

Keckite **$\text{Ca}(\text{Mn}^{2+}, \text{Zn})_2\text{Fe}_3^{3+}(\text{PO}_4)_4(\text{OH})_3 \cdot 2\text{H}_2\text{O}$**

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Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals are elongated along [001], to 2 mm; in tufted or fan-shaped groups. *Twinning:* Reported, probably on {111} and {110}.

Physical Properties: *Cleavage:* Poor on {001}, and poorer on {100}. *Tenacity:* Flexible but not elastic. Hardness = 4.5 D(meas.) = 2.60 D(calc.) = 2.649

Optical Properties: Translucent. *Color:* Dirty gray-brown to brown, yellow-brown.

Luster: Dull.

Optical Class: Biaxial (-); undulatory extinction. *Pleochroism:* X = reddish brown; Y = yellow; Z = paler yellow. *Orientation:* $Z = b$; $X \wedge c = 15\text{--}22^\circ$. *Absorption:* $X \gg Y \geq Z$. $\alpha = \text{n.d.}$
 $\beta = 1.692$ $\gamma = 1.699$ $2V(\text{meas.}) = \text{n.d.}$

Cell Data: *Space Group:* $P2_1/a$. $a = 15.02(1)$ $b = 7.19(5)$ $c = 19.74(2)$ $\beta = 110^\circ 30(1)'$
 $Z = 2$

X-ray Powder Pattern: Hagendorf, Germany.

2.86 (10), 9.3 (8), 4.98 (5), 3.51 (5d), 2.59 (4), 1.879 (4), 4.63 (3)

Chemistry:

	(1)
P_2O_5	35.75
Fe_2O_3	30.02
MnO	14.85
ZnO	2.24
MgO	0.66
CaO	5.88
H_2O	[10.60]
Total	[100.00]

(1) Hagendorf, Germany; by electron microprobe, total Fe as Fe_2O_3 , total Mn as MnO, H_2O by difference, $(\text{OH})^{1-}$ determined by IR; corresponding to $(\text{Ca}_{0.83}\text{Mg}_{0.13})_{\Sigma=0.96}(\text{Mn}_{1.66}\text{Zn}_{0.22})_{\Sigma=1.88}\text{Fe}_{2.99}^{3+}(\text{PO}_4)_4(\text{OH})_{2.65} \cdot 2.03\text{H}_2\text{O}$.

Mineral Group: Whiteite group.

Occurrence: A weathering product of phosphate minerals in a complex granite pegmatite.

Association: Rockbridgeite, phosphophyllite, scholzite, fairfieldite, vivianite, reddingite, huréaulite, strengite, apatite.

Distribution: In Germany, in Bavaria, from Hagendorf, at the Silbergrube quarry, near Waidhaus, and at Hühnerkobel, near Zwiesel. In the Bendada pegmatite, near Guarda, Portugal.

Name: Honors Erich Keck, Etzenricht, Germany, collector of Hagendorf minerals.

Type Material: National Museum of Natural History, Washington, D.C., USA, 145616, 145617.

References: (1) Mücke, A. (1979) Keckit, $(\text{Ca}, \text{Mg})(\text{Mn}, \text{Zn})_2\text{Fe}_3^{3+}[(\text{OH})_3|(\text{PO}_4)_4] \cdot 2\text{H}_2\text{O}$, ein neues Mineral von Hagendorf/Opf. und seine genetische Stellung. Neues Jahrb. Mineral., Abh., 134, 183–192 (in German with English abs.). (2) (1979) Amer. Mineral., 64, 1330–1331 (abs. ref. 1).