

Crystal Data: Monoclinic. *Point Group:* 2/m. Prismatic, fibrous, or columnar to 1 cm.

Physical Properties: *Cleavage:* Perfect on {110}, with intersections at ~55° and ~125°. *Fracture:* n.d. *Tenacity:* [Brittle.] *Hardness =* [5-6] *D(meas.) =* 3.34 *D(calc.) =* 3.41

Optical Properties: Transparent to translucent. *Color:* Yellowish brown, greenish gray, colorless. *Streak:* n.d. *Luster:* Silky to vitreous. *Optical Class:* Biaxial (-). $\alpha = 1.666$ $\beta = 1.682$ $\gamma = 1.698$ $2V(\text{meas.}) = 88^\circ$ *Dispersion:* $r < v$. *Pleochroism:* X = red-violet; Y = pale violet; Z = blue. *Orientation:* Y = b; Z \wedge c = 15°.

Cell Data: Space Group: C2/m. $a = 9.618(4)$ $b = 18.28(2)$ $c = 5.335(1)$ $\beta = 102.31(1)^\circ$ $Z = 2$ (ICDD 38-465).

X-ray Powder Pattern: Brunsgjogrovan, Hallefors, Sweden (ICDD 38-465). 8.36 (100), 3.088 (90), 2.755 (40), 3.276 (35), 2.632 (20), 3.454 (18), 9.14 (16)

Chemistry:	(1)	(2)	(3)	(1)	(2)	(3)
SiO ₂	50.74	51.6	49.2	CaO	2.00	0.83
TiO ₂	0.06	0.13		Na ₂ O	0.22	1.1
Al ₂ O ₃	0.88	0.65	0.27	K ₂ O	0.08	0.09
Fe ₂ O ₃	1.80			F	0.07	
FeO	24.13	23.9	24.97	H ₂ O ⁺	1.94	
MnO	7.38	8.1	12.11	<u>H₂O</u>		[4.06]
MgO	10.57	11.1	8.48	Total	99.87	97.5
						100.03

(1) Uttersvik, Sweden; corresponds to $(\text{Fe}^{2+}_{3.10}\text{Mg}_{2.42}\text{Mn}_{0.96}\text{Ca}_{0.33}\text{Fe}^{3+}_{0.21}\text{Na}_{0.07}\text{Ti}_{0.01}\text{K}_{0.01})_{\Sigma=7.11}(\text{Si}_{7.80}\text{Al}_{0.16})_{\Sigma=7.96}\text{O}_{22}[(\text{OH})_{1.99}\text{F}_{0.03}]_{\Sigma=2.02}$. (2) Haute-Maurienne, France; by electron microprobe. (3) Brunsgjogrovan, Hallefors, Sweden, average of 10 electron microprobe analyses, H₂O by difference (ICDD 38-465).

Polymorphism & Series: Can form a continuous series with cummingtonite and grunerite.

Mineral Group: Amphibole supergroup, magnesium-iron-manganese group.

Occurrence: An uncommon mineral in metamorphosed iron-poor manganese rocks.

Association: Calcite, quartz, garnet.

Distribution: From Dannemora, Uppland; Uttersvik and Närkevarn, Södermanland; in the Brunsgjö mine, near Grythyttan, Örebro; at Brunsgjogrovan, Hallefors, and at Väster Silfberg, Värmland, Sweden. At Haute-Maurienne, Isère, France. From Guarulhos, São Paulo, Brazil. At Paddy's River mine, Australian Capital Territory, and from Broken Hill, New South Wales, Australia. Some of these need analytical confirmation.

Name: The prefix *clino* indicates a monoclinic structure, the prefix *ferro* indicates that in the C structural site $\text{Fe}^{2+} > \text{Mg}, \text{Mn}^{2+}$. The rootname *suenoite* indicates an amphibole with composition expressed as $\text{A}^{\square}\text{B}^{\text{Mn}^{2+}}_2\text{C}^{\text{Mg}}_5\text{T}^{\text{Si}_8}\text{O}_{22}^{\text{W}}(\text{OH})_2$.

References: (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 386, 391, 395. (2) Deer, W.A., R.A. Howie, and J. Zussman (1963) Rock-forming minerals, v. 2, chain silicates, 239. (3) Mottana, A. (1986) Blueschist-facies metamorphism of manganese cherts: a review of the alpine occurrences. In: B.W. Evans and E.H. Brown, Eds., Blueschists and eclogites, Geol. Soc. Amer. Memoir 164, 267-299. (4) Oberti, R., M. Boiocchi, F.C. Hawthorne, M.E. Ciriotti, O. Revheim, and R. Bracco (2018) Clino-suenoite, a newly approved magnesium-iron-manganese amphibole from Valmalenco, Sondrio, Italy. Mineral. Mag., 82(1), 189-198. (5) Hawthorne, F.C., R. Oberti, G.E. Harlow, W.V. Maresch, R.F. Martin, J.C. Schumacher, and M.D. Welch, (2012) Nomenclature of the amphibole supergroup. Amer. Mineral., 97, 2031-2048.