

Crystal Data: Monoclinic. *Point Group:* 2. Long prismatic to needlelike crystals, with equant cross section, elongated parallel [010], to 1 mm; in aggregates.

Physical Properties: *Cleavage:* { $h0l$ }, perfect. Hardness = 2.3 VHN = 42
D(meas.) = 3.1(1) D(calc.) = 2.95 Turns white on exposure to air, possibly from hydration.

Optical Properties: Transparent. *Color:* Dark green.
Optical Class: Biaxial (+). *Pleochroism:* Strong; X = pale green; Y = grayish green; Z = dark green. *Orientation:* Y = b; X \perp b; Y \perp b. $\alpha = 1.542(1)$ $\beta = 1.548(1)$ $\gamma = 1.641(1)$
2V(meas.) = n.d. 2V(calc.) = 30°

Cell Data: *Space Group:* I2. $a = 18.423(5)$ $b = 5.139(1)$ $c = 18.690(7)$ $\beta = 101.72(2)^\circ$
Z = 4

X-ray Powder Pattern: Tolbachik volcano, Russia; similar to klyuchevskite.
9.04 (100), 9.15 (84), 7.20 (52), 3.781 (37), 3.757 (33), 2.786 (21), 4.509 (15)

Chemistry:	(1)	(2)
SO ₃	40.70	42.63
Al ₂ O ₃	4.65	6.79
Fe ₂ O ₃	3.70	
CuO	31.19	31.77
K ₂ O	18.68	18.81
Total	98.92	100.00

(1) Tolbachik volcano, Russia; by electron microprobe, average of 26 analyses; corresponds to $\text{K}_{3.07}\text{Cu}_{3.04}(\text{Al}_{0.71}\text{Fe}_{0.36})_{\Sigma=1.07}\text{O}_2(\text{S}_{0.98}\text{O}_4)_4$. (2) $\text{K}_3\text{Cu}_3\text{AlO}_2(\text{SO}_4)_4$.

Occurrence: Deposited by fumarolic gases.

Association: Fedotovite, tenorite, lammerite, averievite, piypite, langbeinite.

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

Name: For *aluminum* in its composition and its relation to *klyuchevskite*.

Type Material: St. Petersburg Mining Institute, St. Petersburg, Russia, 2072/1.

References: (1) Gorskaya, M.G., L.P. Vergasova, S.K. Filatov, D.V. Rolich, and V.V. Ananiev (1995) Alumoklyuchevskite, $\text{K}_3\text{Cu}_3\text{AlO}_2(\text{SO}_4)_4$, a new oxysulfate of K, Cu and Al from volcanic exhalations, Kamchatka, Russia. Zap. Vses. Mineral. Obshch., 124(1), 95–100 (in English).
(2) (1996) Amer. Mineral., 81, 249–254 (abs. ref. 1).