Picropharmacolite $Ca_4Mg(AsO_4)_2(HAsO_3OH)_2 \cdot 11H_2O$

Crystal Data: Triclinic. *Point Group:* $\overline{1}$. Prismatic crystals, rectangular, elongated along [001], to 1 cm; typically in radial aggregates, globular crusts, and fibrous concretions.

Physical Properties: *Cleavage:* {100}, {010}, perfect. Hardness = 1.5–2
D(meas.) = 2.62(2) D(calc.) = 2.60

Optical Properties: Semitransparent. *Color:* White; in transmitted light, colorless.
Luster: Feeble pearly to silky.
Optical Class: Biaxial (+). *Orientation:* $Z \wedge c = 8(1)°$. *Dispersion:* $r < v$, rather strong.
$\alpha = 1.557$–[1.566] $\beta = 1.566$–1.571 $\gamma = 1.577$–1.579 2V(meas.) = 50(2)°

Cell Data: *Space Group:* $P\overline{1}$. $a = 13.547$–13.549 $b = 13.500$–13.562 $c = 6.710$–6.737
$\alpha = 99.63°-99.85°$ $\beta = 96.12°-96.41°$ $\gamma = 91.52°-91.60°$ Z = 2

X-ray Powder Pattern: Richelsdorf, Germany.
13.50 (FFF), 3.18 (F), 9.20 (mF), 3.78 (mF), 3.06 (mF), 2.92 (m), 4.84 (mf)

Chemistry:

	(1)	(2)
As_2O_5	46.93	48.88
MgO	3.73	4.28
CaO	25.77	23.85
H_2O	24.01	22.99
Total	100.44	100.00

(1) Freiberg, Germany. (2) $Ca_4Mg(AsO_4)_2(HAsO_4)_2 \cdot 11H_2O$.

Occurrence: An oxidation product of arsenic-bearing sulfides in reaction with surrounding calcic rocks; a recent efflorescence in mine workings.

Association: Erythrite, pharmacolite.

Distribution: In Germany, from Richelsdorf, Hesse; at Freiberg, Marienberg, Annaberg, and Schneeberg, Saxony; fine examples in the Anton mine, Heubachtal, near Schiltach, and at Wittichen, Black Forest. At Sainte-Marie-aux-Mines, Haut-Rhin, France. From Jáchymov (Joachimsthal), Czech Republic. At the Khovu-Aksy Ni–Co deposit, Tuva, Siberia, Russia. In the Wanthwaite mine, St. John's in the Vale, Cumbria, England. At Silver Glen, Alva, Clackmannanshire, Scotland. From Bou Azzer, Morocco. At Matra, Corsica. In the USA, from Sterling Hill, Ogdensburg, Sussex Co., New Jersey; long fibers at the Getchell mine, Potosi district, Humboldt Co., Nevada.

Name: From the Greek for *bitter*, in allusion to its magnesium content, and its chemical similarity to *pharmacolite*.

Type Material: National School of Mines, Paris, France, 95.497.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 740–741. (2) Pierrot, R. (1961) Nouvelles données sur la picropharmacolite. Bull. Soc. fr. Minéral., 84, 391–396 (in French). (3) Yakhontova, L.K. (1968) Magnesium-calcium and calcium arsenates from the oxidation zone of an arsenide deposit. Trudy Mineral. Muzeya, Akad. Nauk SSSR, 18, 154–167 (in Russian). (4) Abbona, F. and G. Ferraris (1976) On the crystal chemistry of picropharmacolite. Amer. Mineral., 61, 326–328. (5) Catti, M., G. Ferraris, and G. Ivaldi (1981) The crystal structure of picropharmacolite, $Ca_4Mg(HAsO_4)_2(AsO_4)_2 \cdot 11H_2O$. Amer. Mineral., 66, 385–391.