

large mineral masses, and together with the protoxide or ferrous oxide, occurs in smaller or larger proportions in the great majority of crystalline rocks. Iron (as sulphate or in combination with organic acids) is removed in solution in the water of springs, and precipitated as a hydrous peroxide. Manganese is commonly associated with iron in minute proportions in igneous rocks, and being similarly removed in solution in water, is thrown down as bog manganese or wad.

Silicic Acid, Carbonic Acid, and Sulphuric Acid are the three acids with which most of the bases that compose the earth's crust have been combined. With these we may connect the water which, besides merely percolating through rocks, or existing inclosed in the vesicles of minerals, has been chemically absorbed in the process of hydration, and which thus constitutes more than 10 or even 20 per cent of some rocks (gypsum).

Chemical analysis has revealed the numerous combinations in which the elements are united to form minerals and rocks. Considerable additional light has been thrown on the subject by chemical synthesis, that is, by artificially producing the minerals and rocks which are found in nature. The experiments have been varied indefinitely so as to imitate as far as possible the natural conditions of production. Further reference to this subject will be found on pp. 161, 505 *et seq.*

Although every mineral may be made to yield data of more or less geological significance, only those minerals need be referred to here which enter as chief ingredients into the composition of rock-masses, or which are of frequent occurrence as accessories, and special note may be taken of those of their characters which are of main interest