

Ferrarisite**Ca₅(AsO₄)₂(AsO₃OH)₂·9H₂O**

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Crystal Data: Triclinic. *Point Group:* $\bar{1}$. Crystals, flattened on {110}, slightly elongated along $[\bar{1}10]$, with pseudohexagonal outline, to 300 μm .

Physical Properties: *Cleavage:* On {001}, perfect. Hardness = n.d. D(meas.) = 2.63 D(calc.) = 2.594 Dehydrates in dry air.

Optical Properties: Transparent. *Color:* Colorless, white on dehydration. *Optical Class:* Biaxial (+). *Orientation:* $X \wedge c = 17^\circ$; $Z \perp \{110\}$. *Dispersion:* Strong. $\alpha = 1.562(2)$ $\beta = 1.572(2)$ $\gamma = 1.585(2)$ $2V(\text{meas.}) = \sim 90^\circ$ $2V(\text{calc.}) = 83^\circ$

Cell Data: *Space Group:* $P\bar{1}$. $a = 8.294(4)$ $b = 6.722(3)$ $c = 11.198(5)$ $\alpha = 106.16(4)^\circ$ $\beta = 92.94(4)^\circ$ $\gamma = 99.20(4)^\circ$ $Z = 1$

X-ray Powder Pattern: Sainte-Marie-aux-Mines, France. 10.81 (10), 2.831 (9), 3.170 (8), 4.07 (4), 3.573 (4), 6.34 (3), 5.36 (3)

Chemistry:	(1)	(2)
As ₂ O ₅	49.3	49.95
MgO	0.52	
CaO	30.6	30.47
H ₂ O	19.4	19.58
Total	99.8	100.00

(1) Sainte-Marie-aux-Mines, France; by AA, MgO considered as admixed picroparmacolite, H₂O average of two determinations, one by the Penfield method 18.1%, another by TGA 20.7%; corresponds to Ca_{5.00}(AsO₄)₂(AsO₃OH)₂·9.85H₂O. (2) Ca₅(AsO₄)₂(AsO₃OH)₂·9H₂O.

Polymorphism & Series: Dimorphous with guérinite.

Occurrence: A post-mine low-temperature reaction product of carbonate gangue with arsenical solutions derived from arsenic (Sainte-Marie-aux-Mines, France).

Association: Picroparmacolite, pharmacolite, sainfeldite, raenthalite, phaunouxite, calcite, löllingite (Sainte-Marie-aux-Mines, France).

Distribution: From the Gabe-Gottes mine, Raenthal, near Sainte-Marie-aux-Mines, Haut-Rhin, and at Duranus, Alpes-Maritimes, France. In Germany, in the Anton mine, Heubachtal, near Schiltach, Wittichen, Black Forest, in the Bauhaus district, Richelsdorf Mountains, Hesse, and at Ramsbeck, North Rhein-Westphalia.

Name: To honor Professor Giovanni Ferraris (1937–), Institute of Mineralogy, Crystallography and Geochemistry, University of Turin, Turin, Italy, who worked on crystal structures of several arsenate minerals from Sainte-Marie-aux-Mines, France.

Type Material: National School of Mines, Paris, France; Institute of Mineralogy and Crystallography, University of Stuttgart, Stuttgart, Germany; National Museum of Natural History, Washington, D.C., USA, 146899.

References: (1) Bari, H., F. Permingeat, R. Pierrot, and K. Walenta (1980) La ferrarisite Ca₅H₂(AsO₄)₄·9H₂O, une nouvelle espèce minérale dimorphe de la guérinite. Bull. Minéral., 103, 533–540 (in French with English abs.). (2) Catti, M., G. Chiari, and G. Ferraris (1980) The structure of ferrarisite, Ca₅(HAsO₄)₂(AsO₄)₂·9H₂O: disorder, hydrogen bonding, and polymorphism with guerinite. Bull. Minéral., 103, 541–546. (3) (1981) Amer. Mineral., 66, 637 (abs. refs. 1 and 2).