

Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. As well-formed, stout prismatic to acicular crystals to 0.2 mm; also in radiating aggregates.

Physical Properties: *Cleavage:* Distinct. *Fracture:* Uneven to splintery. *Tenacity:* Brittle. Hardness = ~ 3 D(meas.) = n.d. D(calc.) = 4.512 VHN = 189 (50 g load).

Optical Properties: Translucent. *Color:* Honey-yellow or dark brown (prismatic crystals) to bright yellow (acicular), gray with a bluish tint in reflected light with orange-red or orange-brown internal reflections. *Streak:* Yellow to light brown. *Luster:* Adamantine. *Anisotropism:* Distinct. *Optical Class:* n.d.

R_1 - R_2 : (470) 14.95-16.3, (546) 13.4-14.85, (589) 12.73-14.16, (650) 12.15-13.5

Cell Data: *Space Group:* $Pnma$. $a = 7.6638(1)$ $b = 6.8670(1)$ $c = 14.5554(2)$ $Z = 4$

X-ray Powder Pattern: Second Scoria Cone, Tolbachik volcano, Kamchatka Peninsula, Russia. 3.436 (100), 3.301 (99), 3.065 (79), 7.312 (67), 2.506 (66), 2.556 (62), 3.518 (55)

Chemistry:	(1)	(2)	(3)
MoO ₃	54.48	50.3	54.67
SO ₃	0.71	2.16	
V ₂ O ₅	0.28	0.91	
SiO ₂	0.04	0.10	
CuO	43.03	37.8	45.33
FeO	0.08	0.09	
ZnO	0.53	8.48	
Total	99.15	99.87	100.00

(1) Second Scoria Cone, Tolbachik volcano, Russia; average of 7 electron microprobe analyses; corresponding to $(\text{Cu}_{2.83}\text{Zn}_{0.03}\text{Fe}_{0.01})_{\Sigma=2.87}(\text{Mo}_{1.98}\text{S}_{0.05}\text{V}_{0.02})_{\Sigma=2.05}\text{O}_9$ (prismatic crystals). (2) Second Scoria Cone, Tolbachik volcano, Russia; average of 7 electron microprobe analyses; corresponding to $(\text{Cu}_{2.46}\text{Zn}_{0.54}\text{Fe}_{0.01})_{\Sigma=3.01}(\text{Mo}_{1.81}\text{S}_{0.14}\text{V}_{0.05})_{\Sigma=2.00}\text{O}_9$ (acicular variety). (3) $\text{Cu}_3\text{O}(\text{MoO}_4)_2$.

Occurrence: A fumarolic mineral formed during post-volcanic degassing.

Association: Piypite, fedotovite, vergasovite, hematite, magnetite, apthitalite, langbeinite, palmierite, As-bearing orthoclase, lammerite, klyuchevskite, alumoklyuchevskite, euchlorine, lyonsite, pseudo-lyonsite, averievite, rutile, gold.

Distribution: From the Yadovitaya (poisonous) fumarole, Second Scoria Cone, Tolbachik volcano, Kamchatka Peninsula, Russia.

Name: For its chemical composition. The name also reflects the stoichiometric relationship with cuprotungstite, $\text{Cu}_3(\text{OH})_2(\text{WO}_4)_2$.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (# 4072/1).

References: (1) Zelenski, M.E., N.V. Zubkova, I.V. Pekov, Y.S. Polekhovsky, and D.Yu. Pushcharovsky (2012) Cupromolybdate, $\text{Cu}_3\text{O}(\text{MoO}_4)_2$, a new fumarolic mineral from the Tolbachik volcano, Kamchatka Peninsula, Russia. *European Journal of Mineralogy*, 24(4), 749-757. (2) (2014) *Amer. Mineral.*, 99, 2152-2153 (abs. ref. 1).