

Meionite

$3\text{CaAl}_2\text{Si}_2\text{O}_8 \cdot \text{CaCO}_3$

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Crystal Data: Tetragonal. *Point Group:* $4/m$. Crystals prismatic, typically with flat pyramidal terminations, striated \parallel [001], to 0.7 m; granular, massive.

Physical Properties: *Cleavage:* {100}, {110}, distinct. *Fracture:* Uneven to conchoidal. *Tenacity:* Brittle. Hardness = 5–6 $D(\text{meas.}) = 2.74\text{--}2.78$ $D(\text{calc.}) = [2.86]$ Commonly fluoresces orange to bright yellow or red under LW or SW UV or both.

Optical Properties: Transparent to opaque. *Color:* Colorless, white, grey; pink, violet, blue, yellow, orange-brown, brown; colorless in thin section. *Streak:* White. *Luster:* Vitreous to pearly or resinous.

Optical Class: Uniaxial (–). $\omega = 1.590\text{--}1.600$ $\epsilon = 1.556\text{--}1.562$

Cell Data: *Space Group:* $I4/m$ (synthetic). $a = 12.179(1)$ $c = 7.571(1)$ $Z = 2$

X-ray Powder Pattern: Bolton, Massachusetts, USA. (ICDD 2-405). 3.47 (100), 3.08 (100), 2.07 (100), 2.73 (80), 1.91 (80), 1.37 (80), 3.87 (70)

Chemistry:		(1)		(1)
	SiO ₂	41.38	Cl	0.18
	Al ₂ O ₃	31.59	H ₂ O ⁺	0.29
	MgO	0.29	CO ₂	4.35
	CaO	20.72	SO ₃	0.35
	Na ₂ O	1.38	−O = (F, Cl) ₂	0.04
	K ₂ O	0.48	Total	100.97

(1) Vesuvius, Campania, Italy; corresponds to $(\text{Ca}_{3.39}\text{Na}_{0.41}\text{K}_{0.09}\text{Mg}_{0.07})_{\Sigma=3.96}$
 $(\text{Si}_{6.32}\text{Al}_{5.68})_{\Sigma=12.00}\text{O}_{24}[(\text{CO}_3)_{0.91}\text{Cl}_{0.05}(\text{SO}_4)_{0.04}]_{\Sigma=1.00}$.

Polymorphism & Series: Forms a series with marialite; intermediate members are $P4_2/n$.

Mineral Group: Scapolite group.

Occurrence: Typically in regionally metamorphosed rocks, especially marbles, calcareous gneisses, granulites, and greenschists. Also in skarns, some pegmatites, pneumatolytically or hydrothermally altered mafic igneous rocks, and ejected volcanic blocks.

Association: Plagioclase, garnet, pyroxenes, amphiboles, apatite, titanite, zircon.

Distribution: Most specimens are intermediate in the series, see also marialite; some localities for highly calcic material include: at Monte Somma and Vesuvius, Campania, Italy. Around the Laacher See, Eifel district, Germany. From Pargas and Pusunsaari, Finland. At Slyudyanka, near Lake Baikal, Siberia, Russia. From Gooderham, Ontario, and Grenville, Quebec, Canada. At Rossie, St. Lawrence Co., New York; Bolton, Worcester Co., Massachusetts; and Cutcane Creek, Fannin Co., Georgia, USA.

Name: From the Greek for *less*, referring to its less acute pyramidal form compared with vesuvianite.

Type Material: Natural History Museum, Paris, France, 3774.

References: (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 466–468. (2) Deer, W.A., R.A. Howie, and J. Zussman (1963) Rock-forming minerals, v. 4, framework silicates, 321–337. (3) Papike, J.J. and N.C. Stephenson (1966) The crystal structure of mizzonite, a calcium- and carbonate-rich scapolite. *Amer. Mineral.*, 51, 1014–1027. (4) Aitken, B.G., H.T. Evans, Jr., and J.A. Konnert (1984) The crystal structure of a synthetic meionite. *Neues Jahrb. Mineral., Abh.*, 149, 309–324. (5) Bayliss, P. (1987) Scapolite [meionite, part]. *Mineral. Mag.*, 51, 176.

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