

Crystal Data: Hexagonal. *Point Group:* 6/*m*. Crystals short to long prismatic, may be acicular [0001], with prominent {10 $\bar{1}$ 0}, {0001}, {10 $\bar{1}$ 1}, {20 $\bar{2}$ 1}, hopped terminations typical, to 8 cm, rarely tabular to equant; radiating to branching groups, tapering to a point. Commonly rounded, globular, reniform, botryoidal. *Twining:* On {11 $\bar{2}$ 2}, very rare.

Physical Properties: *Cleavage:* On {10 $\bar{1}$ 1}, interrupted. *Fracture:* Uneven to subconchoidal. *Tenacity:* Brittle. Hardness = 3.5–4 D(meas.) = 7.04 D(calc.) = 7.14 Piezoelectric if biaxial; may fluoresce yellow to orange under LW and SW UV.

Optical Properties: Transparent to translucent. *Color:* Dark grass-green, green, yellow, yellow-orange, reddish orange, yellow-brown, brown, tan, grayish, may be colorless; colorless or nearly so in transmitted light. *Streak:* White. *Luster:* Resinous to subadamantine. *Optical Class:* Uniaxial (-), may be anomalously biaxial (-), sectored. *Pleochroism:* Weak. *Absorption:* $O < E$. $\omega = 2.058$ $\epsilon = 2.048$

Cell Data: *Space Group:* P6₃/*m* (synthetic). $a = 9.987$ $c = 7.330$ $Z = 2$

X-ray Powder Pattern: Synthetic.

2.985 (100), 2.959 (100), 2.885 (60), 4.132 (45), 3.271 (36), 2.063 (34), 3.377 (27)

Chemistry:

	(1)	(2)
P ₂ O ₅	16.11	15.70
As ₂ O ₅	0.13	
PbO	81.33	82.28
Cl	2.71	2.61
-O = Cl ₂	0.61	0.59
Total	99.67	100.00

(1) Wissen, Germany. (2) Pb₅(PO₄)₃Cl.

Mineral Group: Apatite group.

Occurrence: A secondary mineral in the oxidized zone of lead deposits; rarely a volcanic sublimate.

Association: Cerussite, anglesite, smithsonite, willemite, galena.

Distribution: Many localities, even for fine examples. A few include: in Germany, from the Friedrichsseggen and other mines, near Bad Ems, Rhineland-Palatinate. At Příbram, Czech Republic. In England, from Wheal Alfred, Phillack, and elsewhere in Cornwall; at Roughton Gill, Caldbeck Fells, Cumbria. Large masses from the Horcajo mines, 35 km south of Brazortas, Ciudad Real Province, Spain. In France, large crystals from Poullaouen, Finistère; fine groups at the Les Farges mine, Ussel, Corrèze, France. From Beresovsk, near Yekaterinburg (Sverdlovsk), Middle Ural Mountains, Russia. In the USA, at the Wheatley mines, Phoenixville, Chester Co., Pennsylvania; large crystal groups from the Bunker Hill and other mines, Kellogg, Coeur d'Alene district, Shoshone Co., Idaho. At the Society Girl mine, Moyie, British Columbia, Canada. From San Juan Guazapares, Chihuahua, Mexico. At Broken Hill, New South Wales, and Mt. Isa, Queensland, Australia. From the Touissit mine, near Oujda, Morocco. At Kabwe (Broken Hill), Zambia.

Name: From the Greek for *fire* and *form*, as melted globules will recrystallize.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 889–895. (2) Dai, Y. and J.M. Hughes (1989) Crystal-structure refinements of vanadinite and pyromorphite. *Can. Mineral.*, 27, 189–192. (3) Cockbain, A.G. (1968) Lead apatite solid-solution series. *Mineral. Mag.*, 36, 1171–1173. (4) 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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