

amorphous clayey character, with exceedingly minute fragments of all the mineral particles and siliceous organisms with oxides of iron and manganese.

In the last column of the table will be found additional observations with reference to the nature of the bottom at the place where the deposits were collected, with other brief details. For more easy reference there is placed along the edges of the tables a statement as to the regions of the ocean to which the descriptions refer, and at the upper left-hand corner of each table there is a reference to the charts and sections in which the stations are represented.

### c. CHEMICAL ANALYSES OF THE DEPOSITS.

During the cruise of the Challenger, Mr. J. Y. Buchanan frequently made qualitative tests of the deposits and of some of the substances found in them, but no detailed quantitative analyses could be attempted. In the foregoing sections it has been stated that we have not always had recourse to complete and elementary chemical analysis, preferring as a general rule microscopic analysis, for these deposits not having a constant and well-defined composition, did not require for their classification the long operations of quantitative analysis. As previously stated, the quantity of carbonate of calcium has in every case been determined, as this afforded a ready and certain means of classing the various kinds of deposits. In a great number of cases we have applied quantitative methods of chemical analysis with a definite end in view while engaged in the examination of the various samples, and in typical examples of all the deposits complete qualitative and quantitative analyses have been undertaken by ourselves or other chemists acting under our directions. The plan adopted by MM. Renard, Sipöcz, Hornung, and Klement, in the laboratory of Professor Ludwig of Vienna, or in M. Renard's laboratory at Brussels, may be here referred to in order to prevent repetition.

Following the method generally adopted at present for the analysis of silicates, three samples of the substance were taken. The first served to determine the water, silica, alumina, oxide of iron, manganese, magnesia, lime, and eventually cobalt and nickel.

With reference to the direct determination of water, this has always been effected after the method which we owe to Dr. Sipöcz. The substance is dried at 110° C., weighed, mixed with three times its weight of alkaline carbonates, and placed in a small platinum boat; the latter is then introduced into a porcelain tube and exposed to the action of a heated stove, all the precautions prescribed by Sipöcz being taken during the operation.<sup>1</sup> Under the influence of the heat of the furnace, the solvents act at the same time as the water frees itself; this latter is driven off by a current of dry air and collected in a U-tube containing pumice stone saturated with sulphuric acid, previously weighed. When the disengagement of the water ceases, the increased weight

<sup>1</sup> Sipöcz, *Sitzungsberichte der Wiener Akademie der Wissenschaften*, Bd. lxxvi. p. 51, 1877.