

Brendelite**(Bi, Pb)₂(Fe³⁺, Fe²⁺)O₂(PO₄)(OH)**

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Crystal Data: Monoclinic. *Point Group:* 2/*m*. Crystals are tabular { $\bar{2}01$ }, showing also {100}, {010}, {001}, to 0.3 mm, in aggregates.

Physical Properties: Hardness = 4.5 VHN = 270–330, 300 average (15 g load).
D(meas.) = n.d. D(calc.) = 6.83

Optical Properties: Translucent to opaque. *Color:* Black; dark brown in transmitted light.
Streak: Pale brown. *Luster:* Vitreous to adamantine.

Optical Class: Biaxial (–). *Pleochroism:* Strong; *X* = pale brown to brown; *Y* = *Z* = dark brown to opaque. *Orientation:* *Z* = *b*; *Y* $\simeq$ *a*. α = [2.06] β = [2.15] γ = [2.19]
2*V*(meas.) = 70.5°

*R*₁–*R*₂: (400) 14.69–16.36, (420) 13.98–15.66, (440) 13.49–15.22, (460) 13.13–14.86, (480) 12.85–14.58, (500) 12.73–14.48, (520) 12.60–14.37, (540) 12.45–14.24, (560) 12.38–14.14, (580) 12.28–14.04, (600) 12.22–13.94, (620) 12.15–13.85, (640) 12.10–13.77, (660) 12.06–13.69, (680) 11.96–13.61, (700) 12.03–13.61

Cell Data: *Space Group:* *C*2/*m*. *a* = 12.278(2) *b* = 3.815(1) *c* = 6.899(1)
 β = 111.14(1)° *Z* = 2

X-ray Powder Pattern: Güldener Falk mine, Germany.

3.011 (100), 3.372 (77), 2.750 (62), 5.726 (54), 3.217 (46), 3.322 (37), 2.863 (34)

Chemistry:

	(1)	(2)
P ₂ O ₅	10.71	10.98
As ₂ O ₅	0.32	0.20
V ₂ O ₅	0.24	0.55
Bi ₂ O ₃	47.10	56.12
Fe ₂ O ₃	9.44	6.32
FeO	3.12	5.58
PbO	26.08	18.12
H ₂ O	[1.46]	[1.46]
Total	[98.47]	[99.33]

(1) Güldener Falk mine, Germany; by electron microprobe, average of 15 analyses; Fe²⁺:Fe³⁺ from Mössbauer spectroscopy, H₂O calculated from theory; corresponds to (Bi_{1.27}Pb_{0.73}) $_{\Sigma=2.00}$ (Fe_{0.80}³⁺Fe_{0.23}²⁺) $_{\Sigma=1.03}$ O_{2.04}[(PO₄)_{0.95}(AsO₄)_{0.02}(VO₄)_{0.02}] $_{\Sigma=0.99}$ (OH)_{0.96}. (2) Do.; by electron microprobe, average of 25 analyses, Fe²⁺:Fe³⁺ from Mössbauer spectroscopy, H₂O calculated from theory; corresponds to (Bi_{1.50}Pb_{0.51}) $_{\Sigma=2.01}$ (Fe_{0.76}³⁺Fe_{0.21}²⁺) $_{\Sigma=0.97}$ O_{2.28}[(PO₄)_{0.96}(VO₄)_{0.04}(AsO₄)_{0.01}] $_{\Sigma=1.01}$ (OH)_{0.72}.

Occurrence: A very rare secondary mineral found on the dumps of a Bi–Co–Ni–Ag deposit.

Association: Eulytite, bismutite, bismutoferrite.

Distribution: From the Güldener Falk mine, near Schneeberg, Saxony, Germany.

Name: In honor of Christian Friedrich Brendel (1776–1861), expert in mining equipment, Neustädtel-Schneeberg, Germany.

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

References: (1) Krause, W., H.-J. Bernhardt, C. McCammon, and H. Effenberger (1998) Brendelite, (Bi, Pb)₂Fe^{3+·2+}O₂(OH)(PO₄), a new mineral from Schneeberg, Germany: description and crystal structure. *Mineral. Petrol.*, 63, 263–277. (2) (1999) *Amer. Mineral.*, 84, 1195 (abs. ref. 1).

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