

Calcium. Lime exists in a soil sometimes as carbonate, that is, air-slacked lime, but most generally as silicate, that is chemically united to silicic acid, or sand. In the human body, in union with phosphoric acid, it forms a very large part of the bones. It exists in combination with different acids, in the root, stalk, blade, and grain of all plants.

Besides the necessity of its presence to form the structure of plants, it performs many other important functions in a soil. It promotes the decomposition of vegetable matter, and thus causes it to yield the different mineral substances which it contains, as means for the production of another growth. It improves the mechanical texture of the land; which is but one of its smallest uses. It powerfully aids the disintegration of the minerals (grains of sand) on a soil which contain many of the necessary elements of plants, and which, without the *fluxing* or *fusing* power of lime, would not yield them. This is one of its greatest and most important uses, and we cannot yet say, whether or not, lime, when applied to a soil, does not act more beneficially in this way than in any other.

MAGNESIA.—Magnesia is the oxyd or rust of a metal called magnesium, which never exists naturally in a pure state. It is one of the necessary constituents of soil, being found in the bones of animals, and in the roots, stalks, leaves, and grain of plants. It has, in many respects, the same action as lime, and to a certain extent can be substituted for it. The quantity of it varies in different soils. In some I have found as much as two per cent., equal to about six hundred bushels to the acre, to the depth of twelve inches, and in others but a mere trace. The facts to show what the best quantity is in a soil, are very meagre. As far as my knowledge extends, I believe that where it exists in a less quantity than two-tenths of one per cent., in a soil, magnesian lime is the best application for that soil. There were no experiments on the subject, and no means taken, any where, so far as I know, before those in Maryland, to lay down any foundation for experiment that will be worth any thing when made. My own knowledge, as to the action of it, is derived from gentlemen who have used both magnesian, oyster shell and pure stone lime on their lands, and analyses of the soils which I subsequently made, have led me to the above opinion, and are the only data yet given to the agricultural community on this subject. [See article—Lime, Manures.]

POTASH.—Potash, the oxyd or rust of a metal called potassium, is another of the necessary constituents of soil. In union with silicic acid, it gives strength and firmness to the stalk, and to the husks or envelope of the grain.

The proportions in which I have found it to exist in soils are very variable, from a mere trace in some, to as much as (1.20) one