

**Crystal Data:** Tetragonal. *Point Group:*  $\bar{4}2m$ . Massive, as disseminated small grains; individual grains commonly exhibit rectangular outlines. *Twinning:* Rarely lamellar.

**Physical Properties:** *Cleavage:* Poor, rectangular. *Fracture:* Uneven, subconchoidal. *Tenacity:* Brittle. Hardness = 3 VHN = 88–100 (100 g load). D(meas.) = 6.44–6.49 D(calc.) = 6.590

**Optical Properties:** Opaque. *Color:* Bluish black with reddish cast, weathers to a dull iridescent purple. *Streak:* Black. *Pleochroism:* Pronounced; reddish purple to grayish blue. *Anisotropism:* Very strong; fiery orange to straw-yellow with a rose tint.

R<sub>1</sub>–R<sub>2</sub>: (400) 23.3–24.7, (420) 22.1–22.5, (440) 20.7–20.3, (460) 19.4–18.4, (480) 18.5–17.0, (500) 17.7–15.6, (520) 16.8–14.2, (540) 16.0–13.0, (560) 15.5–12.3, (580) 15.3–12.4, (600) 15.5–13.8, (620) 16.0–16.2, (640) 16.7–19.4, (660) 17.4–22.8, (680) 18.0–26.3, (700) 18.5–29.4

**Cell Data:** *Space Group:*  $P\bar{4}2_1m$ .  $a = 6.4024(5)$   $c = 4.2786(4)$   $Z = 2$

**X-ray Powder Pattern:** Sierra de Umango, Argentina. 3.559 (100), 1.829 (90), 1.778 (80), 3.108 (70), 2.258 (70), 3.202 (60), 1.908 (50)

**Chemistry:**

	(1)	(2)
Cu	54.35	54.69
Ag	0.55	
Se	45.10	45.31
Total	100.00	100.00

(1) Sierra de Umango, Argentina. (2) Cu<sub>3</sub>Se<sub>2</sub>.

**Occurrence:** With other selenides in hydrothermal veins, formed below 112 °C.

**Association:** Clausthalite, tiemannite, berzelianite, guanajuatite, eucairite, klockmannite, hessite, naumannite, chalconenite, chalcopyrite, cobaltite, pyrite, malachite, calcite.

**Distribution:** In Argentina, from the Sierra de Umango [TL], in the Santa Brigida mine, at Los Llantenes, and from Tuminico, Sierra de Cacho, La Rioja Province; and at the Cerro de Cacheuta, Mendoza Province. In Canada, from Lodge Bay on Lake Athabasca, to Ato Bay on Beaverlodge Lake, Saskatchewan, and on Christopher Island, Baker Lake, Northwest Territories. At Skrikerum, near Tryserum, Kalmar, Sweden. In Germany, in the Harz Mountains, at St. Andreasberg, Tilkerode, Zorge, Lerbach, and Clausthal. From the Chaméane uranium mine, near Vernet-la-Varenne, Puy-de-Dôme, France. At Hope's Nose, Torquay, Devon, England. From Kletno, Poland. In the Czech Republic, in the Bukov and Habří mines, near Tisnova; at the Petrovice uranium deposit, near Žďár; and from the Předbořice uranium deposit, near Krásna Hora. At Shinkolobwe, Katanga Province, Congo (Shaba Province, Zaire). From Tsumeb, Namibia. At Kalgoorlie, and from the Copper Hills prospect, East Pilbara region, Western Australia; in the Iron Monarch quarry, Iron Knob, South Australia. In the Frederik VII's mine, near Julianehåb, southern Greenland. A few additional localities are known.

**Name:** For the Sierra de Umango, Argentina, place of first discovery.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 194–195. (2) Earley, J.W. (1950) Description and synthesis of the selenide minerals. *Amer. Mineral.*, 35, 337–364. (3) Heyding, R.D. and R.M. Murray (1976) The crystal structures of Cu<sub>1.8</sub>Se, Cu<sub>3</sub>Se<sub>2</sub>,  $\alpha$ - and  $\beta$ -CuSe, CuSe<sub>2</sub>, and CuSe<sub>2</sub>II. *Can. J. Chem.*, 54, 841–848. (4) Berry, L.G. and R.M. Thompson (1962) X-ray powder data for the ore minerals. *Geol. Soc. Amer. Mem.* 85, 43–44. (5) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 596.

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