

**Crystal Data:** Monoclinic. *Point Group:* 2, *m*, or 2/*m*. As radiating sprays of acicular laths, to 0.5 mm elongated along [100] or [001] and flattened on {001} or {100}. Terminations are nearly always rounded, some are chisel-like. Perched on botryoidal crusts of chalcoalumite.

**Physical Properties:** *Cleavage:* Perfect on {100} or {001}. *Tenacity:* Sectile. *Fracture:* Uneven. Hardness = 2 D(meas.) = 2.81 D(calc.) = 2.72 Nonfluorescent.

**Optical Properties:** Transparent. *Color:* Greenish blue. *Streak:* Very pale blue. *Luster:* Vitreous. *Optical Class:* Biaxial (-).  $\alpha = 1.590(4)$   $\beta = 1.625(4)$   $\gamma = 1.645(4)$   $2V(\text{calc.}) = 72(3)^\circ$   
*Pleochroism:* Distinct, *Z* = pale blue-green, *Y* = very pale yellow, *X* = very pale yellow; Strong when concordant stacks of elongated plates are viewed perpendicular to the stacking direction.  
*Orientation:* *Y* = *b*, *Z* approximately parallel to elongation.

**Cell Data:** *Space Group:* *P2*, *P2*<sub>1</sub>, *Pm*, *P2/m* or *P2*<sub>1</sub>/*m*. *a* = 10.908(2) *b* = 6.393(3) *c* = 10.118(2)  $\beta = 107.47(2)^\circ$  *Z* = 1

**X-ray Powder Pattern:** Grandview mine, Coconino County, Arizona, USA. 6.208 (100), 3.949 (79), 5.287 (35), 9.667 (33), 2.816 (14), 3.625 (10), 2.990 (9)

Chemistry:	(1)	(2)
CuO	21.4	21.33
Al <sub>2</sub> O <sub>3</sub>	40.7	41.01
SO <sub>3</sub>	14.5	14.31
H <sub>2</sub> O	23.3	23.35
Total	99.9	100.00

(1) Grandview mine, Coconino County, Arizona, USA; electron microprobe analysis supplemented by FT-IR spectroscopy, Cu (AAS), Al (colorimetric), SO<sub>3</sub> and H<sub>2</sub>O by TGA, water of crystallization absent in the derived stoichiometry; corresponding to Cu<sub>2.97</sub>Al<sub>8.82</sub>(SO<sub>4</sub>)<sub>2</sub>(OH)<sub>28.55</sub>.

(2) Cu<sub>3</sub>Al<sub>9</sub>(SO<sub>4</sub>)<sub>2</sub>(OH)<sub>29</sub>.

**Occurrence:** A secondary mineral formed by the oxidation of Cu-bearing sulfides.

**Association:** Chalcoalumite, cyanotrichite, carbonatecyanotrichite.

**Distribution:** At the Grandview mine (also known as the Last Chance mine), at Cape Royal, Horseshoe Mesa, Grand Canyon National Park, Coconino County, Arizona, USA [TL].

**Name:** For the locality that produced the first specimens.

**Type Material:** Geosciences Department, Museum Victoria, Melbourne, Australia (M50490).

**References:** (1) Colchester, D.M., D.R. Klish, P. Leverett, and P.A. Williams (2008) Grandviewite, Cu<sub>3</sub>Al<sub>9</sub>(SO<sub>4</sub>)<sub>2</sub>(OH)<sub>29</sub>, a new mineral from the Grandview Mine, Arizona, USA. *Australian J. Mineral.*, 14(2), 51-5.