Monetite $CaHPO_4$

Crystal Data: Triclinic. *Point Group:* $\overline{1}$. Euhedral crystals uncommon, to 7 cm, typically aggregated into crusts, stalactitic, massive. *Twinning:* Multiple, twin plane parallel to elongation.

Physical Properties: *Cleavage:* Indistinct in three directions. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = 3.5 D(meas.) = 2.93 (synthetic). D(calc.) = 2.92

Optical Properties: Translucent. *Color:* Pale yellowish white; colorless in transmitted light. *Luster:* Vitreous.
Optical Class: Biaxial (+). *Orientation:* ∼30° to twin plane. *Dispersion:* $r > v$, weak.
α = 1.587–1.60 β = ∼1.615 γ = 1.640–1.65 2V(meas.) = Large.

Cell Data: *Space Group:* $P\overline{1}$ (synthetic). $a = 6.910(1)$ $b = 6.627(2)$ $c = 6.998(2)$
$\alpha = 96.34(2)°$ $\beta = 103.82(2)°$ $\gamma = 88.33(2)°$ Z = 4

X-ray Powder Pattern: Synthetic. (ICDD 9-80).
2.958 (100), 3.35 (75), 3.37 (70), 2.937 (35), 2.721 (35b), 3.13 (20), 2.754 (20)

Chemistry:

	(1)	(2)
P_2O_5	50.3	52.16
FeO	0.2	
MnO	0.6	
CaO	39.6	41.22
H_2O	n.d.	6.62
Total		100.00

(1) Boqueirão pegmatite, Brazil; by electron microprobe, partial analysis. (2) $CaHPO_4$.

Occurrence: As coatings and cements resulting from guano-induced phosphatization of sedimentary rocks; a coating on phosphate minerals in granite pegmatite.

Association: Newberyite, gypsum, whitlockite, aphthitalite, syngenite (guano-related), apatite, lithiophilite, jahnsite, huréaulite, barbosalite, whitlockite (pegmatites).

Distribution: On Monito (Moneta), Mona, Los Monges, and Aruba Islands, West Indies, Caribbean Sea. From Ascension Island, South Atlantic Ocean. On Paoha Island, Mono Lake, Mono Co., California, USA. From the Boqueirão pegmatite, Parelhas, Rio Grande do Norte, Brazil. In Murra-el-elevyn Cave, Cocklebiddy, Western Australia. From the Gunong Keriang Cave and the Niah Great Cave, Sarawak, Malaysia. At the Sandamap pegmatite, west of Usakos, Namibia.

Name: For Moneta (now Monito) Island, which contains a notable occurrence.

Type Material: The Natural History Museum, London, England, 54779; National Museum of Natural History, Washington, D.C., USA, 123822, 128714.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 660–661. (2) Murdoch, J. (1958) Phosphate minerals of the Borborema pegmatites: II – Boqueirão. Amer. Mineral., 43, 1148–1156. (3) Kampf, A.R. and P.J. Dunn (1994) Chavesite discredited. Amer. Mineral., 79, 385–386. (4) Catti, M., G. Ferraris, and A. Filhol (1977) Hydrogen bonding in the crystalline state. $CaHPO_4$ (monetite), $P\overline{1}$ or $P1$? A novel neutron diffraction study. Acta Cryst., 33, 1223–1229.