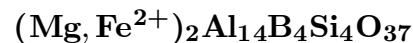


# Werdingite



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**Crystal Data:** Triclinic. *Point Group:*  $\bar{1}$ . Anhedral to subhedral crystals, up to 3 mm. *Twinning:* Composition plane  $\parallel$  [001], simple twins, common; also lamellar twins with several individuals.

**Physical Properties:** *Cleavage:* Prismatic, poor, or a parting. *Fracture:* Conchoidal. Hardness = 7 D(meas.) = 3.04(2) D(calc.) = 3.07

**Optical Properties:** Translucent. *Color:* Honey-yellow to brownish yellow. *Streak:* Buff-white. *Luster:* Vitreous. *Optical Class:* Biaxial (-). *Pleochroism:* X = Z = colorless; Y = yellow. *Orientation:* Z = c. *Dispersion:*  $r > v$ , moderately strong.  $\alpha = 1.614(2)$   $\beta = 1.646(2)$   $\gamma = 1.651(2)$   $2V(\text{meas.}) = 33(1)^\circ$   $2V(\text{calc.}) = 42^\circ$

**Cell Data:** *Space Group:*  $P\bar{1}$ .  $a = 7.995(2)$   $b = 8.152(1)$   $c = 11.406(4)$   $\alpha = 110.45(2)^\circ$   $\beta = 110.85(2)^\circ$   $\gamma = 84.66(2)^\circ$  Z = 1

**X-ray Powder Pattern:** Bok se Puts Farm, South Africa.

5.23 (100), 5.43 (80), 4.98 (75), 2.708 (60), 3.392 (50), 2.194 (50), 1.527 (40)

## Chemistry:

	(1)
SiO <sub>2</sub>	19.83
TiO <sub>2</sub>	0.05
B <sub>2</sub> O <sub>3</sub>	10.19
Al <sub>2</sub> O <sub>3</sub>	59.49
FeO	5.06
MnO	0.00
MgO	4.46
Na <sub>2</sub> O	0.00
Total	99.08

(1) Bok se Puts Farm, South Africa; by electron microprobe, B by ICP; corresponds to  $(\text{Mg}_{1.35}\text{Fe}_{0.86})_{\Sigma=2.21}\text{Al}_{14.21}\text{B}_{3.56}\text{Ti}_{0.01}\text{Si}_{4.02}\text{O}_{36.91}$ .

**Occurrence:** In granulite facies metamorphosed metasediments and metavolcanic cordierite-sillimanite and biotite gneisses.

**Association:** Kornerupine, grandidierite, sillimanite, zircon, rutile, hercynite.

**Distribution:** On the Bok se Puts Farm, Namaqualand, Cape Province, South Africa.

**Name:** For Dr. Günter Werding, of the Mineralogical Institute, Ruhr University, Bochum, Germany.

**Type Material:** South African Museum, SAMG 7140–7150, and the University of Cape Town, Cape Town, South Africa.

**References:** (1) Moore, J.M., D.J. Waters, and M.L. Niven (1990) Werdingite, a new borosilicate mineral from the granulite facies of the western Namaqualand metamorphic complex, South Africa. *Amer. Mineral.*, 75, 415–420. (2) Niven, M.L., D.J. Waters, and J.M. Moore (1991) The crystal structure of werdingite,  $(\text{Mg, Fe})_2\text{Al}_{12}(\text{Al, Fe})_2\text{Si}_4(\text{B, Al})_4\text{O}_{37}$ , and its relationship to sillimanite, mullite, and grandidierite. *Amer. Mineral.*, 76, 246–256.