Wermlandite \( \text{(Ca, Mg)} \text{Mg}_7 \text{(Al, Fe}^{3+} \text{)}_2 \text{(SO}_4\text{)}_2 \text{(OH)}_{18} \cdot 12\text{H}_2\text{O} \)

Crystal Data: Hexagonal. Point Group: \( \text{3} \ 2/m \). Thin platy crystals, to 1 cm, showing \{0001\}, \{10\overline{7}0\}.

Physical Properties: Cleavage: On \{0001\}, perfect, micaceous. Tenacity: Flexible but inelastic. Hardness = 1.5 \( D \text{(meas.)} = 1.932 \) \( D \text{(calc.)} = 1.96 \)

Optical Properties: Semitransparent. Color: Pale greenish gray; colorless in transmitted light. Optical Class: Uniaxial (−). \( \omega = 1.493 \) \( \epsilon = 1.482 \) \( 2V \text{(meas.)} = 2^\circ–5^\circ \)

Cell Data: Space Group: \( P\overline{3}c1 \). \( a = 9.303(3) \) \( c = 22.57(1) \) \( Z = 2 \)


Chemistry:
\[
\begin{array}{ccc}
\text{SO}_3 & [15.98] \\
\text{Al}_2\text{O}_3 & 6.16 \\
\text{Fe}_2\text{O}_3 & 7.33 \\
\text{MnO} & 0.39 \\
\text{MgO} & 28.72 \\
\text{CaO} & 3.78 \\
\text{H}_2\text{O} & [37.64] \\
\text{Total} & [100.00] \\
\end{array}
\]

(1) Långban, Sweden; recalculated after deduction of calcite 5.73%, \( \text{SO}_3 \) and \( \text{H}_2\text{O} \) from crystal-structure analysis, \( \text{(SO}_4\text{)}_2^{2−} \) confirmed by IR; corresponds then to \( \text{(Ca}_{0.68}\text{Mg}_{0.14}\text{Mn}_{0.06})_{\Sigma=0.88}\text{Mg}_7\text{(Al}_{1.21}\text{Fe}^{3+}_{0.92})_{\Sigma=2.13}\text{(SO}_4\text{)}_2\text{(OH)}_{18.15} \cdot 11.86\text{H}_2\text{O} \).

Occurrence: Very rare in a metamorphosed Fe–Mn orebody in a low-temperature fissure-filling assemblage among large calcite crystals.

Association: Calcite, magnetite.


Name: For Wermland, an earlier spelling of the Swedish province Värmland, in which the Långban deposit is located.


References: (1) Moore, P.B. (1971) Wermlandite, a new mineral from Långban, Sweden. Lithos, 4, 213–217. (2) (1972) Amer. Mineral., 57, 327 (abs. ref. 1). (3) Rius, J. and R. Allmann (1984) The superstructure of the double layer mineral wermlandite \([\text{Mg}_{7}\text{(Al}_{0.57}\text{Fe}^{3+}_{0.43})_{\Sigma=1.98}(\text{OH})_{18}]^{2+} \cdot \left[\text{(Ca}_{0.6}\text{,Mg}_{0.4})\text{(SO}_4\text{)}_2\text{(H}_2\text{O})_{12}\right]^{2−}\) Zeits. Krist., 168, 133–144.