

Reichenbachite

$\text{Cu}_5(\text{PO}_4)_2(\text{OH})_4$

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Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals are lancet-shaped, to 0.3 mm; may be in spherical aggregates or botryoidal crusts.

Physical Properties: *Fracture:* Irregular. Hardness = ~ 3.5 D(meas.) = n.d.
D(calc.) = 4.370

Optical Properties: Semitransparent. *Color:* Dark green to pale blue. *Streak:* Pale green.
Luster: Vitreous.

Optical Class: Biaxial (-). *Pleochroism:* Very weak; X = bright emerald-green; Z = emerald-green. *Orientation:* Y = b; Z \wedge a = $29(2)^\circ$. *Dispersion:* $r < v$, weak. $\alpha = 1.782(2)$
 $\beta = [1.833]$ $\gamma = 1.867(5)$ $2V(\text{meas.}) = 76.3(4)^\circ$

Cell Data: *Space Group:* $P2_1/a$ (synthetic). a = 9.186(2) b = 10.684(2) c = 4.461(2)
 $\beta = 92.31(1)^\circ$ Z = 2

X-ray Powder Pattern: Reichenbach, Germany.
4.470 (100), 2.10 (100), 3.132 (30), 3.012 (30), 2.814 (25), 2.945 (20), 2.357 (20)

Chemistry:	(1)	(2)
P_2O_5	22.25	24.65
As_2O_5	2.11	
SiO_2	0.10	
CuO	68.19	69.09
H_2O	[6.09]	6.26
Total	[98.74]	100.00

(1) Reichenbach, Germany; by electron microprobe, H_2O calculated for $4(\text{OH})^{1-}$; corresponds to $\text{Cu}_{5.07}[(\text{P}_{0.93}\text{As}_{0.06})_{\Sigma=0.99}\text{O}_4]_2(\text{OH})_4$. (2) $\text{Cu}_5(\text{PO}_4)_2(\text{OH})_4$.

Polymorphism & Series: Trimorphous with ludjibaite and pseudomalachite.

Occurrence: A rare secondary mineral in the oxidized zone of hydrothermal copper deposits.

Association: Pseudomalachite, malachite, duftite, bayldonite, mimetite, quartz (Reichenbach, Germany).

Distribution: In Germany, from Reichenbach, and at Gadernheim, near Bensheim, Hesse. At the Old Gunnislake mine, Calstock, Cornwall, England. From L'ubietová, near Baňská Bystrica (Libethen, near Neusohl), Slovakia. At the Miguel Vacas mine, Vila Viçosa, near Estremoz, Portugal. From Brown's Prospect, Rum Jungle, Alligator River district, Northern Territory, Australia. At Kipushi, 28 km southwest of Lubumbashi, Katanga Province, Congo (Shaba Province, Zaire). From Binghampton, Yavapai Co., Arizona, USA.

Name: For Reichenbach, Germany, the original locality.

Type Material: Natural History Museum, Mainz; Mineralogical Museum, Würzburg University, Würzburg, Germany.

References: (1) Sieber, N.H.W., E. Tillmanns, and O. Medenbach (1987) Hentschelite, $\text{CuFe}_2(\text{PO}_4)_2(\text{OH})_2$, a new member of the lazulite group, and reichenbachite, $\text{Cu}_5(\text{PO}_4)_2(\text{OH})_4$, a polymorph of pseudomalachite, two new copper phosphate minerals from Reichenbach, Germany. *Amer. Mineral.*, 72, 404–408. (2) Anderson, J.B., G.L. Shoemaker, E. Kostiner, and F.A. Ruzsala (1977) The crystal structure of synthetic $\text{Cu}_5(\text{PO}_4)_2(\text{OH})_4$, a polymorph of pseudomalachite. *Amer. Mineral.*, 62, 115–121.