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Action of zinc on sulphurous acid, sulphite of zinc

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ACTION OF POTASSIUM AND SODIUM ON SULPHUROUS ACID. BY MM. FORDOS AND GELIS.

When potassium or sodium is thrown into an aqueous solution of sulphurous acid, they act upon it in the same way as on pure water; potash and soda are formed and hydrogen is evolved, which inflames; the alkalies combining with the sulphurous acid to form sulphites, which remain in solution; if the experiment be made in a tube with the pure metals, the phænomena are similar, hydrogen and sulphites being obtained.

The reaction takes place with so much violence, and the rise of temperature is so considerable, that it is natural to suppose that these two circumstances influence the results, and that if the reaction were less vivid different results would be obtained; for such bodies as combine at common temperatures do not act upon each other when the temperature is raised.

MM. Fordos and Gélis endeavoured therefore to bring potassium into contact with aqueous sulphurous acid, under such circumstances as should not raise the temperature, and they succeeded in the attempt, by operating with freezing mixtures and treating sulphurous acid with potassium which had been previously combined with metals that were incapable of decomposing water or sulphurous acid by themselves; or in other words, they used the alloy of potassium and antimony, and that of potassium and mercury.

These alloys decompose water which has been well cooled, regularly and without inflammation; when they are treated with very dilute sulphuric acid containing sulphurous acid, hydrogen mixed with sulphuretted hydrogen is disengaged, the presence of which is ascertained by the smell and its action upon acetate of lead.

If these alloys be treated with water containing sulphurous acid only, hydrogen is still disengaged, for the action cannot be so regulated as to obtain the perfect reduction of the sulphurous acid; but no sulphuretted hydrogen is evolved, and acids precipitate sulphur in abundance from the solution; consequently there are formed, under these circumstances, both a sulphite and a hyposulphite.—*Journ. de Ph. et de Ch.*, Octobre 1843.

ACTION OF ZINC ON SULPHUROUS ACID, SULPHITE OF ZINC. BY MM. FORDOS AND GELIS.

An aqueous solution of sulphurous acid readily attacks zinc, especially when the metal is in filings and the solution is concentrated; there is increase of temperature but no gaseous product. Fourcroy and Vauquelin have stated, that when the action is rapid a notable quantity of hydrosulphuric acid gas is evolved; but it is easy to prove that when this occurs it is from a totally different cause from that which they assign to it. Well-washed and recently prepared sulphurous acid never produces this effect; it occurs, on the contrary, when the acid employed contains sulphuric acid.

In order to obtain a concentrated solution of zinc in sulphurous

acid, the gas, well-washed, should be passed through Woulf's bottles, containing distilled water and cuttings of zinc. In this operation the following appearances occur: the metal at first tarnishes and is covered with a grayish crust; the liquor then becomes slightly yellow, but not turbid; the colour increases until it becomes as deep as that of a concentrated solution of chromate of potash, and it continues as long as there is great excess of sulphurous acid in the liquid. If the disengagement of gas slackens, or if by the increase of temperature the metal is more rapidly dissolved, the colour diminishes, and in the first case the liquid becomes turbid and a white pulverulent deposit is formed; if the operation be now stopped, or if the liquor be suffered to remain at rest during a night, this white powder is converted into white brilliant prismatic crystals, which collect on the sides of the vessel and on the undissolved portions of the metal.

Examination of these Crystals.—They are easily obtained in considerable quantity, either by spontaneous evaporation or cautious evaporation in a water-bath; much sulphurous acid is evolved, and the surface of the solution is covered with a thick layer of crystals. These crystals may be washed with water, for they are almost insoluble in it; but water containing sulphurous acid dissolves them readily, without becoming coloured; these crystals are colourless, inodorous, transparent and insoluble in alcohol; acids decompose them with the evolution of sulphurous acid, without any deposit of sulphur; the solution in hydrochloric acid gives no precipitate with chloride of barium. When the crystals are moist they are readily converted into sulphate by exposure to the air, but when dry they may be long kept without alteration.

The preceding facts prove that these crystals consist of sulphurous acid, oxide of zinc and water; to analyse them the oxide of zinc was obtained by calcination, the sulphurous acid by converting into sulphuric by means of iodine, and noting the quantity absorbed, and the water by calculation; this it would be almost impossible to obtain directly, for the sulphurous acid is disengaged at about the same temperature.

The salt appeared to be composed of

One equivalent of sulphurous acid	32
One equivalent of oxide of zinc	40
Two equivalents of water	18
Equivalent	90

Examination of the Mother-water.—The solution from which the sulphite of zinc has been separated is colourless, transparent and inodorous, contains no sulphuric acid; and the examination proved that when sulphurous acid acts upon zinc two salts only are formed, the sulphite and hyposulphite; when, however, the mother-water is further evaporated, it yields different products according to the temperature at which it is effected, yielding sulphurous acid, sulphite of zinc and other products.—*Journ. de Ph. et de Ch.*, Octobre 1843.