

Bayldonite

PbCu₃O(AsO₃OH)₂(OH)₂

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Crystal Data: Monoclinic. *Point Group:* 2/m. Rare as crystals, to 1 cm. Usually as mammillary crusts, powdery, fine-grained massive. *Twinning:* As pseudoscalenohedral trillings with composition plane (311).

Physical Properties: *Fracture:* Conchoidal to irregular. Hardness = 4.5 D(meas.) = 5.24–5.65 D(calc.) = 5.707

Optical Properties: Translucent. *Color:* Siskin-green, apple-green, yellow-green, grass-green; dark green to black in crystals; may show sector twinning in thin section. *Luster:* Resinous. *Optical Class:* Biaxial (+). *Orientation:* X = b; Y ∧ elongation ≈ 45°. *Dispersion:* r < v, strong. α = 1.95(1) β = 1.97 γ = 1.99(1) 2V(meas.) = Large. 2V(calc.) = 89°

Cell Data: *Space Group:* C2/c. a = 10.147(2) b = 5.892(1) c = 14.081(2) β = 106.05(1)° Z = 4

X-ray Powder Pattern: Tsumeb, Namibia. 3.148 (100), 2.932 (78), 3.231 (72), 4.516 (65), 2.723 (60), 2.658 (55), 2.260 (54)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
SO ₃		1.00		PbO	30.13	32.60	30.67
P ₂ O ₅		0.20		H ₂ O	4.58	4.20	4.95
As ₂ O ₅	31.76	30.09	31.59	rem.	2.65		
CuO	30.88	31.70	32.79	Total	100.00	99.79	100.00

(1) St. Day, Cornwall, England; after deduction of remnant Fe₂O₃, CaO, and loss on ignition, corresponds to Pb_{1.03}Cu_{2.97}O(As_{1.06}O₃OH)₂(OH)_{2.22}. (2) Kayraky, Kazakhstan; (OH)¹⁻ confirmed by IR, corresponding to Pb_{1.00}Cu_{3.00}O[(As_{0.98}P_{0.01})_{Σ=0.99}O₃OH]₂(OH)_{1.77}. (3) Cu₃PbO(AsO₃OH)₂(OH)₂.

Occurrence: A rare secondary mineral in the oxidized zone of some polymetallic deposits.

Association: Mimetite, olivenite, azurite, malachite, tsumebite, cuprian adamite, duftite, keyite, schulténite, philipsbornite (Tsumeb, Namibia); beudantite, anglesite, cerussite, malachite, azurite, barite (Kayraky, Kazakhstan).

Distribution: In England, in Cornwall, from the Penberthy Croft mine, St. Hilary; at Wheal Carpenter, near Gwinear; from Wheal Gorland, Gwennap; and at Wheal Alfred, Phillack; from many mines at Caldbeck Fells, Cumbria. In the Tynagh mine, near Loughrea, Co. Galway, Ireland. In France, at the Cap Garonne mine, near le Pradet, Var; La Rabasse, Hérault; Les Ardillats, Rhône; and elsewhere. Large crystals from Tsumeb, Namibia. At Kayraky, Kazakhstan. In Australia, from Broken Hill, New South Wales; in the Anticline prospect, 11 km west-southwest of Ashburton Downs homestead, Capricorn Range, Western Australia; at the Mt. Malvern mine, near Clarendon, South Australia. In the USA, from the Killie mine, Spruce Mountain district, Elko Co., Nevada; in Arizona, at Bisbee, Cochise Co., and from the Frijole prospect, Santa Rita Mountains, Pima Co.; in the Black Pine mine, near Philipsburg, Granite Co., Montana.

Name: Honors John Bayldon, English physician who collected the original specimens.

Type Material: The Natural History Museum, London, England, 1921,433.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 929–930. (2) Cesbron, F. and H. Vachey (1974) The unit cell and twin of bayldonite. Mineral. Mag., 39, 716–718. (3) Sumín de Portilla, V., M. Portillo Quevedo and V.I. Stepanov (1981) The structure of bayldonite: chemical analysis, differential thermal analysis, and IR spectroscopy. Amer. Mineral., 66, 148–153. (4) Ghose, S. and C. Wan (1979) Structural chemistry of copper and zinc minerals. VI. Bayldonite, (Cu, Zn)₃Pb(AsO₄)₂(OH)₂: a complex layer structure. Acta Cryst., 35, 819–823.

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