

Magnesioneptunite **$\text{KNa}_2\text{Li}(\text{Mg,Fe})_2\text{Ti}_2\text{Si}_8\text{O}_{24}$**

Crystal Data: Monoclinic. *Point Group:* 2/m. As nearly isometric grains or prismatic crystals to 0.08 mm.

Physical Properties: *Cleavage:* Perfect on {110}. *Fracture:* n.d. *Tenacity:* Brittle.
Hardness = 5-6 D(meas.) = n.d. D(calc.) = 3.152

Optical Properties: Translucent. *Color:* Dark brown to red-brown. *Streak:* n.d. *Luster:* Vitreous.
Optical Class: Biaxial (+). $\alpha = 1.697(2)$ $\beta = 1.708(3)$ $\gamma = 1.725(3)$ $2V(\text{meas.}) = 45(15)^\circ$
 $2V(\text{calc.}) = 78^\circ$ *Pleochroism:* Moderate, Z = brown, Y = light brown, X = light greenish brown.
Absorption: Z > Y > X.

Cell Data: *Space Group:* C2/c. $a = 16.3271(7)$ $b = 12.4788(4)$ $c = 9.9666(4)$ $\beta = 115.651(5)^\circ$
Z = 4

X-ray Powder Pattern: Upper Chegem Caldera, Kabardino-Balkaria, Northern Caucasus, Russia.
3.56 (10), 3.20 (9), 9.7 (8), 2.48 (8), 1.50 (7), 2.16 (6), 4.55 (4)

Chemistry:	(1)	(2)		(1)	(2)
Li ₂ O	1.71	1.77	Al ₂ O ₃	0.12	
Na ₂ O	8.08	7.33	Cr ₂ O ₃	0.06	
K ₂ O	3.61	5.57	TiO	18.38	18.91
CaO	0.08		SiO ₂	54.78	56.88
MgO	5.36	9.54	V ₂ O ₅	0.07	
MnO	0.07		ZrO ₂	0.05	
FeO	7.30		Total	99.67	100.00

(1) Upper Chegem Caldera, Kabardino-Balkaria, Northern Caucasus, Russia; average of 29 electron microprobe analyses, Li₂O calculated from stoichiometry; corresponds to $(\text{K}_{0.67}\text{Na}_{0.27}\text{Ca}_{0.01})_{\Sigma=0.95}\text{Na}_{2.00}\text{Li}_{1.00}(\text{Mg}_{1.16}\text{Fe}_{0.89})_{\Sigma=2.05}\text{Ti}_{2.00}(\text{Si}_{7.90}\text{Al}_{0.01}\text{V}_{0.01})_{\Sigma=7.92}\text{O}_{24}$. (2) $\text{KNa}_2\text{Li}(\text{Mg,Fe})_2\text{Ti}_2\text{Si}_8\text{O}_{24}$.

Mineral Group: Neptunite group.

Occurrence: In volcanic ejecta of hornfelsed fine-grained sandstone as reaction zones between a skarn carbonate xenolith and host ignimbrite by alteration of ilmenite.

Association: Quartz, sanidine, microcline, albite, aegirine, rutile, Mg-ilmenite, monazite-(Ce), Cs-analcime, pollucite.

Distribution: From the Upper Chegem (Verkhnechegemskaya) Caldera near Mount Lakargi in the interfluvium of the Chegem and Kenstanta Rivers, Kabardino-Balkaria, Northern Caucasus, Russia.

Name: As the *magnesium* analog of *neptunite*.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (3747/1).

References: (1) Zadov, A.E., V.M. Gazeev, O.V. Karimova, N.N. Pertsev, I.V. Pektiv, E.V. Galuskin, I.O. Galuskina, A.G. Gubanov, D.I. Belakovskiy, S.E. Borisovskiy, P.M. Kartashov, A.G. Ivanova, and O.V. Yakubovich (2011) Magnesioneptunite $\text{KNa}_2\text{Li}(\text{Mg,Fe})_2\text{Ti}_2\text{Si}_8\text{O}_{24}$, new mineral species of the neptunite group. *Zap. Ross. Mineral. Obsch.*, 140(1), 57-66 (in Russian, English abstract). English translation: *Geol. Ore Deposits* (2011), 53(8), 775-782. (2) Karimova, O.V., O.V. Yakubovich, A.E. Zadov, A.G. Ivanova, and V.S. Urusov (2012) Crystal structure of magnesioneptunite. *Kristallografiya*, 57(4), 574-582 (in Russian). English translation: *Crystal Reports* (2012), 57(4), 505-513. (3) (2012) *Amer. Mineral.*, 98, 2068 (abs. refs. 1 & 2).