

## Walpurgite

## $\text{Bi}_4(\text{UO}_2)\text{O}_4(\text{AsO}_4)_2 \cdot 2\text{H}_2\text{O}$

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**Crystal Data:** Triclinic. *Point Group:*  $\bar{1}$ . Crystals typically lathlike, elongated along [001], tabular on {010}, showing {010}, {110}, {1 $\bar{1}$ 0}, { $\bar{1}\bar{1}$ 1}, a number of other forms, to 6 mm. In radial to subparallel aggregates. *Twining:* Common, with {010} twin and composition plane.

**Physical Properties:** *Cleavage:* On {010}, perfect. Hardness = 3.5 D(meas.) = n.d. D(calc.) = 6.59 Radioactive.

**Optical Properties:** Transparent to translucent. *Color:* Wax-yellow, straw-yellow, honey-yellow; pale yellow to colorless in transmitted light, commonly zoned. *Streak:* Pale brownish yellow. *Luster:* Adamantine to greasy. *Optical Class:* Biaxial (-). *Pleochroism:* X = colorless; Y = Z = very faint greenish yellow. *Orientation:* X  $\simeq$  [010]. *Dispersion:* Small.  $\alpha = 1.871\text{--}1.90$   $\beta = 1.975\text{--}2.00$   $\gamma = 2.005\text{--}2.05$  2V(meas.) = Medium large. 2V(calc.) = 52°

**Cell Data:** *Space Group:*  $P\bar{1}$ .  $a = 7.135(2)$   $b = 10.426(4)$   $c = 5.494(1)$   $\alpha = 101.47(2)^\circ$   $\beta = 110.82(2)^\circ$   $\gamma = 88.20(2)^\circ$  Z = 1

**X-ray Powder Pattern:** Schmiedestollen, Germany. 3.128 (100), 10.257 (41), 3.059 (38), 3.268 (32), 2.739 (26), 3.400 (23), 2.188 (20)

Chemistry:	(1)	(2)	(3)
UO <sub>3</sub>	18.7	16.16	19.28
P <sub>2</sub> O <sub>5</sub>	0.9	5.88	
As <sub>2</sub> O <sub>5</sub>	14.1	12.45	15.49
V <sub>2</sub> O <sub>5</sub>			
Bi <sub>2</sub> O <sub>3</sub>	61.8	61.87	62.80
H <sub>2</sub> O	3.7	3.42	2.43
Total	99.2	99.78	100.00

(1) Schneeberg, Germany; microchemical analysis. (2) Do. (3)  $\text{Bi}_4(\text{UO}_2)\text{O}_4(\text{AsO}_4)_2 \cdot 2\text{H}_2\text{O}$ .

**Polymorphism & Series:** Dimorphous with orthowalpurgite.

**Occurrence:** A rare secondary mineral in the oxidized zone of Bi-U-As-bearing hydrothermal mineral deposits.

**Association:** Trögerite, zeunerite, uranosphaerite, uranospinite, torbernite (Schneeberg, Germany).

**Distribution:** In Germany, found in the Walpurgis vein, Weisser Hirsch mine, and on the dump of the Ritterzeche, Neustädtel-Schneeberg, Saxony; from the Schmiedestollen, near Wittichen, and at Nussbach, near Triberg, Black Forest. From the Geister vein, Eliáš mine, Jáchymov (Joachimsthal), Czech Republic. At Southwick Cliffs, near Dalbeattie, Kirkcudbrightshire, Scotland.

**Name:** For its first-noted occurrence in the Walpurgis vein, Schneeberg, Germany.

**Type Material:** Mining Academy, Freiberg, Germany, 21779.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 796–797. (2) Frondel, C. (1958) Systematic mineralogy of uranium and thorium. U.S. Geol. Sur. Bull. 1064, 239–242. (3) Mereiter, K. (1982) The crystal structure of walpurgite,  $(\text{UO}_2)\text{Bi}_4\text{O}_4(\text{AsO}_4)_2 \cdot 2\text{H}_2\text{O}$ . Tschermaks Mineral. Petrog. Mitt., 30, 129–139. (4) Krause, W., H. Effenberger, and F. Brandstätter (1995) Orthowalpurgite,  $(\text{UO}_2)\text{Bi}_4\text{O}_4(\text{AsO}_4)_2 \cdot 2\text{H}_2\text{O}$ , a new mineral from the Black Forest, Germany. Eur. J. Mineral., 7, 1313–1324.

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