

Mrázekite**Bi₂Cu₃O₂(PO₄)₂(OH)₂•2H₂O**

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Crystal Data: Monoclinic. *Point Group:* 2/*m*. As acicular to slender bladed crystals, tabular on {101}, elongated along [010] or [20 $\bar{1}$], with wedgelike terminations, to 2 mm; in rosettes or spherules of radial acicular crystals, and as crusts.

Physical Properties: *Cleavage:* On {20 $\bar{1}$ }. Hardness = 2–3 D(meas.) = 4.90(2)
D(calc.) = 5.00

Optical Properties: Translucent to transparent. *Color:* Cerulean blue. *Luster:* Vitreous. *Optical Class:* Biaxial (–). *Pleochroism:* Very faint; in ink-blue tints. *Orientation:* *X* = *b*; *Y* $\simeq$ *a*; *Z* $\wedge$ *c* = 16°; or *Z* = *b*; *X* $\wedge$ *c* = 27°; *Y* $\wedge$ *a* = 15°. *Dispersion:* *r* < *v*, strong. *Absorption:* *X* < *Y* < *Z*. *n* = 1.865(5) or 1.89(5) 2*V*(meas.) = 66(5)°–68(2)°

Cell Data: *Space Group:* *P*2₁/*n*. *a* = 9.065(1) *b* = 6.340(1) *c* = 21.239(3)
 β = 101.57(1)° *Z* = 4

X-ray Powder Pattern: Lubietová, Slovakia.

3.040 (100), 2.924 (83), 7.625 (78), 3.014 (63), 5.200 (52), 5.145 (45), 5.410 (43)

Chemistry:

	(1)	(2)	(3)
P ₂ O ₅	15.89	15.16	15.76
As ₂ O ₅	0.11	0.26	
V ₂ O ₅		0.25	
Bi ₂ O ₃	51.97	50.09	51.74
CuO	26.14	25.44	26.50
PbO		0.10	
H ₂ O	[5.90]	[6.00]	6.00
Total	[100.01]	[97.30]	100.00

(1) Lubietová, Slovakia; by electron microprobe, original total given as 100.00%, H₂O calculated from stoichiometry, IR confirms (OH)^{1–}, H₂O, (PO₄)³⁺; corresponds to Bi_{2.01}Cu_{2.96}O_{2.00}[(P_{1.01}As_{0.01}) _{Σ =1.02}O₄]₂(OH)₂•1.95H₂O. (2) Reichenbach, Germany; by electron microprobe, average of 14 analyses, H₂O calculated, presence of (OH)^{1–} and molecular H₂O confirmed by FTIR spectroscopy; corresponds to Bi_{2.05}Cu_{2.99}O_{2.00}[(PO₄)_{1.95}(AsO₄)_{0.02}(VO₄)_{0.02}] _{Σ =1.99}(OH)_{1.98}•1.88H₂O. (3) Bi₂Cu₃O₂(PO₄)₂(OH)₂•2H₂O.

Occurrence: A rare secondary mineral formed by oxidization of polymetallic sulfides.

Association: Chalcopyrite, tetrahedrite, chalcocite, malachite, pyromorphite, pseudomalachite, libethenite, reichenbachite, beudantite, bismutite, mixite, chrysocolla.

Distribution: From L'ubietová, near Baňská Bystrica (Libethen, near Neusohl), Slovakia. At Gadernheim and Reichenbach, near Bensheim, Hesse, Germany. From Sainte-Marie-aux-Mines, Haut-Rhin, France. In the Morass Creek Gorge, 15 km north of Benambra, Victoria, Australia.

Name: Honors Zdenek Mrázek (1952–1984), who collected the first specimens and recognized their unusual characteristics.

Type Material: Charles University, Prague; National Museum, Prague, Czech Republic, P1N 88529.

References: (1) Řídkošil, T., V. Šrein, J. Fábry, J. Hybler, and B.A. Maximov (1992) Mrázekite, Bi₂Cu₃(OH)₂O₂(PO₄)₂•2H₂O, a new mineral species and its crystal structure. Can. Mineral., 30, 215–224. (2) (1992) Amer. Mineral., 77, 1306 (abs. ref. 1). (3) Effenberger, H., W. Krause, K. Belendorff, H.-J. Bernhardt, O. Medenbach, J. Hybler, and V. Petříček (1994) Revision of the crystal structure of mrázekite, Bi₂Cu₃(OH)₂O₂(PO₄)₂•2H₂O. Can. Mineral., 32, 365–372. (4) Birch, W.D., D.A. Henry, and A. Pring (1995) A new occurrence of mrázekite [sic] from Benambra, Victoria, Australia. Mineral. Record, 26, 107–113.

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