

Orpheite

$\text{H}_6\text{Pb}_{10}\text{Al}_{20}(\text{PO}_4)_{12}(\text{SO}_4)_5(\text{OH})_{40} \cdot 11\text{H}_2\text{O}(\?)$

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Crystal Data: Hexagonal. *Point Group:* $\bar{3} 2/m$. As rhombohedral crystals, to 0.5 mm; as colloform crusts with radial and granular structure and replacements of pyromorphite.

Physical Properties: *Cleavage:* On {0001}, indistinct. Hardness = 3.5 VHN = 261 (50 g load). $D(\text{meas.}) = 3.75(1)$ $D(\text{calc.}) = 3.84$ May fluoresce turquoise-blue.

Optical Properties: Transparent. *Color:* Colorless, gray; pale blue, pale green, yellow-green with copper impurity, may be finely zoned. *Streak:* White to pale blue. *Luster:* Vitreous, dull in aggregates.

Optical Class: Uniaxial (+); uniaxial (-) in part. $\omega = 1.682\text{--}1.704$ $\epsilon = 1.670\text{--}1.691$

Cell Data: *Space Group:* $R\bar{3}m$. $a = 7.00(2)$ $c = 16.72(2)$ $Z = 0.32$

X-ray Powder Pattern: Madjarovo deposit, Bulgaria; close to hinsdalite. (ICDD 29-756). 5.66 (100), 2.967 (97), 3.50 (67), 1.901 (33), 1.749 (26), 4.91 (22), 2.209 (22)

Chemistry:

	(1)
SO ₃	8.32
P ₂ O ₅	17.09
As ₂ O ₅	0.07
Al ₂ O ₃	20.20
CuO	0.52
PbO	40.63
CaO	1.27
H ₂ O ⁺	12.30
H ₂ O ⁻	0.01
LOI	0.10
<u>Total</u>	<u>100.51</u>

(1) Madjarovo deposit, Bulgaria; estimated to contain pyromorphite about 4%; corresponds to $\text{H}_{6.00}(\text{Pb}_{9.05}\text{Ca}_{1.10})_{\Sigma=10.15}(\text{Al}_{19.75}\text{Cu}_{0.30})_{\Sigma=20.05}[(\text{PO}_4)_{12.00}(\text{AsO}_4)_{0.05}]_{\Sigma=12.05}(\text{SO}_4)_{5.15}(\text{OH})_{39.80} \cdot 11.10\text{H}_2\text{O}$.

Occurrence: A rare secondary mineral in the oxidized zone of a polymetallic deposit.

Association: Pyromorphite, anglesite, kaolinite, Fe–Mn hydroxides.

Distribution: From the Madjarovo Pb–Zn deposit, eastern Rhodopes Mountains, 60 km southeast of Haskovo, Bulgaria.

Name: For *Orpheus*, mythical singer in the Rhodopes Mountains.

Type Material: Natural History Museum, Sofia; University of Sofia, Sofia, Bulgaria, 1833.

References: (1) Kolkovski, B. (1971–1972) Orpheite, a new mineral from Madjarovo deposit, eastern Rhodopes Mountain, Bulgaria. *Ann. Univ. Sofia, Fac. Geol. Geogr.*, 64, 107–130 (in English). (2) (1974) *Mineral. Abs.*, 25, 240 (abs. ref. 1). (3) (1976) *Amer. Mineral.*, 61, 176 (abs. ref. 1).