

Crystal Data: Monoclinic. *Point Group:* 2/m. As equant, thick tabular or short prismatic crystals with pyramid-like terminations to 30 μm in crusts. *Twinning:* Cyclic interpenetrant, common.

Physical Properties: *Cleavage:* None. *Tenacity:* Brittle. *Fracture:* Uneven. Hardness = n.d. D(meas.) = n.d. D(calc.) = 3.715

Optical Properties: Translucent to nearly opaque. *Color:* Dark grayish green to olive-greenish black, dark gray in reflected light. *Streak:* Grayish green with olive hue. *Luster:* Strong vitreous. *Optical Class:* Birefractance: Weak. *Anisotropism:* Weak. *Pleochroism:* None. R₁-R₂: (470) 7.3-7.6, (546) 6.9-7.2, (589) 6.8-7.1, (650) 6.7-7.0

Cell Data: *Space Group:* C2/m. *a* = 10.742(2) *b* = 21.019(3) *c* = 11.787(2) β = 117.06(3)° *Z* = 2

X-ray Powder Pattern: Arsenatnaya fumarole, Tolbachik volcano, Kamchatka, Russia. 8.74 (100), 5.288 (80), 10.58 (79), 2.574 (74), 5.381 (46), 3.770 (33), 2.643 (30)

Chemistry:	(1)		(1)
Na ₂ O	20.04	Fe ₂ O ₃	2.79
K ₂ O	0.91	TiO ₂	0.29
CaO	0.12	SiO ₂	0.05
PbO	0.67	P ₂ O ₅	0.07
MgO	0.17	V ₂ O ₅	0.04
MnO	0.03	As ₂ O ₅	34.46
CuO	35.37	SO ₃	0.25
ZnO	0.25	Cl	6.41
Al ₂ O ₃	0.03	<u>-O = Cl</u>	<u>1.45</u>
		Total	100.50

(1) Arsenatnaya fumarole, Tolbachik volcano, Kamchatka, Russia; average electron microprobe analysis supplemented by IR spectroscopy; corresponds to (Na_{17.06}K_{0.51}Pb_{0.08}Ca_{0.06})_{Σ=17.71} (Cu_{11.73}Mg_{0.11}Zn_{0.08}Mn_{0.01})_{Σ=12.93}(Fe³⁺_{0.92}Ti_{0.10}Al_{0.02})_{Σ=1.04}(As_{7.91}S_{0.08}P_{0.03}Si_{0.02}V_{0.01})_{Σ=8.05}O_{40.23}Cl_{4.77}.

Occurrence: A sublimate around an active volcanic fumarole.

Association: Lehmannite, hematite, sanidine, sylvite, halite, tenorite, cassiterite, rutile, and 40 other species.

Distribution: From the Arsenatnaya fumarole, Second scoria cone, Tolbachik Fissure Eruption, Tolbachik volcano, Kamchatka, Russia.

Name: The prefix, *ars*, identifies essential arsenic and *mirandus* (Latin for 'marvellous') in allusion to the unusual crystal structure.

Type Material: A.E. Fersman Mineralogical Museum, RAS, Moscow, Russia (94623).

References: (1) Pekov, I.V., S.N. Britvin, V.O. Yapaskurt, N.N. Koshlyakova, Y.S. Polekhovskiy, J. Göttlicher, N.V. Chukanov, M.F. Viggasina, S.V. Krivovichev, A.G. Turchkova, and E.G. Siderov (2020) Arsmirandite, Na₁₈Cu₁₂Fe³⁺O₈(AsO₄)₈Cl₅, and lehmannite, Na₁₈Cu₁₂TiO₈(AsO₄)₈FCl₅, new minerals from fumarole exhalations of the Tolbachik Volcano, Kamchatka, Russia. Zap. Ross. Mineral. Obshch., 149(3), 1-17.