

Crystal Data: Monoclinic. *Point Group:* 2/m. As fibrous aggregates and as flattened elongated crystals, often in tufts to 2 cm.

Physical Properties: *Cleavage:* Perfect on {110} (by analogy to group). *Fracture:* n.d. *Tenacity:* Brittle (by analogy to group). *Hardness* = n.d. *D(meas.)* = n.d. *D(calc.)* = 3.175

Optical Properties: Transparent to translucent. *Color:* Yellow, honey-yellow, yellow-brown to light brown. *Streak:* n.d. *Luster:* Vitreous.

Optical Class: Biaxial (+). $\alpha = 1.632(2)$ $\beta = 1.644(2)$ $\gamma = 1.664(2)$ $2V(\text{meas.}) = 78(2)^\circ$ $2V(\text{calc.}) = 76.3^\circ$ *Pleochroism:* *X* = pale yellow to yellow, *Y* = yellow to pale orange, *Z* = orange-brown. *Dispersion:* $v < r$, weak. *Orientation:* $X \wedge a = 15^\circ$ (in β obtuse), $Y \parallel b$, $Z \wedge c = 2^\circ$ (in β acute).

Cell Data: Space Group: *C2/m*. $a = 9.6128(11)$ $b = 18.073(2)$ $c = 5.3073(6)$ $\beta = 102.825(2)^\circ$ $Z = 2$

X-ray Powder Pattern: Lower Scerscen Glacier, Valmalenco, Sondrio, Italy. 2.728 (100), 2.513 (77), 3.079 (62), 8.321 (60), 3.421 (54), 2.603 (42), 2.175 (42)

Chemistry:	(1)	(2)		(1)	(2)
Na ₂ O	0.70		Fe ₂ O ₃	[0.75]	
K ₂ O	0.01		Al ₂ O ₃	0.22	
CaO	1.65		SiO ₂	54.95	57.08
MgO	19.40	23.93	F	0.14	
ZnO	0.10		Cl	0.01	
NiO	0.12		H ₂ O	[1.80]	2.14
MnO	17.81	16.85	<u>-O = (F, Cl)</u>	<u>0.06</u>	
FeO	[0.32]		Total	97.93	100.00

(1) Lower Scerscen Glacier, Valmalenco, Sondrio, Italy; average of 10 electron microprobe analyses supplemented by Raman spectroscopy, FeO and Fe₂O₃ apportioned by electroneutrality, H₂O calculated; corresponds to ${}^A\text{Na}_{0.04}{}^B(\text{Mn}^{2+})_{1.58}{}^C\text{Ca}_{0.26}{}^D\text{Na}_{0.16}{}^E\Sigma=2.00{}^F(\text{Mg}_{4.21}\text{Mn}^{2+}_{0.61}\text{Zn}_{0.01}\text{Ni}_{0.01}\text{Fe}^{3+}_{0.08}\text{Al}_{0.04})\Sigma=5.00{}^G\text{Si}_{8.00}\text{O}_{22}{}^H[(\text{OH})_{1.94}\text{F}_{0.06}]\Sigma=2.00$. (2) $\square\text{Mn}^{2+}_2\text{Mg}_5\text{Si}_8\text{O}_{22}(\text{OH})_2$.

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

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

Occurrence: In Mn-rich quartzite glacial erratics derived from metamorphosed marine radiolaritic sediments.

Association: Braunitz, rhodonite, spessartine, tiragalloite, pyrophanite.

Distribution: At the Lower Scerscen Glacier, Valmalenco, Sondrio, Italy.

Name: The rootname *suenoite* indicates an amphibole with composition expressed as ${}^A{}^B\text{Mn}^{2+}{}_2{}^C\text{Mg}_5{}^D\text{Si}_8\text{O}_{22}{}^E(\text{OH})_2$ and the prefix *clino* indicates a monoclinic structure.

Type Material: Mineralogical Museum, University of Pavia, Lombardy, Italy (2016-01).

References: (1) 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. (2) (2019) *Amer. Mineral.*, 104(5), 780-781 (abs. ref. 1). (3) 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.