Portlandite, a new mineral from Scawt Hill, Co. Antrim.

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THOUGH calcium hydroxide has long been known as a product of hydrolysis of Portland cement, reliable data on its physical and optical properties were not available until Ashton and Wilson[1] prepared this substance artificially and had examined crystals developed in vugs in old cement briquettes. In examining some recently collected larnite-spurrite-rocks from Scawt Hill the writer observed crystals now shown to be $Ca(OH)_2$ as constituents of aggregates composed mainly of coarsely grained afwillite, forming infillings in these contact-rocks. In the previous record of afwillite at Scawt Hill[2] this mineral was noted as microscopic euhedral crystals in cavities in an altered crust to a spurrite-rock. Since that time, however, afwillite has been frequently observed in infillings associated with the melilite-rocks of the contact-zone and accompanied by calcite and ettringite.

The infillings now referred to consist essentially of afwillite, calcite, and a colourless hexagonal platy mineral unsuited for goniometrical examination, with a perfect cleavage parallel to the plates. The plates possess a pearly lustre and in their hardness, sectility, and flexibility are reminiscent of brucite. The optical properties of this mineral do not agree, however, with any described mineral. The mineral is sectile, and cleavage plates are flexible; hardness 2, intermediate between gypsum and rock-salt, and specific gravity 2·23. The plates show an excellent uniaxial negative interference-figure. Using a stage-goniometer and immersion liquids, refractive indices were determined as ω 1·575, ϵ 1·547. The mineral reacts with clove oil[3] being gradually stained yellow, the oil itself also taking on a

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[1] F. W. Ashton and R. Wilson, Amer. Journ. Sci., 1927, ser. 5, vol. 13, p. 209. [Min. Abstr., vol. 5, p. 257.]

[2] C. E. Tilley, Geol. Mag., 1930, vol. 67, p. 168. [M.A. 4–330.]

[3] Clove oil consists largely of eugenol, the acidic properties of which are responsible for its action on the base $Ca(OH)_2$.

yellowish tint. The mineral is, however, unaffected by mixtures of cedar-wood oil and α-monobromonaphthalene.

Micro-chemical tests show abundant calcium, and in the closed tube the mineral gives reaction for water. The residue treated with $AgNO_3$ solution turns brownish-black, due to the precipitation of Ag_2O. It dissolves slowly in water and the solution is alkaline to litmus. The mineral dissolves completely in weak hydrochloric acid.

In its physical and optical properties this mineral agrees with those of the artificial rhombohedral $Ca(OH)_2$, described by Ashton and Wilson. These results are supported by an X-ray investigation, which Miss H. D. Megaw of this Department has kindly undertaken at my request. The best cleavage flakes show always some curvature and form material inferior to the artificial crystals for X-ray study. Two oscillation photographs of a cleavage flake, with two straight edges at 60°, were taken. In the first the X-ray beam was inclined at a small angle to the crystal plate to give reflections from (0001), and in the second the beam was nearly at right angles to the plate to give reflections from a prism plane. The plane (0001) gave sharp spots. The other planes showed very marked asterism, which may be attributed to the bending of the crystal, but spots corresponding to $(10\bar{1}0)$ were obtained superposed on the white streaks. These were on the first layer-line, corresponding to a plane of the type $(11\bar{2}l)$. Measurements to the spots gave the spacings $a\,3{\cdot}64 \pm 0{\cdot}10$, $c\,4{\cdot}85 \pm 0{\cdot}10$ Å; as compared with the exact values measured by Miss Megaw on a good artificial crystal, namely, $a\,3{\cdot}585 \pm 0{\cdot}001$ $c\,4{\cdot}895 \pm 0{\cdot}003$ Å.

The manner of occurrence and association of these afwillite-$Ca(OH)_2$ aggregates with larnite-spurrite assemblages makes it clear that both these minerals arise by hydration of these calcium orthosilicates. It was previously noted that afwillite was derived by alteration of spurrite. The formation of $Ca(OH)_2$ can be regarded as a further development of this hydration process in which hydrolysis of calcium orthosilicate has also played a part. Crystals of $Ca(OH)_2$ can be obtained from briquettes of Ca_2SiO_4 stored under water as noted by Ashton and Wilson. The occurrence of $Ca(OH)_2$ as a well-defined species in the contact-zone of Scawt Hill merits a new mineral name, and in view of its occurrence as a common product of hydration of Portland cement, and furthermore as crystals from this source have provided the first reliable physical and optical data on crystalline $Ca(OH)_2$, it is fitting that the mineral name should bear record of these facts. The name Portlandite is accordingly proposed.