

**Crystal Data:** Monoclinic, pseudo-orthorhombic. *Point Group:*  $2/m$  or  $m$ . Crystals are short prismatic [001], thick to tabular {001}, to 12 cm across, and prismatic [100], to 25 cm long; {001} is striated || [100]. Massive, compact, fine powdery. *Twinning:* Common on {110} yielding pseudo-hexagonal stellate forms; also on {032}, {112}. Seen as lamellar twinning in polished section.

**Physical Properties:** *Cleavage:* Indistinct on {110}. *Fracture:* Conchoidal. *Tenacity:* Brittle, somewhat sectile. Hardness = 2.5–3 VHN = 84–87 (100 g load). D(meas.) = 5.5–5.8 D(calc.) = 5.80

**Optical Properties:** Opaque. *Color:* Blackish lead-gray. *Streak:* Blackish lead-gray. *Luster:* Metallic. *Anisotropism:* Weak.

R<sub>1</sub>–R<sub>2</sub>: (400) 37.0–36.8, (420) 37.8–37.4, (440) 37.7–37.6, (460) 37.0–37.2, (480) 36.2–36.2, (500) 35.6–35.4, (520) 34.7–34.4, (540) 33.7–33.5, (560) 32.5–32.5, (580) 32.1–31.8, (600) 31.3–31.2, (620) 30.8–30.7, (640) 30.0–30.0, (660) 29.5–30.0, (680) 29.2–29.7, (700) 29.0–29.6

**Cell Data:** *Space Group:*  $P2_1/c$  or  $Pc$ .  $a = 11.82$   $b = 27.05$   $c = 13.43$   $\beta = 90^\circ$   
Z = 96

**X-ray Powder Pattern:** Bristol, Connecticut, USA (close to djurleite). 1.8800 (100), 2.4030 (70), 1.9746 (70), 1.8811 (70), 2.4074 (50), 3.276 (35), 2.7256 (35)

Chemistry:	(1)	(2)	(3)
Cu	79.67	79.50	79.86
Fe	0.14	0.17	
S	20.16	20.05	20.14
SiO <sub>2</sub>	0.09	0.17	
Total	100.06	99.89	100.00

(1) Butte, Montana, USA; Fe present as pyrite. (2) New London, Maryland, USA; contains Fe as bornite. (3) Cu<sub>2</sub>S.

**Occurrence:** An uncommon primary hydrothermal mineral but important as a secondary mineral. Found in or below the zone of oxidation in hydrothermal veins and in large low-grade porphyry copper orebodies.

**Association:** Pyrite, chalcopyrite, covellite, bornite, molybdenite, many other sulfides and their alteration products.

**Distribution:** An important and widely distributed ore mineral of copper. Only a few localities producing exceptional crystals or pure masses can be listed. From the Turinsk copper mine, Bogoslovsk, Ural Mountains, Russia. In England, fine crystals from Cornwall at St. Just, St. Ives, Camborne, and Redruth. In the USA, exceptional crystals from Bristol, Hartford Co., Connecticut; in Arizona, at Bisbee, Cochise Co.; from the Magma mine, Superior, Pinal Co.; in the United Verde Extension mine, Yavapai Co.; from Butte, Silver Bow Co., Montana; crystals at the Flambeau mine, southwest of Ladysmith, Rusk Co., Wisconsin; from Kennicott, Copper River district, Alaska. Large crystals from Nababiep West mine, Cape Province, and Messina, Transvaal, South Africa. At M'Passa, Niari Province, Congo Republic. In the Mashamba West mine, Kolwezi, Katanga Province, Congo (Shaba Province, Zaire). Fine crystals from Telfer, Western Australia.

**Name:** For its composition, from the Greek for *chalkos*, copper.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 187–190. (2) Evans, H.T., Jr. (1979) The crystal structures of low chalcocite and djurleite. *Zeits. Krist.*, 150, 299–320. (3) Evans, H.T., Jr. (1979) Djurleite (Cu<sub>1.94</sub>S) and low chalcocite (Cu<sub>2</sub>S): new crystal structure studies. *Science*, 203, 356–358. (4) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 82.

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