

# Hedyphane

# Pb<sub>3</sub>Ca<sub>2</sub>(AsO<sub>4</sub>)<sub>3</sub>Cl

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**Crystal Data:** Hexagonal. *Point Group:* 6/*m*. As dipyramidal, tabular, or prismatic crystals, with {10 $\bar{1}$ 0}, {10 $\bar{1}$ 1}, {0001}, several modifying forms, to 3 cm; commonly massive.

**Physical Properties:** *Cleavage:* On {10 $\bar{1}$ 1}, poor. *Fracture:* Subconchoidal. *Tenacity:* Moderately brittle. Hardness = 4.5 D(meas.) = 5.71–5.85 D(calc.) = 5.99 Pale yellow fluorescence in LW UV.

**Optical Properties:** Translucent. *Color:* Yellow, violet, white, colorless, gray, brown; colorless in thin section. *Streak:* White. *Luster:* Vitreous to greasy. *Optical Class:* Uniaxial (+).  $\omega = 1.948$   $\epsilon = 1.958$

**Cell Data:** *Space Group:* P6<sub>3</sub>/*m*.  $a = 10.053$ – $10.140$   $c = 7.185$ – $7.284$   $Z = 2$

**X-ray Powder Pattern:** Långban, Sweden.  
3.014 (10), 2.929 (8), 1.943 (8), 3.586 (7), 4.135 (5), 8.77 (4), 5.070 (4)

Chemistry:	(1)	(2)	(3)
P <sub>2</sub> O <sub>5</sub>	0.4	0.2	
As <sub>2</sub> O <sub>5</sub>	28.2	29.1	29.87
PbO	58.0	52.0	58.03
CaO	10.3	9.1	9.72
SrO	1.0	7.0	
BaO	0.1	0.5	
Cl	3.3	3.4	3.07
–O = Cl <sub>2</sub>	0.7	0.8	0.69
Total	100.6	100.5	100.00

(1) Långban, Sweden; by electron microprobe, corresponding to Ca<sub>2.05</sub>(Pb<sub>2.90</sub>Sr<sub>0.10</sub>) $_{\Sigma=3.00}$  [(AsO<sub>4</sub>)<sub>2.75</sub>(PO<sub>4</sub>)<sub>0.05</sub>] $_{\Sigma=2.80}$ Cl<sub>1.05</sub>. (2) Franklin, New Jersey, USA; by electron microprobe. (3) Pb<sub>3</sub>Ca<sub>2</sub>(AsO<sub>4</sub>)<sub>3</sub>Cl.

**Mineral Group:** Apatite group.

**Occurrence:** A rare secondary mineral in metamorphosed manganese deposits (Sweden); in a metamorphosed stratiform zinc orebody (Franklin, New Jersey, USA).

**Association:** Barite, barylite, rhodonite, hausmannite, bixbyite, phlogopite, amphibole, calcite (Långban, Sweden); barylite, calcite, copper, rhodonite, barite, manganaxinite, willemite, cahnite (Franklin, New Jersey, USA).

**Distribution:** In Sweden, from Långban, Nordmark, and the Harstigen mine, near Persberg, Värmland, and the Sjö mine, near Grythyttan, Örebro. At Brandy Gill, Caldbeck Fells, Cumbria, England. In the Tynagh mine, near Loughrea, Co. Galway, Ireland. From Franklin, Sussex Co., New Jersey, and the Balmat #4 mine, Fowler, St. Lawrence Co., New York, USA. In the San Carlos mine, Santa Eulalia, Chihuahua, Mexico. Large crystals from Tsumeb, Namibia. In the Puttapa zinc mine, near Beltana, South Australia.

**Name:** From the Greek for *beautifully bright*, in allusion to the typical luster of specimens.

**Type Material:** Mining Academy, Freiberg, Germany, 45154; Harvard University, Cambridge, Massachusetts, USA, 90417.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 900–902. (2) Rouse, R.C., P.J. Dunn, and D.R. Peacor (1984) Hedyphane from Franklin, New Jersey and Långban, Sweden: cation ordering in an arsenate apatite. *Amer. Mineral.*, 69, 920–927. (3) Dunn, P.J., R.C. Rouse, and J.A. Nelen (1985) Hydroxyl-bearing hedyphane from Långban, Sweden. *Geol. Fören. Förhandl.* Stockholm, 107, 325–327. (4) Dunn, P.J. (1995) Franklin and Sterling Hill, New Jersey. No publisher, n.p., 650–651.

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