

Crystal Data: Tetragonal. *Point Group:* $4/m$ or $\bar{4}$. Crystals commonly square, flat tabular on [001], showing {001} and flat or rounded vicinal faces, {010}, to 11 cm; may be elongated along [001], or pyramidal {011}. Commonly other {0kl}, {hkl} forms, some showing pyramidal hemihedrism; granular, massive. *Twinning:* On {001}, as contact twins, common.

Physical Properties: *Cleavage:* On {011}, distinct; on {001}, {013}, indistinct. *Fracture:* Subconchoidal to uneven. *Tenacity:* Brittle. Hardness = 2.75–3 D(meas.) = 6.5–7.5 D(calc.) = 6.88–7.48 Individuals may be piezoelectric.

Optical Properties: Transparent to opaque. *Color:* Bright yellow, wax-yellow, yellow-orange, bright orange, red-orange, bright red; gray, grayish white, rarely white, colorless; siskin-green, olive-green, pale to dark blue, reddish brown, brown, black. *Streak:* White. *Luster:* Resinous, subadamantine to adamantine.

Optical Class: Uniaxial (–), may be anomalously biaxial. *Pleochroism:* Weak; orange and yellow. $\omega = 2.405$ $\epsilon = 2.283$ $2V(\text{meas.}) = \leq 8^\circ$

Cell Data: *Space Group:* $I4_1/a$, with $a = 5.436(2)$ $c = 12.068(8)$ $Z = 4$, or *Space Group:* $\bar{I}4$, with $a = 5.441(1)$ $c = 12.068(6)$ $Z = 4$

X-ray Powder Pattern: Synthetic.

3.244 (100), 2.021 (30), 2.718 (25), 1.653 (25), 3.028 (20), 1.787 (18), 4.96 (12)

Chemistry:

	(1)	(2)	(3)
MoO ₃	38.87	17.52	17.51
WO ₃		28.22	28.20
PbO	60.91	54.25	54.29
Total	99.78	99.99	100.00

(1) Oudida, Morocco; corresponds to Pb_{1.01}Mo_{1.00}O_{4.00}. (2) Chillago, Australia; corresponds to Pb_{1.00}(Mo_{0.50}W_{0.50})_{Σ=1.00}O_{4.00}. (3) Pb(Mo, W)O₄ with Mo:W = 1:1.

Occurrence: A secondary mineral formed in the oxidized zone of hydrothermal lead deposits, the molybdenum commonly introduced externally.

Association: Cerussite, anglesite, smithsonite, hemimorphite, vanadinite, pyromorphite, mimetite, desclozite, plattnerite, Fe–Mn oxides.

Distribution: Hundreds of localities; a few for fine examples include: from Bleiberg, Carinthia, Austria. At Mežica (Mies) and Črna pri Prevaljah (Schwartzzenbach), Slovenia. In the USA, from Arizona, at the Red Cloud and nearby mines, Silver district, La Paz Co., in the Old Yuma mine, near Tucson, Pima Co., at the Mammoth-St. Anthony mine, Tiger, Pinal Co., large crystals from the Glove mine, near Amado, Tyndall district, Santa Cruz Co., at the Hilltop mine, Chiricahua Mountains, and in the Defiance mine, Gleeson, Cochise Co.; in New Mexico, at the Stevenson-Bennett mine, Organ Mountains, Doña Ana Co.; in the Lucin District, Elko Co., Nevada. In Mexico, from the San Francisco mine, Cerro Prieta, Magdalena, Sonora; at Los Lamentos and Santa Eulalia, Chihuahua; in the Ojuela mine, Mapimí, Durango. Large crystals at Tsumeb, Namibia. Ponderous crystals from Mfouati, Congo Republic. In the Tchah Kharboze mine, Anarak district, Iran. At the Touissit mine, near Oujda, Morocco. From Sidjak, Uzbekistan. At the Christmas mine, Chillago, Queensland, Australia.

Name: To honor Franz Xavier Wulfen (1728–1805), Austrian–German Jesuit, who wrote a monograph on the lead ores of Bleiberg, Austria.

Type Material: Mining Academy, Freiberg, Germany.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 1081–1086. (2) Hibbs, D.E., C.M. Jury, P. Leverett, I.R. Plimer, and P.A. Williams (2000) An explanation for the origin of hemihedrism in wulfenite: the single-crystal structures of $I4_1/a$ and $\bar{I}4$ wulfenites. *Mineral. Mag.*, 64, 1057–1062. (3) (1957) NBS Circ. 539, 7, 23.

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