

Perhamite**Ca₃Al₇(SiO₄)₃(PO₄)₄(OH)₃•16.5H₂O**

Crystal Data: Hexagonal. *Point Group:* $\bar{3} 2/m$. As radial discoidal, platy hexagonal crystals, in rough spherules, to 1 mm.

Physical Properties: *Cleavage:* Imperfect on {0001}. *Fracture:* n.d. *Tenacity:* Brittle. Hardness = ~5. D(meas.) = 2.64(1) D(calc.) = 2.49

Optical Properties: Translucent to nearly opaque. *Color:* Light brown, white. *Streak:* White. *Luster:* Dull, vitreous on cleavage surface. *Optical Class:* Uniaxial (+). *Dispersion:* $r > v$; moderate. $\omega = 1.564(2)$ $\epsilon = 1.577(4)$

Cell Data: *Space Group:* $P\bar{3}m1$. $a = 7.021(1)$ $c = 20.218$ $Z = 1$

X-ray Powder Pattern: Bell Pit, Maine, USA.

2.882 (100), 5.80 (71), 6.08 (50), 3.510 (50), 3.115 (50), 1.757 (50), 6.71 (35)

Chemistry:	(1)	(2)	(3)
SiO ₂	13.64	13.72	13.47
TiO ₂	0.09		
Al ₂ O ₃	27.09	27.17	29.33
FeO	0.26		
MgO	0.02		
CaO	12.26	12.81	11.66
Na ₂ O	0.02		
F	0.10		
H ₂ O	[24.62]	24.69	[24.2]
P ₂ O ₅	21.90	21.61	21.34
Total	[100.00]	100.00	[100.00]

(1) Bell Pit, Maine, USA; by electron microprobe, average of three analyses, H₂O by difference; corresponding to 3(CaO)3.5(Al₂O₃)3(SiO₂)2(P₂O₅)18(H₂O).

(2) Ca₃Al₇(SiO₄)₃(PO₄)₄(OH)₃•16.5H₂O. (3) Emmons mine, Maine, USA; average of 4 electron microprobe analyses, H₂O by difference, presence of Sr confirmed by EDS analysis; corresponding to (Ca,Sr)₃Al_{7.7}Si₃P₄O_{23.5}(OH)_{14.1}•8H₂O or 3[(Ca,Sr)O]3.85(Al₂O₃)3(SiO₂)2(P₂O₅)15H₂O.

Occurrence: As isolated masses in a vuggy, amblygonite-rich pegmatite (Bell Pit, Maine, USA).

Association: Siderite, wardite, amblygonite, eosphorite, sphalerite (Bell Pit, Maine, USA); fluellite, minyulite, wavellite (Tom's quarry, South Australia).

Distribution: In the USA, from Oxford Co., Maine, in the Bell Pit and Dunton mines, Newry; the Emmons quarry, Greenwood; and in the Ski Pike quarry, Cobble Hill, West Paris; at the Silver Coin mine, near Valmy, Iron Point district, Humboldt Co., Nevada. From Tom's quarry, Kapunda, and the Moculta quarry, Mount Lofty Ranges, South Australia.

Name: Honors Frank Croydon Perham (b. 1934), American geologist and pegmatite miner of West Paris, Maine, USA.

Type Material: The Natural History Museum, London, England (1976,424); National Museum of Natural History, Washington, D.C., USA, (135740, 143393).

References: (1) Dunn, P.J. and D.E. Appleman (1977) Perhamite, a new calcium aluminum silico-phosphate mineral, and a re-examination of viseite. *Mineral. Mag.*, 41, 437-442. (2) (1978) *Amer. Mineral.*, 63, 794 (abs. ref. 1). (3) Mills, S., G. Mumme, I. Grey, and P. Bordet (2006) The crystal structure of perhamite. *Mineral. Mag.*, 70, 201-209. (4) (2007) *Amer. Mineral.*, 92, 1542 (abs. ref. 1).