

## Zeunerite

## $\text{Cu}(\text{UO}_2)_2(\text{AsO}_4)_2 \cdot 10\text{--}16\text{H}_2\text{O}$

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**Crystal Data:** Tetragonal. *Point Group:*  $4/m\ 2/m\ 2/m$ . Crystals, to 4 cm, flat tabular on {001}, commonly in subparallel growths.

**Physical Properties:** *Cleavage:* On {001}, perfect; on {100}, distinct. Hardness = 2.5  
D(meas.) = 3.47 D(calc.) = [3.57] for  $16\text{H}_2\text{O}$ . Radioactive; commonly dehydrates to metazeunerite.

**Optical Properties:** Transparent, becoming translucent on dehydration. *Color:* Green to emerald-green. *Luster:* Vitreous.  
*Optical Class:* Uniaxial (-). *Pleochroism:* *O* = blue-green; *E* = pale blue-green.  
 $\omega = 1.610\text{--}1.613$   $\epsilon = 1.582\text{--}1.585$

**Cell Data:** *Space Group:*  $I4/mmm$ .  $a = 7.18$   $c = 21.06$   $Z = 2$

**X-ray Powder Pattern:** Synthetic  $\text{Cu}(\text{UO}_2)_2(\text{AsO}_4)_2 \cdot 16\text{H}_2\text{O}$ .  
10.65 (10), 3.59 (9), 5.04 (8), 3.39 (7), 1.926 (6), 6.86 (5), 2.08 (5)

**Chemistry:** (1) Identification rests on comparison of the X-ray powder pattern and optical data with those of synthetic  $\text{Cu}(\text{UO}_2)_2(\text{AsO}_4)_2 \cdot 16\text{H}_2\text{O}$ .

**Mineral Group:** Autunite group.

**Occurrence:** An uncommon secondary mineral in the oxidized zone of arsenic-bearing hydrothermal uranium deposits.

**Association:** Olivenite, mansfieldite, scorodite, azurite, malachite.

**Distribution:** Material which is fully hydrated at the time of study is relatively rare, although most meta-zeunerite is a dehydration product of pre-existing zeunerite. In Germany, from the Walpurgis vein, Weisser Hirsch mine, Neustädtel-Schneeberg, Saxony; at Sailauf, northeast of Aschaffenburg, Bavaria; in the Anton mine, Heubachtal, near Schiltach, from Menzenschwand, and elsewhere in the Black Forest. In England, at a number of places in Cornwall, as at Wheals Gorland and Maid, Gwennap; in the South Terras mine, St. Stephen-in-Brannel; at Wheal Edward, St. Just. In France, from the Cap Garonne mine, near le Pradet, Var; at the Margnac mine, Comprégnac, Haute-Vienne; in the Rabéjac uranium deposit, seven km south-southeast of Lodève, Hérault. In the USA, from the Dexter mine, Calf Mesa, San Rafael district, Emery Co., Utah; at the Majuba Hill mine, Antelope district, Pershing Co., Nevada; in various of the Colorado Plateau-type U-V deposits, Colorado. Large crystals from Brumado, Bahia, Brazil.

**Name:** Honoring Gustav Anton Zeuner (1828–1907), Director, School of Mines, Freiberg, Germany.

**Type Material:** State Museum of Mineralogy and Geology, Dresden; Mining Academy, Freiberg, Germany, 21730; now metazeunerite.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 989–990 [name reserved for natural occurrence of the higher hydrate].  
(2) Frondel, C. (1958) Systematic mineralogy of uranium and thorium. U.S. Geol. Sur. Bull. 1064, 191–195.