

Neustädtelite**Bi₂Fe³⁺(Fe³⁺, Co)₂[O, (OH)]₄(AsO₄)₂**

Crystal Data: Triclinic. *Point Group:* $\bar{1}$. Crystals, to 0.2 mm, are tabular on {001}, slightly to distinctly elongated along [010], and display 3 pinacoids; in aggregates to 0.3 mm.

Physical Properties: *Cleavage:* Good on {001}. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 4.5 D(meas.) = n.d. D(calc.) = 5.81

Optical Properties: Transparent to translucent. *Color:* Brown, nearly black as crusts.

Streak: Light brown. *Luster:* Adamantine.

Optical Class: Biaxial (-). $\alpha = 2.02(2)$ $\beta(\text{calc.}) = 2.07$ $\gamma = 2.12(2)$ $2V(\text{calc.}) = 65(5)^\circ$

Pleochroism: Strong, X = brown to opaque, Y = yellow, Z = pale yellow. *Orientation:* X \approx [010]; for crystals lying on (001), X' show an oblique extinction of $\sim 7^\circ$ relative to [010].

Cell Data: Space Group: $P\bar{1}$. $a = 4.556(1)$ $b = 6.153(2)$ $c = 8.984(2)$ $\alpha = 95.43(2)^\circ$
 $\beta = 99.22(2)^\circ$ $\gamma = 92.95(3)^\circ$ $Z = \frac{1}{2}$

X-ray Powder Pattern: Guldener Falk mine, near Schneeberg-Neustädtel, Saxony, Germany. 3.542 (100), 3.766 (90), 2.913 (81), 3.505 (62), 2.798 (49), 8.827 (44), 2.668 (39)

Chemistry:	(1)	(2)
Bi ₂ O ₃	52.58	53.35
PbO	0.08	
CaO	0.15	
Fe ₂ O ₃	13.92	18.28
Al ₂ O ₃	0.29	
CoO	3.35	
NiO	0.34	
ZnO	0.09	
CuO	0.07	
As ₂ O ₅	26.82	26.31
P ₂ O ₅	0.23	
H ₂ O	[2.56]	2.06
Total	100.48	100.00

(1) Guldener Falk mine, near Schneeberg-Neustädtel, Saxony, Germany; average of 13 electron microprobe analyses supplemented by Mössbauer and IR spectroscopy, H₂O calculated from idealized empirical formula; corresponds to (Bi_{1.94}Ca_{0.02}) $\Sigma=1.96$ Fe_{1.00}(Fe_{0.50}Co_{0.38}Ni_{0.04}Al_{0.05}Zn_{0.01}Cu_{0.01}) $\Sigma=0.99$ [(OH)_{2.44}O_{1.40}] $\Sigma=3.84$ [(AsO₄)_{2.01}(PO₄)_{0.03}] $\Sigma=2.04$. (2) Bi₂Fe³⁺Fe³⁺O₂(OH)₂(AsO₄)₂.

Polymorphism & Series: Forms a series with cobaltneustädtelite.

Mineral Group: Medenbachite group.

Occurrence: In vugs in quartz collected on waste piles from mining activity.

Association: Cobaltneustädtelite, quartz, preisingerite, "limonite"/goethite, mixite, zeunerite, bismutite, bismutoferrite.

Distribution: Studied material from the dumps of the Guldener Falk mine, near Schneeberg-Neustädtel, Saxony, Germany. Other mines with confirmed occurrence in the same district are Siebenschleken, Junge Kalbe, Friedefürst, and Peter und Paul. Also, from the Friedrich-Wilhelm adit, Friedensgruber vein, near Lichtenberg, Bavaria, Germany.

Name: For the locality, Schneeberg-Neustädtel, near where the studied samples were collected.

Type Material: State Museum for Geology and Mineralogy, Dresden, Germany (18328).

References: (1) Krause, W., H-J. Bernhardt, C. McCammon, and H. Effenberger (2002) Neustädtelite and cobaltneustädtelite, the Fe³⁺- and Co²⁺-analogues of medenbachite. *Amer. Mineral.*, 87(5-6), 726-738.