

**Friedrichbeckeite**

**Crystal Data:** Hexagonal. *Point Group:* 6/m 2/m 2/m. Crystals, thin tabular, flattened on {0001}, to 0.6 mm, exhibiting forms {0 0 0 1}, {1 0  $\bar{1}$  0}, {1 1  $\bar{2}$  0}.

**Physical Properties:** *Cleavage:* None. *Fracture:* Irregular. *Tenacity:* Brittle. Hardness = 6 D(meas.) = n.d. D(calc.) = 2.686

**Optical Properties:** Transparent to translucent. *Color:* Colorless to pale yellow. *Streak:* Colorless to pale cream. *Luster:* Vitreous. *Pleochroism:* Distinct; *O* = yellow; *E* = light blue. Anomalous extinction, slight biaxiality and zoning sometimes observed. *Optical Class:* Uniaxial (+).  $\omega = 1.552(2)$   $\varepsilon = 1.561(2)$

**Cell Data:** *Space Group:* P6/mcc.  $a = 9.970(1)$   $c = 14.130(3)$   $Z = 2$

**X-ray Powder Pattern:** Bellerberg volcano, East Eifel volcanic area, Germany. 3.180 (100), 2.885 (70), 4.993 (30), 4.081 (30), 3.690 (30), 4.321 (25), 3.525 (25)

<b>Chemistry:</b>	(1)	(2)
Na <sub>2</sub> O	2.73	3.19
K <sub>2</sub> O	4.16	4.86
BeO	4.67	5.16
CaO	0.04	
MgO	11.24	12.46
MnO	2.05	
FeO	1.76	
Al <sub>2</sub> O <sub>3</sub>	0.15	
SiO <sub>2</sub>	73.51	74.33
TiO <sub>2</sub>	0.02	
Total	100.33	100.00

(1) Bellerberg volcano, East Eifel volcanic area, Germany; average of 15 electron microprobe analyses, Be determined by laser-ablation ICP-MS, absence of OH and H<sub>2</sub>O confirmed by Micro-Raman spectroscopy, corresponding to  $\text{K}_{0.87}\text{Na}_{0.86}(\text{Mg}_{1.57}\text{Mn}_{0.28}\text{Fe}_{0.24})_{\Sigma=2.09}(\text{Be}_{1.83}\text{Mg}_{1.17})_{\Sigma=3.00}[\text{Si}_{12}\text{O}_{30}]$ . (2)  $\text{K}(\square_{0.5}\text{Na}_{0.5})_2\text{Mg}_2\text{Be}_3[\text{Si}_{12}\text{O}_{30}]$ .

**Mineral Group:** Milarite-osumilite group.

**Occurrence:** In vesicles in pyrometamorphically metasomatized silicate-rich xenoliths in leucite-tephrite volcanic rock.

**Association:** Tridymite, augite, magnesiohornblende, enstatite, almandine-spessartine garnet, fluorapatite, biotite, braunite, hematite, roedderite.

**Distribution:** Bellerberg volcano, southeast of Ettringen, East Eifel volcanic area, Germany.

**Name:** Honors Austrian mineralogist and petrographer Friedrich Johann Karl Becke (1855–1931), best known for developing the Becke-line method for determining indices of refraction.

**Type Material:** Natural History Museum, Vienna, Austria (catalog no. 2009-IV-a).

**References:** (1) Lengauer, C.L., N. Hrauda, U. Kolitsch, R. Krickl, and E. Tillmans (2009) Friedrichbeckeite,  $\text{K}(\square_{0.5}\text{Na}_{0.5})_2(\text{Mg}_{0.8}\text{Mn}_{0.1}\text{Fe}_{0.1})_2(\text{Be}_{0.6}\text{Mg}_{0.4})_3[\text{Si}_{12}\text{O}_{30}]$ , a new milarite-type mineral from the Bellerberg volcano, Eifel area, Germany. *Mineral. Petrol.*, 96, 221–232. (2) (2009) *Amer. Mineral.*, 94, 1497 (abs. ref. 1).