

Crystal Data: Hexagonal. *Point Group:* 3. As pseudo-hexagonal crystals, to 0.3 mm, with $\{10\bar{1}0\}$, $\{01\bar{1}0\}$, $\{0001\}$, $\{000\bar{1}\}$.

Physical Properties: *Cleavage:* On $\{10\bar{1}0\}$, good. *Tenacity:* Brittle. *Hardness* = ~ 4 VHN = 258 (20 g load). *D*(meas.) = 3.54 (thought low due to adhesion of air bubbles). *D*(calc.) = 4.01(1)

Optical Properties: Opaque. *Color:* Black. *Streak:* Black. *Luster:* Metallic to resinous. *Optical Class:* Uniaxial.

R_1 – R_2 : n.d.

Cell Data: *Space Group:* $P3$. $a = 6.375(1)$ $c = 8.399(1)$ $Z = 1$

X-ray Powder Pattern: Tolbachik volcano, Russia.
2.315 (10), 3.43 (7), 2.810 (4), 1.598 (4), 2.131 (3), 3.048 (2), 1.871 (2)

Chemistry:	(1)
MoO ₃	1.51
V ₂ O ₅	23.84
Fe ₂ O ₃	0.62
CuO	62.01
K ₂ O	0.98
Rb ₂ O	0.82
Cs ₂ O	3.35
Cl	7.56
–O = Cl ₂	1.70
Total	98.99

(1) Tolbachik volcano, Russia; by electron microprobe, average of 17 analyses, total Fe as Fe₂O₃; with chloride compounds in open structural channels, corresponds to $\text{Cu}_{5.00}\text{O}_{2.19}[(\text{V}_{0.94}\text{Mo}_{0.04}\text{Fe}_{0.02})_{\Sigma=1.00}\text{O}_{3.89}]_2 \cdot \text{Cu}_{0.56}\text{Cl}_{1.12} \cdot (\text{Cs}_{0.17}\text{K}_{0.15}\text{Rb}_{0.06})_{\Sigma=0.38}\text{Cl}_{0.40}$.

Occurrence: In volcanic fumaroles.

Association: Piypite, alumoklyuchevskite, fedotovite, alarsite, nabokoite, tenorite, lammerite, langbeinite.

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

Name: To honor Valerii Viktorovich Aver'ev [Averiev] (1929–1968), volcanologist, Institute of Volcanology, Petropavlovsk-Kamchatskii, Russia.

Type Material: Mining Museum, St. Petersburg Mining Institute, St. Petersburg, Russia, 2102/2.

References: (1) Vergasova, L.P., G.L. Starova, S.K. Filatov, and V.V. Anan'ev (1998) Averievite $\text{Cu}_5(\text{VO}_4)_2\text{O}_2 \cdot n\text{MX}$ – a new mineral of volcanic exhalations. *Doklady Acad. Nauk*, 359, 804–807 (in Russian). (2) Starova, G.L., S.V. Krivovichev, V.S. Fundamensky, and S.K. Filatov (1997) The crystal structure of averievite, $\text{Cu}_5\text{O}_2(\text{VO}_4)_2 \cdot n\text{MX}$: comparison with related compounds. *Mineral. Mag.*, 61, 441–446. (3) (1999) *Amer. Mineral.*, 84, 685 (abs. ref. 1–2).