



Preparation of protoxide of gold

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the contrary, the temperature be slowly raised, they lose 14.1 per cent. of water without fusing; they are then anhydrous, and fuse only at a temperature a little lower than the salts of barytes and strontia.

Like these salts also the chlorate of lime loses oxygen at a high temperature, and chloride of calcium with an alkaline reaction remains. This salt consists of

Chloric acid ..	62.54
Lime	23.36
Water	14.10
	<hr/> 100.

Chlorate of Magnesia.—The neutral solution of this salt, obtained by decomposing chlorate of barytes by sulphate of magnesia, yielded by evaporation over sulphuric acid, a saline mass of crystalline laminae, which was very deliquescent and readily soluble in alcohol. It was separated from the solution, pressed between folds of blotting-paper, and then perfectly dried over sulphuric acid; it fused at 120° Fahr.; and at about 248° Fahr. it begins to lose water, oxygen and chlorine. When the heat is continued there is obtained a mixture of magnesia and chloride of magnesium; if it be heated very rapidly magnesia only is left.

It is composed of

Chloric acid ..	50.25
Magnesia	13.77
Water	35.98
	<hr/> 100.

Protochlorate of Manganese.—This compound could not be obtained in the solid form. The colourless solution obtained by decomposing chlorate of barytes with protosulphate of manganese, decomposes by evaporation over sulphuric acid, at a certain degree of concentration, into chlorine, oxygen and hydrated peroxide of manganese; the author therefore merely states the properties of a dilute solution: it suffers no change by ebullition; sulphuric acid diluted gives it a deep red colour; there being formed sulphate of manganese at the expense of the oxygen of the chloric acid. If a small quantity of solution of protoxide of manganese be added to an excess of concentrated sulphuric acid, a brown crystalline precipitate is formed, which is an intimate mixture of peroxide of manganese and sulphate of the protoxide, insoluble in concentrated sulphuric acid.—*Journ. de Pharm. et de Ch.*, Mai 1844.

PREPARATION OF PROTOXIDE OF GOLD. BY M. L. FIGUIER.

The author states that the substance which Berzelius describes as protoxide of gold is a mixture of the oxide and metallic gold; and he mentions the following processes for procuring the real protoxide:—

1st. Let a solution of chloride of gold be evaporated to dryness to deprive it of acidity; to the residue dissolved in water add a solution

of protonitrate of mercury, and a deep violet precipitate of protoxide of gold is formed; sometimes the precipitate does not separate, and the oxide remains apparently dissolved; but by heat, the precipitate separates immediately; in this operation it is essential not to use an excess of the mercurial salt, for it would produce protochloride, on account of the presence of the hydrochloric acid which accompanies the reaction; it is sufficient not to precipitate the whole of the gold, and to stop while the solution remains slightly coloured yellow with the undecomposed chloride of gold.

2nd. The decomposition of protochloride of gold by potash is a good method of preparing protoxide of gold, but there are precautions which are indispensable to be observed in order to obtain a pure product: evaporate a solution of chloride of gold to dryness, and heat the residue on a sand-bath, the temperature of which is determined by a thermometer; the mass is to be continually agitated till it assumes a very bright canary-yellow colour, taking care that the temperature does not exceed 302° Fahr.; at a higher temperature the protochloride loses the greater part of its chlorine.

If potash be then poured on the mixture, a dark violet precipitate of protoxide of gold separates, and the solution has a deep yellow colour, owing to the potash having dissolved a part of the protoxide of gold; after filtration nitric acid is to be added, so as very accurately to saturate the potash, and precipitate the oxide of gold which it held in solution, in the state of a gelatinous hydrate of a deep violet colour; excess of nitric acid must be avoided, for the *aqua regia* which it would form, would dissolve the product; it is better to let the solution remain slightly alkaline; the products of these operations are to be collected on the same filter.

3rd. If concentrated acetic acid be boiled with tritoxide of gold obtained by decomposing aurate of potash with nitric acid, the filtered liquor has a deep yellow colour, and by evaporating it nearly to dryness, the separation of a very considerable quantity of protoxide of gold takes place.

4th. The tritoxide of gold (auric acid) recently prepared from the aurate of magnesia or barytes, being diffused through a solution of potash or soda, readily dissolves and forms a solution of a golden yellow colour; if this solution be submitted to evaporation, protoxide of gold is always precipitated, whatsoever means of evaporation be employed, either without the contact of air or spontaneous evaporation.

This precipitation is especially active at a boiling heat; the solution becomes quickly turbid and deposits a greenish precipitate, probably the tritoxide, and this is soon followed by an abundant deposit of violet protoxide of gold; this reaction continues in a singular manner, and solutions which contained only about 300 grains of gold, will continue to become turbid and to deposit protoxide of gold, after having boiled for nearly two days.

5th. The neutral chloride of gold, treated with potash or soda, forms, after long-continued ebullition, so considerable a quantity of

protoxide that this method may also be used. The carbonate and bicarbonate of potash produce the same effects.

6th. Vegetable infusions, treated with chloride of gold and excess of a fixed alkali, produce, at a moderately high temperature, or still better by contact of some hours' duration, an abundant precipitate of protoxide of gold, retaining, however, a little organic matter.

7th. The acetate, citrate and the tartrate of potash, with an excess of potash, form under the same circumstances protoxide of gold.

The preceding facts seem to determine pretty clearly the action of organic salts upon chloride of gold: when an alkali is present, protoxide is precipitated; but if the salts be neutral or acid, metallic gold is thrown down: these facts are proved by a very simple experiment; when solution of gold is boiled, tartaric acid or neutral tartrate of potash, a precipitate of gold is formed; but if the liquor be filtered which contains some undecomposed chloride of gold, and potash be added in excess, a blackish-violet precipitate of protoxide is immediately obtained.—*Ann. de Ch. et de Ph.*, Juillet 1844.

[The properties and composition of the protoxide and some other compounds of gold will be given in a future number.—Ed. P. M.]

METEOROLOGICAL OBSERVATIONS FOR JUNE 1844.

Chiswick.—June 1. Clear and fine. 2. Overcast and cold: fine: cloudy. 3. Light clouds and very fine. 4, 5. Very fine. 6. Slight rain: cloudy. 7. Overcast: boisterous. 8. Very fine. 9. Slight rain: very fine. 10. Fine: cloudy. 11—16. Very fine. 17. Hot and dry: cloudy. 18. Rain: fine. 19. Overcast: heavy clouds, with showers. 20. Overcast. 21, 22. Very fine. 23. Exceedingly clear: sultry. 24. Cloudy: hot and sultry. 25. Constant heavy rain. 26. Cloudy: fine. 27. Cloudy. 28, 29. Very fine. 30. Dry haze: overcast and fine.—Mean temperature of the month $2^{\circ}19$ above the average.

Boston.—June 1. Fine. 2, 3. Cloudy. 4. Fine. 5. Cloudy. 6. Rain early A.M.: rain A.M. 7. Cloudy. 8. Cloudy: thermometer at 4 o'clock 75° . 9. Cloudy. 10. Fine: rain A.M. 11. Fine. 12. Fine: thermometer 4 o'clock 75° . 13. Fine: stormy all day. 14, 15. Stormy. 16, 17. Fine. 18. Cloudy. 19, 20. Cloudy: rain A.M. and P.M. 21. Cloudy. 22. Fine. 23. Fine: thermometer at noon 81° . 24. Fine: rain early A.M., with thunder and lightning: thermometer at noon 80° . 25. Cloudy: rain A.M. and P.M. 26, 27. Cloudy. 28—30. Fine.

Sandwich Manse, Orkney.—June 1. Cloudy. 2, 3. Bright: cloudy. 4. Showers: cloudy. 5—7. Showers: rain. 8. Bright: cloudy. 9. Cloudy: showers. 10, 11. Bright: drops. 12. Bright: rain. 13. Showers: bright. 14, 15. Showers. 16. Bright: clear. 17. Clear. 18. Drizzle. 19. Drizzle: drops. 20. Showers: drops. 21. Clear. 22. Fog. 23. Drops: clear. 24. Hazy: clear. 25. Clear: cloudy. 26, 27. Cloudy. 28. Cloudy: damp. 29, 30. Cloudy.

Applegarth Manse, Dumfries-shire.—June 1. Dry and withering. 2. Dry and withering: cloudy. 3. Fine. 4. Cloudy and threatening rain. 5, 6. Rain. 7. Very wet. 8. Fair, but cloudy. 9. Fair: threatening. 10. Showers. 11. One slight shower. 12, 13. Heavy rain. 14, 15. Fair. 16. Fair and fine. 17, 18. Rain. 19. Fair. 20, 21. Rain. 22. Fair. 23. Fair and warm: thunder. 24. Rain. 25. Showery. 26—30. Fair and fine.

Mean temperature of the month	$55^{\circ}1$
Mean temperature of June 1843	$54^{\circ}7$
Mean temperature of spring-water	$51^{\circ}6$
Mean temperature of ditto June 1843	$50^{\circ}7$