

**Crystal Data:** Triclinic. *Point Group:*  $\bar{1}$ . Uncommonly as short prismatic [001] to thick tabular  $\{\bar{1}\bar{1}1\}$  crystals, exhibiting {100}, {130}, {120}, {110},  $\{1\bar{1}0\}$ ,  $\{\bar{1}\bar{1}1\}$ , with 25 other forms noted, to 2 cm; commonly in stalactitic to reniform crusts, cross-vein fibrous, massive, or granular. *Twinning:* Rarely as cruciform intergrowths with {010} common between individuals.

**Physical Properties:** *Cleavage:* Perfect on  $\{1\bar{1}0\}$ ; interrupted on {110}. *Fracture:* Conchoidal. Hardness = 2.5 D(meas.) = 2.286 (synthetic). D(calc.) = 2.282 Soluble in H<sub>2</sub>O, metallic taste; dehydrates in dry air.

**Optical Properties:** Translucent. *Color:* Berlin blue to sky-blue, greenish blue; colorless to pale blue in transmitted light. *Streak:* White. *Luster:* Vitreous to resinous. *Optical Class:* Biaxial (-). *Orientation:* X (169°,76°); Y (76°,78°); Z (-57°,18°) [with c (0°,0°) and b\* (0°,90°) using ( $\phi,\rho$ )]. *Dispersion:*  $r < v$ .  $\alpha = 1.514$   $\beta = 1.537$   $\gamma = 1.543$   $2V(\text{meas.}) = 56^\circ 02'$

**Cell Data:** *Space Group:*  $P\bar{1}$ .  $a = 6.110$   $b = 10.673$   $c = 5.95$   $\alpha = 97^\circ 35'$   $\beta = 107^\circ 10'$   $\gamma = 77^\circ 33'$   $Z = 2$

**X-ray Powder Pattern:** Synthetic. (ICDD 11-646). 4.73 (100), 3.71 (85), 3.99 (60), 3.30 (60), 5.48 (55), 2.749 (50), 2.824 (40)

Chemistry:	(1)	(2)
SO <sub>3</sub>	32.13	32.07
Fe <sub>2</sub> O <sub>3</sub>	0.76	
CuO	31.40	31.86
H <sub>2</sub> O	35.90	36.07
Total	100.19	100.00

(1) Luishia, Shaba Province, Congo. (2) CuSO<sub>4</sub>·5H<sub>2</sub>O.

**Mineral Group:** Chalcanthite group.

**Occurrence:** A secondary mineral in the oxidized portions of copper sulfide deposits, commonly of post-mining formation; rarely as a fumarolic deposit.

**Association:** Melanterite, fibroferrite, rhomboclase, epsomite, goslarite, pickeringite, retgersite, morenosite, brochantite, gypsum.

**Distribution:** Widespread; commercial deposits may occur in arid regions. From the Island of Cyprus. On Vesuvius, Campania, Italy. From Rammelsberg and Goslar, Harz Mountains, Germany. Abundant at Rio Tinto, Huelva, Spain. In Chile, from Chuquicamata, at Quetena, near Calama, and Copaquire, Antofagasta. In the USA, in Arizona, at the United Verde mine, Yavapai Co., and in the Clifton-Morenci district, Greenlee Co.; from the Blue Bird mine, Fierro-Hanover district, Grant Co., New Mexico; commercial amounts in the Bluestone mine, Yerington district, Lyon Co., Nevada; at Butte, Silver Bow Co., Montana; from Ducktown, Polk Co., Tennessee.

**Name:** From an older Latin name, *chalcanthum*, for *flowers of copper*.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 488–491. (2) Iskhakova, L.D., V.K. Trunov, T.M. Shchegoleva, V.V. Ilyukhin, and A.A. Vedernikov (1983) Crystal structure of chalcanthite CuSO<sub>4</sub>·5H<sub>2</sub>O grown under microgravity. *Kristallografiya (Sov. Phys. Crystal.)*, 28, 383–387.