

Hilarionite

Crystal Data: Monoclinic. *Point Group:* 2/m, m, or 2. As sub-parallel to divergent aggregates of prismatic to acicular crystals, to 0.5 mm, also as crusts or as spherulites, to 1 mm.

Physical Properties: *Cleavage:* Good parallel to elongation. *Fracture:* Uneven or splintery. *Tenacity:* Ductile, flexible fibers. Hardness = 2 D(meas.) = 2.40(5) D(calc.) = 2.486

Optical Properties: Translucent. *Color:* Light green (with olive or grayish tint) to yellowish green, colorless in transmitted light. *Streak:* n.d. *Luster:* Vitreous to silky. *Optical Class:* Biaxial(+). $\alpha = 1.575(2)$ $\beta = \text{n.d.}$ $\gamma = 1.640(2)$ 2V = Large. *Dispersion:* Strong, $r > v$. *Orientation:* Z is close to elongation.

Cell Data: *Space Group:* C2/m, Cm, or C2. $a = 18.53(4)$ $b = 17.43(3)$ $c = 7.56(1)$
 $\beta = 94.06(15)^\circ$ Z = 8

X-ray Powder Pattern: Hilarion mine, Lavrion ore district, Atliki Prefecture, Greece. 12.66 (100), 5.00 (10), 4.70 (10), 4.33 (7), 7.60 (6), 2.887 (5), 3.215 (4)

Chemistry:	(1)
MnO	0.03
CuO	0.18
ZnO	0.17
Fe ₂ O ₃	33.83
P ₂ O ₅	0.22
As ₂ O ₅	18.92
SO ₃	22.19
<u>H₂O</u>	<u>26.3</u>
Total	101.82

(1) Hilarion mine, Lavrion ore district, Atliki Prefecture, Greece; average of 7 electron microprobe analyses, Fe⁺³ confirmed by Mössbauer spectroscopy, H₂O determined by Alimarin method, complex anions confirmed by IR spectroscopy; corresponding to (Fe³⁺_{1.90}Cu_{0.01}Zn_{0.01}) $\Sigma=1.92$ [(SO₄)_{1.24}(AsO₄)_{0.74}(PO₄)_{0.01}] $\Sigma=1.99$ (OH)_{1.01}·6.03H₂O.

Occurrence: A secondary mineral in the oxidized zone of a sulfide-rich (pyrite, sphalerite, chalcocopyrite, galena) orebody.

Association: Goethite, gypsum, bukovskyite, jarosite, melanterite, chalcantinite, allophane, azurite, hematite, unidentified hydrous copper sulfates.

Distribution: At the Hilarion mine, near Agios Konstantinos (Kamariza), Lavrion ore district, Atliki Prefecture, Greece.

Name: For the mine that produced the first specimens.

Type Material: A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia (92988) and the Mineralogical Museum, Athens University, Greece.

References: (1) Pekov, I.V., N.V. Chukanov, V.O. Yapaskurt, V.S. Rusakov, D.I. Belakovskiy, A.G. Turchkova, P. Voudouris, A. Magganis, and A. Katerinopoulos (2013) Hilarionite, Fe³⁺₂(SO₄)(AsO₄)(OH)·6H₂O, a new supergene mineral from Lavrion, Greece. Zapiski Rossiyskogo Mineralogicheskogo Obshchestva, 142(5), 30-42 (in Russian with English abstract). (2) (2014) Amer. Mineral., 99, 1515 (abs. ref. 1).