Astrophyllite

\((K, Na)_3(Fe^{2+}, Mn)_7Ti_2Si_8O_{24}(O, OH)_7\)

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Crystal Data:  Triclinic.  Point Group:  \(\overline{T}\).  Crystals tabular \(\perp\{001\}\), bladed or acicular, some faces commonly striated, to 10 cm; groups may be stellate.

Physical Properties:  Cleavage:  Perfect on \(\{001\}\), poor on \(\{100\}\).  Tenacity:  Brittle.  Hardness = 3  \(D(\text{meas.}) = 3.2 - 3.4\)  \(D(\text{calc.}) = \text{n.d.}\).

Optical Properties:  Opaque to translucent in thin leaves.  Color:  Bronze-yellow to gold-yellow, brown to reddish brown.  Streak:  Golden.  Luster:  Submetallic, pearly, greasy.  Optical Class:  Biaxial (+).  Pleochroism:  Strong; \(X = \text{deep orange-red}; Y = \text{orange-yellow}; Z = \text{lemon-yellow}\).  Orientation: \(X' = c; Y' = b; Z' = a\).  Dispersion:  \(r > v\), strong.  Absorption:  \(X > Y > Z\).  \(\alpha = 1.678 - 1.695\)  \(\beta = 1.703 - 1.726\)  \(\gamma = 1.733 - 1.758\)  \(2V(\text{meas.}) = 66^\circ - 84^\circ\).

Cell Data:  Space Group:  \(\overline{A\overline{T}}\).  \(a = 5.36\)  \(b = 11.76\)  \(c = 21.08\)  \(\alpha = 85^\circ 8'\)  \(\beta = 90^\circ 0'\)  \(\gamma = 103^\circ 13'\)  \(Z = 2\).

X-ray Powder Pattern:  Láven Island, Norway; nearly identical with kupletskite.  (ICDD 14-194).
10.6 (100), 3.51 (80), 2.77 (60), 2.64 (60), 2.57 (60), 9.82 (30), 1.76 (30).

Chemistry:

\[
\begin{array}{ccc}
\text{SiO}_2 & 36.64 & \text{MnO} & 5.68 \\
\text{TiO}_2 & 10.76 & \text{CaO} & 0.98 \\
\text{ZrO}_2 & 0.66 & \text{Na}_2\text{O} & 2.52 \\
\text{Nb}_2\text{O}_5 & 0.77 & \text{K}_2\text{O} & 5.13 \\
\text{FeO} & 31.50 & \text{H}_2\text{O} & [4.92] \\
\text{Total} & [99.56] & & \\
\end{array}
\]

(1) Kangerdlugssuaq Fjord, Greenland; by electron microprobe, \(H_2O\) calculated from stoichiometry; corresponds to \((K_{1.46}\text{Na}_{1.04}\text{Ca}_{0.22})\Sigma=2.71(\text{Fe}_{5.62}\text{Mn}_{1.03})\Sigma=6.65(\text{Ti}_{1.73}\text{Nb}_{0.07}\text{Zr}_{0.07})\Sigma=1.87\text{Si}_{7.82}\text{O}_{24}(\text{OH})_{7.00}\).

Polymorphism & Series:  Forms a series with kupletskite.

Mineral Group:  Astrophyllite group.

Occurrence:  In nepheline syenites, alkali granites, and their pegmatites; less commonly in fenites and other metasomatized rocks; in nepheline syenite gneisses and paragneisses.

Association:  Albite, aegirine, arvedsonite, nepheline, natrolite, zircon, biotite, leucophanite, eudialyte, catapleiite, djer¯sherite, rasvumite, delhayelite, kupletskite.


Name:  From the Greek for \textit{star} and \textit{leaf}, for the stellate and foliated micaceous habit.

Type Material:  Mining Academy, Freiberg, Germany, 26244.

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