Werdingite \((\text{Mg}, \text{Fe}^{2+})_2\text{Al}_{14}\text{B}_4\text{Si}_4\text{O}_{37}\)  

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**Crystal Data:** Triclinic. *Point Group:* \(\overline{1}\). Anhedral to subhedral crystals, up to 3 mm.  

*Twinning:* Composition plane \([001]\), simple twins, common; also lamellar twins with several individuals.

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

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

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

**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:**

\[
\begin{align*}
\text{SiO}_2 & : 19.83 \\
\text{TiO}_2 & : 0.05 \\
\text{B}_2\text{O}_3 & : 10.19 \\
\text{Al}_2\text{O}_3 & : 59.49 \\
\text{FeO} & : 5.06 \\
\text{MnO} & : 0.00 \\
\text{MgO} & : 4.46 \\
\text{Na}_2\text{O} & : 0.00 \\
\text{Total} & : 99.08
\end{align*}
\]

(1) Bok se Puts Farm, South Africa; by electron microprobe, B by ICP; corresponds to \((\text{Mg}_{1.35}\text{Fe}_{0.65})_{\Sigma = 2.21}\text{Al}_{14.21}\text{B}_{3.56}\text{Ti}_{0.01}\text{Si}_{4.02}\text{O}_{36.91}\).

**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:**  
(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, nullite, and grandidierite. Amer. Mineral., 76, 246–256.

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