

**Crystal Data:** Monoclinic. *Point Group:* 2/m. As prismatic crystals, to 0.1 mm.

**Physical Properties:** *Cleavage:* Perfect on {100}. *Fracture:* n.d. *Tenacity:* Brittle.  
*Hardness* = 3-4 *D(meas.)* = n.d. *D(calc.)* = 4.61

**Optical Properties:** Transparent. *Color:* Dark brown. *Streak:* Brown. *Luster:* Adamantine.  
*Optical Class:* Biaxial (+).  $\alpha = 1.98(1)$   $\beta = 2.01(1)$   $\gamma = 2.08(1)$   $2V(\text{meas.}) = 50(15)^\circ$   
 $2V(\text{calc.}) = 68(10)^\circ$  *Pleochroism:* X = light brown, Y = n.d., Z = reddish brown.  
*Orientation:* X = c, Y = b.

**Cell Data:** *Space Group:* C2/m.  $a = 18.468(2)$   $b = 6.1475(8)$   $c = 15.314(2)$   $\beta = 119.284(2)^\circ$   
Z = 4

**X-ray Powder Pattern:** Great Tolbachik Fissure Eruption, Kamchatka Region, Russia.  
3.08 (100), 3.86 (80), 3.55 (80), 1.543 (50), 1.349 (40), 1.710 (30), 1.448 (30)

<b>Chemistry:</b>	(1)
CuO	43.96
ZnO	0.15
SeO <sub>2</sub>	20.66
PbO <sub>2</sub>	2.34
Cl	16.58
-O = Cl <sub>2</sub>	3.75
Total	99.94

(1) Great Tolbachik Fissure Eruption, Kamchatka Region, Russia; average of 21 electron microprobe analyses; corresponds to  $\text{Cu}^{+}_{1.00}\text{Cu}^{2+}_{4.92}\text{Pb}_{1.07}\text{Se}_{1.99}\text{O}_{7.99}\text{Cl}_{5.01}$ .

**Occurrence:** Formed by sublimation around a degassing volcanic fumarole.

**Association:** Cotunnite, sphiite, ilinskite, georgbokiite, burnsite.

**Distribution:** From second cinder cone of the northern breach of the Great Tolbachik Fissure Eruption, Kamchatka Region, Russia.

**Name:** Derived from the Greek for “different” (*allos*) and “copper” (*chalkos*) and from “selenium”, to reflect the different valences and crystallographic behavior of copper in this selenite mineral.

**Type Material:** n.d.

**References:** (1) Vergasova, L.P., S.V. Krivovichev, S.N. Britvin, S.K. Filatov, P.C. Burns, and V.V. Ananyev (2005) Allochalcoselite,  $\text{Cu}^+\text{Cu}^{2+}_5\text{PbO}_2(\text{SeO}_3)_2\text{Cl}_5$  - a new mineral from volcanic exhalations (Kamchatka, Russia). *Zap. Ross. Mineral. Obshch.*, 134(3), 70-74 (in Russian, English abstract). (2) (2006) *Amer. Mineral.*, 91, 1201 (abs. ref. 1). (3) Krivovichev, S.V., S.K. Filatov, P.C. Burns, and L.P. Vergasova (2006) The crystal structure of allochalcoselite,  $\text{Cu}^+\text{Cu}^{2+}_5\text{PbO}_2(\text{SeO}_3)_2\text{Cl}_5$ . *Can. Mineral.*, 44, 507-514. (4) (2006) *Amer. Mineral.*, 91, 1949-1950 (abs. ref. 3).