Heterosite $(Fe^{3+}, Mn^{3+})PO_4$

Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. As cleavable blocky masses.

Physical Properties: *Cleavage:* Good on {100}; poor on {010}; surfaces may be curved. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = 4–4.5 D(meas.) = 3.40 D(calc.) = [3.67]

Optical Properties: Translucent to opaque. *Color:* Deep rose to purple, black. *Streak:* Pale purple. *Luster:* Satiny on fresh surfaces, dull to earthy.
Optical Class: Biaxial (–). *Pleochroism:* Intense; X = yellow brown, $Y = Z$ = reddish purple; optic axis sections show anomalous green interference colors. *Orientation:* $X = a$. *Absorption:* $Z \geq Y > X$. $\alpha = 1.86(1)$ $\beta = 1.89(1)$ $\gamma = 1.91(1)$ 2V(meas.) = 37°

Cell Data: *Space Group: Pmnb.* $a = 5.83(1)$ $b = 9.79(1)$ $c = 4.769(5)$ Z = 4

X-ray Powder Pattern: Palermo #1 mine, New Hampshire, USA. (ICDD 34–134).
2.452 (100), 4.31 (90), 3.46 (85), 2.92 (85), 4.94 (60), 2.412 (40), 2.96 (35)

Chemistry:

	(1)	(2)
P_2O_5	43.45	47.20
Fe_2O_3	38.36	26.55
Mn_2O_3	12.08	26.25
MgO	trace	
CaO	1.37	
Li_2O	trace	
Na_2O	trace	
H_2O	4.82	
insol.	0.19	
Total	100.27	100.00

(1) Hill City, South Dakota, USA. (2) $(Fe, Mn)PO_4$ with Fe:Mn = 1:1.

Polymorphism & Series: Forms a series with purpurite.

Occurrence: A secondary mineral in the oxidized zone of complex granite pegmatites, replacing primary phosphate minerals, principally triphylite.

Association: Triphylite, ferrisicklerite, many secondary Fe–Mn phosphates.

Distribution: Widespread in weathered phosphate-bearing pegmatites. Some prominent localities include: in France, in Haute-Vienne, from near Limoges, Huréaux, and in the La Vilate quarry, near Chanteloube. At Hagendorf, and Hühnerkobel, near Zwiesel, Bavaria, Germany. From the Norrö pegmatite, on Rånö Island; Skrumpetorp, Östergötand; and in the Varuträsk pegmatite, 15 km northwest of Skellefteå, Västerbotten, Sweden. At Sukula and Tammela, Finland. In the USA, from the Fletcher and Palermo #1 mines, near North Groton, Grafton Co., New Hampshire; at Newry, Oxford Co., Maine; around Hill City, Pennington Co., and elsewhere in South Dakota. In the Sapucaia pegmatite mine, about 50 km east-southeast of Governador Valadares, and several other localities in Minas Gerais, Brazil. At the Tsaobismund pegmatite, 60 km south of Karibib, Namibia. From the Angarf-Sud pegmatite, Tazenakht Plain, Anti-Atlas Mountains, Morocco.

Name: From the Greek for *another*, probably because it was the second manganese-bearing species described from the type locality.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 675–677. (2) Eventoff, W., R. Martin, and D.R. Peacor (1972) The crystal structure of heterosite. Amer. Mineral., 57, 45–51.