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M. Alexander Waechter

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ON THE PREPARATION AND PROPERTIES OF CERTAIN CHLORATES. BY M. ALEXANDER WAECHTER.

Protochlorate of Iron.—A colourless neutral solution of this salt is obtained by decomposing a solution of protosulphate of iron with one of chlorate of barytes, both solutions being cold. This salt decomposes spontaneously when the solution is not kept at a very low temperature; it then loses its neutrality, precipitates basic perchloride of iron of a cinnamon colour, and there remains a deep red coloured solution of perchlorate and perchloride of iron.

Protochloride of Tin.—Hydrated protoxide of tin, when recently precipitated, dissolves in aqueous chloric acid, and forms a colourless solution; this decomposes spontaneously in a few minutes with strong detonation and increased temperature, yielding a gelatinous mass when the decomposition is over; this contains hydrated oxide of tin, perchloride of tin and much free chloric acid. The detonation arises from a decomposition of a portion of the chloric acid, produced by the increase of temperature.

Chlorate of Zinc.—The solution of this salt is obtained by the decomposition of chlorate of barytes by means of sulphate of zinc; by evaporation over sulphuric acid a very deliquescent crystalline mass was obtained, which was very soluble in alcohol; this melts at 140° Fahr., and at a little higher temperature it yields chlorine, oxygen and water; and when the heat is sufficiently raised, pure oxide of zinc remains.

It yielded by analysis,

Chloric acid ..	44·46
Oxide of zinc..	23·72
Water	31·82
	<hr/>
	100·

Chlorate of Nickel.—A solution of this salt was obtained by decomposing chlorate of barytes with sulphate of nickel, and the solution yielded, by evaporation over sulphuric acid, very fine regular octahedrons, of a deep green colour, which very readily deliquesced in the air and were very soluble in alcohol; they melt in their water of crystallization at 176° Fahr., and begin to decompose at 284°, yielding water, chlorine and oxygen; if the temperature be not raised above 392°, a black mixture, a residue of peroxide and chloride of nickel, remains, which at a low red heat assumes a yellowish-gray colour, and is then a basic chloride of nickel. If it be heated to redness for a long time, it is converted into pure oxide of nickel of a silver-gray colour.

The crystals of chloride of nickel were found to be composed of

Chloric acid ..	45·16
Oxide of nickel	22·50
Water	32·34
	<hr/>
	100·

Chlorate of Cobalt.—Chlorate of barytes was decomposed by sulphate of cobalt; the solution, separated by the filter from the sul-

phate of barytes, gave, by evaporation over sulphuric acid, regular octahedrons. The crystals are extremely deliquescent, and very soluble in alcohol; they melt at 122° , and are totally decomposed at 212° , with the evolution of chlorine, oxygen and water, leaving pure peroxide of cobalt.

This salt yielded by analysis,

Chloric acid	45·18
Oxide of cobalt . .	22·48
Water	32·34
	<hr/>
	100·

Chlorate of Copper.—The solution of this salt, obtained by the decomposition of chlorate of barytes and sulphate of copper, yielded by evaporation *in vacuo* over sulphuric acid, a dark green liquid of the consistence of a syrup, which became a crystalline mass by exposure to intense cold. Distinct crystals, which appeared to be regular octahedrons, were however rarely obtained. Chlorate of copper is very deliquescent and very soluble in alcohol; it fuses at 149° , and begins to decompose at a somewhat higher temperature; fused chlorate of copper does not solidify till the temperature is reduced to about 68° , even when it has not suffered the slightest decomposition by heat; if it be heated to 212° , bubbles of gas are disengaged, each of which occasions a slight detonation. When the decomposition is effected at the lowest possible temperature, a green residue is obtained, which suffers no further decomposition till heated to above 500° ; this is insoluble in water, but very soluble in dilute acids; the solution in weak nitric acid gives no precipitate with nitrate of silver; the solution in hydrochloric acid has a very distinct smell of chlorine; this green substance is therefore a basic chlorate of hydrate of copper.

Chlorate of copper yielded by analysis,

Chloric acid	44·60
Oxide of copper . .	23·45
Water	31·95
	<hr/>
	100·

Chlorate of Lead.—A neutral solution of this salt is obtained by saturating chloric acid with the oxide; its concentration may be continued over the spirit-lamp, without decomposition, until it begins to crystallize on cooling; the crystals are rhombic prisms; they are at first transparent and possess much lustre, but by exposure to the air they quickly become dull and opaque; they do not deliquesce, but they dissolve very readily in water and in alcohol. When mixed with combustible bodies, they detonate by percussion almost as strongly as the potash salt. At 302° the crystals lose 4·59 per cent. of water; at 446° they are suddenly decomposed with a hissing noise, yielding chlorine and oxygen, and a partly fused black mass remains, which is a mixture of peroxide and chloride of lead; if the heat be continued this yields oxygen, and is converted into basic-yellow chloride of lead, the composition of which is constant.

This salt is composed of

Chloric acid ..	38·49
Oxide of lead..	56·92
Water	4·59
	100·

Chlorate of Silver.—A neutral solution of this salt is obtained by dissolving oxide of silver in chloric acid; this yields by evaporation distinct prismatic crystals; chlorate of silver is anhydrous; it dissolves in about five parts of cold water, and likewise in alcohol without suffering alteration; it fuses at 446°, and begins at 518° to give off oxygen with a trace of chlorine; when heated until the evolution of gas ceases, chloride of silver remains. The evolution of oxygen is much more ready and rapid if the salt be mixed with oxide of copper or peroxide of manganese. If chlorate of silver be heated very rapidly, it decomposes suddenly with explosion and the extrication of light. When mixed with combustible bodies, it detonates by percussion much more strongly than the potash salt.

It is composed of

Chloric acid ..	39·37
Oxide of silver	60·63
	100·

If chlorine be passed through water containing oxide of silver in suspension, chlorate of silver is also formed; but if the current of chlorine be too long continued, this salt decomposes and oxygen gas is evolved, and there are formed chloride of silver and free chloric, not perchloric acid. By the action of hypochlorous acid on oxide of silver, or also upon finely divided metallic silver, no chloric acid is formed, but a mixture of peroxide of silver and chloride of silver.

Ammoniacal Chlorate of Silver.—Prismatic crystals of this salt are obtained by dissolving chlorate of silver in ammonia, and evaporating the solution; these crystals are very soluble in water and in alcohol; they melt at 212° and lose their ammonia, and when the temperature does not exceed 534° pure chlorate of silver remains; when heated rapidly they decompose with explosion and the emission of light. The solution of this salt yields, on the addition of potash, a gray precipitate of Berthollet's fulminating silver.

This salt is composed of

Chlorate of silver	84·81
Ammonia	15·19
	100·

Journ. de Pharm. et de Ch., Mai 1844.

ON THE PROPERTIES AND COMPOSITION OF THE PROTOXIDE OF GOLD. BY M. L. FIGUIER.

The modes of preparing the protoxide of gold proposed by the chemist above named were stated in the last Number of the Philosophical Magazine; we proceed now to state the

Properties of the Protoxide of Gold.—In the state of hydrate it is of so dark a violet colour as to appear black; when dried it has the violet-blue colour of the powder of Cassius. It does not decompose