

Crystal Data: Triclinic. *Point Group:* $\bar{1}$. As prismatic crystals to 0.1 mm.

Physical Properties: *Cleavage:* None. *Tenacity:* Brittle. *Fracture:* Uneven. Hardness = n.d.
D(meas.) = n.d. D(calc.) = 4.264

Optical Properties: Translucent to almost opaque. *Color:* Brown-black to black, gray in reflected light with weak, brown internal reflections. *Streak:* Light brown. *Luster:* Semi-metallic.

Optical Class: Anisotropy: Distinct. *Birefractance:* Very weak.

R_1 - R_2 : (470) 8.3-8.2, (546) 7.7-7.4, (589) 7.1-6.9, (650) 6.3-6.3

Cell Data: *Space Group:* $P\bar{1}$. $a = 5.1168(6)$ $b = 9.1241(12)$ $c = 9.6979(14)$ $\alpha = 110.117(13)^\circ$
 $\beta = 102.454(12)^\circ$ $\gamma = 92.852(11)^\circ$ $Z = 1$

X-Ray Diffraction Pattern: Arsenatnaya fumarole, Tolbachik Volcano, Russia.
3.427 (100), 8.79 (92), 2.851 (65), 3.148 (64), 5.22 (44), 7.63 (41), 2.551 (40)

Chemistry:	(1)	(2)
Na ₂ O	3.13	2.92
K ₂ O	8.12	8.87
CuO	36.55	37.43
ZnO	0.46	
Fe ₂ O ₃	7.34	7.52
TiO ₂	0.27	
As ₂ O ₅	43.57	43.26
Total	99.44	100.00

(1) Arsenatnaya fumarole, Tolbachik Volcano, Kamchatka, Russia; average electron microprobe analysis supplemented by Raman spectroscopy; corresponds to $\text{K}_{1.83}\text{Na}_{1.07}\text{Cu}_{4.88}\text{Zn}_{0.06}\text{Fe}^{3+}_{0.98}\text{Ti}_{0.04}\text{As}_{4.03}\text{O}_{18}$. (2) $\text{K}_2\text{NaCu}_5\text{Fe}^{3+}\text{O}_2(\text{AsO}_4)_4$.

Occurrence: A sublimate on basaltic scoria at an active volcanic fumarole.

Association: Hematite, dmisokolovite, johillerite, bradaczekite, orthoclase, sylvite.

Distribution: From the Arsenatnaya fumarole, Second scoria cone, Northern Breakthrough of the Great Tolbachik Fissure Eruption, Tolbachik Volcano, Kamchatka, Russia.

Name: Honors Russian geologist and Arctic explorer *Eduard Vasilievich Toll* (1858-1902) for contributions to the geology and geography of Polar Siberia and islands in the Arctic Ocean.

Type Material: A.E. Fersman Mineralogical Museum, RAS, Moscow, Russia (95350).

References: (1) Pekov, I.V., N.V. Zubkova, A.A. Agakhanov, D.A. Ksenofontov, L.A. Pautov, E.G. Sidorov, S.N. Britvin, M.F. Vigasina, and D.Y. Pushcharovsky (2019) New arsenate minerals from the Arsenatnaya fumarole, Tolbachik volcano, Kamchatka, Russia. X. Edtollite, $\text{K}_2\text{NaCu}_5\text{Fe}^{3+}\text{O}_2(\text{AsO}_4)_4$, and alumoedtollite, $\text{K}_2\text{NaCu}_5\text{AlO}_2(\text{AsO}_4)_4$. Mineral. Mag., 83, 485-495.