

**Crystal Data:** Hexagonal. *Point Group:* 6/*m*. Typically in well-developed hexagonal prismatic crystals, to 14 cm, short to long along [0001], with {10 $\bar{1}$ 0}, {0001}, modified by {11 $\bar{2}$ 0}, {10 $\bar{1}$ 1}, {20 $\bar{2}$ 1}, {11 $\bar{2}$ 1}, many others. Commonly cavernous and in parallel groupings; may be acicular, hairlike, fibrous; rarely rounded, globular.

**Physical Properties:** *Fracture:* Uneven to conchoidal. *Tenacity:* Brittle. Hardness = 2.5–3 D(meas.) = 6.88 D(calc.) = 6.95

**Optical Properties:** Subtransparent to opaque. *Color:* Red-orange, deep red, brownish red, brownish yellow, yellow, pale straw-yellow; may be concentrically zoned. *Streak:* White to pale red or pale yellow. *Luster:* Subresinous to subadamantine.

*Optical Class:* Uniaxial (–). *Absorption:*  $E < O$ .  $\omega = 2.416$   $\epsilon = 2.350$

**Cell Data:** *Space Group:*  $P6_3/m$ .  $a = 10.3174$   $c = 7.3378$   $Z = 2$

**X-ray Powder Pattern:** Synthetic.

2.987 (100), 2.995 (92), 3.069 (89), 3.380 (41), 4.470 (35), 3.397 (30), 4.224 (27)

Chemistry:	(1)	(2)
P <sub>2</sub> O <sub>5</sub>	0.30	
As <sub>2</sub> O <sub>5</sub>	trace	
V <sub>2</sub> O <sub>5</sub>	19.10	19.26
PbO	78.07	78.80
CaO	0.07	
Cl	2.66	2.50
–O = Cl <sub>2</sub>	0.60	0.56
Total	99.60	100.00

(1) Obir, Carinthia, Austria. (2) Pb<sub>5</sub>(VO<sub>4</sub>)<sub>3</sub>Cl.

**Mineral Group:** Apatite group.

**Occurrence:** A secondary mineral in the oxidized zone of lead-bearing deposits, the vanadium leached from wall-rock silicates.

**Association:** Mimetite, pyromorphite, descloizite, mottramite, wulfenite, cerussite, anglesite, calcite, barite, iron oxides.

**Distribution:** Many localities, even for fine crystals. From Zimapán, Hidalgo; at San Carlos and Los Lamentos, Chihuahua; and Rayon, Sonora, Mexico. In the USA, in Arizona, fine examples from the Old Yuma mine, near Tucson, Pima Co., at the Hamburg, Red Cloud, and North Geronimo mines, Silver district, La Paz Co., and in the Puzzler mine, Castle Dome district, Yuma Co., from the Mammoth-St. Anthony mine, Tiger, Pinal Co., at the Gallagher mine, near Charleston, Cochise Co., in the Apache mine, Gila Co., at the Western Union mine, near Cerbat, Mohave Co.; in New Mexico, from the Hillsboro and Lake Valley districts, Sierra Co. In Morocco, large crystals from Mibladen, at Taouz, and in the Touissit mine, near Oujda. At Keban, Turkey. Very large crystals from Abenab, Otavi district, Namibia. At Broken Hill, New South Wales, Australia.

**Name:** For its content of *vanadium*.

**Type Material:** Lost at sea.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 895–898. (2) Dai, Y. and J.M. Hughes (1989) Crystal-structure refinements of vanadinite and pyromorphite. *Can. Mineral.*, 27, 189–192. (3) Baker, W.E. (1966) An X-ray diffraction study of synthetic members of the pyromorphite series. *Amer. Mineral.*, 51, 1712–1721.

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