Anatolyite $Na_6(Ca, Na)(Mg, Fe^{3+})_3Al(AsO_4)_6$

Crystal Data: Hexagonal. *Point Group*: $\bar{3}$ 2/*m*. As rhombohedral-prismatic, equant, or slightly elongated along [001] crystals to 0.2 mm in aggregates to 2 mm..

Physical Properties: *Cleavage*: None. *Tenacity*: Brittle. *Fracture*: Uneven. Hardness = ~4.5
D(meas.) = n.d. D(calc.) = 3.872

Optical Properties: Transparent. *Color*: Pale brownish pinkish, colorless in thin section.
Streak: White. *Luster*: Vitreous.
Optical Class: Uniaxial (-). ω = 1.703(4) ε = 1.675(3) Nonpleochroic.

Cell Data: *Space Group*: $R\bar{3}$ *c*. *a* = 13.6574(10) *c* = 18.2349(17) Z = 6

X-Ray Diffraction Pattern: Arsenatnaya fumarole, Tolbachik Volcano, Russia.
2.827 (100), 7.21 (33), 3.196 (31), 4.347 (27), 3.421 (20), 2.981 (17), 2.589 (18)

Chemistry:

	(1)	(2)		(1)	(2)
Na_2O	16.55	16.27	Fe_2O_3	7.94	6.99
K_2O	0.43		TiO_2	0.18	
CaO	2.49	4.91	SnO_2	0.17	
MgO	5.80	7.05	SiO_2	0.04	
MnO	0.16		P_2O_5	0.55	
CuO	0.69		As_2O_5	60.75	60.32
ZnO	0.55		SO_3	0.03	.
Al_2O_3	5.01	4.46	Total	101.34	100.00

(1) Arsenatnaya fumarole, Tolbachik Volcano, Kamchatka, Russia; average electron microprobe analysis; corresponds to $(Na_{5.90}K_{0.10})_{\Sigma=6.00}(Ca_{0.50}Na_{0.13}Zn_{0.08}Mn_{0.03})_{\Sigma=0.74}(Mg_{1.63}Fe^{3+}_{1.12}Al_{0.15}Cu_{0.10})_{\Sigma=3.00}(Al_{0.96}Ti_{0.03}Sn_{0.01})_{\Sigma=1.00}(As_{5.97}P_{0.09}Si_{0.01})_{\Sigma=6.07}O_{24}$. (2) $Na_6(Ca)(Mg_2Fe^{3+})Al(AsO_4)_6$.

Occurrence: A sublimate at an active volcanic fumarole.

Association: Potassic feldspar, hematite, tenorite, cassiterite, johillerite, tilasite, ericlaxmanite, lammerite, arsmirandite, sylvite, halite, aphthitalite, langbeinite, anhydrite, wulffite, krasheninnikovite, fluoborite, pseudobrookite, fluorophlogopite.

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

Name: Honors Russian crystallographer, mineralogist, and mathematician *Anatoly* Kapitonovich Boldyrev (1883-1946) Professor of Crystallography and Mineralogy, Leningrad Mining Institute.

Type Material: A.E. Fersman Mineralogical Museum, RAS, Moscow, Russia (95620 and 95913).

References: (1) Pekov, I.V., I.S. Lykova, V.O. Yapaskurt, D.I. Belakovskiy, A.G. Turchkova, S.N. Britvin, E.G. Sidorov, and K.S. Scheidl (2019) New arsenate minerals from the Arsenatnaya fumarole, Tolbachik volcano, Kamchatka, Russia. XI. Anatolyite, $Na_6(Ca,Na)(Mg,Fe^{3+})_3Al(AsO_4)_6$. Mineral. Mag., 83, 633-638.