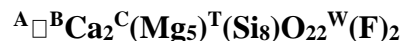


**Fluoro-tremolite**

**Crystal Data:** Monoclinic. *Point Group:* 2/m. As bladed to prismatic crystals.  
*Twinning:* [Simple or multiple twinning || {100}.]

**Physical Properties:** *Cleavage:* [Perfect on {110}, with intersections at ~56° and ~124°; partings on {100} and {001}.] *Tenacity:* [Brittle.] *Hardness =* [5-6] *D(calc.) =* 3.044

**Optical Properties:** Transparent. *Color:* Light green to colorless. *Streak:* Gray.  
*Luster:* Vitreous.

*Optical Class:* Biaxial (-).  $\alpha = 1.5987(5)$   $\beta = 1.6102(5)$   $\gamma = 1.6257(5)$   $2V(\text{meas.}) = 85(1)^\circ$   
 $2V(\text{calc.}) = 82^\circ$  *Orientation:* n.d. *Dispersion:* n.d. *Pleochroism:* n.d.

**Cell Data:** *Space Group:* C2/m.  $a = 9.846(2)$   $b = 18.050(3)$   $c = 5.2769(14)$   
 $\beta = 104.80(2)^\circ$   $Z = 2$

**X-ray Powder Pattern:** Calculated pattern.

2.706 (100), 2.827 (100), 3.555 (88), 3.126 (67), 2.531 (59), 2.055 (58), 3.381 (57)

<b>Chemistry:</b>	(1)	(2)		(1)	(2)
SiO <sub>2</sub>	55.52	58.88	CaO	13.41	13.74
TiO <sub>2</sub>	0.14		Na <sub>2</sub> O	1.10	
Al <sub>2</sub> O <sub>3</sub>	1.95		K <sub>2</sub> O	0.11	
Cr <sub>2</sub> O <sub>3</sub>	0.02		H <sub>2</sub> O	[0.91]	
FeO	2.44		F	2.65	4.65
MgO	22.74	24.68	Cl	0.03	
MnO	0.03		-O = Cl <sub>2</sub>	0.01	
ZnO	0.10		-O = F <sub>2</sub>	3.07	1.95
			Total	100.03	100.00

(1) Limecrest-Southdown quarry, Sparta, New Jersey, USA; average of 3 electron microprobe analyses supplemented by FTIR spectroscopy, H<sub>2</sub>O calculated for 2(OH,F,Cl) apfu; corresponds to  $A(Na_{0.89}K_{0.02})_{\Sigma=0.30} B(Ca_{1.99}Na_{0.01})_{\Sigma=2.00} C(Mg_{4.70}Fe^{2+}_{0.28}Zn_{0.01}Ti^{4+}_{0.16})_{\Sigma=5.00} T(Si_{7.68}Al_{0.32})_{\Sigma=8.00} O_{22} W(F_{1.16}OH_{0.84})_{\Sigma=2.00}$ . (2)  $A \square B Ca_2 C (Mg_5)^T (Si_8) O_{22} W (F)_2$ .

**Polymorphism & Series:** Forms a series with tremolite.

**Mineral Group:** Calcium amphibole group;  $B(Ca+\Sigma M^{2+})/\Sigma B \geq 0.75$ ,  $B Ca/\Sigma B \geq B \Sigma M^{2+}/\Sigma B$ .

**Occurrence:** A rock-forming mineral in skarn (Sparta, New Jersey).

**Association:** Calcite, chondrodite, pyrrhotite.

**Distribution:** Limecrest-Southdown quarry, Sparta, New Jersey, USA.

**Name:** The fluorine-analog of *tremolite*. The prefix *fluoro* indicates dominant fluorine in the W atomic site and the root name indicates the relation to *tremolite*.

**Type Material:** Franklin Mineral Museum, Franklin, New Jersey, USA (7710).

**References:** (1) Oberti, R., F. Cámara, F. Bellatreccia, F. Radica, A. Gianfagna and M. Boiocchi (2018) Fluoro-tremolite from the Limecrest-Southdown quarry, Sparta, New Jersey, USA: crystal chemistry of a newly approved end-member of the amphibole supergroup. *Mineral. Mag.*, 82(1), 145-157. (2) (2019) *Amer. Mineral.*, 104, 1867-1868 (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.