Murmanite  \( \text{Na}_2(\text{Ti}, \text{Nb})_2\text{Si}_2\text{O}_9\cdot \text{nH}_2\text{O} \)

Crystal Data:  Triclinic.  \( \text{Point Group: } 1 \).  Rarely in well-formed crystals, to 2 cm.  As flaky and lamellar segregations and radial and fine-grained aggregations.

Physical Properties:  \( \text{Cleavage: } \{001\} \), perfect.  \( \text{Tenacity: } \) Brittle.  \( \text{Hardness } = \) 2–3
\( \text{D(meas.) } = 2.76–2.84 \quad \text{D(calc.) } = 3.00 \)

Optical Properties:  \( \text{Translucent to opaque. } \)
\( \text{Color: } \) Lilac to bright pink when fresh; yellow, brown, cinnamon-brown to black when altered; in thin section, light pink, brownish, or dull gray.
\( \text{Luster: } \) Vitreous on cleavages, greasy on fractures.
\( \text{Optical Class: } \) Biaxial (\(-\)).  \( \text{Pleochroism: } X = \) light pink; \( Y = \) light brown; \( Z = \) pinkish brown to dark brown.
\( \text{Orientation: } X \perp (100); \ Z = b. \quad \text{Dispersion: } r > v, \) distinct.  \( \text{Absorption: } Z > X > Y. \ 
\alpha = 1.682–1.735 \quad \beta = 1.765–1.770 \quad \gamma = 1.807–1.839 \quad 2V(\text{meas.}) = 57°–64° \)

Cell Data:  \( \text{Space Group: } P1. \quad a = 10.535(5) \quad b = 13.884(4) \quad c = 11.688(14) \quad \varphi = 94°31(6) \quad \gamma = 98°62(8) \quad \beta = 89°81(3) \quad Z = [4] \)

X-ray Powder Pattern:  Lovozero massif, Russia.
\( 4.220 (10), 2.867 (10), 11.56 (9), 5.810 (9), 3.762 (6), 2.640 (4), 2.485 (4) \)

Chemistry:  
\begin{align*}
\text{SiO}_2 &: 30.06 & 31.24 & 30.83 & \text{MgO} &: 0.35 & 0.64 & 0.33 \\
\text{TiO}_2 &: 38.24 & 30.40 & 33.48 & \text{CaO} &: 2.56 & 3.16 & 5.40 \\
\text{ZrO}_2 &: 2.08 & 1.62 & & \text{Na}_2\text{O} &: 10.38 & 8.64 & 10.58 \\
\text{Fe}_2\text{O}_3 &: 2.33 & 2.96 & 0.48 & \text{K}_2\text{O} &: 0.83 & 0.62 & 0.19 \\
\text{Nb}_2\text{O}_5 &: 6.56 & 4.78 & & \text{H}_2\text{O}^+ &: 4.17 & 5.37 & 8.62 \\
\text{Ta}_2\text{O}_5 &: 0.56 & & & \text{H}_2\text{O}^- &: 6.03 & 6.13 & \\
\text{FeO} &: 0.30 & 1.73 & & \text{P}_2\text{O}_5 &: 2.66 & & \\
\text{MnO} &: 2.30 & 2.38 & 0.75 & & & &
\end{align*}
\begin{align*}
\text{Total} &: 99.63 & 100.28 & 99.83 \\
\end{align*}

(1) Chinglusuai Valley, Russia.  (2) Sengischorr cirque, Lovozero massif, Russia.  (3) Ilímaussaq intrusion, Greenland; by electron microprobe, XRF, and DTA, recalculated to oxides, \( \text{Fe}^{2+} + \text{Fe}^{3+} = 4:1, \text{H}_2\text{O} \) estimated from oxygen difference; corresponds to \( (\text{Na}_{0.88}\text{Ca}_{0.38}\text{Fe}_{2+}^{0.09}\text{Mg}_{0.03}\text{K}_{0.02})\Sigma = 1.40(\text{Ti}_{1.63}\text{Nb}_{0.14}\text{Mn}_{0.04}\text{Fe}_{2+}^{0.05})\Sigma = 1.84\text{Si}_2\text{O}_8\text{H}_2\text{O} \).

Occurrence:  In pegmatites and associated igneous rocks of alkaline complexes, as a primary magmatic mineral or altered from lomonosovite.

Association:  Lomonosovite, aegirine, arfvedsonite, neptunite, microcline, albite, natrolite, analcime, nepheline, sodalite, eudialyte, lorenzenite, lamprophyllite, rinkite, ussingite.


Name:  For the Murman coast on the northern side of the Kola Peninsula, Russia.

Type Material:  A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 25852–25854, 25862, 25863.


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