

MINERAL PHOSPHATES.

Apatite is a mineral consisting essentially of tricalcic phosphate, $\text{Ca}_3\text{P}_2\text{O}_8$, or otherwise expressed $(\text{CaO})_3\text{P}_2\text{O}_5$, with some calcium fluoride, CaF_2 , or calcium chloride, CaCl_2 . That containing the fluoride is known as *fluor-apatite*, and that containing the chloride, *chlor-apatite*. The Canadian apatite is of the former variety. It is generally green in colour and occurs as hexagonal crystals or crystalline masses, principally in pyroxenites. When pure, it contains 42.3 per cent phosphoric acid, P_2O_5 , 55.5 per cent of lime and 3.8 per cent of fluorine.

At one time large quantities of this mineral were produced in Canada, but at present the production is very limited owing to the cheaper and more easily ground imported phosphates which supply the market. *Hard rock phosphate* and *pebble phosphate* are the two forms of mineral phosphate which are most extensively used to-day. They are imported from the southern United States.

The *hard rock phosphates* are of sedimentary character, as opposed to the crystalline phosphate of the apatite veins. They consist essentially of amorphous phosphatic material, of varying degrees of richness, and represent the natural concentration of the tricalcic phosphate content of percolating meteoric waters. These waters, by a process of leaching and precipitation, have caused local zones of phosphatic concentration in what was originally a calcareous rock containing a small percentage of phosphate.

The so-called *pebble phosphate* represents alluvial material derived principally from the *hard rock* deposits, and consists of water-worn fragments of phosphatic rock mixed with teeth, bones, and other similar organic remains.

Acid phosphate is the product resulting from the treatment of mineral phosphates with sulphuric acid, by which the tricalcic phosphate, $(\text{CaO})_3\text{P}_2\text{O}_5$, is converted into the monocalcic phosphate, $\text{CaO} \cdot (\text{H}_2\text{O})_2\text{P}_2\text{O}_5$.

USES.

The major use of mineral phosphates is in the manufacturing of fertilizer. Since the tricalcic phosphate, of which they are