NOTES AND NEWS

ZUNYITE IN UTAH*

T. S. LOVERING† AND BRONSON STRINGHAM‡

Unusually fine zunyite has recently been found in the Tintic district of Utah. The material was brought to us for identification by Mr. Lee Armstrong of the Longyear Drilling Company and was obtained from the Mintintic property about a mile and a half south of Silver City. It occurs along a steep northeasterly fissure, both as a fissure filling and as an impregnation of the silicified tuff that makes up the country rock. Some well crystallized iron stained zunyite forms a vein about four inches wide but much more is present in the walls of the fissure. Associated with the zunyite are rutile, alunite, dickite, octahedral pyrite, and two generations of quartz, all earlier than the zunyite.

The average size of the crystals of zunyite is about 2 mm. but crystals $4\frac{1}{2}$ mm. across are present locally in the vein. They appear as brilliant phenocryst-like tetrahedral individuals lying in a moderately soft brownish porous matrix whose color and porosity are probably due to oxidation of associated pyrite. Nearly all crystals have well developed positive and negative tetrahedrons {111}, {$1\bar{1}\bar{1}$}, and the cube {100}. Small fragments are water clear but most crystals appear light brown because of the iron oxide that stains the surface and internal fractures. Small inclusions of quartz are present in all the zunyite studied so neither the specific gravity nor chemical composition were determined.

Excellent zonal growth with a very slight variation in indices of refraction was observed in thin section. Usually the outer zone had the highest index of refraction with a nearly constant value of 1.596; that of the inner zones was moderately variable, commonly ranging between 1.595 and 1.594. The index did not rise progressively from core to rim but instead zones of higher and lower index alternated or showed an unsystematic variation.

Spencer (1930) suggested that the variation in the indices of refraction of zunyite might be due to a change in the fluorine-hydroxyl ratio, the index dropping with decreasing fluorine and increasing hydroxyl. However, a comparison of the recorded analyses shows that both hydroxyl and fluorine are very constant, except for the zunyite from South Africa. Moreover the index of the material with less hydroxyl is lower than that of zunyite containing the higher proportions of hydroxyl. We conclude that available data indicate that the variation of indices is most closely

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† Senior Geologist, U. S. Geol. Survey.

‡ Assistant Geologist, U. S. Geol. Survey.

related to the fluorine-chlorine ratio, and that the index rises with increasing chlorine and decreasing fluorine.

The index of the Mintintic zunyite correlates it with the high fluorine zunyite found in the type locality in Colorado.

References

Hillebrand, W. F., New mineral species from Colorado: *Proc. Colo. Sc. Soc.*, **1,** 124, (1884). *U. S. Geol. Survey, Bull.* **20,** 100–105, (1885).

Penfield, S. L., Mineralogical notes: *Am. Jour. Sci.*, (3) **45,** 397–398, (1893).

Niggli, P., and Schlaepfer, M., Neue Beitrage zur hydrothermalen Silicatbildung: *Zeit. Anorganische Chem.*, **87,** 56 (1914).

Doelter, C. Zunyite, *Handbuch der Mineralchemie.* Band II, 2 Halfte, pp. 29–30 (**1917**).

Matilde, Albis, *Rend. R. Accad. Lincei., Cl. Sci. Fis., Roma* (**1921**), ser. 5, **30,** sem. 2, p. 472. *Mineral. Abst.*, **2,** 43, (1923).

Gossner, B., und Mussgung, F., Die chemische Zusammensetzung von Zunyite: *Centralbl. Mineral., Geologie und Palaontologie,* Abt. A, 149–155 (1926.)

Nel, L. T., A new occurrence of zunyite near Postmasburg, South Africa: *Mineral Mag.* **22,** 207–216 (1930.)

Spencer, L. J., Note on the crystallography of zunyite: *Mineral. Mag.*, **22,** 217–220 (1930.)

Palache, C., Zunyite from Guatemala: (abst.) *Am. Mineral.*, **17,** 117 (1932).