

Bussenite**Ba₄(Na, □)₂(Fe²⁺, Na)₂Ti₂(Si₂O₇)₂(CO₃)₂O₂(OH)₂(H₂O)₂F₂**

Crystal Data: Triclinic. *Point Group:* $\bar{1}$. As aggregates of thin curved plates, to 5 cm.

Physical Properties: *Cleavage:* Perfect on {100}, moderate on {110} and {1̄10}. *Tenacity:* Brittle. *Fracture:* Stepped. Hardness = 4 D(meas.) = 3.63(2) D(calc.) = 3.65 Macroscopically and microscopically resembles lamprophyllite.

Optical Properties: Translucent. *Color:* Yellow-brown. *Streak:* White. *Luster:* Vitreous.

Optical Class: Biaxial (+). $\alpha = 1.671(2)$ $\beta = 1.694(2)$ $\gamma = 1.734(3)$ $2V = 71(1)^\circ$

Dispersion: Strong, $r > v$. *Pleochroism:* Strong; $X = Z =$ pale yellow, $Y =$ brownish orange.

Orientation: $Y \approx a$, $c \wedge X \approx 5^\circ$ in obtuse α .

Cell Data: *Space Group:* $P\bar{1}$. $a = 5.399(3)$ $b = 7.016(9)$ $c = 16.254(14)$ $\alpha = 102.44(8)^\circ$ $\beta = 93.18(6)^\circ$ $\gamma = 90.10(7)^\circ$ $Z = 2$

X-ray Powder Pattern: Mount Kukisvumchorr, Khibiny massif, Kola Peninsula, Russia.

3.186 (100), 2.738 (62), 3.910 (44), 3.055 (38), 2.695 (32), 2.613 (32), 2.797 (29)

Chemistry:

	(1)
Na ₂ O	8.98
K ₂ O	0.65
CaO	1.56
SrO	6.78
BaO	28.79
FeO	6.77
MnO	4.68
SiO ₂	18.01
TiO ₂	11.57
Nb ₂ O ₅	1.04
H ₂ O	3.90
CO ₂	5.76
F	2.79
<u>-O = F</u>	<u>1.17</u>
Total	100.11

(1) Mount Kukisvumchorr, Khibiny massif, Kola Peninsula, Russia; average electron microprobe analysis, H₂O by Penfield method, CO₂ calculated from total weight loss minus H₂O loss; corresponding to (Na_{1.94}K_{0.09})_{Σ=2.03}(Ba_{1.25}Sr_{0.44}Ca_{0.19})_{Σ=1.88}(Fe²⁺_{0.63}Mn_{0.44})_{Σ=1.07}(Ti_{0.97}Nb_{0.05})_{Σ=1.02}Si_{2.00}O_{7.27}(CO₃)_{0.87}(OH)_{2.89}F_{0.98}.

Mineral Group: Bafertisite group.

Occurrence: In a sodalite-natrolite-calcite veinlet that cuts urtite in an alkaline massif.

Association: Natrolite, sodalite, aegirine, biotite, vinogradovite, titanite, eudialyte, calcite, barytocalcite, fluorapatite, fluorite, djerfisherite, molybdenite.

Distribution: At Mount Kukisvumchorr, Khibiny alkaline massif, Kola Peninsula, Russia.

Name: Honors Russian petrologist Irina V. *Bussen* (b. 1915), specialist in the petrology and mineralogy of the Khibiny-Lovozero alkaline complex.

Type Material: A.E. Fersman Mineralogical Museum, Moscow, Russia.

References: (1) Khomyakov, A.P., Yu.P. Men'shikov, G.N. Nechelyustov, and Huyun Zhou (2001) Busenite, Na₂Ba₂Fe²⁺TiSi₂O₇(CO₃)(OH)₃F, a new mica-like titanosilicate from the Khibiny alkaline massif (Kola Peninsula). *Zap. Vseross. Mineral. Obshch.*, 130(3), 50-55 (in Russian, English abs.). (2) (2002) Amer. Mineral., 87, 1509 (abs. ref. 1). (3) Zhou, H., R.K. Rastsvetaeva, A.P. Khomyakov, Z. Ma, and N. Shi (2002) Crystal structure of new micalike titanosilicate - busenite, Na₂Ba₂Fe²⁺[TiSi₂O₇][CO₃]O(OH)(H₂O). *Crystallogr. Rep.* 47, 43-46.