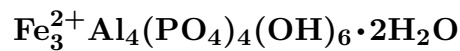


# Gormanite



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**Crystal Data:** Triclinic, pseudomonoclinic. *Point Group:*  $\bar{1}$  or 1. Crystals are elongated along [010], with large {001}, giving a bladelike aspect, with smaller {100}, {102},  $\{\bar{1}02\}$ , {010}, to 1 cm; commonly in radial aggregates. *Twining:* Polysynthetic around [010], composition plane {001}, universal.

**Physical Properties:** *Cleavage:* On {001}, poor. Hardness = 4–5 D(meas.) = 3.10–3.13 D(calc.) = 3.10–3.12

**Optical Properties:** Semitransparent. *Color:* Blue-green. *Streak:* Pale green.

*Luster:* Vitreous.

*Optical Class:* Biaxial (-). *Pleochroism:* X = Z = colorless; Y = blue. *Orientation:* X ( $163^\circ, 7^\circ$ ); Y ( $-77.5^\circ, 86.5^\circ$ ); Z ( $12.5^\circ, 84^\circ$ ) [using  $(\phi, \rho)$ ]. *Dispersion:*  $r > v$ , very strong. *Absorption:* Y > X = Z.  $\alpha = 1.619(3)$   $\beta = 1.653(3)$   $\gamma = 1.660(3)$  2V(meas.) =  $53(2)^\circ$  2V(calc.) =  $56^\circ$

**Cell Data:** *Space Group:*  $P\bar{1}$  or  $P1$ .  $a = 11.79(1)$   $b = 5.11(1)$   $c = 13.61(1)$   
 $\alpha = 90^\circ 50(5)'$   $\beta = 99^\circ 00(5)'$   $\gamma = 90^\circ 05(5)'$   $Z = 2$

**X-ray Powder Pattern:** Yukon Territory, Canada.

3.395 (100), 2.554 (90d), 2.925 (80), 4.761 (60), 3.154 (60d), 3.062 (40), 6.72 (30)

Chemistry:	(1)	(2)	(1)	(2)	
P <sub>2</sub> O <sub>5</sub>	37.23	38.05	MgO	6.65	8.10
Al <sub>2</sub> O <sub>3</sub>	25.51	27.33	CaO	0.26	
Fe <sub>2</sub> O <sub>3</sub>	3.82		H <sub>2</sub> O	11.45	12.07
FeO	14.68	14.45	Total	99.91	100.00
MnO	0.31				

(1) Yukon Territory, Canada; Mg, Ca, Al by AA, P by XRF, H<sub>2</sub>O by TGA; after removal of quartz 7.0%, corresponds to  $(\text{Fe}_{1.56}^{2+}\text{Mg}_{1.26}\text{Ca}_{0.04}\text{Mn}_{0.03})_{\Sigma=2.89}(\text{Al}_{3.82}\text{Fe}_{0.36}^{3+})_{\Sigma=4.18}(\text{PO}_4)_4(\text{OH})_{6.32} \cdot 1.69\text{H}_2\text{O}$ . Commonly strongly chemically zoned, although optical property variations are not a guide. (2)  $(\text{Fe}^{2+}, \text{Mg})_3\text{Al}_4(\text{PO}_4)_4(\text{OH})_6 \cdot 2\text{H}_2\text{O}$  with  $\text{Fe}^{2+}:\text{Mg} = 1:1$ .

**Polymorphism & Series:** Forms a series with souzalite.

**Occurrence:** As low-temperature fracture fillings in phosphate-ironstones (Yukon Territory, Canada); in fractures in tonalite (Bisbee, Arizona, USA).

**Association:** Souzalite, siderite, ludlamite, oxidized vivianite, arrojadite, kryzhanovskite, quartz (Yukon Territory, Canada); chlorite, calcite, quartz (Bisbee, Arizona, USA).

**Distribution:** From Rapid Creek, Yukon Territory, Canada. In the USA, in large crystals at Bisbee, Cochise Co., Arizona; in New Hampshire, from the G.E. Smith mine, Newport, Sullivan Co. and the Charles Davis pegmatite, Groton, Grafton Co. At the Tsaobismund pegmatite, 60 km south of Karibib, Namibia.

**Name:** Honoring Donald Herbert Gorman (1922–), Professor of Mineralogy, Department of Geology, University of Toronto, Toronto, Canada.

**Type Material:** Royal Ontario Museum, Toronto, Canada, M35123, M35124, M37368; National Museum of Natural History, Washington, D.C., USA, 137494, 137495, 145741.

**References:** (1) Sturman, B.D., J.A. Mandarino, M.E. Mrose, and P.J. Dunn (1981) Gormanite,  $\text{Fe}_3^{2+}\text{Al}_4(\text{PO}_4)_4(\text{OH})_6 \cdot 2\text{H}_2\text{O}$ , the ferrous analogue of souzalite, and new data for souzalite. *Can. Mineral.*, 19, 381–387. (2) (1982) *Amer. Mineral.*, 67, 622–623 (abs. ref. 1).

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