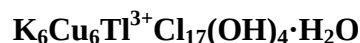


Chrysothallite

Crystal Data: Tetragonal. *Point Group:* 4/m 2/m 2/m. As equant to thick tabular crystals, to 0.05 mm, displaying {001}, {100}, {110}, {101} and {102}. Also in aggregates to 0.2 mm or in crusts to 1 mm thick.

Physical Properties: *Cleavage:* None. *Fracture:* Uneven. *Tenacity:* Brittle.
Hardness = ~ 3 D(meas.) = 2.95(2) D(calc.) = 2.97

Optical Properties: Transparent. *Color:* Bright golden-yellow to light yellow; yellow in transmitted light. *Streak:* Yellow. *Luster:* Vitreous.
Optical Class: Uniaxial (+). $\omega = 1.720(5)$ $\varepsilon = 1.732(5)$ *Pleochroism:* Weak, in yellow tones.
Absorption: $O > E$.

Cell Data: *Space Group:* I4/mmm. $a = 11.3689(7)$ $c = 26.207(2)$ $Z = 4$

X-ray Powder Pattern: Second scoria cone, Tolbachik volcano, Kamchatka, Russia.
6.88 (100), 3.075 (47), 13.20 (44), 2.771 (38), 5.16 (30), 3.153 (30), 3.471 (28)

Chemistry:	(1)	(2)
K	15.92	15.88
Cu	24.56	25.82
Zn	1.38	
Tl	13.28	13.84
Cl	40.32	50.88
H ₂ O	[3.49]	3.66
Total	98.95	100.00

(1) Second scoria cone, Tolbachik volcano, Kamchatka, Russia; average of 4 electron microprobe analyses supplemented by Raman spectroscopy, H₂O from structure analysis; corresponding to $\text{K}_{6.09}(\text{Cu}_{5.78}\text{Zn}_{0.32})_{\Sigma=6.10}\text{Tl}_{0.97}\text{Cl}_{17}[(\text{OH})_{3.80}\text{O}_{0.20}]\cdot\text{H}_2\text{O}$. (2) $\text{K}_6\text{Cu}_6\text{Tl}^{3+}\text{Cl}_{17}(\text{OH})_4\cdot\text{H}_2\text{O}$.

Occurrence: Formed by the interactions among high-temperature sublimate minerals, fumarolic gas and atmospheric water vapor at temperatures not higher than 150 °C.

Association: Belloite, avdoninite, chlorothionite, sanguite, eriochalcite, mitscherlichite, sylvite, carnallite, kainite (Glavnaya Tenoritovaya fumarole); belloite, avdoninite, chlorothionite, eriochalcite, atacamite, halite, kröhnkite, natrochalcite, gypsum, antlerite (Pyatno fumarole).

Distribution: From the Glavnaya Tenoritovaya and Pyatno fumaroles, Second scoria cone, Northern Breakthrough of the Great Tolbachik Fissure Eruption, Tolbachik volcano, Kamchatka, Russia.

Name: For its bright golden-yellow color (from the Greek χρυσός for *gold*) and the presence of *thallium* as a species-defining constituent.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (94129).

References: (1) Pekov, I.V., N.V. Zubkova, D.I. Belakovskiy, V.O. Yapaskurt, M.F. Vigasina, I.S. Lykova, E.G. Sidorov, and D.Yu. Pushcharovsky (2015) Chrysothallite $\text{K}_6\text{Cu}_6\text{Tl}^{3+}\text{Cl}_{17}(\text{OH})_4\cdot\text{H}_2\text{O}$, a new mineral species from the Tolbachik volcano, Kamchatka, Russia. Mineral. Mag., 79(2), 365-376. (2) (2016) Amer. Mineral., 101, 1490-1491 (abs. ref. 1).