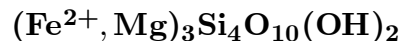


Minnesotaitite



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Crystal Data: Triclinic. *Point Group:* $\bar{1}$. In microscopic plates or needles, the latter radiating or in sheaves; fibrous, rarely platy. *Twinning:* Inferred from single-crystal X-ray photographs.

Physical Properties: *Cleavage:* Perfect micaceous on {001}. *Hardness* = Soft. $D(\text{meas.}) = 3.01$ $D(\text{calc.}) = [2.97]$

Optical Properties: Semitransparent. *Color:* Greenish gray to olive-green. *Luster:* Greasy to waxy, dull.

Optical Class: Biaxial. *Pleochroism:* $X =$ pale green; $Z =$ colorless to pale greenish yellow. $\alpha = 1.580\text{--}1.592$ $\beta = \text{n.d.}$ $\gamma = 1.615\text{--}1.632$ $2V(\text{meas.}) = \text{Small}$.

Cell Data: *Space Group:* $P\bar{1}$. $a = 5.623(2)$ $b = 9.419(2)$ $c = 9.624(3)$ $\alpha = 85.21(3)^\circ$ $\beta = 95.64(3)^\circ$ $\gamma = 90.00(2)^\circ$ $Z = 4$

X-ray Powder Pattern: Cuyuna district, Minnesota, USA.

9.54 (100), 4.62 (58), 3.18 (50), 2.528 (45), 2.655 (35), 2.405 (32), 2.759 (25)

Chemistry:	(1)	(2)	(1)	(2)	
SiO ₂	51.29	52.30	CaO	0.00	0.04
TiO ₂	0.04		Na ₂ O	0.08	0.04
Al ₂ O ₃	0.61	0.07	K ₂ O	0.03	
Fe ₂ O ₃	2.00		H ₂ O ⁺	5.54	
FeO	33.66	35.85	H ₂ O ⁻	0.24	
MnO	0.12	1.31	H ₂ O		8.31
MgO	6.26	2.08	Total	99.87	100.00

(1) Mesabi district, Minnesota, USA; corresponding to $(\text{Fe}_{2.28}\text{Mg}_{0.72}\text{Mn}_{0.01})_{\Sigma=3.01}(\text{Si}_{3.95}\text{Al}_{0.05})_{\Sigma=4.00}\text{O}_{10}(\text{OH})_2$. (2) Emilia-San Valentin deposit, Spain; by electron microprobe, corresponding to $(\text{Fe}_{2.62}\text{Mg}_{0.28}\text{Mn}_{0.10})_{\Sigma=3.00}\text{Si}_4\text{O}_{10}(\text{OH})_2$.

Occurrence: In banded iron formations subjected to low-grade regional metamorphism.

Association: Quartz, siderite, stilpnomelane, greenalite (Mesabi Range, Minnesota, USA).

Distribution: In the USA, in the Mesabi and Cuyuna districts, St. Louis Co., Minnesota. From a number of places in the Sokoman Iron Formation, Howells River area, Labrador, Newfoundland; and in the Blue Bell mine, Riodel, British Columbia, Canada. In the Mamatwan mine, near Kuruman, Cape Province, South Africa. In the Emilia-San Valentin Pb–Zn deposit, Sierra de Cartagena, Murcia Province, Spain. From Tynagh, near Killimor, Co. Galway, Ireland. At The Lizard, Cornwall, England. From Hagendorf, Bavaria, Germany. In the Marra Mamba and Brockman Iron Formations, Hamersley basin, and in the Weld Range, Western Australia.

Name: For the State of Minnesota, USA, from which it was first described.

Type Material: n.d.

References: (1) Gruner, J.W. (1944) The composition and structure of minnesotaitite, a common iron silicate in iron formations. *Amer. Mineral.*, 29, 363–372. (2) Blake, R.L. (1965) Iron phyllosilicates of the Cuyuna district in Minnesota. *Amer. Mineral.*, 50, 148–169. (3) Guggenheim, S. and S.W. Bailey (1982) The superlattice of minnesotaitite. *Can. Mineral.*, 20, 579–584. (4) Kager, P.C.A. and I.S. Oen (1983) Iron-rich talc-opal-minnesotaitite spherulites and crystallochemical relations of talc and minnesotaitite. *Mineral. Mag.*, 47, 229–231. (5) Guggenheim, S. and R.A. Eggleton (1986) Structural modulations in iron-rich and magnesium-rich minnesotaitite. *Can. Mineral.*, 24, 479–497.

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