Clinoenstatite $Mg_2Si_2O_6$

Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals prismatic, to 2 mm; lamellar, fibrous, or massive; as stellate clusters. *Twinning:* Polysynthetic on {100}.

Physical Properties: *Cleavage:* Good on {110}, (110) ∧ (1$\bar{1}$0) ∼91°. *Tenacity:* [Brittle] (by analogy to enstatite). Hardness = [5–6] D(meas.) = n.d. D(calc.) = 3.210

Optical Properties: Semitransparent. *Color:* [White to brown; colorless in thin section.] *Optical Class:* Biaxial (+). *Orientation:* $X = b$; $Z \wedge c = 20°–22°$. $\alpha = 1.651$ $\beta = 1.654$ $\gamma = 1.660$ 2V(meas.) = 53.5°

Cell Data: *Space Group:* $P2_1/c$ (synthetic). $a = 9.6065$ $b = 8.8146$ $c = 5.1688$ $\beta = 108.335°$ Z = 4

X-ray Powder Pattern: Synthetic.
2.873 (100), 2.976 (75), 3.17 (30), 2.452 (30), 2.115 (30), 3.28 (25), 2.518 (18)

Chemistry:

	(1)
SiO_2	57.36
TiO_2	0.00
Al_2O_3	0.11
Cr_2O_3	0.28
FeO	6.32
MnO	0.09
MgO	34.97
CaO	0.26
Na_2O	0.00
Total	99.39

(1) Ogasawara Islands, Japan; by electron microprobe, corresponds to $(Mg_{1.81}Fe_{0.18}Ca_{0.01}Cr_{0.01})_{\Sigma=2.01}(Si_{1.99}Al_{0.01})_{\Sigma=2.00}O_6$.

Polymorphism & Series: Dimorphous with enstatite; forms a series with clinoferrosilite.

Mineral Group: Pyroxene group.

Occurrence: As phenocrysts, likely inverted from "protoenstatite," in high-magnesium nonfeldspathic andesites. Exsolved in diopside in ultramafic rocks and in enstatite in high-grade metamorphic hornfelses. An essential constituent of chondrite and achondrite meteorites, likely formed by stress.

Association: Diopside, enstatite, chromite, "hypersthene," glass.

Distribution: From Cape Vogel, Papua New Guinea, and on the inner slope of the Mariana trench. At Chichijima and Mukojima, Ogasawara (Bonin) Islands, Japan. From Népoui, New Caledonia. In the USA, from the Mt. Stuart batholith, central Cascade Mountains, Washington.

Name: For its monoclinic crystal system and chemical identity to *enstatite*.

Type Material: n.d.

References: (1) Dana, E.S. and W.E. Ford (1909) Dana's system of mineralogy, (6th edition), app. II, 30. (2) Deer, W.A., R.A. Howie, and J. Zussman (1978) Rock-forming minerals, (2nd edition), v. 2A, single-chain silicates, 20–161. (3) Stephenson, D.A., C.B. Sclar, and J.V. Smith (1966) Unit cell volumes of synthetic orthoenstatite and low clinoenstatite. Mineral. Mag., 35, 838–846. (4) Komatsu, M. (1980) Clinoenstatite in volcanic rocks from the Bonin Islands. Contr. Mineral. Petrol., 74, 329–338. (5) Ohashi, Y. (1984) Polysynthetically-twinned structures of enstatite and wollastonite. Phys. Chem. Minerals, 10, 217–229.