NOTES AND NEWS

THERMAL DECOMPOSITION OF ZINC SULFIDE POLYMORPHS

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Crystals or small cleavage pieces of the five known polymorphs[1] of zinc sulfide when heated in air for 16 hours at 800° C. were found by x-ray study to be converted in every instance to the ordinary form of zinc oxide (zincite). ZnO has a wurtzite-type structure (2H) based on hexagonal closest-packing of the oxygen atoms. It was hoped that higher polymorphs of ZnO would be derived from the corresponding ZnS forms, but this did not prove to be the case. With wurtzite-4H, 6H and 15R, the ZnO produced by thermal decomposition in all instances formed single-crystal pseudomorphs oriented parallel to the original crystal, as determined by x-ray precession photographs taken about $[10\bar{1}0]$ and rotation photographs taken about [0001]. The perfection of the orientation varied somewhat among different crystals of these polymorphs. Ordinary wurtzite (2H) and particularly the isometric polymorph, sphalerite, showed a relatively large amount of disorientation. Rotation photographs of oxidized cleavage fragments of these substances showed well-marked powder lines, although with diffuse intensity maxima thereon that indicated a considerable degree of parallel orientation of the ZnO crystallites to the [0001] or [111] axes of the original ZnS crystal. In the case of sphalerite the disorientation effect is enhanced by the presence of the non-parallel but symmetrically equivalent tetrahedral planes of nucleation.

Crystals of wurtzite-4H and 6H when heated in an atmosphere of H_2S in sealed tubes at 700° were not found to have undergone an irreversible structural change. A crystal of wurtzite-6H heated in H_2S at 1000° was found to have sublimed. The oxidized crystals are pale yellow-brown in color, with a bright luster. Under the microscope all of the oxidized pseudomorphs were seen to consist of parallel aggregates of minute crystallites that behaved optically as a uniaxial individual.

[1] Frondel, C., and Palache, C.: *Am. Mineral.*, **35**, 29–42 (1950).