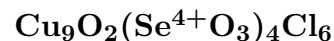


Chloromenite



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Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals are platy on $\{\bar{1}01\}$, elongated along $[111]$ or $[1\bar{1}1]$, may be equant, with well-developed $\{001\}$, $\{\bar{1}01\}$, $\{101\}$, $\{110\}$, $\{011\}$, $\{\bar{3}12\}$, poor $\{\bar{3}01\}$, $\{310\}$, to 0.2 mm

Physical Properties: *Cleavage:* Perfect on $\{101\}$. *Tenacity:* Plastic. Hardness = n.d. VHN = 60–63, 62 average (5 g load). D(meas.) = n.d. D(calc.) = 4.15(1)

Optical Properties: Transparent. *Color:* Tobacco-green. *Streak:* Yellowish green. *Luster:* Vitreous.

Optical Class: Biaxial (-). *Pleochroism:* X = green; Y = pale brownish green; Z = dark brownish green. *Orientation:* Y = b; Z \simeq c. *Absorption:* Z > X > Y. $\alpha = 1.87(1)$ $\beta = 1.92(1)$ $\gamma = 1.94(1)$ $2V(\text{meas.}) = 66(2)^\circ$ $2V(\text{calc.}) = 63^\circ$

Cell Data: *Space Group:* $I2/m$. $a = 14.170(3)$ $b = 6.262(1)$ $c = 12.999(3)$
 $\beta = 113.05(1)^\circ$ Z = 2

X-ray Powder Pattern: Tolbachik volcano, Russia; shows significant preferred orientation. 3.450 (100), 5.56 (83), 11.29 (63), 2.486 (61), 3.239 (39), 2.714 (31), 3.643 (25)

Chemistry:

	(1)	(2)
SeO ₂	34.37	33.51
CuO	46.23	54.05
ZnO	5.94	
Cl	16.57	16.06
-O = Cl ₂	3.74	3.62
Total	[99.37]	100.00

(1) Tolbachik volcano, Russia; by electron microprobe, average of four analyses, original total given as 99.36%; corresponds to $(\text{Cu}_{7.71}\text{Zn}_{0.97})_{\Sigma=8.68}\text{O}_{1.80}(\text{Se}_{1.03}\text{O}_3)_4\text{Cl}_{6.20}$. (2) $\text{Cu}_9\text{O}_2(\text{SeO}_3)_4\text{Cl}_6$.

Occurrence: Formed in a volcanic fumarole.

Association: Melanothallite, sofiite, georgbokiite, ilinskite, chloromenite, burnsite, cotunnite.

Distribution: From the Tolbachik fissure volcano, Kamchatka Peninsula, Russia.

Name: From the Greek for *green*, in allusion to its color, and for *moon*, for its *selenium* content.

Type Material: Department of Mineralogy, St. Petersburg State University; Mining Museum, St. Petersburg, Russia.

References: (1) Vergasova, L., S. Krivovichev, T. Semenova, S. Filatov, and V. Ananiev (1999) Chloromenite, $\text{Cu}_9\text{O}_2(\text{SeO}_3)_4\text{Cl}_6$, a new mineral from the Tolbachik volcano, Kamchatka, Russia. *Eur. J. Mineral.*, 11, 119–123. (2) (1999) *Amer. Mineral.*, 84, 1464 (abs. ref. 1). (3) Krivovichev, S.V., S.K. Filatov, T.F. Semenova, and I.V. Rozhdestvenskaya (1998) Crystal chemistry of inorganic compounds based on chains of oxocentered tetrahedra I. Crystal structure of chloromenite, $\text{Cu}_9\text{O}_2(\text{SeO}_3)_4\text{Cl}_6$. *Zeits. Krist.*, 213, 645–649.