

likewise necessarily come from the decomposition of certain silicates under the action of the acid in the analyses, for instance, from the zeolites, the altered volcanic minerals, glasses, and lapilli. A part of the water shown in the column under the head of *loss on ignition* must also be regarded as belonging to the constitution of clay, another part to hydrated oxide of iron, and to the decomposed volcanic rocks present in the deposit, especially hydrated glasses, of which palagonite is the most constant, and a third part must be referred to the organic substances present.

The percentage of oxide of iron in the soluble portion is very variable, but is occasionally present in greater quantity than the alumina, and shows, as the microscopic examination had already done, that we are dealing with a ferruginous clay. The ferric hydrate is the pigment that colours the clay in the majority of cases, as the hydrated peroxide of manganese does in some special regions. We can indeed by the aid of acids remove these two substances, and thus decolorise the clay. Although in clay iron replaces alumina in many cases, still it appears from the results of microscopic examination that here at least a considerable portion of the hydroxide of iron exists in a free state in the Red Clay, or intimately mixed with manganese as is generally the case in Deep-Sea Deposits.

The carbonate of calcium is present for the most part in the form of shells and skeletons of organisms; the proportion is, however, reduced to a minimum in the Red Clays and Radiolarian Oozes, if a comparison be made with most of the other Deep-Sea Deposits. As to the carbonate of magnesium indicated in all the analyses, it might be that a part came from the debris of organisms where it would be in isomorphic mixture with carbonate of calcium, but the percentage of carbonate of magnesium appears to be proportionally too high to that of the carbonate of calcium to admit this interpretation. It seems therefore probable that the carbonate of magnesium comes from the sulphate of magnesium contained in the sea-water acting on the carbonate of calcium and replacing a part of this carbonate which forms the debris of organisms deposited on the floor of the ocean. In this case we should have an incipient dolomitisation.

The sulphate of lime present in all the analyses doubtless comes from the sulphate of lime contained in sea-water, which impregnates the deposit when freshly collected, and is precipitated with great facility from sea-water when the deposit is placed in alcohol; large crystals of this substance are formed in this way in the bottles in which the deposits were preserved with a small quantity of spirit. It seems well to remember that in the interpretation of all analyses of Deep-Sea Deposits, we have always to take account of the facility with which certain sea-salts are retained in clayey matter. One of the striking properties of this substance is to absorb with avidity and to retain sea-water and its salts; to such an extent is this the case that they are difficult to remove even after repeated washings. In the case of a Globigerina Ooze, we have made some experiments bearing on this point, and have shown that after repeated washings with cold water the deposit retained more than 1 per cent. of alkalies not combined with sedimentary materials.