Natroaphthitalite $KNa_3(SO_4)_2$

Crystal Data: Hexagonal. *Point Group*: $\bar{3}\,2/m$. As drop-like crystals to 1 cm, sometimes combined in crusts with a ''glazed'' surface to 2 cm, and as tabular to lamellar hexagonal crystals to 2 mm, sometimes skeletal, typically combined in parallel intergrowths or brush-like aggregates.

Physical Properties: *Cleavage*: Imperfect on {10*0}. *Tenacity*: Brittle. *Fracture*: n.d.
Hardness = ~3 D(meas.) = 2.69(1) D(calc.) = 2.664 Dissolves in water at room temperature.

Optical Properties: Translucent to transparent. *Color*: Yellow to colorless. *Streak*: White.
Luster: Vitreous to waxy.
Optical Class: Uniaxial (+). ω = 1.488(2) ε = 1.490(2) Non-pleochroic.

Cell Data: *Space Group: P* $\bar{3}$ *m*1. *a* = 5.6014(3) *c* = 7.1507(5) Z = 1

X-Ray Diffraction Pattern: Arsenatnaya fumarole, Tolbachik volcano, Kamchatka, Russia.
2.797 (100), 2.877 (77), 4.010 (42), 2.007 (40), 3.574 (15), 1.631 (12), 1.617 (11)

Chemistry:

	(1)
Na_2O	22.54
K_2O	26.39
SO_3	51.78
Total	100.71

(1) Arsenatnaya fumarole, Tolbachik volcano, Kamchatka, Russia; average electron microprobe and IR spectroscopic analyses; corresponds to $^{X}K_{1.00}{}^{Y}(Na_{1.28}K_{0.72})_{\Sigma=2.00}{}^{M}Na_{1.00}{}^{T}(SO_4)_2$.

Polymorphism & Series: In a series with aphthitalite and belomarinaite.

Mineral Group: Aphthitalite group.

Occurrence: A sublimate at an active volcanic fumarole.

Association: Anhydrite, langbeinite, hematite, tenorite, As-bearing sanidine, johillerite, tilasite, belomarinaite.

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

Name: The prefix indicates the analogue of *aphthitalite* with total Na > K and in the *Y* site.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (5254/1).

References: (1) Shchipalkina, N.V., I.V. Pekov , N.V. Chukanov, D.I. Belakovskiy, N.V. Zubkova, N.N. Koshlyakova, S.N. Britvin, and E.G. Sidorov (2020) Alkali sulfates with aphthitalite-like structures from fumaroles of the Tolbachik volcano, Kamchatka, Russia. II. A new mineral, natroaphthitalite, and new data on belomarinaite. Can. Mineral., 58, 167-181.