{HgCl}$

VI.) $6 \text{HgO} \cdot \text{HgCl} + \text{Aq}$ Unacted upon by cold water.

VII.) $6 \text{HgO} \cdot \text{HgCl}$
[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.

OXYCHLORIDE OF NICKEL. Sparingly soluble in water. (Berzelius.)

OXYCHLORIDE OF PALLADIUM. Insoluble in water. (Berzelius.) Soluble in acids. (Kane, *Phil. Trans.*, 1842, p. 282.)

OXYCHLORIDE OF PHOSPHORUS. *Vid.* Chloro-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.)

OXYCHLORIDE OF SELENEETHYL. Soluble in water, and in absolute alcohol. (Joy.)

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.)

OXYCHLORIDE OF TELLURETHYL. Sparingly soluble in cold water; much more readily soluble in ammonia-water. Soluble in boiling, less soluble in cold alcohol. (Wöhler.)

OXYCHLORIDE OF TELLERMETHYL. Soluble in alcohol. (Wöhler & Dean.)

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.)

OXYCHLORIDE OF TUNGSTEN.

I.) WCl_6O Immediately decomposed by water. (Riche.)

II.) WClO_2 Slowly decomposed by water. (Riche.)

OXYCHLORIDE OF ZINC. Insoluble in water. Zn Cl_2 ; 9 Zn O Somewhat soluble in ammonia-water. Easily soluble in acids.

(Schindler.)

OXYCHLORIDE OF ZIRCONIUM. *Vid. Sesquichloride of Zirconium (basic).*

OXYCHLOROCARBONATE OF METHYLENE. *Vid. ChloroCarbonate of Methyl.*

OXYCHLOROCARBONIC ETHER. *Vid. ChloroCarbonate of Ethyl.*

OXYCHLOROCITRIC ACID. Deliquesces, with (*Oxychloride of Citryl.*) 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 benzol) bisulphide of carbon, in which it is insoluble, or very sparingly soluble. (Pebal, *Ann. Ch. u. Pharm.*, 1856, 98. 72.)

OXYCHLORONAPHTHALENOSE. Insoluble in $\text{C}_{12} \text{ H}_8 \text{ O}_2$? water. Slightly soluble in alcohol, and ether. Soluble in concentrated sulphuric acid. (Laurent.)

OXYCOBALTCYANIDE OF LEAD. Insoluble $\text{Pb}_2 \text{ Co}_2 \text{ Cy}_2$; 6 Pb O , 3 H O in water. Soluble in acids. (Zwenger.)

OXYCOPAIVIC ACID. See Resins of Copaiba, under RESINS.

OXYCUMINIC ACID. Sparingly soluble in $\text{C}_{20} \text{ H}_{22} \text{ O}_2$ cold, more soluble in boiling water; more readily soluble in alcohol. (Cahours, *Ann. Ch. et Phys.*, (3.) 53. 338.)

OXYCUMINATE OF SILVER.

$\text{C}_{20} \text{ H}_{22} \text{ Ag O}_2$

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_2 ; Sb F_3

OXYFLUORIDE OF COBALT. Insoluble in $2(\text{Co O}; \text{Co F}) + \text{Aq}$ water. (Berzelius.)

OXYFLUORIDE OF COPPER. Insoluble in Cu F ; $\text{Cu O} + \text{Aq}$ 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 oxygen gas at the ordinary temperature; hence

1 kilogram. of water contains 0.0464 gram. 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 0m.76 of mercury, at °C.	Dissolves of oxygen gas, — vols., reduced to 0°C. and 0m.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°	0.02989
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 0m.76 of mercury at any temperature from 0° to 24° C. dissolves 0.28997 vol. of oxygen gas, reduced to 0° and 0m.76 pressure of mercury. (Bunsen's *Gasometry*, pp. 286, 128, 153.) 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. (Doebereiner.) 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.