

Greifensteinite**Ca₂Be₄(Fe²⁺,Mn)₅(PO₄)₆(OH)₄·6H₂O**

Crystal Data: Monoclinic. *Point Group:* 2/m. In subparallel and radial aggregates of poorly formed tabular crystals, to 5 mm.

Physical Properties: *Cleavage:* Good on {100}. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = 4.5 D(meas.) = 2.93(2) D(calc.) = 2.95

Optical Properties: Transparent to translucent. *Color:* Dark olive-green. *Streak:* White. *Luster:* Vitreous.

Optical Class: Biaxial (-). $\alpha = 1.624(2)$ $\beta = 1.634(2)$ $\gamma = 1.638(2)$ $2V(\text{meas.}) = 80^\circ$ $2V(\text{calc.}) = 64^\circ$ *Orientation:* $X = b$. *Pleochroism:* $X =$ light bluish green, $Y =$ light green, $Z =$ brownish green.

Cell Data: Space Group: $C2/c$. $a = 15.903(7)$ $b = 11.885(7)$ $c = 6.677(3)$ $\beta = 94.68(4)^\circ$ $Z = 2$

X-ray Powder Pattern: Greifenstein, Saxony, Germany.

9.48 (100), 3.96 (90), 5.94 (80), 2.783 (80), 2.982 (70), 2.638 (70), 4.82 (60)

Chemistry:	(1)	(2)
MgO	0.34	
CaO	9.98	9.84
FeO	22.42	25.20
MnO	5.56	6.22
Al ₂ O ₃	1.05	
P ₂ O ₅	38.36	37.34
BeO	9.24	8.77
H ₂ O	13.6	12.63
Total	100.55	100.00

(1) Greifenstein, Saxony, Germany; average of 5 electron microprobe analyses, supplemented by AA, Mössbauer and IR spectroscopy, H₂O by TGA; corresponds to Ca_{1.98}Be_{4.10}(Fe²⁺_{3.46}Mn²⁺_{0.88}Al_{0.22}Mg_{0.10})_{Σ=4.66}[PO₄]₆(OH)_{3.72}·6.52H₂O. (2) Ca₂Be₄(Fe²⁺₄Mn)_{Σ=5.00}(PO₄)₆(OH)₄·6H₂O.

Mineral Group: Roscherite group.

Occurrence: In miarolitic cavities in Li-rich granite pegmatite.

Association: Albite, K-feldspar, roscherite, viitaniemiite, childrenite, quartz, an apatite-group mineral, herderite, elbaite, montmorillonite.

Distribution: From Greifenstein, Saxony, Germany. At the João Teodoro mine, Linópolis district, Divino das Laranjeiras, and the Xanda mine, Virgem da Lapa, Minas Gerais, Brazil. From the Tip Top mine, Custer County, South Dakota, USA.

Name: For the locality in Germany that provided the first specimens.

Type Material: State Museum of Mineralogy and Geology, Dresden, Germany (18634).

References: (1) Chukanov, N.V., S. Möckel, R.K. Rastsvetaeva, and A.E. Zadov (2002) Greifensteinite Ca₂Be₄(Fe²⁺,Mn)₅(PO₄)₆(OH)₄·6H₂O - a new mineral from Greifenstein, Saxony. Zap. Vses. Mineral. Obshch., 131(4), 47-52 (in Russian). (2) Rastsvetaeva, R.K., O.A. Gurbanova, and N.V. Chukanov (2002) Crystal structure of greifensteinite Ca₂Be₄(Fe²⁺,Mn)₅(PO₄)₆(OH)₄·6H₂O. Doklady Akad. Nauk 383, 354-357 (in Russian; English translation in Doklady Chemistry, 383, 78-81). (3) (2003) Amer. Mineral., 88(7), 1176-1178 (abs. refs. 1 & 2).