

**Crystal Data:** Cubic. *Point Group:*  $4/m\bar{3}2/m$ . As cubic, octahedral, and dodecahedral crystals, to 14 cm, which may be highly modified; as hairlike capillary forms, with square section, reticulated, tufted and matted; also earthy, compact granular, massive.

**Physical Properties:** *Cleavage:* {111}, interrupted; {001}, rare. *Fracture:* Conchoidal to uneven. *Tenacity:* Brittle. Hardness = 3.5–4 VHN = 183–222 (100 g load). D(meas.) = 6.14 D(calc.) = 6.15

**Optical Properties:** Transparent to translucent. *Color:* Cochineal-red, ruby-red, purplish red, to nearly black; in transmitted light, cochineal-red or red in thick sections; yellow-orange, yellow, lemon-yellow in progressively thinner sections; in reflected light, gray blue, commonly with many red internal reflections. *Streak:* Brownish red, shining. *Luster:* Adamantine to submetallic, earthy.

*Optical Class:* Isotropic, anomalously anisotropic. *Pleochroism:* Anomalous, common.  
 $n = 2.849$

R: (400) 32.1, (420) 32.2, (440) 32.3, (460) 31.7, (480) 30.4, (500) 28.8, (520) 27.5, (540) 26.3, (560) 25.5, (580) 24.8, (600) 24.4, (620) 23.9, (640) 23.6, (660) 23.4, (680) 23.2, (700) 23.1

**Cell Data:** *Space Group:*  $Pn\bar{3}m$  (synthetic).  $a = 4.2685(1)$   $Z = 2$

**X-ray Powder Pattern:** Synthetic.  
2.465 (100), 2.135 (37), 1.510 (27), 1.287 (17), 3.020 (9), 1.233 (4), 0.9795 (4)

**Chemistry:** No modern analyses are available.

**Occurrence:** A common mineral in the oxidized portions of many copper deposits.

**Association:** Copper, tenorite, malachite, azurite, calcite, brochantite, antlerite, atacamite, chrysocolla, iron oxides, clay minerals.

**Distribution:** A few localities for fine specimens include: at Bogoslovsk, Nizhni Tagil, and Yekaterinburg (Sverdlovsk), Ural Mountains, Russia. At Dzhezkazgan, Kazakhstan. In England, fine crystals from many mines in Cornwall. At Rheinbreitbach, North Rhine-Westphalia, Germany. In Namibia, large crystals from the Onganja mine, 60 km northeast of Windhoek, and at Tsumeb. At Likasi, Ruwe, and the Mashamba West mine, Kolwezi, Katanga Province, Congo (Shaba Province, Zaire). In the USA, in Arizona, large crystals from Bisbee, Cochise Co., at Ray, Pinal Co., Globe, Gila Co., and elsewhere; from Santa Rita, Grant Co., New Mexico. From Boleo, Baja California, Mexico. At Chuquicamata, Antofagasta, Chile. In Australia, from Broken Hill and Cobar, New South Wales; at Burra-Burra and Moonta, South Australia; large crystals in the Red Dome mine, Chilliago, Queensland.

**Name:** From the Latin *cuprum*, for its copper content.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 491–494. (2) Kirfel, A. and K. Eichhorn (1990) Accurate structure analysis with synchrotron radiation. The electron density in Al<sub>2</sub>O<sub>3</sub> and Cu<sub>2</sub>O. *Acta Cryst.*, A46, 271–284. (3) (1953) NBS Circ. 539, 2, 23.