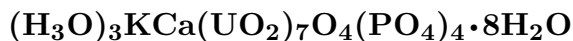


Phosphuranylite



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Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. In thin scales, irregular to rectangular in outline, to 2 mm. Commonly as scaly crusts, thin films, and coatings.

Physical Properties: *Cleavage:* One, perfect, \parallel flattening. *Hardness* = 2–2.5
D(meas.) = \sim 4.1 D(calc.) = 4.575–4.631 *Radioactive.*

Optical Properties: Semitransparent. *Color:* Deep golden yellow, lemon-yellow, honey-yellow.

Optical Class: Biaxial (–), commonly nearly uniaxial (–). *Pleochroism:* $X =$ colorless; $Y = Z =$ golden yellow. *Orientation:* $Z \perp$ flattening. *Dispersion:* $r > v$, strong. *Absorption:* $X < Y = Z$; may be $X < Y < Z$. $\alpha = 1.658\text{--}1.695$ $\beta = 1.699\text{--}1.77$ $\gamma = 1.699\text{--}1.77$ $2V(\text{meas.}) = 0^\circ\text{--}35^\circ$

Cell Data: *Space Group:* $Cmcm$. $a = 15.779\text{--}15.899$ $b = 13.702\text{--}13.790$
 $c = 17.253\text{--}17.330$ $Z = 4$

X-ray Powder Pattern: Flat Rock mine, North Carolina, USA; nearly identical to dewindtite.

7.83 (10), 3.969 (9), 5.829 (8), 3.363 (6), 3.121 (6), 2.858 (6), 1.895 (5)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
UO ₃	76.4	78.1	76.58	CaO	2.3	2.1	2.15
P ₂ O ₅	11.1	10.3	10.86	K ₂ O	n.d.	2.5	1.80
PbO	trace	0.2		H ₂ O	n.d.	[6.8]	8.61
				Total		[100.0]	100.00

(1) Rosmaneira, Portugal; partial analysis. (2) Bois Noirs, France; by electron microprobe, H₂O by difference. (3) (H₃O)₃KCa(UO₂)₇O₄(PO₄)₄•8H₂O.

Occurrence: A secondary mineral typically occurring in the weathering zone of granite pegmatites, coating cracks and fissures near altered uraninite; in paleochannels in sandstone Colorado Plateau-type U–V deposits.

Association: Uraninite, autunite, meta-autunite, uranophane, uranophane-beta, becquerelite, curite, parsonsite, torbernite, metatorbernite, saléeite, sabugalite, haiweeite, uranian “opal”.

Distribution: In the USA, from the Flat Rock and Buchanan pegmatite mines, Mitchell Co., North Carolina; in the Ruggles mine, near Grafton, and the Palermo #1 mine, near North Groton, Grafton Co., New Hampshire; at Newry, Oxford Co., Maine; from Branchville, Fairfield Co., Connecticut; at the Barker (Ferguson) mine, five km southeast of Keystone, Pennington Co., South Dakota; from the DeLongchamps and Red Bluff mines, Pyramid district, Washoe Co., and several other occurrences in Nevada. In Brazil, at the Énio and Córrego do Urucum pegmatites, near Galiléia, Minas Gerais; in the Perus district, 25 km north of São Paulo. From Pamplonita, Colombia. At Peveragno, Piedmont, and Arcu su Linnarbu, near Capoterra, Cagliari, Sardinia, Italy. From the La Crouzille mine and Margnac mine, Compreignac, Haute-Vienne, and at Bois Noirs, Loire, France. From Wölsendorf, Bavaria, Germany. In Portugal, at Carrasca, Sabugal, Mangualde, and elsewhere. From Shinkolobwe, Katanga (Shaba) Province, and at the Kobokobo pegmatite, Lusungu River district, Kivu Province, Congo (Zaire). At Vatovory, Madagascar. In the Saddle Ridge mine, South Alligator Valley, Northern Territory, Australia. Known from a number of other minor localities.

Name: For *phosphorus* and *uranyl* uranium in the composition.

Type Material: Pennsylvania State University, State College, Pennsylvania; Yale University, New Haven, Connecticut, USA, 3249–3251.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana’s system of mineralogy, (7th edition), v. II, 876. (2) Frondel, C. (1950) Studies of uranium minerals (V): phosphuranylite. *Amer. Mineral.*, 35, 756–763. (3) Frondel, C. (1958) Systematic mineralogy of uranium and thorium. *U.S. Geol. Sur. Bull.* 1064, 222–227. (4) Demartin, F., V. Diella, S. Donzelli, C.M. Gramaccioli, and T. Pilat (1991) The importance of accurate crystal structure determination of uranium minerals. I. Phosphuranylite KCa(H₃O)₃(UO₂)₇(PO₄)₄O₄•8H₂O. *Acta Cryst.*, 47, 439–446.

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