

**Schmiederite****Pb<sub>2</sub>Cu<sub>2</sub>(Se<sup>4+</sup>O<sub>3</sub>)(Se<sup>6+</sup>O<sub>4</sub>)(OH)<sub>4</sub>**

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**Crystal Data:** Monoclinic. *Point Group:* 2/m. Fibrous crystals, to 1 mm, in spherical, radial, or irregular aggregates, may be in crusts; powdery.

**Physical Properties:** Hardness = n.d. D(meas.) = n.d. D(calc.) = 5.62

**Optical Properties:** Transparent. *Color:* Pale to deep Prussian blue. *Luster:* Subadamantine, satiny in aggregates.

*Optical Class:* Biaxial (+).  $\alpha = 1.85\text{--}1.9$   $\beta = 1.9\text{--}1.95$   $\gamma = 1.95\text{--}2.1$  2V(meas.) = n.d.

**Cell Data:** *Space Group:* P2<sub>1</sub>/m (synthetic).  $a = 9.922(3)$   $b = 5.712(2)$   $c = 9.396(3)$   
 $\beta = 101.96(3)^\circ$  Z = 2

**X-ray Powder Pattern:** Cóndor mine, Argentina.

3.23 (100), 3.19 (90), 3.13 (90), 3.57 (60), 4.85 (50), 4.52 (50), 2.74 (40)

**Chemistry:**

	(1)	(2)
SeO <sub>3</sub>	14.72	14.43
SeO <sub>2</sub>	12.86	12.62
CuO	18.09	18.09
PbO	51.25	50.76
H <sub>2</sub> O	[3.08]	4.10
Total	[100.00]	100.00

(1) Cóndor mine, Argentina; partial elemental analysis here recalculated to oxides assuming Se<sup>4+</sup>:Se<sup>6+</sup> = 1:1; corresponds to Pb<sub>2.00</sub>Cu<sub>2.00</sub>(SeO<sub>3</sub>)<sub>1.01</sub>(SeO<sub>4</sub>)<sub>1.01</sub>(OH)<sub>3.99</sub>.

(2) Pb<sub>2</sub>Cu<sub>2</sub>(SeO<sub>3</sub>)(SeO<sub>4</sub>)(OH)<sub>4</sub>.

**Occurrence:** A rare secondary mineral in the oxidized zone of selenium-bearing hydrothermal base metal deposits.

**Association:** Chalcomenite, molybdomenite, umangite, clausthalite (Cóndor mine, Argentina).

**Distribution:** From the Cóndor mine, Los Llantenes district, Sierra de Cacheuta, La Rioja Province, Argentina. In the El Dragón mine, 30 km southwest of Cerro Rico de Potosí, Potosí, Bolivia. In Wales, from the Llechwedd Helyg mine, Tir-y-Mynach, and at the Nantycagl (Eaglebrook) mine, Ceulanymaesmawr, Dyfed; in the Dyfngwm mine, Penegoes, Powis; from Machen. In the Greystone quarry, Levant, Cornwall, England. From the Baccu Locci mine, near Villaputzu, Sarrabus district, Sardinia, Italy. In the Tonopah-Belmont mine, Osborne district, Maricopa Co., Arizona, USA.

**Name:** To honor Oscar Schmieder (1891–1980), German geographer, a Director of the Museum of Mineralogy and Geology, National University, Córdoba, Argentina.

**Type Material:** The Natural History Museum, London, England, 1962,217; National Museum of Natural History, Washington, D.C., USA, 160487.

**References:** (1) Sarp, H. and G. Burri (1987) Étude de la schmiederite de la mine Condor, La Rioja (Sierra de Cacheuta) Argentine, un séléniate et sélénite hydraté de plomb et de cuivre. Schweiz. Mineral. Petrog. Mitt., 67, 219–223 (in French with English abs.). (2) Effenberger, H. (1987) Crystal structure and chemical formula of schmiederite, Pb<sub>2</sub>Cu<sub>2</sub>(OH)<sub>4</sub>(SeO<sub>3</sub>)(SeO<sub>4</sub>), with a comparison to linarite, PbCu(OH)<sub>2</sub>(SO<sub>4</sub>). Mineral. Petrol., 36, 2–12.