

of the tube shows the quantity of water collected directly, and the solvent process is now complete. The boat is withdrawn from the tube and contains a vitreous mass. The silica is separated in the usual way after the evaporation to dryness of an acid solution. The iron and alumina are precipitated in the form of hydroxides by ammonia. Ebullition is maintained until the complete disappearance of the excess of free ammonia, so as to keep the manganese in solution; when the latter body was present in rather considerable quantities, the separation was effected by means of succinate of ammonia.

The oxides of iron and alumina weighed together are redissolved in hydrochloric acid; the small quantity of silica which is left undissolved in the acid is then treated apart, and the weight of it added to that of the silica obtained before. The iron is separated from the alumina by potassium hydrate; to the filtrate, after the separation of the iron and alumina, the direct addition of sulphide of ammonium gives a precipitate of sulphide of manganese, which is weighed after calcination in the form of manganomanganic oxide. The calcium is afterwards precipitated in the form of oxalate of calcium, and weighed as oxide of calcium. In the filtrate separated from the precipitate of oxalate of calcium, the addition of phosphate of ammonium and ammonia produces a precipitate of ammonio-magnesia phosphate. Finally, the sulphuric acid is treated in the form of sulphate of barium in the last filtrate.

The second portion of the substance was destined for the determination of the protoxide of iron. The substance, dried and weighed, is introduced into a hard glass tube in an atmosphere of carbonic acid gas, and mixed with hydrofluoric acid and sulphuric acid. The sealed tube is submitted to a temperature of about 100° C. until the substance is entirely decomposed; the solution is then titrated with permanganate of potash.

The third and last portion of the substance is used for the determination of the alkalis. This part, weighed and dried, is submitted to the action of sulphuric and hydrofluoric acids in a platinum capsule; after evaporation with acids and calcination, the substance is treated with hydrochloric acid. The manganese is precipitated by baryta, and the excess of baryta by ammonia and carbonate of ammonia. A solution is thus obtained, containing the alkaline chlorides and excess of carbonate of ammonia; the latter is got rid of by calcination. The last traces of magnesia are eliminated by oxide of mercury; the chlorides are weighed together. To the solution containing the chlorides of sodium and potassium is added chloride of platinum, in order to separate the potassium as chloro-platinate, which is weighed in a glass filter after dessication. From the weight of the chloro-platinate of potassium, the quantity of chloride of potassium is deduced. The weight of chloride of sodium is obtained by difference.

In certain cases, when it became necessary to estimate quantitatively the various substances forming the residue, a large quantity of the deposit was treated with very dilute hydrochloric acid, taking care that the operation should take place without