

**Znucalite****CaZn<sub>11</sub>(UO<sub>2</sub>)(CO<sub>3</sub>)<sub>3</sub>(OH)<sub>20</sub>•4H<sub>2</sub>O**

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**Crystal Data:** Orthorhombic. *Point Group:* n.d. Crystals are thin lamellar, to 100 μm, in spherical boxworklike aggregates; forms coatings.

**Physical Properties:** *Cleavage:* Perfect on {010}. *Hardness* = n.d. *D(meas.)* = 3.01–3.1 *D(calc.)* = 3.15 *Radioactive;* may fluoresce intense yellow-green under SW and LW UV.

**Optical Properties:** *Translucent.* *Color:* White, pale grayish yellow, yellow. *Luster:* Silky. *Optical Class:* Biaxial (-). *Orientation:* *X* = *c*; *Y* = *b*; *Z* = *a*.  $\alpha = 1.556\text{--}1.563$   $\beta = 1.600$   $\gamma = 1.620\text{--}1.621$  *2V(meas.)* = 50°–60° *2V(calc.)* = 66.4°

**Cell Data:** *Space Group:* n.d. *a* = 10.72(1) *b* = 25.16(1) *c* = 6.325(4) *Z* = 2

**X-ray Powder Pattern:** Příbram, Czech Republic.

2.708 (100), 2.728 (90), 6.141 (78), 3.165 (70), 25.1 (62), 2.682 (56), 5.650 (54)

**Chemistry:**

	(1)	(2)	(3)
CO <sub>2</sub>	8.25	n.d.	8.14
UO <sub>3</sub>	17.42	18.51	17.64
ZnO	56.75	53.52	55.21
CaO	4.06	3.55	3.46
H <sub>2</sub> O	15.37	n.d.	15.55
Total	101.85		100.00

(1) Příbram, Czech Republic; by electron microprobe, average of 15 analyses, CO<sub>2</sub> and H<sub>2</sub>O by thermal analysis; corresponds to Ca<sub>1.15</sub>Zn<sub>11.01</sub>(UO<sub>2</sub>)<sub>0.96</sub>(CO<sub>3</sub>)<sub>2.97</sub>(OH)<sub>20.30</sub>•3.34H<sub>2</sub>O.

(2) Mas-d'Alary deposit, France; by electron microprobe, average of 17 partial analyses; utilizing CO<sub>2</sub> and H<sub>2</sub>O from (1), corresponds to Ca<sub>1.02</sub>Zn<sub>10.70</sub>(UO<sub>2</sub>)<sub>1.06</sub>(CO<sub>3</sub>)<sub>3.06</sub>(OH)<sub>19.44</sub>•4.16H<sub>2</sub>O.

(3) CaZn<sub>11</sub>(UO<sub>2</sub>)(CO<sub>3</sub>)<sub>3</sub>(OH)<sub>20</sub>•4H<sub>2</sub>O.

**Occurrence:** A rare secondary species at carbonate-hosted polymetallic veins, and nearby oxidizing uranium veins; on dump material and coating mine walls, apparently of post-mine origin.

**Association:** Gypsum, hydrozincite, serpierite, römerite, sphalerite, galena, pyrite, calcite, aragonite (Příbram, Czech Republic); adamite, metalodèveite, umohoite, calcurmolite, uranophane, studdite (Mas-d'Alary deposit, France).

**Distribution:** In the Czech Republic, from the Lill mine, Příbram, and in the Evangelista and Ondřej veins, Jáchymov (Joachimsthal). At the Mas-d'Alary uranium deposit, three km south-southeast of Lodève, Hérault, France. In the St. Christophe mine, near Bärenhecke, Saxony, Germany.

**Name:** For Zn, U, and Ca in the composition.

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

**References:** (1) Ondruš, P., F. Veselovský, and R. Rybka (1990) Znucalite, Zn<sub>12</sub>(UO<sub>2</sub>)Ca(CO<sub>3</sub>)<sub>3</sub>(OH)<sub>22</sub>•4H<sub>2</sub>O, a new mineral from Příbram, Czechoslovakia. *Neues Jahrb. Mineral., Monatsh.*, 393–400. (2) (1991) *Amer. Mineral.*, 76, 1732–1733 (abs. ref. 1). (3) Chiappero, P.J. and H. Sarp (1993) Nouvelles données sur la znucalite et seconde occurrence: Le Mas d'Alary, Lodève (Hérault, France). *Archs Sci. Genève*, 46, 291–301 (in French with English abs.).