

# Hemihedrite

# Pb<sub>10</sub>Zn(CrO<sub>4</sub>)<sub>6</sub>(SiO<sub>4</sub>)<sub>2</sub>F<sub>2</sub>

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**Crystal Data:** Triclinic. *Point Group:* 1. As euhedral crystals exhibiting hemihedral symmetry, up to 1 cm. *Twinning:* Three laws recognized; by reflection on (223), (012), and (010), with composition surface (010).

**Physical Properties:** Hardness = 3 D(meas.) = 6.42 D(calc.) = 6.50

**Optical Properties:** Translucent to transparent. *Color:* Bright orange, henna-brown, to almost black. *Streak:* Saffron-yellow. *Luster:* Vitreous.

*Optical Class:* Biaxial (-). *Pleochroism:* Feeble, yellow to orange. *Dispersion:* Noticeable, resembles horizontal dispersion. *Absorption:* Z > Y > X.  $\alpha = 2.105(5)$   $\beta = 2.32(2)$   
 $\gamma = 2.65(2)$  2V(meas.) = 92° 2V(calc.) = 88°

**Cell Data:** *Space Group:* P1.  $a = 9.497(1)$   $b = 11.443(2)$   $c = 10.841(2)$   $\alpha = 120^\circ 30'$   
 $\beta = 92^\circ 06'$   $\gamma = 55^\circ 50'$  Z = 1

**X-ray Powder Pattern:** Florence Lead-Silver mine, Arizona, USA.

3.301 (100), 4.872 (90), 4.364 (80), 3.164 (80), 3.102 (80), 2.924 (55), 2.849 (45)

## Chemistry:

	(1)	(2)
SiO <sub>2</sub>	3.2	3.93
CrO <sub>3</sub>	19.5	19.64
ZnO	[3.8]	2.66
PbO	70.5	73.05
F	5.1	1.24
H <sub>2</sub> O	n.d.	
-O = F <sub>2</sub>	2.1	0.52
Total	[100.0]	100.00

(1) Florence Lead-Silver mine, Arizona, USA; average of several analyses, corrected for PbMoO<sub>4</sub> and PbCO<sub>3</sub> impurities, ZnO originally given as 3.93%; recalculated to 100.0%.

(2) Pb<sub>10</sub>Zn(CrO<sub>4</sub>)<sub>6</sub>(SiO<sub>4</sub>)<sub>2</sub>F<sub>2</sub>.

**Polymorphism & Series:** Forms a series with iranite.

**Occurrence:** Formed through oxidation of galena, sphalerite, and pyrite, in the oxide zone of hydrothermal lead-bearing veins.

**Association:** Cerussite, phoenicochroite, vauquelinite, willemite, wulfenite, galena, sphalerite, pyrite, tennantite, chalcopyrite (Florence Lead-Silver mine, Arizona, USA).

**Distribution:** From the Florence Lead-Silver mine, Tortilla Mountains, Pinal Co., and the Pack Rat claim, the Moon Anchor mine, and the Potter-Cramer property, Belmont Mountains, Maricopa Co., Arizona; also from near Boulder City, Clark Co., Nevada, USA. In the Seh-Changi mine, near Neyband, Khorassan, Iran.

**Name:** In allusion to its distinctive *hemihedral* morphology.

**Type Material:** The Natural History Museum, London, England, 1968,246; University of Arizona, Tucson, Arizona; National Museum of Natural History, Washington, D.C., USA, 141026.

**References:** (1) Williams, S.A. and J.W. Anthony (1970) Hemihedrite, a new mineral from Arizona. *Amer. Mineral.*, 55, 1088–1102. (2) McLean, W.J. and J.W. Anthony (1970) The crystal structure of hemihedrite. *Amer. Mineral.*, 55, 1103–1114. (3) Cesbron, F. and S.A. Williams (1980) Iranite–hemihedrite, bellite, phoenicochroite, vauquelinite et fornacite: synthèse et nouvelles données. *Bull. Minéral.*, 103, 469–477 (in French with English abs.).

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