

# Mangan-neptunite

# $\text{KNa}_2\text{Li}(\text{Mn}^{2+}, \text{Fe}^{2+})_2\text{Ti}_2\text{Si}_8\text{O}_{24}$

©2001 Mineral Data Publishing, version 1.2

**Crystal Data:** Monoclinic. *Point Group:*  $2/m$  or  $2$ . Crystals prismatic, somewhat elongated along [001], to 7 cm, showing {110}, {001}, {100}, also {111},  $\{\bar{1}11\}$ , rare {210}. Also as aggregates of small crystals, druses, rosettes, blooms, and earthy crusts. *Twining:* As contact twins on {001}.

**Physical Properties:** *Cleavage:* Distinct in two directions, intersecting at  $\sim 80^\circ$ . *Fracture:* Uneven to conchoidal. *Tenacity:* Brittle. Hardness = 5–6 D(meas.) = 3.17–3.20 D(calc.) = 3.26

**Optical Properties:** Transparent to translucent to opaque. *Color:* Dark cherry-red, orange, or black in small crystals; cherry-red in thin fragments; in thin section, light yellow, orange, or red-orange. *Streak:* Brick-red to reddish brown. *Luster:* Vitreous to resinous. *Optical Class:* Biaxial (+). *Pleochroism:* Distinct;  $X$  = light yellow;  $Y$  = orange or yellow-orange;  $Z$  = red-orange. *Orientation:*  $Y = b$ ;  $Z \wedge c = 16^\circ$ – $20^\circ$ . *Dispersion:*  $r < v$ , very strong. *Absorption:*  $Z > Y > X$ .  $\alpha = 1.691$ – $1.697$   $\beta = 1.693$ – $1.700$   $\gamma = 1.713$ – $1.728$   $2V(\text{meas.}) = 31^\circ$ – $36^\circ$

**Cell Data:** *Space Group:*  $C2/m$  or  $C2/c$ .  $a = 16.38$   $b = 12.48$   $c = 10.01$   $\beta = 115^\circ 24'$   $Z = 4$

**X-ray Powder Pattern:** Lovozero massif, Russia.

2.485 (100), 1.506 (100), 1.483 (90), 2.170 (80), 1.924 (70), 2.841 (60), 2.948 (50)

<b>Chemistry:</b>	(1)	(2)	(3)		(1)	(2)	(3)
SiO <sub>2</sub>	52.65	52.68	52.98	CaO	0.37	0.43	
TiO <sub>2</sub>	17.38	18.21	17.61	Li <sub>2</sub> O	1.08		1.65
Al <sub>2</sub> O <sub>3</sub>	0.99			Na <sub>2</sub> O	5.12	9.16	6.83
Fe <sub>2</sub> O <sub>3</sub>	1.07			K <sub>2</sub> O	6.30	4.94	5.19
FeO	5.54	5.16	7.92	H <sub>2</sub> O <sup>+</sup>	0.06		
MnO	8.87	9.95	7.82	H <sub>2</sub> O <sup>−</sup>	0.10		
MgO	0.15	0.12					
				Total	99.68	100.65	100.00

(1) Mt. Karnasurt, Lovozero massif, Russia. (2) Kola Peninsula, Russia. (3)  $\text{KNa}_2\text{Li}(\text{Mn}, \text{Fe})_2\text{Ti}_2\text{Si}_8\text{O}_{24}$  with Mn:Fe = 1:1.

**Polymorphism & Series:** Forms a series with neptunite.

**Occurrence:** A late segregation mineral found in almost all rock types, including most of the pegmatites, in a differentiated alkalic massif (Lovozero massif, Russia).

**Association:** Aegirine, natrolite, analcime, lamprophyllite, murmanite, lomonosovite, eudialyte, pectolite, villaumite, sodalite (Lovozero massif, Russia); in miarolitic cavities in a nepheline syenite sill (Saint-Amable, Canada).

**Distribution:** On Mt. Malyi Mannepakhk, Khibiny massif, and in the Lovozero massif, Kola Peninsula, Russia. At Point of Rocks, Colfax Co., New Mexico, USA. From Mont Saint-Hilaire and near Saint-Amable, Quebec, Canada. On Mt. Malosa, Zomba district, Malawi.

**Name:** For the preponderance of manganese in this chemical variant of the neptunite structure.

**Type Material:** n.d.

**References:** (1) A.E. Fersman (1923) Minerals of the Khibina and Lovozero Tundras. Trans. Northern Sci. Econ. Exped., 16, pp. 16, 69, 73. (2) (1927) Amer. Mineral., 12, 96–97 (abs. ref. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise without the prior written permission of Mineral Data Publishing.

1). (3) Bussen, I.V., A.P. Denisov, R.A. Kravchenko-Berezhnoi, and E.I. Uspenskaya (1965) Mineralogy of manganoneptunite [*sic*]. Zap. Vses. Mineral. Obshch., 94, 204–207 (in Russian). (4) (1965) Chem. Abs., 63, 2756–2757 (abs. ref. 3). (5) Mandarino, J.A., D.C. Harris, and J. Bradley (1965) Mangan-neptunite, epididymite, and new species from Mont St. Hilaire, Quebec. Can. Mineral., 8, 398. (6) Vlasov, K.A., M.V. Kuz'menko, and E.M. Es'kova (1966) The Lovozero alkali massif. Akad. Nauk SSSR, 373–376 (in English). (7) Mandarino, J.A. and V. Anderson (1989) Monteregian Treasures. Cambridge Univ. Press, 134. (8) Horváth, L., E. Pfenninger-Horváth, R.A. Gault, and P. Tarasoff (1998) Mineralogy of the Saint-Amable Sill, Varennes and Saint-Amable, Québec. Mineral. Record, 29, 83–118, esp. 104.