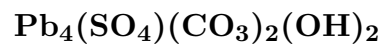


## Susannite



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**Crystal Data:** Hexagonal. *Point Group:* 3. As equant to acute rhombohedral crystals, modified by a prism and basal pinacoid, to 8 cm.

**Physical Properties:** Hardness = n.d. D(meas.) = n.d. D(calc.) = 6.52

**Optical Properties:** Translucent. *Color:* Colorless, white, pale green, pale yellow, brown. *Optical Class:* Uniaxial, may be anomalously biaxial.  $\omega$  = n.d.  $\epsilon$  = n.d.  $2V(\text{meas.}) = 0^\circ\text{--}3^\circ$

**Cell Data:** *Space Group:* P3.  $a = 9.0718(7)$   $c = 11.570(1)$   $Z = 3$

**X-ray Powder Pattern:** Susanna mine, Scotland; nearly identical to leadhillite, from which it may be distinguished by presence of the (101) diffraction peak at 6.5 (1). 3.571 (vs), 2.937 (s), 2.622 (s), 4.538 (ms), 2.113 (ms), 2.316 (m), 2.066 (m)

**Chemistry:** (1) Composition established by crystal-structure analysis.

**Polymorphism & Series:** Trimorphous with leadhillite and macphersonite.

**Occurrence:** A rare secondary mineral in the oxidized zone of hydrothermal lead-bearing deposits, formed at temperatures above 80 °C.

**Association:** Leadhillite, macphersonite, lanarkite, caledonite, cerussite (Leadhills, Scotland).

**Distribution:** From the Susanna mine, Leadhills, Lanarkshire, Scotland. At Caldbeck Fells, Cumbria, England. In Wales, in Dyfed, from the Esgair Hir mine, Bwlch-y-Esgair, Ceulanymaesmawr; in the Bwlch Glas mine; at the Llechweddhelyg mine, Tir-y-Mynach; from the Hendrefelen mine, Ysbyty Ystwyth; and at the Frongoch mine. In Germany, in the Richelsdorfer Mountains, Hesse; from Virneberg, near Rheinbreitbach, Rhineland-Palatinate; at Ramsbeck, North Rhine-Westphalia, Wilnsdorf. Siegerland; and in the Clara mine, near Oberwolfach, Black Forest. In the USA, from the Mammoth-St. Anthony mine, Tiger, Pinal Co., Arizona, and at the Ecton mine, Audubon, Montgomery Co., Pennsylvania. From Iporanga, Sao Paulo, Brazil. Very large crystals at Tsumeb, Namibia.

**Name:** For its first-noted occurrence in the Susanna mine, Leadhills, Scotland.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 298–299. (2) Mrose, M.E. and R.P. Christian (1969) The leadhillite-susannite relation. *Can. Mineral.*, 10, 141 (abs.). (3) Livingstone, A. and J.D. Russell (1985) X-ray powder data for susannite and its distinction from leadhillite. *Mineral. Mag.*, 49, 759–761. (4) Steele, I.M., J.J. Pluth, and A. Livingstone (1999) Crystal structure of susannite,  $\text{Pb}_4\text{SO}_4(\text{CO}_3)_2(\text{OH})_2$ : a trimorph with macphersonite and leadhillite. *Eur. J. Mineral.*, 11, 493–499.