

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

Cell Data: *Space Group:* $Pn\bar{n}m$. $a = 8.6235(7)$ $b = 8.2757(7)$ $c = 5.9501(5)$ $Z = 4$

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 ₂ O	0.03	
PbO	0.16	
CuO	19.93	29.00
ZnO	0.80	
Fe ₂ O ₃	31.36	29.11
Sb ₂ O ₅	12.71	
P ₂ O ₅	0.04	
V ₂ O ₅	0.00	
As ₂ O ₅	17.32	41.89
SiO ₂	0.76	
SeO ₃	0.04	
TeO ₃	0.53	
SO ₃	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 $(\text{Fe}^{3+}_{1.33}\text{Cu}^{2+}_{0.85}\text{Zn}_{0.03})_{\Sigma=2.21}(\text{As}_{0.51}\text{Sb}_{0.27}\text{Si}_{0.04}\text{S}_{0.02}\text{Te}_{0.01})_{\Sigma=0.85}\text{O}_5$.

(2) $\text{Fe}^{3+}\text{Cu}^{2+}\text{AsO}_4\text{O}$.

Polymorphism & Series: Forms a series with olivenite.

Group: Olivenite group.

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

Association: Sengnigite, 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, $\text{Fe}^{3+}\text{Cu}^{2+}\text{AsO}_4\text{O}$, the first M^{3+} 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).