

**Crystal Data:** Triclinic. *Point Group:* 1. As needlelike individual crystals, in spherulitic or disklike aggregates, to 0.5 mm.

**Physical Properties:** Hardness = 5 VHN = 660(30) (50 g load).  $D(\text{meas.}) = 3.71$   
 $D(\text{calc.}) = 3.96$  (Morocco); 4.03(Chile)

**Optical Properties:** Semitransparent. *Color:* Dark blue. *Streak:* Sky-blue. *Luster:* Vitreous.  
*Optical Class:* Biaxial.  $\alpha = 1.720(5)$ - $1.733(5)$  || length.  $\beta = \text{n.d.}$   $\gamma = 1.740(5)$ - $1.754(5)$   $\perp$  length.  
 $2V(\text{meas.}) = \sim 90^\circ$  *Pleochroism:*  $X' =$  turquoise-blue;  $Z' =$  deep turquoise-blue. Extinction  $\sim 45^\circ$  to elongation.

**Cell Data:** *Space Group:* P1.  $a = 5.315(4)$   $b = 5.978(6)$   $c = 5.030(6)$   $\alpha = 113.58(6)^\circ$   
 $\beta = 97.14(7)^\circ$   $\gamma = 89.30(8)^\circ$   $Z = 1$

**X-ray Powder Pattern:** Arhbar mine, Morocco.

4.57 (100), 4.51 (90), 3.72 (60), 2.603 (50), 2.474 (50), 3.25 (40), 2.63 (40)

Chemistry:	(1)	(2)	(3)
As <sub>2</sub> O <sub>5</sub>	33.85	33.05	33.67
MgO	10.20	8.36	11.81
FeO	0.04		
NiO	0.20		
CoO	0.24		
CuO	47.46	50.71	46.61
ZnO		0.13	
SiO <sub>2</sub>	0.10	0.24	
H <sub>2</sub> O	[7.58]	[7.49]	7.92
Total	99.63	100.08	100.01

(1) Arhbar mine, Morocco; by electron microprobe supplemented by FTIR spectroscopy, H<sub>2</sub>O calculated; corresponds to  $\text{Cu}_{1.98}(\text{Mg}_{0.88}\text{Cu}_{0.09}\text{Ni}_{0.01}\text{Co}_{0.01})_{\Sigma=0.99}(\text{AsO}_4)_{1.02}(\text{OH})_{2.92}$ . (2) El Guanaco mine, Chile; by electron microprobe supplemented by FTIR spectroscopy, H<sub>2</sub>O calculated; corresponds to  $\text{Cu}_{1.99}(\text{Mg}_{0.73}\text{Cu}_{0.25}\text{Zn}_{0.01})_{\Sigma=0.99}[(\text{AsO}_4)_{1.01}(\text{SiO}_4)_{0.01}]_{\Sigma=1.02}(\text{OH})_{2.92}$ . (3)  $\text{Cu}_2\text{Mg}(\text{AsO}_4)(\text{OH})_3$ .

**Occurrence:** A rare secondary mineral in polymetallic hydrothermal ore deposits.

**Association:** Dolomite, hematite, löllingite, pharmacolite, erythrite, talc, mcguinnessite (Arhbar mine, Morocco); chrysocolla, brochantite, olivenite, iodargyrite, dolomite (Emma Louisa mine, Chile); guanacoite (El Guanaco mine, Chile).

**Distribution:** From the Arhbar mine, Bou Azzer district, Morocco. In the [Emma Luisa gold mine,] and El Guanaco mine, Guanaco district, about 100 km east-northeast of Taltal, Antofagasta, Chile.

**Name:** For the *Arhbar* (Aghbar) mine, Morocco, where the mineral was first found.

**Type Material:** National Museum of Natural History, Washington, D.C., USA, 160383.

**References:** (1) Schmetzer, K., G. Tremmel, and O. Medenbach (1982) Arhbarit,  $\text{Cu}_2[\text{OH}|\text{AsO}_4] \cdot 6\text{H}_2\text{O}$ , ein neues Mineral von Bou-Azzer, Marokko. Neues Jahrb. Mineral., Monatsh., 529-533 (in German with English abs.). (2) (1983) Amer. Mineral., 68, 1038 (abs. ref. 1). (3) Krause, W., H.-J. Bernhardt, H. Effenberger, U. Kolitsch, and Ch. Lengauer (2003) Redefinition of arhbarite,  $\text{Cu}_2\text{Mg}(\text{AsO}_4)(\text{OH})_3$ . Mineral. Mag., 67, 1099-1107. (4) (2004) Amer. Mineral., 89, 897 (abs. ref. 3).