Smithsonite $ZnCO_3$

Crystal Data: Hexagonal. *Point Group:* $\bar{3}\ 2/m$. Uncommon as crystals, to 10 cm, rhombohedral $\{10\bar{1}1\}$ and scalenohedral $\{21\bar{3}1\}$, with $\{10\bar{1}0\}$, $\{0001\}$, additional modifying forms, with curved faces; typically botryoidal, reniform, spherulitic; stalactitic, and as cave pearls; earthy, friable, granular to porous or compact massive.

Physical Properties: *Cleavage:* On $\{10\bar{1}1\}$, nearly perfect. *Fracture:* Uneven to conchoidal. *Tenacity:* Brittle. Hardness = 4–4.5 D(meas.) = 4.43(1) D(calc.) = 4.43 May fluoresce pale green or pale blue under UV.

Optical Properties: Translucent to transparent. *Color:* White, pale gray, dark gray, pale brown, brown, more rarely pale shades of red, pink, orange, yellow, green, apple-green, emerald-green, blue, bluish gray; colorless to faintly tinted in transmitted light. *Streak:* White. *Luster:* Vitreous, may be pearly.
Optical Class: Uniaxial (–). $\omega = 1.842$–1.850 $\epsilon = 1.619$–1.623

Cell Data: *Space Group:* $R\bar{3}c$. a = 4.6526(7) $c = 15.0257(22)$ Z = 6

X-ray Powder Pattern: Kabwe, Zambia.
2.760 (100), 3.55 (50), 1.703 (45), 2.327 (25), 1.946 (25), 2.110 (18), 1.515 (14)

Chemistry:

	(1)	(2)
CO_2	35.25	35.10
ZnO	64.55	64.90
MgO	0.04	
CaO	0.35	
insol.	0.07	
Total	100.26	100.00

(1) Aachen district, Germany. (2) $ZnCO_3$.

Polymorphism & Series: Forms two series, with rhodochrosite and with siderite.

Mineral Group: Calcite group.

Occurrence: A secondary mineral formed in the oxidized zone of zinc-bearing deposits and replacing adjacent carbonate rocks, where it may constitute an ore.

Association: Hemimorphite, willemite, hydrozincite, cerussite, malachite, azurite, aurichalcite, anglesite.

Distribution: Many localities, even for fine specimens, including: abundant at Laurium, Greece. In major ore deposits at Tarnowitz and Beuthen, Poland. From Moresnet, Belgium. At Altenberg, near Aachen, North Rhine-Westphalia, Germany. Good crystals from Chessy, near Lyon, Rhône, France. At Bleiberg, Carinthia, Austria. From Iglesias, Sardinia, Italy. Large crystals at Kabwe (Broken Hill), Zambia. Abundant in fine specimens with large crystals, from Tsumeb, Namibia. In the USA, at Friedensville, Lehigh Co., Pennsylvania; in the Joplin district, Jasper Co., Missouri; from the Rush Creek district, Marion Co., Arkansas; an ore at Leadville, Lake Co., Colorado; in the Mammoth-St. Anthony mine, Tiger, Pinal Co., Arizona; fine examples from the Kelly mine, Magdalena, Socorro Co., New Mexico. In Mexico, abundant at Santa Eulalia, Chihuahua, and from Choix, Sinaloa. At Trang da, Tonkin, North Vietnam. From Broken Hill, New South Wales, Australia.

Name: To honor James Lewis (Macie) Smithson (1754–1829), British chemist and mineralogist, whose bequest founded the Smithsonian Institution, Washington, D.C., USA.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 176–180. (2) Effenberger, H., K. Mereiter, and J. Zemann (1981) Crystal structure refinements of magnesite, rhodochrosite, siderite, smithsonite, and dolomite, with discussion of some aspects of the stereochemistry of calcite type carbonates. Zeits. Krist., 156, 233–243. (3) (1958) NBS Circ. 539, 8.