Panethite $(Na, Ca)(Mg, Fe^{2+})PO_4$

Crystal Data: Monoclinic. *Point Group:* $2/m$. As anhedral grains, to 1 mm. *Twinning:* Simple twinning observed.

Physical Properties: Hardness = n.d. D(meas.) = 2.9–3.0 D(calc.) = [2.96]

Optical Properties: Transparent. *Color:* Pale amber.
Optical Class: Biaxial (–). $\alpha = 1.567(1)$ $\beta = 1.576(1)$ $\gamma = 1.579(1)$ 2V(meas.) = 51°

Cell Data: *Space Group:* $P2_1/n$. $a = 10.18(1)$ $b = 14.90(2)$ $c = 25.87(3)$ $\beta = 91.1°$
Z = 48

X-ray Powder Pattern: Dayton meteorite.
3.007 (10), 2.710 (7), 5.10 (6), 3.236 (5), 2.749 (5), 4.210 (4), 3.951 (4)

Chemistry:

	(1)
P_2O_5	47.7
FeO	5.3
MnO	1.7
MgO	24.1
CaO	5.6
Na_2O	15.2
K_2O	0.9
Total	100.5

(1) Dayton meteorite; by electron microprobe, average of six grains, total Fe as FeO, total Mn as MnO; corresponds to $(Na_{0.77}Ca_{0.14}K_{0.03})_{\Sigma=0.94}(Mg_{0.88}Fe_{0.11}Mn_{0.04})_{\Sigma=1.03}P_{0.98}O_4$.

Occurrence: A very rare mineral in phosphate nodules in an iron meteorite.

Association: Brianite, whitlockite, albite, enstatite, schreibersite, kamacite, taenite, graphite, sphalerite, troilite.

Distribution: In the Dayton very fine octahedrite meteorite.

Name: Honoring Professor Friedrich Adolf Paneth (1887–1958), Austrian chemist, Director of the Max Planck Institute for Chemistry, Mainz, Germany, for his contributions to the study of meteorites.

Type Material: National Museum of Natural History, Washington, D.C., USA, 1506.

References: (1) Fuchs, L.H., E. Olsen, and E.P. Henderson (1967) On the occurrence of brianite and panethite, two new phosphate minerals from the Dayton meteorite. Geochim. Cosmochim. Acta, 31, 1711–1719. (2) (1968) Amer. Mineral., 53, 509 (abs. ref. 1).