

## Majorite

## Mg<sub>3</sub>(Fe, Al, Si)<sub>2</sub>(SiO<sub>4</sub>)<sub>3</sub>

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**Crystal Data:** Cubic. *Point Group:*  $4/m\bar{3}2/m$ . Grains, to 10  $\mu\text{m}$ , acicular to equant, within narrow veinlets.

**Physical Properties:** Hardness = 7–7.5 D(meas.) =  $\sim 4$  D(calc.) = 4.00

**Optical Properties:** Semitransparent. *Color:* Purple, pale yellowish brown, colorless; purple in thin section.

*Optical Class:* Isotropic.  $n = \text{n.d.}$

**Cell Data:** *Space Group:*  $Ia3d$ .  $a = 11.524\text{--}11.543$   $Z = 8$

**X-ray Powder Pattern:** Coorara meteorite; \* = overlap with goethite impurity. (ICDD 25-843).

2.575 (100\*), 2.881 (70), 1.540 (60), 2.454 (45\*), 1.597 (40), 2.262 (35\*), 2.352 (30)

### Chemistry:

	(1)	(2)
SiO <sub>2</sub>	52.0	54.89
TiO <sub>2</sub>	0.0	
Al <sub>2</sub> O <sub>3</sub>	2.6	4.61
Cr <sub>2</sub> O <sub>3</sub>	0.68	
FeO	16.9	8.64
NiO	0.04	
MgO	27.5	30.99
CaO	0.0	1.63
Na <sub>2</sub> O	0.7	
K <sub>2</sub> O	0.0	
Total	100.42	[100.76]

(1) Coorara meteorite; by electron microprobe, average of five analyses; original analysis Si 24.3%, Al 1.4%, Cr 0.45%, Fe 13.1%, Mg 16.6%, Ni 0.03%, Na 0.5%, here recalculated to oxides; corresponds to  $(\text{Mg}_{2.98}\text{Na}_{0.10})_{\Sigma=3.08}(\text{Fe}_{1.02}^{2+}\text{Si}_{0.78}\text{Al}_{0.23}\text{Cr}_{0.03})_{\Sigma=2.06}\text{Si}_{3.00}\text{O}_{12}$ . (2) Pampa del Infierno meteorite; by electron microprobe, original total given as 100.77%; corresponds to  $(\text{Mg}_{2.88}\text{Ca}_{0.12})_{\Sigma=3.00}(\text{Si}_{0.78}\text{Fe}_{0.50}^{2+}\text{Al}_{0.38}\text{Mg}_{0.32})_{\Sigma=1.98}\text{Si}_{3.00}\text{O}_{12}$ .

**Mineral Group:** Garnet group.

**Occurrence:** Formed from low-calcium, high-aluminum pyroxene, olivine, and shock-induced glass, by high-pressure impact metamorphism in bolides.

**Association:** Pyroxene, ringwoodite, olivine, kamacite, goethite, troilite.

**Distribution:** In the Coorara, Catherwood, Pampa del Infierno, Tenham, and Peace River chondritic meteorites.

**Name:** For Alan Major, who assisted A.E. Ringwood in the high-pressure synthesis of garnet from pyroxene.

**Type Material:** National Museum of Natural History, Washington, D.C., USA, 122379.

**References:** (1) Smith, J.V. and B. Mason (1970) Pyroxene-garnet transformation in Coorara meteorite. *Science*, 168, 832–833. (2) (1970) *Amer. Mineral.*, 55, 1815 (abs. ref. 1). (3) Coleman, L.C. (1977) Ringwoodite and majorite in the Catherwood meteorite. *Can. Mineral.*, 15, 97–101. (4) Mao, H.K., P.M. Bell, and N.Z. Boktor (1982) The mineral chemistry of majorite in L6 chondrites. *Carnegie Inst. Washington Yearbook 1981*, 279–281.

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