

Bayleyite

Mg₂(UO₂)(CO₃)₃•18H₂O

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Crystal Data: Monoclinic. *Point Group:* 2/*m*. Crystals are well-formed, short prismatic along [001], to 0.1 mm; typically in globular aggregates and crusts of divergent crystals.

Physical Properties: *Fracture:* Conchoidal. Hardness = 2–2.5 D(meas.) = 2.05 D(calc.) = 2.06 Radioactive. Soluble in H₂O; may rapidly dehydrate; weak fluorescence of uncertain yellow-green to pale greenish under LW and SW UV.

Optical Properties: Semitransparent. *Color:* Sulfur-yellow. *Luster:* Vitreous, dulling with dehydration.

Optical Class: Biaxial (–). *Pleochroism:* X = pale pink; Y = Z = pale yellow to greenish yellow.

Orientation: Z = b; X ∧ c = 8°–15°. α = 1.454–1.455 β = 1.490–1.492 γ = 1.500–1.502 2V(meas.) = 30° 2V(calc.) = 45°–57°

Cell Data: *Space Group:* P2₁/a. a = 26.65(5) b = 15.31(5) c = 6.53(2) β = 93°04' Z = 4

X-ray Powder Pattern: Hillside mine, Arizona, USA.

7.66 (10), 13.1 (9), 3.83 (6), 2.69 (5), 2.21 (5), 6.53 (4), 5.85 (4b)

Chemistry:	(1)	(2)		(1)	(2)
UO ₃	35.28	34.76	Na ₂ O	0.21	
SO ₃	0.02		K ₂ O	0.10	
CO ₂	16.72	16.04	H ₂ O	37.91	39.40
MgO	9.76	9.80	Total	[100.00]	100.00

(1) Hillside mine, Arizona, USA; recalculated from an original total of 100.78%, after deduction of gypsum 8.45% and insoluble 0.45%; corresponds to Mg_{2.00}(UO₂)_{1.02}(CO₃)_{3.15}•17.43H₂O.

(2) Mg₂(UO₂)(CO₃)₃•18H₂O.

Occurrence: As a coating or efflorescence with other secondary uranium minerals, which may be post-mining, typically in sediment-hosted uranium-bearing deposits.

Association: Schröckingerite, andersonite, swartzite, gypsum (Hillside mine, Arizona, USA); schröckingerite, gypsum (Hideout mine, Utah, USA); tyuyamunite, uranophane, liebigite, carnotite (Powder River Basin, Wyoming, USA).

Distribution: In the USA, in Arizona, from the Hillside mine, about 5.5 km north of Bagdad, Eureka district, Yavapai Co., and in the Cole shaft, Bisbee, Cochise Co.; at Ambrosia Lake, Grants district, McKinley Co., New Mexico; in Utah, from the Hideout No. 1 (Tiger) mine, Deer Flats, White Canyon district, on the Coral claim, Elk Ridge, at the Mi Vida mine, San Juan Co., and from the Delta Group mine, San Rafael Swell, Emery Co.; in Colorado, at the Garfield and Rifle mines, north of Rifle, Garfield Co., from the J.J. mine, Montrose Co., and well-crystallized in the Schwartzwalder mine, Jefferson Co.; in Wyoming, from the Pumpkin Buttes area, Powder River Basin, Niobrara Co. In the Rabbit Lake uranium mine, Saskatchewan, Canada. From near Azegour, Morocco. In the Huemul mine, Malargüe district, Mendoza Province, Argentina. From the Mas-d'Alary uranium deposit, three km south-southeast of Lodève, Hérault, France. In the Hatrurim Formation, Israel.

Name: To honor Professor William Shirley Bayley (1861–1943), American mineralogist and geologist, University of Illinois, Urbana, Illinois, USA, and the U.S. Geological Survey.

Type Material: National Museum of Natural History, Washington, D.C., USA, 106101–106104.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 237–238. (2) Frondel, C. (1958) Systematic mineralogy of uranium and thorium. U.S. Geol. Sur. Bull. 1064, 112–115. (3) Weeks, A.D. and M.E. Thompson (1954) Identification and occurrence of uranium and vanadium minerals from the Colorado Plateaus. U.S. Geol. Surv. Bull. 1009-B, 25–26. (4) Axelrod, J.M., F.S. Grimaldi, C. Milton, and K.J. Murata (1951) The uranium minerals from the Hillside mine, Yavapai County, Arizona. Amer. Mineral., 36, 1–22. (5) Z.Y. Zhang, K.D. Luo, and Z.R. Chen (1985) The crystal structure of bayleyite. Scientia Sinica, Series B, 28(4), 344–350.

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