Znucalite $CaZn_{11}(UO_2)(CO_3)_3(OH)_{20}\cdot 4H_2O$

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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:* $X = c$; $Y = b$; $Z = a$. $\alpha = 1.556$–1.563 $\beta = 1.600$ $\gamma = 1.620$–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_2	8.25	n.d.	8.14
UO_3	17.42	18.51	17.64
ZnO	56.75	53.52	55.21
CaO	4.06	3.55	3.46
H_2O	15.37	n.d.	15.55
Total	101.85		100.00

(1) Příbram, Czech Republic; by electron microprobe, average of 15 analyses, CO_2 and H_2O by thermal analysis; corresponds to $Ca_{1.15}Zn_{11.01}(UO_2)_{0.96}(CO_3)_{2.97}(OH)_{20.30}\cdot 3.34H_2O$.
(2) Mas-d'Alary deposit, France; by electron microprobe, average of 17 partial analyses; utilizing CO_2 and H_2O from (1), corresponds to $Ca_{1.02}Zn_{10.70}(UO_2)_{1.06}(CO_3)_{3.06}(OH)_{19.44}\cdot 4.16H_2O$.
(3) $CaZn_{11}(UO_2)(CO_3)_3(OH)_{20}\cdot 4H_2O$.

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, metalodèvite, umohoite, calcurmolite, uranophane, studtite (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, $Zn_{12}(UO_2)Ca(CO_3)_3(OH)_{22}\cdot 4H_2O$, 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.).

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