Phosgenite $Pb_2(CO_3)Cl_2$

Crystal Data: Tetragonal. *Point Group:* $4/m\ 2/m\ 2/m$. Crystals are short prismatic to prismatic [001]; rarely thick tabular {001}; commonly terminated by {001} or with large {111}, to 30 cm; granular, massive.

Physical Properties: *Cleavage:* {001} and {110}, distinct; {100}, indistinct. *Fracture:* Conchoidal. *Tenacity:* Sectile, flexible $\perp$ [001]. Hardness = 2–3, varying with direction. D(meas.) = 6.12–6.15 D(calc.) = 6.124 May fluoresce yellow under LW UV, X-rays, and electron beams.

Optical Properties: Transparent to translucent. *Color:* Pale yellow to yellowish brown, pale brown, smoky brown, smoky violet; colorless, pale rose, gray, yellowish gray, pale green; colorless in transmitted light. *Streak:* White. *Luster:* Adamantine.
Optical Class: Uniaxial (+); anomalously biaxial. *Pleochroism:* Weak; in thick sections; O = pink; E = pale green. $\omega = 2.118$ $\epsilon = 2.145$

Cell Data: *Space Group:* $P4/mbm$. $a = 8.160(4)$ $c = 8.883(6)$ $Z = 4$

X-ray Powder Pattern: In a lead pot from Wookey Hole Cavern, England.
2.79 (vvs), 3.61 (vs), 4.40 (s), 2.56 (s), 4.04 (ms), 2.21 (m), 1.800 (m)

Chemistry:

	(1)	(2)
CO_2	8.13	8.07
PbO	81.78	81.86
Cl	12.91	13.00
$-O = Cl_2$	2.91	2.93
Total	99.91	100.00

(1) Altai district, Siberia. (2) $Pb_2(CO_3)Cl_2$.

Occurrence: Uncommon, typically formed by alteration of galena in the oxidized zone of hydrothermal lead deposits, or by reaction of sea water with other lead minerals.

Association: Cerussite, anglesite, matlockite, laurionite.

Distribution: In England, fine crystals from the Bage and other mines, near Matlock, Derbyshire, and from a number of mines in Cornwall. On Sardinia, Italy, fine crystals from Monteponi and Montevecchio, near Iglesias, and from Gibbas, near Cagliari. In slag from Laurium, Greece. At Tarnowitz, Poland. From the Syzjanov mine, Altai district, Siberia, Russia. Large fine crystals from the Touissit mine, near Oujda, Morocco. At Sidi Amor ben Salem, Tunisia. Large crystals from Tsumeb, Namibia. From Broken Hill, New South Wales, and in the Comet mine, Dundas, Tasmania, Australia. Found at Boleo, near Santa Rosalia, Baja California, Mexico. In the USA, large masses from the Terrible mine, Isle, Custer Co., Colorado; in the Mammoth mine, Tiger, Pinal Co., Arizona; at the Stevenson-Bennett mine, Organ Mountains, Doña Ana Co., New Mexico. From a number of other localities but in small amounts.

Name: From *phosgene*, $COCl_2$, composed of elements in the mineral's composition.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 256–259. (2) Giuseppetti, G. and C. Tadini (1974) Reexamination of the crystal structure of phosgenite, $Pb_2Cl_2(CO_3)$. Tschermaks Mineral. Petrog. Mitt., 21, 101–109. (3) Midgley, H.G. (1958) A further occurrence of phosgenite. Mineral. Mag., 31, 883.