Hydrozincite $Zn_5(CO_3)_2(OH)_6$

Crystal Data: Monoclinic. *Point Group:* $2/m$. Uncommonly as lathlike or bladed crystals, flattened on {100} and elongated along [001], with pointed terminations, to 6 mm; fibrous, stalactitic, reniform, pisolitic, isolated spheroidal and in aggregates, earthy, chalky, massive. *Twinning:* Contact twins on {100}.

Physical Properties: *Cleavage:* On {100}, perfect. *Tenacity:* Very brittle. Hardness = 2–2.5 D(meas.) = 4.00(3) D(calc.) = 4.01 Fluoresces pale blue to lilac under UV.

Optical Properties: Transparent. *Color:* Colorless, white, gray, pale shades of yellow, brown, pink, green, spherules may be concentrically color banded; colorless in transmitted light. *Luster:* Pearly, silky to dull or earthy in aggregates.
Optical Class: Biaxial (–). *Orientation:* $X = b$; $Z \wedge c \simeq 40°$. *Dispersion:* $r < v$, strong.
$\alpha = 1.635$–1.640 $\beta = 1.736$ $\gamma = 1.740$–1.750 2V(meas.) = n.d. 2V(calc.) = 40°

Cell Data: *Space Group:* $C2/m$. a = 13.62 $b = 6.30$ $c = 5.42$ $\beta = 95°50'$ Z = 2

X-ray Powder Pattern: Goodsprings, Nevada, USA.
6.77 (10), 2.480 (7), 2.72 (6), 3.14 (5), 1.688 (4), 2.85 (3), 1.908 (3b)

Chemistry:

	(1)	(2)
CO_2	[16.41]	16.03
ZnO	74.67	74.12
H_2O	8.92	9.85
Total	[100.00]	100.00

(1) Goodsprings, Nevada, USA; CO_2 by difference. (2) $Zn_5(CO_3)_2(OH)_6$.

Occurrence: Uncommonly formed in the oxidized portions of zinc-bearing deposits, at the expense of sphalerite or smithsonite, and as incrustations in mine workings and caves.

Association: Smithsonite, hemimorphite, willemite, cerussite, aurichalcite, calcite, "limonite".

Distribution: Widespread. A few localities affording good specimens include: from Bleiberg, Carinthia, Austria. On Monte Malfidano, near Buggerru, and in the Gutturu Pala mine, north of Iglesias, Sardinia, Italy. In commercial amounts at Picos de Europa, near Santander, and at Udias, Cantabria Province, Spain. In the USA, from Friedensville, Lehigh Co., Pennsylvania; Linden, Iowa Co., Wisconsin; at Joplin, Jasper Co., Missouri; around Galena, Cherokee Co., Kansas; abundant at Goodsprings, Clark Co., Nevada; from the Tintic district, Juab Co., Utah; pure masses in the Texas-Arizona mine, Gunnison Hills, Cochise Co., Arizona. Fine crystals from the Ojuela mine, Mapimí, Durango, Mexico. From the Tchah Kuh mine, Esfahan, and the Dareh-Bandjir and Mehdi-Abad mines, near Anjireh, Iran. In Australia, at Paddy's River mine, Australian Capital Territory; in the Billy Springs mine, near Mt. Fitton, Flinders Ranges, South Australia; and at Broken Hill, New South Wales. From Island Ford Cave, Virginia, USA. In the Shopov's cave system, Bulgaria.

Name: For the non-carbonate essential chemical components, water and *zinc*.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 247–249. (2) Ghose, S. (1964) The crystal structure of hydrozincite, $Zn_5(OH)_6(CO_3)_2$. Acta Cryst., 17, 1051–1057. (3) Jambor, J.L. and G. Pouliot (1965) X-ray crystallography of aurichalcite and hydrozincite. Can. Mineral., 8, 385–389.