

**Crystal Data:** Orthorhombic. *Point Group:*  $2/m\ 2/m\ 2/m$ . Crystals are thick to thin, tabular || {100}, typically with wedge-shaped terminations, producing eight-sided cross sections. Commonly granular, compact, or massive. *Twinning:* On {100}; also on {031}, as trillings.

**Physical Properties:** *Cleavage:* {010}, {100}, imperfect. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 6.5–7 D(meas.) = 4.392 D(calc.) = [4.40]

**Optical Properties:** Transparent. *Color:* Greenish yellow, yellow-brown, brown; pale yellow to amber in thin section. *Streak:* White. *Luster:* Vitreous to resinous on fractures. *Optical Class:* Biaxial (-). *Pleochroism:* Faint; X = Z = pale yellow; Y = yellow-orange, reddish brown. *Orientation:* X = b; Y = c; Z = a. *Dispersion:*  $r > v$ , weak.  $\alpha = 1.827$   $\beta = 1.869$   $\gamma = 1.879$   $2V(\text{meas.}) = 48^\circ$

**Cell Data:** *Space Group:*  $Pbnm$  (synthetic).  $a = 4.8211$   $b = 10.4779$   $c = 6.0889$   $Z = 4$

**X-ray Powder Pattern:** Rockport, Massachusetts, USA. (ICDD 20-1139). 2.501 (100), 2.828 (90), 1.777 (90), 3.55 (80), 2.565 (70), 1.523 (70), 1.516 (70)

**Chemistry:**

	(1)
SiO <sub>2</sub>	29.83
FeO	69.48
MnO	0.28
H <sub>2</sub> O <sup>+</sup>	0.34
H <sub>2</sub> O <sup>-</sup>	0.04
Total	99.97

(1) Brocken massif, Germany; corresponds to  $(\text{Fe}_{1.97}^{2+}\text{Mn}_{0.01}^{2+})_{\Sigma=1.98}\text{Si}_{1.01}\text{O}_4$ .

**Polymorphism & Series:** Forms two series, with forsterite, and with tephroite.

**Mineral Group:** Olivine group.

**Occurrence:** In ultramafic volcanic and plutonic rocks, less commonly in felsic plutonic rocks; rarely in granite pegmatite; in lithophysae in obsidian. In metamorphosed iron-rich sediments and impure carbonate rocks.

**Association:** Augite, plagioclase, microcline, quartz, apatite, magnetite, ilmenite, spinel, hedenbergite, arfvedsonite, amphiboles, almandine, tridymite, grunerite.

**Distribution:** Among the occurrences of relatively pure material are: in the USA, in the St. Peters Dome area, near Pikes Peak, El Paso Co., Colorado; at Obsidian Cliff, Yellowstone National Park, Wyoming; from Coso Hot Springs, Inyo Co., California; at Rockport, Essex Co., Massachusetts; from Monroe, Orange Co., New York; in the Iron Hill mine, Cumberland, Providence Co., Rhode Island. In the Blue Bell mine, Riondel, British Columbia, Canada. From the Brocken massif, Harz Mountains, Germany. At Raftsund, Norway. In the Skaergaard and Ilímaussaq intrusions, Greenland. On Red Rock Ridge, Nevy Fjord, Palmer Peninsula, Antarctica.

**Name:** After Faial (Fayal) Island in the Azores, thought to occur in a local volcanic rock, but probably obtained from slag carried as ship's ballast.

**References:** (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 456–457, 451–456 [chrysolite]. (2) Deer, W.A., R.A. Howie, and J. Zussman (1982) Rock-forming minerals, (2nd edition), v. 1A, orthosilicates, 3–336. (3) Smyth, J.R. (1975) High temperature crystal chemistry of fayalite. *Amer. Mineral.*, 60, 1092–1097.

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