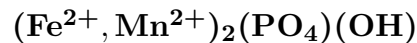


# Wolfeite



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**Crystal Data:** Monoclinic. *Point Group:*  $2/m$ . Very rarely as tiny crystals; typically columnar to coarse fibrous aggregates, to 10 cm, or granular.

**Physical Properties:** *Cleavage:* {100}, good; {120}, fair; {010}, poor; {110}, very poor. *Fracture:* Uneven to subconchoidal. Hardness = 4.5–5 D(meas.) = 3.79–3.82 D(calc.) = 3.88

**Optical Properties:** Opaque, transparent in small grains. *Color:* Reddish brown, pinkish brown, clove-brown, pale brown. *Luster:* Vitreous to silky if fibrous. *Optical Class:* Biaxial (+). *Dispersion:*  $r > v$ , very strong.  $\alpha = 1.741\text{--}1.750$   $\beta = 1.742\text{--}1.750$   $\gamma = 1.746\text{--}1.759$   $2V(\text{meas.}) = 51^\circ$

**Cell Data:** *Space Group:*  $P2_1/a$ .  $a = 12.319(1)$   $b = 13.230(2)$   $c = 9.840(1)$   
 $\beta = 108^\circ 24(1)'$   $Z = 16$

**X-ray Powder Pattern:** Hagendorf, Germany; close to triploidite. 3.098 (100), 3.191 (80), 2.929 (70), 2.817 (60), 2.881 (30), 3.649 (25), 3.381 (20)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
P <sub>2</sub> O <sub>5</sub>	32.90	32.04	31.86	Li <sub>2</sub> O	0.56		
As <sub>2</sub> O <sub>5</sub>		0.04		Na <sub>2</sub> O	0.14		
SiO <sub>2</sub>		0.03		K <sub>2</sub> O	0.05		
Fe <sub>2</sub> O <sub>3</sub>	0.70			F	0.51		
FeO	44.44	50.09	32.25	H <sub>2</sub> O	3.78	[5.44]	4.04
MnO	13.12	12.35	31.85	–O = F <sub>2</sub>	[0.22]		
MgO	2.28			insol.	1.44		
CaO	0.19	0.01		Total	[99.89]	[100.00]	100.00

(1) Palermo #1 mine, New Hampshire, USA. (2) Hagendorf, Germany; by electron microprobe, total Fe as FeO, total Mn as MnO, H<sub>2</sub>O by difference; corresponding to (Fe<sub>1.58</sub>Mn<sub>0.40</sub>)<sub>Σ=1.98</sub>(PO<sub>4</sub>)<sub>1.02</sub>(OH)<sub>1.18</sub>. (3) (Fe, Mn)<sub>2</sub>(PO<sub>4</sub>)(OH) with Fe:Mn = 1:1.

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

**Occurrence:** A secondary mineral, formed by hydrothermal alteration of triphylite in complex zoned granite pegmatites; rarely in hydrothermal veins; in phosphatic nodules in shales.

**Association:** Triphylite, triplite, hagendorfite, arrojadite, apatite (pegmatites); wicksite, satterlyite, marićite (shales).

**Distribution:** In the USA, from the Palermo #1 mine, near North Groton, and at the Keyes mine, Orange, Grafton Co., New Hampshire; in the Big Chief, Bull Moose, and Ross (Highland Lode) mines, near Custer, Custer Co., South Dakota. Large examples from the Big Fish River–Rapid Creek area, Yukon Territory, Canada. In the Énio pegmatite mine, northeast of Galiléia, Minas Gerais, Brazil. At Hagendorf, Bavaria, Germany. From Congrier, Mayenne, France. At the Norrö pegmatite, on Rånö Island, and from Skruppetorp, Sweden. In the Panasqueira Sn–W deposit, Portugal. From Wilson's quarry, Thackaringa district, 40 km southwest of Broken Hill, New South Wales, Australia.

**Name:** To honor Professor Caleb Wroe Wolfe (1908–1980), American crystallographer, Boston University, Boston, Massachusetts, USA.

**Type Material:** The Natural History Museum, London, England, 1963,230; Harvard University, Cambridge, Massachusetts, USA, 100868, 100870, 100871.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 853–855. (2) Clark, A.M. and A.G. Couper (1979) End-member triploidite from Cornwall. Mineral. Mag., 43, 325–326. (3) Antenucci, D., F. Fontan, and A.-M. Fransolet (1989) X-ray powder diffraction data for wolfeite: (Fe<sub>0.59</sub>Mn<sub>0.40</sub>Mg<sub>0.01</sub>)<sub>2</sub>PO<sub>4</sub>(OH). Powder Diffraction, 4(1), 34–35.

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