

Crystal Data: Hexagonal. *Point Group:* 6. As prismatic to acicular crystals to 7 mm typically in parallel or radial intergrowths, bunches, sheaf- or broom-like clusters to 1 cm.

Physical Properties: *Cleavage:* None. *Tenacity:* Brittle. *Fracture:* Uneven. Hardness = n.d. D(meas.) = n.d. D(calc.) = 3.42

Optical Properties: Transparent. *Color:* Light yellow. *Streak:* White. *Luster:* Vitreous. *Optical Class:* Uniaxial (+). $\omega = 1.703(4)$ $\epsilon = 1.750(5)$ *Pleochroism:* Distinct, E = light yellow, O = colorless to very pale yellow.

Cell Data: *Space Group:* $P6_3$. $a = 10.6304(3)$ $c = 4.56374(16)$ $Z = 1$

X-Ray Diffraction Pattern: Arsenatnaya fumarole, Tolbachik volcano, Kamchatka Peninsula, Russia. 9.20 (100), 3.488 (73), 2.228 (72), 2.769 (70), 1.702 (61), 2.549 (40), 1.475 (37)

Chemistry:	(1)
MgO	51.32
CaO	0.37
MnO	0.52
Fe ₂ O ₃	0.48
B ₂ O ₃	20.83
P ₂ O ₅	2.40
As ₂ O ₅	1.69
V ₂ O ₅	4.81
MoO ₃	10.16
WO ₃	4.75
F	3.42
-O = F ₂	1.44
Total	99.31

(1) Arsenatnaya fumarole, Tolbachik volcano, Kamchatka Peninsula, Russia; average electron microprobe analysis supplemented by Raman spectroscopy; corresponding to $(\text{Mg}_{11.78}\text{Mn}_{0.07}\text{Fe}^{3+}_{0.06}\text{Ca}_{0.06})_{\Sigma=11.97}(\text{Mo}^{6+}_{0.65}\text{V}^{5+}_{0.49}\text{W}^{6+}_{0.19})_{\Sigma=1.33}[(\text{P}_{0.31}\text{As}^{5+}_{0.14})_{\Sigma=0.45}\text{B}_{5.54}]_{\Sigma=5.99}\text{O}_{24.33}\text{F}_{1.67}$.

Polymorphism & Series: Continuous solid solution with rhabdoborite-(V) and rhabdoborite-(W).

Mineral Group: Rhabdoborite group.

Occurrence: A volcanic sublimate or, more probably, formed by the interaction between fumarolic gas and basalt scoria.

Association: Rhabdoborite-(V), rhabdoborite-(W), anhydrite, diopside, hematite, schäferite, berzeliite, svabite, calciojohillerite, ludwigite, forsterite, magnesioferrite, baryte, fluorapatite, udinaite, arsenudinaite, powellite.

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

Name: Refers to morphological (*rhabdos* is “rod”, in Greek) and chemical (*borate*) features of the mineral; a suffix indicates the dominant element as the *M* component.

Type Material: A.E. Fersman Mineralogical Museum, RAS, Moscow, Russia (5464/1).

References: (1) Pekov, I.V., N.V. Zubkova, N.N. Koshlyakova, D.I. Belakovskiy, A.A. Agakhanov, M.F. Vidasina, S.N. Britvin, E.G. Sidorov, and D.Y. Pushcharovsky (2020) Rhabdoborite-(V), rhabdoborite-(Mo) and rhabdoborite-(W): a new group of borate minerals with the general formula $\text{Mg}_{12}\text{M}_{1/3}\text{O}_6[(\text{BO}_3)_{6-x}(\text{PO}_4)_x\text{F}_{2-x}]$ ($\text{M}=\text{V}^{5+}$, Mo^{6+} or W^{6+} and $x < 1$). *Phys. Chem. Minerals*, 47, 44, 1-17.