

Destinezite**Fe³⁺₂(PO₄)(SO₄)(OH)·6H₂O**

Crystal Data: Triclinic. *Point Group:* $\bar{1}$. Nodular, reniform, botryoidal, stalactitic, colloform, glassy, earthy.

Physical Properties: *Cleavage:* None. *Fracture:* Conchoidal. *Tenacity:* Brittle. *Hardness* = 3-4
D(meas.) = n.d. D(calc.) = 4.411

Optical Properties: Semitransparent. *Color:* Yellow, brownish yellow, brown; reddish brown, greenish yellow, pale green, pale yellow; in transmitted light, pale yellow to yellowish brown.
Optical Class: Biaxial (+). $\alpha = 1.615$ $\beta = 1.618-1.638$ $\gamma = 1.665-1.670$ $2V(\text{meas.}) = \text{Small}$.
Dispersion: $r > v$, strong.

Cell Data: *Space Group:* $P\bar{1}$. $a = 9.570(1)$ $b = 9.716(1)$ $c = 7.313(1)$ $\alpha = 98.74(1)^\circ$
 $\beta = 107.90(1)^\circ$ $\gamma = 63.86(1)^\circ$ $Z = 2$

X-ray Powder Pattern: Haut-le-Wastia, Belgium.

8.74 (100), 4.377 (100), 8.28 (90), 3.929 (85), 4.082 (65), 2.942 (65), 2.918 (40)

Chemistry:	(1)	(2)
SO ₃	18.85	17.21
P ₂ O ₅	16.76	16.83
Fe ₂ O ₃	37.60	37.80
FeO		0.07
H ₂ O ⁺		16.76
H ₂ O ⁻		10.04
H ₂ O	25.65	
<u>rem.</u>		<u>0.86</u>
Total	100.26	99.57

(1) Visé, Belgium. (2) Haut-le-Wastia, Belgium; H₂O by the Penfield method.

Occurrence: A secondary mineral in gossans and some coal deposits, formed by sulfate-rich solutions acting on earlier phosphates, may be post-mine; in cave deposits, the phosphate derived from guano; widespread in secondary phosphate assemblages in granite pegmatites. As nodular lumps in hematite-rich epiclastic sediments in small crater lakes on the slopes of El Laco volcano.

Association: Pickeringite-apjohnite (Alum Cave Bluff); hematite (El Laco volcano).

Distribution: From Argenteau, Belgium [TL] and Alum Cave Bluff, Great Smoky Mountains National Park, Tennessee, USA. At the El Laco Volcano magnetite deposit, Chile.

Name: Honors M. *Destinez*. Destinezite is visibly crystalline, triclinic Fe₂(PO₄)(SO₄)(OH)·6H₂O. Diadochite is massive to earthy, poorly ordered, X-ray amorphous materials that approximate destinezite in composition.

Type Material: n.d.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 1011-1013. (2) Peacor, D.R., R.C. Rouse, T.D. Coskren, and E.J. Essene (1999) Destinezite ("diadochite"), Fe₂(PO₄)(SO₄)(OH)·6H₂O: its crystal structure and role as a soil mineral at Alum Cave Bluff, Tennessee. *Clays Clay Minerals*, 47, 1-11. (3) (1999) *Amer. Mineral.*, 85, 266 (abs. ref. 2). (4) Van Tassel, R. (1985) *Mineraux phosphates secondaires* (vashegyite, destinezite [= diadochite], wavellite, crandallite, phosphate de fer) a Haut-le-Wastia, province de Namur (Belgique). *Bull. Soc. Belge Géol.*, 94, 19-27 (in French with English abs.). (5) Velasco, F., N. de la Pinta, F. Tornos, T. Briezowski, and A. Larrañaga (2020) The relationship of destinezite to the acid sulfate alteration at the El Laco magnetite deposit, Chile. *Amer. Mineral.*, 105, 860-872.