

Paravinogradovite

Crystal Data: Triclinic. *Point Group:* 1. As fan-shaped aggregates of columnar to acicular crystals, elongate along [100], to 1 cm. Crystals contain optically oriented relics of vinogradovite.

Physical Properties: *Cleavage:* Perfect {001}; indistinct {010}. *Fracture:* Splintery. *Tenacity:* Brittle. *Hardness* = 5 *D(meas.)* = 2.77(2) *D(calc.)* = 2.754
Weak yellow-green fluorescence under 240-400 nm UV.

Optical Properties: Transparent to translucent. *Color:* Colorless to white. *Streak:* White. *Luster:* Vitreous to pearly.

Optical Class: Biaxial (-). $\alpha = 1.707(2)$ $\beta = 1.741(2)$ $\gamma = 1.755(2)$ $2V(\text{meas.}) = 64(1)^\circ$
 $2V(\text{calc.}) = 64^\circ$ *Dispersion:* $r > v$. *Orientation:* $b \approx Z$, $a \wedge X = 30^\circ$. Negative elongation.

Cell Data: *Space Group:* P1. $a = 5.246(1)$ $b = 8.734(3)$ $c = 12.968(5)$ $\alpha = 70.32(1)^\circ$
 $\beta = 79.01(1)^\circ$ $\gamma = 80.90(2)^\circ$ $Z = 1$

X-ray Powder Pattern: Mt. Kukisvumchorr, Khibina alkaline massif, Kola Peninsula, Russia. 3.182 (100), 5.88 (65), 11.9 (58), 4.35 (38), 5.98 (35), 3.085 (29), 2.735 (21)

Chemistry:	(1)
Na ₂ O	7.77
K ₂ O	0.87
MgO	0.13
BeO	[0.76]
Al ₂ O ₃	6.12
Fe ₂ O ₃	4.11
TiO ₂	29.59
Nb ₂ O ₅	0.50
SiO ₂	43.54
<u>H₂O</u>	<u>[6.23]</u>
Total	99.62

(1) Mt. Kukisvumchorr, Khibina massif, Kola Peninsula, Russia; average of 18 electron microprobe analyses supplemented by Mössbauer spectroscopy, H₂O and BeO calculated; corresponding to (Na_{2.293}K_{0.169})_{Σ=2.462}(Ti_{3.386}Fe_{0.471}Nb_{0.034}Mg_{0.029})_{Σ=3.920}(Si_{6.626}Al_{1.098}Be_{0.276})_{Σ=8.000}O₂₂(OH)₄(H₂O)_{1.16}.

Occurrence: On albite in miarolitic cavities within a pegmatite at the contact between a xenolith of corundum-bearing hornfels and enclosing foyaite in an alkaline massif. A secondary mineral formed from vinogradovite.

Association: Nepheline, K-feldspar, albite, analcime, natrolite, aegirine, biotite, chlorite, zircon, ilmenite, pyrochlore, ancylite-(Ce), nordstrandite, carbonate-fluorapatite, fluorite, galena, cerussite.

Distribution: From the northeastern spur, Mt. Kukisvumchorr, Khibina alkaline massif, Kola Peninsula, Russia.

Name: The prefix *para* (Greek for 'close by') alludes to the close relationships of the crystal structure and chemical composition to those of *vinogradovite*.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (2883/1).

References: (1) Khomyakov, A.P., I.E. Kulikova, E. Sokolova, F.C. Hawthorne, and P.M. Kartashov (2003) Paravinogradovite, (Na, □)₂[(Ti⁴⁺, Fe³⁺)₄{Si₂O₆}₂{Si₃AlO₁₀}(OH)₄]H₂O, a new mineral species from the Khibina alkaline massif, Kola Peninsula, Russia: description and crystal structure. *Can. Mineral.*, 41, 989-1002. (2) (2004) *Amer. Mineral.*, 89(5-6), 895 (abs. ref. 1).