Calcite $CaCO_3$

Crystal Data: Hexagonal. *Point Group:* $\bar{3}\ 2/m$. Well-formed crystals are common, $\{10\bar{1}1\}$, $\{21\bar{3}1\}$, thin to thick tabular $\{0001\}$, with combinations of over 1000 forms noted, to 7 m; granular, stalactitic, in concretions, massive. *Twinning:* On $\{01\bar{1}2\}$, $\{10\bar{1}1\}$, $\{0001\}$, $\{02\bar{2}1\}$ as twin and composition planes.

Physical Properties: *Cleavage:* $\{10\bar{1}1\}$, perfect. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 3 D(meas.) = 2.7102(2) D(calc.) = 2.711 May fluoresce red, blue, yellow, and other colors under either SW and LW UV; phosphorescent, cathodoluminescent, thermoluminescent, rarely triboluminescent.

Optical Properties: Transparent to opaque. *Color:* Colorless or white, also gray, yellow, green, many other colors from included minerals; colorless in transmitted light. *Streak:* White. *Luster:* Vitreous; pearly on cleavages and $\{0001\}$.
Optical Class: Uniaxial (–); anomalously biaxial. *Dispersion:* Very strong.
Absorption: $O > E$. $\omega = 1.658$ $\epsilon = 1.486$ 2V(meas.) = 0° to small.

Cell Data: *Space Group:* $R\bar{3}c$. $a = 4.9896(2)$ $c = 17.0610(11)$ $Z = 6$

X-ray Powder Pattern: Synthetic.
3.035 (100), 2.285 (18), 2.095 (18), 1.913 (17), 1.875 (17), 2.495 (14), 3.86 (12)

Chemistry:

	(1)	(2)		(1)	(2)
CO_2	[44.22]	43.97	MgO	1.74	
FeO	0.43		CaO	53.60	56.03
			Total	[99.99]	100.00

(1) Monterey Formation, California, USA, CO_2 calculated from stoichiometry. (2) $CaCO_3$.

Polymorphism & Series: Trimorphous with aragonite and vaterite; forms a series with rhodochrosite.

Mineral Group: Calcite group.

Occurrence: A major rock-forming mineral; in limestones, marbles, chalks, a common cement in clastic sedimentary rocks, and as gangue in hydrothermal veins; in alkalic to mafic igneous rocks; common as speleothems in caves.

Association: Dolomite, celestine, fluorite, barite, pyrite, marcasite, sphalerite (low-temperature veins); zeolites, chalcedony, "chlorite" (vesicles); talc, tremolite, grossular, quartz (metamorphic); nepheline, diopside, apatite, orthoclase (igneous).

Distribution: Abundant worldwide; a few of the many localities include: in Iceland, at the Helgustadanáma mine, Reydarfjord. In England, from Alston Moor, Egremont, and Frizington, Cumbria; Weardale, Durham; at Liskeard, Cornwall. From St. Andreasberg, Harz Mountains, and Freiberg, Saxony, Germany. At Herja (Kisbánya), Baia Mare (Nagybánya) district, Romania. In the USA, from Rossie and Balmat, St. Lawrence Co., New York; at Hancock, Houghton Co., and in the Phoenix mine, Keeweenaw Co., Michigan; in Missouri, from many mines in Reynolds Co., and at Joplin, Jasper Co.; Galena, Cherokee Co., Kansas; and Picher, Ottawa Co., Oklahoma, in the Tri-State district; from the Elmwood mine, near Carthage, Smith Co., Tennessee; at Bisbee, Cochise Co., Arizona. In Mexico, from Santa Eulalia, and in Areponapuchic Canyon, Chihuahua; at many mines at Guanajuato; from Charcas, San Luis Potosi. At Dal'negorsk, Primorskiy Krai, Russia. From Tsumeb, Namibia. In the Mupine mine, Katanga Province, Congo (Shaba Province, Zaire).

Name: From the Latin *calx*, for *burnt lime*, an allusion to an important commercial use.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 142–160. (2) Chang, L.L.Y., R.A. Howie, and J. Zussman (1996) Rock-forming minerals, (2nd edition), v. 5B, non-silicates, 108–135. (3) Effenberger, H., K. Mereiter, and J. Zemann (1981) Crystal structure refinements of magnesite, calcite, rhodochrosite, siderite, smithsonite, and dolomite, with discussion of some aspects of the stereochemistry of calcite type carbonates. Zeits. Krist., 156, 233–243. (4) (1953) NBS Circ. 539, II, 51.