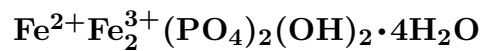


# Whitmoreite



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**Crystal Data:** Monoclinic. *Point Group:*  $2/m$ . Uncommon as isolated pseudo-orthorhombic crystals, prismatic to acicular  $\parallel$  [001], showing {110}, {100}, {011}, {021}, {112}, with chisel-shaped terminations, to 2 mm; typically in fans, radial sprays, and balls resembling burrs or naval mines. *Twinning:* By reflection on {100}, common.

**Physical Properties:** *Cleavage:* On {100}, fair. Hardness = 3 D(meas.) = 2.87(1)  
D(calc.) = 2.85

**Optical Properties:** Semitransparent. *Color:* Deep brown to pale tan, greenish brown.

*Luster:* Vitreous to subadamantine.

*Optical Class:* Biaxial (-). *Pleochroism:*  $X = Y$  = light greenish brown to yellow;  $Z$  = dark greenish brown to yellowish green. *Orientation:*  $X = a$ ;  $Y = b$ ;  $Z = c$ .  $\alpha = 1.670\text{--}1.676$   
 $\beta = 1.712\text{--}1.725$   $\gamma = 1.745\text{--}1.750$   $2V(\text{meas.}) = 60^\circ\text{--}65^\circ$

**Cell Data:** *Space Group:*  $P2_1/c$ .  $a = 10.00(2)$   $b = 9.73(2)$   $c = 5.471(8)$   $\beta = 93^\circ 49(6)'$   
 $Z = 2$

**X-ray Powder Pattern:** Palermo #1 mine, New Hampshire, USA.

10.05 (10), 7.01 (7), 4.98 (7), 4.21 (7), 2.802 (7), 4.42 (6), 3.476 (5)

## Chemistry:

	(1)	(2)
P <sub>2</sub> O <sub>5</sub>	31.2	30.62
Fe <sub>2</sub> O <sub>3</sub>	40.0	34.45
FeO	4.9	15.50
MnO	4.2	
H <sub>2</sub> O	[19.7]	19.43
Total	[100.0]	100.00

(1) Palermo #1 mine, New Hampshire, USA; by electron microprobe, originally given as Fe 27.8%, Mn 3.0%, P 13.0%; with H<sub>2</sub>O by difference and (OH)<sup>1-</sup> for charge balance, corresponds to (Fe<sub>0.31</sub><sup>2+</sup>Fe<sub>0.28</sub><sup>3+</sup>Mn<sub>0.27</sub><sup>2+</sup>)<sub>Σ=0.86</sub>Fe<sub>2.00</sub><sup>3+</sup>(PO<sub>4</sub>)<sub>2.00</sub>(OH)<sub>2.00</sub>•3.97H<sub>2</sub>O. (2) Fe<sup>2+</sup>Fe<sub>2</sub><sup>3+</sup>(PO<sub>4</sub>)<sub>2</sub>(OH)<sub>2</sub>•4H<sub>2</sub>O.

**Mineral Group:** Arthurite group.

**Occurrence:** A secondary mineral in complex zoned granite pegmatites.

**Association:** Siderite, triphylite, ludlamite, strunzite, laueite, beraunite, mitridatite, ushkovite, Fe–Mn oxides.

**Distribution:** In the USA, from the Palermo #1 mine, North Groton, Grafton Co., and at the Fitzgibbon mine, Alstead, Cheshire Co., New Hampshire; from the Bell Pit, Newry, Oxford Co., Maine; in the Big Chief mine, one km south of Glendale, Pennington Co., and the Tip Top mine, 8.5 km southwest of Custer, Custer Co., South Dakota. From the Gravel Hill mine, Perranzabuloe, Cornwall, England. In the Bendada pegmatite, near Guarda, Portugal. At Hagendorf, and Hühnerkobel, near Zwiesel, Bavaria, Germany.

**Name:** Honoring Robert William Whitmore (1936– ), Weare, New Hampshire, USA, American collector of microscopic minerals and owner of the Palermo #1 mine.

**Type Material:** National Museum of Natural History, Washington, D.C., USA, 128069.

**References:** (1) Moore, P.B., A.R. Kampf, and A.J. Irving (1974) Whitmoreite, Fe<sup>2+</sup>Fe<sub>2</sub><sup>3+</sup>(OH)<sub>2</sub>(H<sub>2</sub>O)<sub>4</sub>[PO<sub>4</sub>]<sub>2</sub>, a new species: its description and atomic arrangement. Amer. Mineral., 59, 900–905.