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

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

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

Optical Properties:  
Translucent to opaque.  
Color: Lilac to bright pink when fresh; yellow, brown, cinnamon-brown to black when altered; in thin section, light pink, brownish, or dull gray.  
Luster: Vitreous on cleavages, greasy on fractures.

Optical Class:  
Biaxial (-).  
Pleochroism: \( X = \text{light pink}; \ Y = \text{light brown}; \ Z = \text{pinkish brown to dark brown.} \)

Orientation: \( X = (100); \ Z = b \).

Dispersion: \( r > v; \) distinct.  
Absorption: \( Z > X > Y \).

Cell Data:  
Space Group: \( P1 \).  
\( a = 10.535(5) \quad b = 13.884(4) \quad c = 11.688(14) \)  
\( \beta = 94.31(6)^\circ \quad \gamma = 98.62(8)^\circ \quad \gamma = 89.81(3)^\circ \quad Z = [4] \)

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:  
\( n = 4 \)  
(1) Chinglusuai Valley, Russia.  
(2) Sengischorr cirque, Lovozero massif, Russia.  
(3) Ilmåmaussaq intrusion, Greenland; by electron microprobe, XRF, and DTA, here recalculated to oxides, Fe\(^{2+}\) : Fe\(^{3+}\) = 4:1, H\(_2\)O estimated from oxygen difference; corresponds to \( \text{(Na}_{0.88}\text{Ca}_{0.38}\text{Fe}_{0.38}^2\text{Mn}_{0.04}\text{Fe}_{0.03}^3\text{Mg}_{0.03}\text{K}_{0.02})\Sigma_{=1.40}(\text{Ti}_{1.63}\text{Nb}_{0.14}\text{Mn}_{0.04}\text{Fe}_{0.03}^3\text{Si}_{2.08})\Sigma_{=1.84}\text{Si}_{2}\text{O}_{8.63}\cdot0.15\text{Na}_{3}\text{PO}_{4}\cdot1.87\text{H}_2\text{O} \).

Occurrence:  
In pegmatites and associated igneous rocks of alkalic 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.

Distribution:  

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.

References:  

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