

§ 41. We have already shown in § 38 how the action of carbonate of soda upon sea-water or bittern will destroy the normal proportion between the two chlorids of magnesium and calcium by converting the latter into an insoluble carbonate, and leaving at last only salts of sodium and magnesium in solution. A process the reverse of this has evidently intervened for the production of waters like that from Cape Breton, and some others noticed by Lersch, in which chlorid of calcium abounds, with little or no sulphate or chlorid of magnesium. This process is probably one connected with the formation of a silicate of magnesia. Bischof has already insisted upon the sparing solubility of this silicate; and he observed that silicates of alumina, both artificial and natural, when digested with a solution of magnesian chlorid, exchange a portion of their base for magnesia, thus giving rise to solutions of alumina; which, being decomposed by carbonates, may have been the source of many of the aluminous deposits referred to in § 9. He also observed a similar decomposition between a solution of an artificial silicate of lime and soluble magnesian salts. (Bischof, Chem. Geology, i, 13, also chap. xxiv.) In repeating and extending his experiments, I have confirmed his observation that a solution of silicate of lime precipitates silicate of magnesia from the sulphate and the chlorid of magnesium; and have moreover found that by digestion at ordinary temperatures with an excess of freshly precipitated silicate of lime, chlorid of magnesium is completely decomposed; an insoluble silicate of magnesia being formed, while nothing but chlorid of calcium remains in solution. It is clear that the greater insolubility of the magnesian silicate, as compared with silicate of lime, determines a result the very reverse of that produced by carbonates with solutions of the two earthy bases. In the one case the lime is separated as carbonate, the magnesia remaining in solution; while in the other by the action of silicate of soda (or of lime), the magnesia is removed and the lime remains. Hence carbonate of lime and silicate of magnesia are everywhere found in nature; while carbonate of magnesia and silicate of lime are produced only under local and exceptional conditions. The detailed results of some experiments on this subject are reserved for another place. It is evident that the production from the waters of the early seas of beds of sepiolite, tale, serpentine, and other rocks in which a magnesian silicate abounds, must, in closed basins, have given rise to waters in which chlorid of calcium would predominate.