Magnesium astrophyllite

\( (\text{Na}, \text{K})_4 \text{Mg}_2 (\text{Fe}^{2+}, \text{Fe}^{3+}, \text{Mn})_5 \text{Ti}_2 \text{Si}_8 \text{O}_{24} (\text{O}, \text{OH}, \text{F})_7 \)

Crystal Data: Monoclinic. Point Group: \( 2/m \). Habit not described.

Physical Properties: Cleavage: Very perfect on \{100\}, perfect on \{010\}. Hardness = n.d. \( D(\text{meas.}) = \text{n.d.} \) \( D(\text{calc.}) = [3.33] \)

Optical Properties: Semitransparent. Color: Straw-yellow. Luster: Vitreous. Optical Class: Biaxial (-). Pleochroism: \( X \) = bright yellow; \( Y \) = pale yellowish gray; \( Z \) = gray. Orientation: \( Y = b; Z \wedge c = -5^\circ \) to \( -6^\circ \). Absorption: \( Z > Y > X \). \( \alpha = 1.658 \) \( \beta = [1.687] \) \( \gamma = 1.710 \) \( 2V(\text{meas.}) = 81.5^\circ - 83^\circ \)

Cell Data: Space Group: \( A2/m \). \( a = 10.56 \) \( b = 23.00 \) \( c = 5.35 \) \( \beta = 102^\circ \) \( Z = [2] \)

X-ray Powder Pattern: Khibiny massif, Russia.

3.38 (10), 2.548 (9), 10.1 (8), 1.463 (7), 3.80 (6), 3.079 (5), 2.763 (5)

Chemistry:

\[
\begin{align*}
\text{SiO}_2 & \quad 37.98 \\
\text{TiO}_2 & \quad 12.18 \\
\text{Al}_2\text{O}_3 & \quad 1.11 \\
\text{Fe}_2\text{O}_3 & \quad 2.95 \\
\text{FeO} & \quad 17.91 \\
\text{MnO} & \quad 4.00 \\
\text{MgO} & \quad 6.39 \\
\text{CaO} & \quad 1.15 \\
\text{Na}_2\text{O} & \quad 5.38 \\
\text{K}_2\text{O} & \quad 7.28 \\
\text{F} & \quad 0.45 \\
\text{H}_2\text{O}^+ & \quad 3.44 \\
\text{P}_2\text{O}_5 & \quad 0.06 \\
\text{O} = \text{F} & \quad 0.19 \\
\text{Total} & \quad [100.09]
\end{align*}
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\((1)\) Khibiny massif, Russia; original total given as 100.10\%, corresponds to \((\text{Na}_{2.15} \text{K}_{1.96})\Sigma = 4.11 \text{Mg}_{1.94} (\text{Fe}^{2+}_{0.98} \text{Mn}_{0.70} \text{Fe}^{3+}_{0.46} \text{Ca}_{0.25})\Sigma = 4.49 \text{T}_1.88 (\text{Si}_{7.81} \text{Al}_{0.27})\Sigma = 8.08 \text{O}_{24} (\text{OH})_{4.72} \text{O}_{1.98} \text{F}_{0.30}\Sigma = 7.00 \).

Mineral Group: Astrophyllite group.

Occurrence: In a differentiated alkalic massif.

Association: n.d.


Name: For magnesium in the formula and relation to astrophyllite

Type Material: Museum of Beijing University, Beijing, China.