## Beyerite $(Ca,Pb)Bi_2O_2(CO_3)_2$



**Crystal Data:** Tetragonal. *Point Group:* $4/m\ 2/m\ 2/m$. Crystals are thin rectangular plates, with large {001}, modified by {111}, to 0.5 mm, in rosettes and subparallel aggregates; commonly compact earthy, in thin films, and massive.

**Physical Properties:** *Fracture:* Conchoidal. Hardness = 2–3 D(meas.) = 6.56 D(calc.) = [6.61]

**Optical Properties:** Transparent to opaque. *Color:* Bright yellow, lemon-yellow, pale yellow, grayish green, gray, white; pale yellow to colorless in transmitted light. *Streak:* White. *Luster:* Vitreous.
*Optical Class:* Uniaxial (–); may be anomalously biaxial. $\omega = 2.13(2)$ $\epsilon = 1.99(2)$

**Cell Data:** *Space Group:* $I4/mmm$. $a = 3.78(1)$ $c = 21.77(5)$ Z = 2

**X-ray Powder Pattern:** Schneeberg, Germany.
2.851 (10), 2.721 (9), 1.755 (8), 1.530 (8), 1.688 (7), 3.632 (6), 3.354 (6)

**Chemistry:**

| | (1) | (2) |
|---|---|---|
| $CO_2$ | 13.89 | 14.43 |
| $Bi_2O_3$ | 75.29 | 76.38 |
| PbO | 1.77 | |
| CaO | 9.05 | 9.19 |
| Total | [100.00] | 100.00 |

(1) Mica Lode pegmatite, Colorado, USA; recalculated from an original total of 99.83%, neglecting CuO 1.10%, MnO 0.12%, and insoluble 0.79%, corresponds to $(Ca_{0.99}Pb_{0.04})_{\Sigma=1.03}$ $Bi_{2.00}O_2(CO_3)_{1.95}$. (2) $CaBi_2O_2(CO_3)_2$.

**Occurrence:** A rare secondary mineral in hydrothermal mineral deposits and granite pegmatites, formed by alteration of bismuth-bearing sulfides and sulfosalts.

**Association:** Bismutite, bismutostibiconite, atelestite, preisingerite, pucherite, eulytite, namibite, clinobisvanite, bismutotantalite, bismuthinite, bismuth.

**Distribution:** In Germany, from Schneeberg, Saxony; in the Black Forest, in the Clara mine, near Oberwolfach, from Neubulach, and at Hechtsberg, near Hausach. In the Eliáš and Rovnost mines, Jáchymov (Joachimsthal), Czech Republic. From the Bisundi pegmatite, Bhilwara district, Rajasthan, India. At the Chinorsayskiy granodiorite massif, Tajikistan. In the USA, in California, from the Stewart mine, Pala district, and in the Mesa Grande district, San Diego Co., and the Jensen quarry, Riverside Co.; at the Harding mine, Dixon, Taos Co., New Mexico; in pegmatites in the White Picacho district, Maricopa and Yavapai Cos., and on the Gettysburg claims, Copperopolis, Yavapai Co., Arizona; from the School Section and Mica Lode pegmatites, Eight Mile Park area, Fremont Co., and the Meyers Ranch pegmatite, Park Co., Colorado; at the Boss mine, Goodsprings district, Clark Co., Nevada. From the Northern Spy mine, Tintic district, Juab Co., Utah. In the Evans-Lou quarry, near Wakefield Lake, Quebec, Canada. In Argentina, from the San Elías mine, San Luis Province.

**Name:** To honor Adolph Beyer (1743–1805), mining engineer and mineralogist, Schneeberg, Germany, who first recognized bismutite.

**Type Material:** Harvard University, Cambridge, Massachusetts, 91593, 111598; National Museum of Natural History, Washington, D.C., USA, 94017, C2251, R2756.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 281–282. (2) Heinrich, E.W. (1947) Beyerite from Colorado. Amer. Mineral., 32, 660–669. (3) Lagerkrantz, A. and G. Sillén (1948) On the crystal structure of $Bi_2O_2CO_3$ (bismutite) and $CaBi_2O_2(CO_3)_2$ (beyerite). Arkiv Kemi, 25(20), 21 p.