SHORT COMMUNICATION

Twinned crystals of precipitated gypsum.

THE habits of macrocrystals of gypsum have been extensively studied by mineralogists,[1] but no systematic examination appears to have been made of the habits of microcrystals separating from aqueous solutions. The latter are of interest in connexion with the kinetics of hydration of calcium sulphate hemihydrate and the study of the mechanical properties of cast gypsum.[2] The subject has also a wider interest from the point of view of the mechanism of the growth of crystals. Furthermore, variations in habit that can be related to conditions of formation may throw light on the genesis of natural gypsum deposits. Some observations on the habits of twinned crystals formed in aqueous media are the subject of this note.

A study was made of crystals that had developed either in supersaturated solutions of calcium sulphate or as the result of slow evaporation of saturated solutions of calcium sulphate. Supersaturation was produced by shaking calcium sulphate hemihydrate in water or in aqueous solutions of sodium chloride. Excess calcium sulphate hemihydrate, which is more soluble than gypsum,[2] was removed by filtration through a sintered glass plate. These solutions were stirred during precipitation, which was carried out at about 20° C. Supersaturations up to about 3·5 were used. The slow evaporation of saturated solutions was carried out at about 36° C, with stirring. The crystals were examined by the usual petrographic techniques, using a Vickers projection microscope and a Cooke, Troughton, and Simms petrological microscope.

Two habits were prominent in the crops of crystals from supersaturated solutions, broad crystals exhibiting a 'swallow tail' or 'cruciform' type of twin (fig. 1*a*) and acicular crystals. No cases of twinning were observed in the acicular crystals formed under these conditions. Slow evaporation from saturated solutions, on the other hand, produced acicular crystals that were commonly twinned (fig. 1*b*). Sodium chloride in the solution had little effect upon the crystals except that in strongly saline solutions they tended to be more massive in habit. The cruciform twins from supersaturated solution attained dimensions of about 0·5 mm across the arms, and the acicular twins from saturated solution attained lengths of about 1 mm and a breadth of 0·02 mm.

[1] E. S. Dana, A Textbook of Mineralogy, New York, 1947 (John Wiley & Sons).
[2] M. J. Ridge, Rev. Pure Appl. Chem., 1960, vol. 10, p. 243.

Figs. 1*a* and 1*b* show the twin habits that were observed, with the measurements of the re-entrant angles and the optical orientations. The indices and orientations taken as a basis are those of Dana.[1]

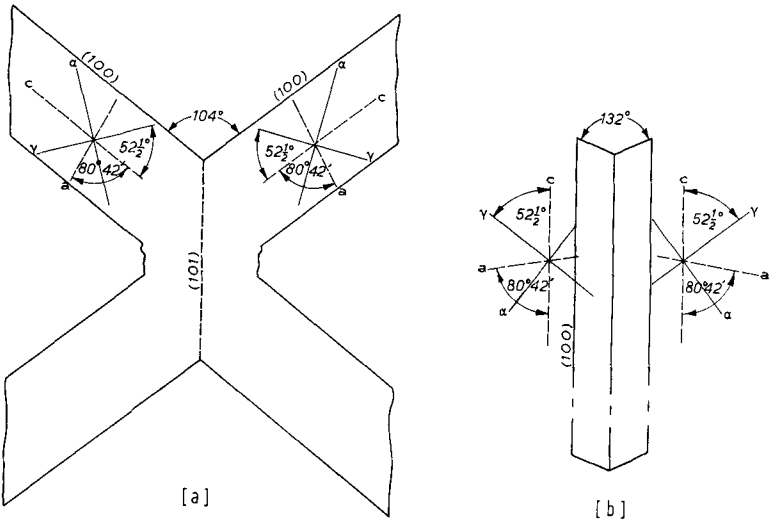

FIG. 1. *a* (left): Twin formed in supersaturated solutions of calcium sulphate. *b* (right): Twin formed during the slow evaporation of saturated solutions of calcium sulphate.

The re-entrant angle of the acicular twin of fig. 1*b* is 132°, and the optical orientation agrees with twinning on the (100) plane, which is common in natural gypsum.[1] In the 'swallow tail' or 'cruciform' type, however, the re-entrant angle is 104°, and this, together with the optical orientation, agrees with twinning on (101). This type of twinning evidently occurs in natural gypsum but is not common.[2]

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[1] E. S. Dana, A Textbook of Mineralogy, New York, 1947 (John Wiley & Sons).
[2] A. N. Winchell, Elements of Optical Mineralogy—Part II, Description of Minerals, New York, 1927 (John Wiley & Sons).