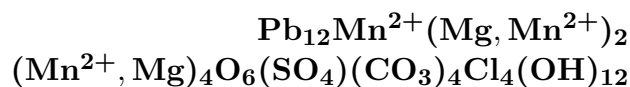


Philolithite

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Crystal Data: Tetragonal. *Point Group:* $4/m\ 2/m\ 2/m$. Crystals are square tabular, {001}, {111}, modified by {110}, {112}, to 0.3 mm; may be aggregated in crusts. *Twinning:* Sectorial in four zones about [001], observed optically.

Physical Properties: *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 3–4
D(meas.) = n.d. D(calc.) = 5.91

Optical Properties: Semitransparent. *Color:* Pale to medium apple-green. *Streak:* White.
Luster: Adamantine.

Optical Class: Biaxial (+), anomalous. *Pleochroism:* Very weak; pale green to pale yellow-green.
Orientation: $X \wedge a = 45^\circ$. $n = > 1.92$. $\omega = \text{n.d.}$ $\epsilon = \text{n.d.}$ $2V(\text{meas.}) = 60^\circ$

Cell Data: *Space Group:* $P4_2/nnm$. $a = 12.627(9)$ $c = 12.595(9)$ $Z = 2$

X-ray Powder Pattern: Långban, Sweden.

2.975 (100), 3.99 (30), 2.752 (30), 8.95 (20), 7.30 (20), 2.473 (20), 1.716 (20)

Chemistry:

	(1)	(2)
SO ₃	1.7	[2.2]
CO ₂	[4.9]	[4.9]
MnO	10.3	8.7
PbO	73.7	75.9
MgO	1.8	2.1
Cl	3.4	4.4
H ₂ O	[3.0]	[3.0]
–O = Cl ₂	0.8	1.0
Total	[98.0]	[100.2]

(1) Långban, Sweden; by energy dispersive analysis, presence of (SO₄)²⁻, (CO₃)²⁻, (OH)¹⁻ confirmed by IR; (CO₃)²⁻, H₂O calculated from crystal-structure analysis; corresponds to Pb_{12.29}(Mn_{5.41}Mg_{1.66})_{Σ=7.07}O_{6.45}(SO₄)_{0.79}(CO₃)_{4.14}Cl_{3.57}(OH)_{12.40}. (2) Do.; by electron microprobe; (SO₄)²⁻, (CO₃)²⁻, H₂O calculated from crystal-structure analysis; corresponds to Pb_{12.32}(Mn_{4.45}Mg_{1.89})_{Σ=6.34}O_{5.31}(SO₄)_{1.00}(CO₃)_{4.04}Cl_{4.50}(OH)_{12.07}.

Occurrence: Very rare in a metamorphosed Fe–Mn orebody.

Association: Lead, copper, mendipite, braunite, hausmannite, pyrochroite, manganoan phlogopite, allactite, calcite.

Distribution: From Långban, Värmland, Sweden.

Name: From the Greek for *loving* and *stone*, in honor of the Friends of Mineralogy organization.

Type Material: Swedish Museum of Natural History, Stockholm, Sweden, 37389, 225116; Canadian Museum of Nature, Ottawa, Canada, 58623; Los Angeles Co. Museum, Los Angeles, California, USA, 41794.

References: (1) Kampf, A.R., P.B. Moore, E.J. Jonsson, and G.H. Swihart (1998) Philolithite, a new mineral from Långban, Värmland, Sweden. *Mineral. Record*, 29, 201–206. (2) (1999) *Amer. Mineral.*, 84, 686–687 (abs. ref. 1). (3) Moore, P.B., A.R. Kampf, and P.K. Sen Gupta (2000) The crystal structure of philolithite, a trellis-like open framework based on cubic closest-packing of anions. *Amer. Mineral.*, 85, 810–816.