

NOTES AND NEWS

NOTE ON THE OCCURRENCE OF CALCIUM SULPHATE HEMIHYDRATE ($\text{CaSO}_4 \cdot 1/2 \text{H}_2\text{O}$) IN THIN SECTIONS OF ROCKS*

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The partial dehydration of gypsum to the hemihydrate with the loss of one and a half of the two water molecules of gypsum has been studied by many investigators, a recent and definitive paper being that by E. Posnjak.¹ As the transformation of the gypsum to the hemihydrate, and the hydration of the latter back to gypsum, is what occurs in the manufacture and use of plaster-of-Paris, the subject is of great practical importance, and the hemihydrate itself, plaster-of-Paris, is a commodity produced and used in enormous quantities. Also as gypsum and anhydrite are among the commonest of minerals, and since the artificial intermediate hemihydrate is an easily prepared every day article of commerce, it would seem reasonable to suppose that naturally-occurring hemihydrate should be listed as a known mineral. This would seem even more likely, when the well-known partial dehydration of gypsum on simple grinding, or on gentle warming, is recalled. Yet, the hemihydrate is not mentioned in the standard reference works of Dana-Ford, Winchell, or Larsen-Berman.

Even texts specifically dealing with sedimentary petrography, as the recent (1938) third edition of *The Petrology of the Sedimentary Rocks* by Hatch, Rastall and Black, or the *Manual of Sedimentary Petrography* by Krumbein and Pettijohn (1938), do not mention the hemihydrate. Neither does Milner, *Sedimentary Petrography*, though under gypsum he mentions the alteration of anhydrite to a substance "of higher specific gravity than normal gypsum, also a higher refractive index than Canada balsam," and under anhydrite, the change of the latter to gypsum; but it is not clear from the context whether these remarks refer to changes occurring in nature, or to changes occurring in preparing the material for study.

The explanation for the paucity of references to the hemihydrate in mineralogical literature is, of course, that on wetting, the hemihydrate is transformed to gypsum. In other words, it can neither survive wetting, nor crystallize from aqueous solution, under ordinary natural temperatures and pressures. As to its formation from gypsum by drying, this can only take place when the atmosphere is drier than the very low dissociation

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¹ The System $\text{CaSO}_4\text{-H}_2\text{O}$, *Am. Jour. Sci.*, 5 ser., 35A, 247-272 (1938).

tion pressure of gypsum; apparently such a condition of desiccation is nowhere attained on the earth's surface.

The reason for calling attention to these well-known matters is that under certain conditions the hemihydrate is very likely to be encountered in petrographic and mineralogical investigations, and since the usual mineralogical reference texts fail to mention it, some difficulty may be experienced at first in identifying the substance. The heating used to prepare thin sections of gypsiferous rocks, for example, may easily transform platy selenite into fibrous masses of hemihydrate of distinctive optical character, as shown in Fig. 1.



FIG. 1. Apparently a veinlet of a fibrous mineral in a phosphatic shale; actually, hemihydrate developed from selenite. $\times 30$. Crossed nicols.

The hemihydrate is characterized by a fibrous or prismatic habit, with indices of refraction $\alpha = 1.55 \pm$, $\gamma = 1.57$, birefringence = 0.02, parallel extinction and positive elongation. The birefringence therefore exceeds that of gypsum, but is less than that of anhydrite; the higher indices distinguish hemihydrate from gypsum, and the lower birefringence, from anhydrite.