

XX.—*On the Determination of Alkalies in Fire-clays and Fire-bricks.*

By G. GORE.

As the process of bringing pulverized fire-clay, or fire-brick, into solution by digestion with aqueous (or treatment with gaseous) hydrofluoric acid, for the determination of the alkalies contained in it, is very tedious,—and as the other process employed for the same purpose, viz., mixing the substance with nitrate of baryta, and subjecting it to an intense white heat, does not produce a perfectly fused and fluid mixture, but only agglutinates the materials into a semi-fused mass,—I have adopted the following method, which has proved in my experience more effectual and satisfactory.

Three parts of perfectly dry nitrate of baryta, very finely pulverized, to prevent decrepitation, were mixed with three parts of equally dry and finely powdered fluoride of barium, and one part of the finely pulverized clay or brick. The mixture was projected, in successive portions, into a red-hot platinum crucible, a little of the nitrate and fluoride, unmixed with the clay, being reserved and spread upon the top, and the mixture then heated as highly as possible over a Bunsen's burner. The crucible was then transferred to a Griffin's analytical gas furnace, and heated during fifteen minutes to a still higher degree, then removed and cooled.

Any particles of the mixture which now adhered to the edge of the crucible were scrupulously removed and added to the general contents. The crucible was placed in a Griffin's gas blast furnace, and covered with a stout sheet of platinum, and heated to the maximum power of that furnace during twenty minutes; the lid was then removed; the contents of the crucible (which were perfectly liquid) were poured into a shallow, massive vessel of cast-iron, and a cold block of cast-iron at once placed upon the heated mass. It quickly decrepitated into numerous small pieces, which were collected, and carefully crushed still smaller in a steel crushing mortar; and the resulting coarse powder, together with the crucible, and any portions adhering to it, was placed in a platinum dish, and covered with pure sulphuric acid. A very moderate heat was now applied, the decomposition proceeded rapidly, and the resulting sulphate of baryta floated upon the acid as a bulky scum; as soon as the action declined, further heat was applied, and the contents of the vessel were evaporated to perfect dryness, to remove excess of sulphuric acid; the residue was now digested with abundance of hot water, and the liquid part, containing the whole of the alkalies in solution, was then treated in the usual manner. The portion of the process here described occupied about four hours.

The results obtained in three different analyses agreed very closely with each other and with three analyses of the same substance made with aqueous hydrofluoric acid.

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