

Pyrobelonite

PbMn²⁺(VO₄)(OH)

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Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. Crystals elongated prismatic to acicular along [010], prominent {101}, {111}, {212}, {210}, {013}, several others, may be curved, anhedral, to 1 cm; massive, in veinlets.

Physical Properties: *Fracture:* Conchoidal. *Tenacity:* Brittle. *Hardness* = 3.5
D(meas.) = 5.82 D(calc.) = 5.79

Optical Properties: Transparent. *Color:* Fire-red to black; gray in reflected light, with red and orange internal reflections. *Streak:* Yellow-orange, reddish. *Luster:* Adamantine, may be submetallic.

Optical Class: Biaxial (-). *Pleochroism:* In shades of red-brown. *Orientation:* $X = a$; $Y = c$; $Z = b$. *Dispersion:* $r > v$. *Absorption:* $Y > X = Z$. $\alpha = 2.32$ $\beta = 2.36$ $\gamma = 2.37$
 $2V(\text{meas.}) = 29^\circ$ *Anisotropism:* Strong. *Bireflectance:* Observable.
 R_1-R_2 : (400) 17.0–19.7, (420) 16.7–19.3, (440) 16.5–18.9, (460) 16.2–18.5, (480) 16.0–18.2, (500) 15.7–17.8, (520) 15.5–17.4, (540) 15.2–17.0, (560) 15.0–16.7, (580) 14.8–16.5, (600) 14.7–16.3, (620) 14.6–16.1, (640) 14.5–16.0, (660) 14.3–15.8, (680) 14.2–15.7, (700) 14.1–15.6

Cell Data: *Space Group:* $Pnma$. $a = 7.644\text{--}7.663$ $b = 6.182\text{--}6.191$ $c = 9.508\text{--}9.522$
 $Z = 4$

X-ray Powder Pattern: Långban, Sweden.
3.24 (10), 5.14 (7), 2.635 (7), 2.323 (7), 3.672 (6.5), 1.667 (6.5), 2.914 (5)

Chemistry:	(1)	(2)	(3)
V ₂ O ₅	23.04	22.74	23.07
MnO	17.64	16.40	18.00
PbO	57.00	57.86	56.64
H ₂ O			2.29
Total	97.68	97.00	100.00

(1) Långban, Sweden; by electron microprobe, average of five analyses, total Mn as MnO.

(2) Tŷ Coch, Wales; by electron microprobe, average of five analyses, total Mn as MnO.

(3) PbMn(VO₄)(OH).

Mineral Group: Descloizite group.

Occurrence: Typically in metamorphosed Fe–Mn mineral deposits.

Association: Hausmannite, manganite, pyrochroite, barite, calcite (Långban, Sweden); vanadinite, braunite, hausmannite, romanèchite, Fe–Mn oxides, barite, calcite, quartz (Tŷ Coch, Wales); medaite, palenzonaite, saneroite, fianelite, parsettensite, rhodochrosite, kutnohorite, aegirine, quartz (Fianel mine, Switzerland).

Distribution: From Långban, Värmland, Sweden. At Tŷ Coch, near South Cornelly, Glamorgan district, Wales. From the Fianel mine, Val Ferrera, Graubünden, Switzerland. In the Iron Monarch quarry, Iron Knob, South Australia. At Franklin, Sussex Co., New Jersey, USA.

Name: From the Greek for *fire* and *needle*, in allusion to the color and habit.

Type Material: Harvard University, Cambridge, Massachusetts, USA, 94381.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 815–816. (2) Criddle, A.J. and R.F. Symes (1977) Mineralization at Tŷ Coch, Glamorgan (Mid Glamorgan), Wales: the second occurrence of pyrobelonite. *Mineral. Mag.*, 41, 85–90. (3) Donaldson, D.M. and W.H. Barnes (1955) The structures of the minerals of the descloizite and adelite groups: II–pyrobelonite. *Amer. Mineral.*, 40, 580–596. (4) Moore, P.B. (1967) Gabrielsonite, PbFe(AsO₄)(OH), a new member of the descloizite-pyrobelonite group, from Långban. *Arkiv. Mineral. Geol.*, 4, 401–405. (5) Barnes, W.H. and F.R. Ahmed (1969) A note on the unit cell constants, and X-ray diffraction powder pattern, of pyrobelonite. *Can. Mineral.*, 10, 117–123.

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