Musgravite \((\text{Mg, Fe}^{2+}, \text{Zn})_2\text{Al}_6\text{BeO}_{12}\)

Crystal Data: Hexagonal. Point Group: \(\overline{3} \ 2/m, 3m, \text{or } 32\). Crystals platy on \{0001\}, to 0.5 mm; massive.

Physical Properties: Cleavage: Perfect, \{0001\}, or a parting; another, \{10\overline{1}1\}, less perfect. Hardness = [8–8.5] (by analogy to taaffeite). \(D(\text{meas.}) = 3.68(2)\) \(D(\text{calc.}) = 3.69\)

Optical Properties: Semitransparent. Color: Pale olive-green; in thin section, nearly colorless. Optical Class: Uniaxial (-). \(\omega = 1.739(2)\) \(\epsilon = 1.735(2)\)

Cell Data: Space Group: \(R\overline{3}m, R\overline{3}m, \text{or } R\overline{3}2\). \(a = 5.682(1)\) \(c = 41.13(1)\) \(Z = 6\)

X-ray Powder Pattern: Musgrave Ranges, Australia.
2.408 (100), 1.4189 (80), 2.052 (70), 2.658 (55), 4.57 (40), 1.4868 (40), 2.271 (35b)

Chemistry:
\[
\begin{array}{ccc}
\text{SiO}_2 & 0.30 & \text{ZnO} & 5.18 \\
\text{TiO}_2 & 0.02 & \text{BeO} & 5.50 [5.50] \\
\text{Al}_2\text{O}_3 & 71.44 & 68.45 & \text{MgO} & 15.76 & 10.64 \\
\text{Fe}_2\text{O}_3 & 0.40 & \text{CaO} & 0.00 & 0.09 \\
\text{Cr}_2\text{O}_3 & 0.01 & \text{K}_2\text{O} & 0.04 \\
\text{FeO} & 6.78 & 9.69 & \text{P}_2\text{O}_5 & 0.02 \\
\text{MnO} & 0.02 & 0.01 & & & \text{Total} & 100.24 & [99.61] \\
\end{array}
\]

(1) Musgrave Ranges, Australia; Be by colorimetric methods, corresponds to \((\text{Mg}_{1.66}\text{Fe}^{2+}_{0.40})\Sigma=2.06\) \((\text{Al}_{5.95}\text{Si}_{0.02}\text{Fe}^{3+}_{0.02})\Sigma=5.99\text{Be}_{0.93}\text{O}_{12}\). (2) Enderby Land, Antarctica; by electron microprobe; Be assumed from (1), total Fe as FeO, original total given as 99.62%; corresponds to \((\text{Mg}_{1.17}\text{Fe}_{0.60}\text{Zn}_{0.28})\Sigma=2.05\text{Al}_{5.97}\text{Be}_{0.98}\text{O}_{12}\).

Polymorphism & Series: 9R, 18R polytypoids.

Occurrence: In a nodule, perhaps formerly a corundum crystal, in high-grade metapyroxenite, associated with metaperidotites and granulites (Musgrave Ranges, Australia); in pegmatite cutting granulite (Enderby Land, Antarctica).

Association: Spinel, sapphirine, phlogopite (Musgrave Ranges, Australia); quartz, sillimanite, garnet, biotite, surinamite, sapphirine (Enderby Land, Antarctica).


Name: For the Musgrave Ranges, South Australia, from where it was first recognized.

Type Material: Western Australian Museum, Perth, M.70.1991; University of Queensland, Brisbane, Australia, V014820; National Museum of Natural History, Washington, D.C., USA, 147436.

; musgravite = magnesiotaaffeite-6N'3S; [full list given under högbohmite];