

**Crystal Data:** Orthorhombic. *Point Group:* 2/m 2/m 2/m. As acicular needles, elongated on [001], to 0.1 mm; in fibrous mats.

**Physical Properties:** *Cleavage:* Perfect on {010}. *Fracture:* Irregular. *Tenacity:* Brittle. Hardness = ~ 3 D(meas.) = n.d. D(calc.) = 4.447

**Optical Properties:** Transparent. *Color:* Brownish golden-yellow; ocherous yellow mats. *Streak:* Brownish yellow. *Luster:* Silky.

*Optical Class:* Biaxial (+).  $a = 1.830(5)$   $\beta = 1.865(5)$   $\gamma = 1.910(5)$   $2V(\text{meas.}) = 83.3(3)^\circ$   $2V(\text{calc.}) = 84.6^\circ$  *Orientation:*  $X = a$ ;  $Y = c$ ;  $Z = b$ . *Dispersion:* Strong;  $r < v$ , probable.

**Cell Data:** *Space Group:* Pnm.  $a = 8.6235(7)$   $b = 8.2757(7)$   $c = 5.9501(5)$   $Z = 4$

**X-ray Powder Pattern:** Black Pine mine, Granite County, Montana, USA.

4.884 (100), 2.991 (92), 2.476 (85), 2.416 (83), 2.669 (74), 4.218 (69), 1.582 (54)

Chemistry:	(1)	(2)
Ag <sub>2</sub> O	0.03	
PbO	0.16	
CuO	19.93	29.00
ZnO	0.80	
Fe <sub>2</sub> O <sub>3</sub>	31.36	29.11
Sb <sub>2</sub> O <sub>5</sub>	12.71	
P <sub>2</sub> O <sub>5</sub>	0.04	
V <sub>2</sub> O <sub>5</sub>	0.00	
As <sub>2</sub> O <sub>5</sub>	17.32	41.89
SiO <sub>2</sub>	0.76	
SeO <sub>3</sub>	0.04	
TeO <sub>3</sub>	0.53	
SO <sub>3</sub>	0.50	
Cl	0.04	
-O=Cl	0.01	
Total	84.21	100.00

(1) Black Pine mine, Granite County, Montana, USA; average of 14 electron microprobe analyses, corresponding to (Fe<sup>3+</sup><sub>1.33</sub>Cu<sup>2+</sup><sub>0.85</sub>Zn<sub>0.03</sub>)<sub>Σ=2.21</sub>(As<sub>0.51</sub>Sb<sub>0.27</sub>Si<sub>0.04</sub>S<sub>0.02</sub>Te<sub>0.01</sub>)<sub>Σ=0.85</sub>O<sub>5</sub>.

(2) Fe<sup>3+</sup>Cu<sup>2+</sup>AsO<sub>4</sub>O.

**Polymorphism & Series:** Forms a series with olivenite.

**Group:** Olivenite group.

**Occurrence:** A secondary mineral in the weathering zone of a polymetallic sulfarsenide deposit.

**Association:** Segnitite, brochantite, malachite, tetrahedrite, pyrite.

**Distribution:** Black Pine mine, 14.5 km NW of Philipsburg, Granite County, Montana, USA.

**Name:** From the Latin *auri* (golden yellow) and *acus* (needle), in reference to its color and habit.

**Type Material:** Mineral Sciences Department, Natural History Museum of Los Angeles County, California, USA (catalog no. 62374); Canadian Museum of Nature, Ottawa, Canada (catalog no. CMNMC 86090).

**References:** (1) Mills, S.J., A.R. Kampf, G. Poirier, M. Raudsepp, and I.M. Steele (2010) Auriacusite, Fe<sup>3+</sup>Cu<sup>2+</sup>AsO<sub>4</sub>O, the first M<sup>3+</sup> member of the olivenite group, from the Black Pine mine, Montana, USA. *Mineral. Petrol.*, 99, 113–120. (2) (2010) *Amer. Mineral.*, 95, 1595 (abs. ref. 1).