

**Crystal Data:** Monoclinic. *Point Group:* 2/m. As pseudo-orthorhombic, spindle-like crystals, elongate along [001] to 1 mm, and to 5 mm in intergrowths. *Twinning:* Polysynthetic on (001).

**Physical Properties:** *Tenacity:* Brittle. *Fracture:* Conchoidal. *Hardness = 5*  
D(meas.) = 2.80(5) D(calc.) = 2.86 Nonfluorescent.

**Optical Properties:** Transparent to translucent. *Color:* Colorless. *Streak:* White. *Luster:* Vitreous.  
*Optical Class:* Biaxial (+).  $\alpha = 1.667(2)$   $\beta = 1.677(2)$   $\gamma = 1.802(5)$   $2V = 32(1)^\circ$   
*Orientation:*  $X = b$ ,  $Y \wedge c = 27^\circ$ ,  $Z = a$ . *Dispersion:* Strong,  $r > v$ .

**Cell Data:** Space Group: C2/m.  $a = 14.39(3)$   $b = 13.900(6)$   $c = 7.825(9)$   $\beta = 117.6(1)^\circ$   $Z = 4$

**X-ray Powder Pattern:** Mount Koashva, Khibina massif, Kola Peninsula, Russia.  
3.186 (100), 6.94 (61), 6.39 (43, broad), 4.91 (31), 2.600 (28), 2.586 (28), 2.489 (24)

Chemistry:	(1)	(1)	
Na <sub>2</sub> O	5.30	Al <sub>2</sub> O <sub>3</sub>	0.06
K <sub>2</sub> O	14.92	SiO <sub>2</sub>	39.78
CaO	0.02	TiO <sub>2</sub>	18.42
SrO	0.02	Nb <sub>2</sub> O <sub>5</sub>	13.52
MnO	0.06	Ta <sub>2</sub> O <sub>5</sub>	0.16
FeO	0.04	H <sub>2</sub> O	7.23
		Total	99.53

(1) Mount Koashva, Khibina massif, Kola Peninsula, Russia; average electron microprobe analysis, H<sub>2</sub>O by thermal analysis; corresponding to (Na<sub>1.033</sub>Ca<sub>0.002</sub>)<sub>Σ=1.035</sub>(K<sub>1.914</sub>Sr<sub>0.001</sub>)<sub>Σ=1.915</sub>(Ti<sub>1.392</sub>Nb<sub>0.614</sub>Mn<sub>0.005</sub>Ta<sub>0.004</sub>Fe<sub>0.004</sub>)<sub>Σ=2.019</sub>(Si<sub>3.999</sub>Al<sub>0.007</sub>)<sub>Σ=4.006</sub>O<sub>13.65</sub>(OH)<sub>0.35</sub>•2.25H<sub>2</sub>O.

**Mineral Group:** Labuntsovite group, lemmleinite subgroup.

**Occurrence:** In ultra-agaic pegmatites in apatite-nepheline in an alkaline massif.

**Association:** Sodalite, natrolite, aegirine, K-feldspar, pectolite, alkali amphibole, lamprophyllite, lomonosovite, sphalerite, sitinakite, catapleiite, rhabdophane-(Ce), intergrowths of sazykinaite.

**Distribution:** At Mount Koashva, Khibina alkaline massif, Kola Peninsula, Russia.

**Name:** Honors Georgy Gleovich *Lemmlein* (1901-1962), Russian mineralogist and crystallographer, the suffix, K, indicates the dominant cation in B site.

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

**References:** (1) Khomyakov, A.P., G.N. Nechelyustov, R.K. Rastsvetaeva, and G.I. Dorokhova (1999) Lemmleinite NaK<sub>2</sub>(Ti,Nb)<sub>2</sub>Si<sub>4</sub>O<sub>12</sub>(O,OH)<sub>2</sub>•2H<sub>2</sub>O - a new mineral of the labuntsovite-nenadkevichite family. *Zapiski Vseross. Mineral. Obshch.*, 128(5), 54-63 (in Russian, English abs.). (2) (2000) Amer. Mineral., 85, 1844 (abs. ref. 1). (3) Chukanov, N.V., I.V. Pekov, and A.P. Khomyakov (2002) Recommended nomenclature for labuntsovite-group minerals. *Eur. J. Mineral.*, 14, 165-173. (4) (2002) Amer. Mineral., 87, 1732-1733 (abs. ref. 3). (5) Armbruster, T., S.V. Krivovichev, T. Weber, E. Gnos, N.N. Organova, V.N. Yakovenchuk, and Z.V. Shlyukova (2004) Origin of diffuse superstructure reflections in labuntsovite-group minerals. *Amer. Mineral.*, 89, 1655-1666.