

Phurcalite**Ca₂(UO₂)₃O₂(PO₄)₂·7H₂O**

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Crystal Data: Orthorhombic. *Point Group:* 2/m 2/m 2/m. Platy crystals, flattened on [010] and elongated along [001], terminated by {001}, {110}, {111}, to 5 mm. Typically in radiating aggregates and thin crusts.

Physical Properties: *Cleavage:* {010}, {001}, perfect to good; {100}, good. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 2.5–3 VHN = 86–95, 90.5 average (5 g load). D(meas.) = 4.22(4) D(calc.) = 4.220 Radioactive; may fluoresce green under SW UV.

Optical Properties: Transparent. *Color:* Yellow. *Streak:* Pale yellow. *Luster:* Vitreous to adamantine, may be silky in aggregates.

Optical Class: Biaxial (-). *Pleochroism:* Strong; X = colorless to pale yellow; Y = very pale yellow to pale yellow; Z = bright yellow to golden yellow. *Orientation:* X = b; Y = a; Z = c. *Dispersion:* r > v, medium. *Absorption:* X < Y < Z. α = 1.670–1.680 β = 1.720–1.732 γ = 1.749–1.775 2V(meas.) = 68°–82°

Cell Data: *Space Group:* Pbca. a = 17.33–17.426 b = 15.87–16.062 c = 13.548–13.598 Z = 8

X-ray Powder Pattern: Bergen, Germany.

8.05 (100), 3.10 (80), 3.09 (80), 2.878 (70), 3.39 (50), 4.24 (30), 4.00 (30)

Chemistry:

	(1)	(2)	(3)	(4)
UO ₃	70.9	72.0	69.88	69.30
P ₂ O ₅	11.5	9.4	11.52	11.46
As ₂ O ₅		1.4		
SiO ₂			0.23	
CaO	8.3	8.7	9.40	9.06
K ₂ O			0.20	
H ₂ O	[9.3]	8.5	11.62	10.18
Total	[100.0]	100.0	102.85	100.00

(1) Bergen, Germany; by electron microprobe, H₂O by difference. (2) Merrivale quarry, England; by electron microprobe, H₂O by TGA. (3) Perus, Brazil; by electron microprobe, average of 19 analyses, H₂O by elemental analyzer; corresponds to (Ca_{1.97}K_{0.05})_{Σ=2.02}(UO₂)_{2.87}O_{1.97}[(PO₄)_{1.90}(SiO₄)_{0.04}]_{Σ=1.94}·7.57H₂O. (4) Ca₂(UO₂)₃O₂(PO₄)₂·7H₂O.

Occurrence: A secondary mineral in cracks and fractures in granite and granite pegmatites.

Association: Autunite, meta-autunite, uranophane, other secondary uranium minerals.

Distribution: From Bergen, Saxony; at Wittichen, Black Forest; and from Waidhaus, Bavaria. In the Merrivale quarry, Dartmoor, Devon, England. At Nisa, Portugal. From Davignac, Corrèze, France. At Shinkolobwe, Katanga Province, Congo (Shaba Province, Zaire). In the USA, on the Ram claims, Pinto Mountains, Riverside Co., and at the Shale Hills, near Taft, Kern Co., California; from the Posey mine, Red Canyon, San Juan Co., and in the La Sal Mountains, Grand Co., Utah. Fine crystals from Perus, São Paulo, Brazil. At the La Gloria pegmatite, Córdoba Province, Argentina.

Name: For PHosphorus, URanium, and CALcium in the composition.

Type Material: Royal Museum of Central Africa, Tervuren, Belgium, RMG13388; National Museum of Natural History, Washington, D.C., USA, 144187.

References: (1) Deliens, M. and P. Piret (1978) La phurcalite, Ca₂(UO₂)₃(PO₄)₂(OH)₄·4H₂O, nouveau minéral. Bull. Minéral., 101, 356–358 (in French with English abs.). (2) (1979) Amer. Mineral., 64, 243 (abs. ref. 1). (3) Braithwaite, R.S.W., W.H. Paar, and J.E. Chisholm (1989) Phurcalite from Dartmoor, southwest England, and its identity with 'nisaite' from Portugal. Mineral. Mag., 53, 583–589. (4) Atencio, D., R. Neumann, A.J.G.C. Silva, and Y.P. Mascarenhas (1991) Phurcalite from Perus, São Paulo, Brazil, and redetermination of its crystal structure. Can. Mineral., 29, 95–105.

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