The ZrO$_2$, HfO$_2$, and ZrO$_2$-HfO$_2$ crystals are colorless and appear to be of good optical quality.

The authors wish to express appreciation to G. M. Wolten who identified and characterized the crystals by x-ray techniques.

References


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CACOXENITE FROM ARKANSAS

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While A. L. Kidwell was a graduate student at the University of Chicago he added to my phosphate collection samples of cacoxenite obtained by him from Arkansas in August 1948. Since this material is not listed in the A.S.T.M. index, and few data appear in the abstract by Gordon (1950), and these are in conflict with what appears in Danas’ System (II 997), I have recently subjected Kidwell’s material to x-ray and optical study.

According to Kidwell the material came from the Isom Avants prospect pit in the bed of a dry branch in the NW. ¼, SE. ¾, sec. 1, T.4S., R. 30W., in Polk County about 2 miles southwest of the old Shady post-office (abandoned now for some years). This is in the Ouachita Mountains near the middle of the west boundary of the state. The mineral occurs as fracture fillings in the novaculite; associated species in this area include strengite, beraunite, rockbridgeite, laubmannite, turquoise, and possibly diadochite, as well as iron and manganese oxides. The geology of the area has been described by Miser and Purdue (1929). In an earlier report Miser (1918) mentions the occurrence of “dufrenite” (rockbridgeite ?) associated with the manganese deposits as green globular aggregates with a radiating structure. Penrose (1891) gave a brief description of the C. C. Avant (iron) claim in sec. 1.

The Arkansas specimens consist of brecciated limonite-stained novaculite with fracture fillings of limonite. The cacoxenite occurs lining cavities in the limonite. It consists of radiating globular masses up to about

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6 mm in diameter of very narrow acicular golden-yellow needles; in part these globules show a concentric structure. Under the microscope at ×360 magnification only a few of these are wide enough to be useful in observing the Becke fringe. The indices are ω = 1.600 and ε = 1.680, but the central parts of the needles are slightly lower in refractive index than their ends, so these figures are not better than ± .003.

A sample consisting of a few needles with their c-axes in sub-parallel position was used to make an x-ray rotation picture (c-axis the rotation axis). The result was a photograph in which the layer lines were broad, the “spots” consisting of streaks of the powder-picture type normal to the layer lines. The very large number of zero-level powder lines thus produced (Table 2) was surprising. Indexing these served to give a good value of a = 27.669 Å. The less-reliable figure obtained for c was 10.655 Å.
A long-exposure Weissenberg yielded a series of streaks parallel the reference line. These were only slightly spotty, indicating a near-random orientation of the a-axes of the crystals. The results of indexing a standard-type powder picture appear in Table 1. No convincing data were obtained in conflict with Gordon's determination of the space group as P6/mmm?

**NOTE**

After the above paper had been accepted for publication an article entitled “An X-ray Study of the Phosphate Minerals from the Alkaline Rock Area of Songo, Sierra Leone” by Atso Vorma came to my attention. This appeared in *Bull. Com. Géol. Finlande*, 31 (196), 405–416, 1961. It contains a table showing unindexed powder x-ray data for cacoxenite from this locality. Vorma’s results are in excellent agreement with the
data of Table 1 of my paper, though he shows lines of medium intensity at \(d = 3.27, 2.44, 2.19,\) and \(1.580\) and lines of weak intensity at \(d = 6.3,\) \(5.75, 3.56, 2.63-2.24\) (5 lines) and \(1.680, 1.629, 1.606, 1.507\) and \(1.473.\) His paper also contains an excellent color photograph of cacoxenite sunbursts.

**References**


