Shannonite $Pb_2O(CO_3)$

Crystal Data: Orthorhombic. *Point Group:* 222. Anhedral to platy crystals, to 400 μm, aggregated into porcelaneous crusts.

Physical Properties: *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = 3–3.5
D(meas.) = n.d. D(calc.) = 7.31–7.59

Optical Properties: Opaque. *Color:* White; white in reflected light, due to white internal reflections. *Streak:* White. *Luster:* Waxy.
Optical Class: Biaxial. n = [2.09] α = n.d. β = n.d. γ = n.d. 2V(meas.) = n.d.

Cell Data: *Space Group:* $P2_12_12_1$ (synthetic). $a = 9.014(1)$ $b = 9.315(1)$ $c = 5.1465(7)$
Z = 4

X-ray Powder Pattern: Grand Reef mine, Arizona, USA.
3.215 (100), 3.181 (90), 4.02 (40), 2.858 (40), 2.564 (35), 6.49 (30), 4.14 (30)

Chemistry:

	(1)	(2)
CO_2	9.70	8.97
PbO	89.9	91.03
Total	99.6	100.00

(1) Grand Reef mine, Arizona, USA; by electron microprobe, CO_2 by CHN analyzer; corresponding to $Pb_{1.91}O(C_{1.05}O_3)$. (2) $Pb_2O(CO_3)$.

Occurrence: A rare secondary mineral formed in the oxidation zone, probably by acidic groundwater reacting with cerussite, in a lead ore deposit (Grand Reef mine, Arizona, USA).

Association: Cerussite, litharge, massicot, minium, hydrocerussite, fluorite, plumbojarosite, hematite, manganese oxides, quartz, muscovite (Grand Reef mine, Arizona, USA).

Distribution: From the Grand Reef mine, about six km northeast of Klondyke, Aravaipa district, Graham Co., Arizona, USA.

Name: Honors David Michael Shannon (1942–2003?2002??ck??), mineral dealer and collector, Mesa, Arizona, USA, who provided the original material.

Type Material: Canadian Geological Survey, Ottawa, Canada, 67216; The Natural History Museum, London, England, 1993,487.

References: (1) Roberts, A.C., J.A.R. Sterling, G.J.C. Carpenter, A.J. Criddle, G.C. Jones, T.C. Birkett, and W.D. Birch (1995) Shannonite, Pb_2OCO_3, a new mineral from the Grand Reef mine, Graham County, Arizona, USA. Mineral. Mag., 59, 305–310. (2) (1996) Amer. Mineral., 81, 252 (abs. ref. 1). (3) Krivovichev, S.V. and P.C. Burns (2000) Crystal chemistry of basic lead carbonates. II. Crystal structure of synthetic shannonite. Mineral. Mag., 64, 1063–1068.