

**Upalite****Al(UO<sub>2</sub>)<sub>3</sub>O(PO<sub>4</sub>)<sub>2</sub>(OH)·7H<sub>2</sub>O**

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**Crystal Data:** Monoclinic, pseudo-orthorhombic. *Point Group:* 2/m. Acicular to fibrous crystals, elongated along [001], poorly terminated, to 0.3 mm. *Twinning:* By reflection on {001}, universal.

**Physical Properties:** *Cleavage:* On {010}, distinct. Hardness = 3 D(meas.) = 3.9(1) D(calc.) = 3.94 Radioactive.

**Optical Properties:** Transparent. *Color:* Amber-yellow; canary-yellow in transmitted light. *Optical Class:* Biaxial (-). *Pleochroism:* Strong; X = colorless; Y = Z = canary-yellow. *Orientation:* X = b; Y = a; Z = c. *Orientation:* Negative elongation. α = 1.649 β = 1.666 γ = 1.676 2V(meas.) = n.d. 2V(calc.) = 74(9)°

**Cell Data:** *Space Group:* P2<sub>1</sub>/a. a = 13.704(4) b = 16.82(1) c = 9.332(2) β = 111.5(1)° Z = 4

**X-ray Powder Pattern:** Kobokobo pegmatite, Congo. 8.4 (100), 4.18 (80), 3.43 (80), 2.903 (75), 3.17 (70), 3.084 (70), 4.24 (60)

<b>Chemistry:</b>	(1)	(2)
UO <sub>3</sub>	80.2	72.34
P <sub>2</sub> O <sub>5</sub>	12.3	11.97
Al <sub>2</sub> O <sub>3</sub>	4.0	4.30
H <sub>2</sub> O	[3.5]	11.39
Total	[100.0]	100.00

(1) Kobokobo pegmatite, Congo; by electron microprobe, H<sub>2</sub>O by difference.

(2) Al(UO<sub>2</sub>)<sub>3</sub>O(PO<sub>4</sub>)<sub>2</sub>(OH)·7H<sub>2</sub>O.

**Occurrence:** A rare secondary mineral in the oxidized uraniferous zone of a complex granite pegmatite.

**Association:** Meta-autunite, phosphuranylite, threadgoldite, phuralumite.

**Distribution:** From the Kobokobo pegmatite, Lusungu River district, Kivu Province, Congo (Zaire).

**Name:** For Uranium, Phosphorus, and ALuminum in the composition.

**Type Material:** Royal Museum of Central Africa, Tervuren, Belgium, RMG5951, RMG13457, RMG11888.

**References:** (1) Deliens, M. and P. Piret (1979) Les phosphates d'uranyle et d'aluminium de Kobokobo. II. La phuralumite Al<sub>2</sub>(UO<sub>2</sub>)<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>(OH)<sub>6</sub>·10H<sub>2</sub>O et l'upalite Al(UO<sub>2</sub>)<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>(OH)<sub>3</sub>, nouveaux minéraux. Bull. Minéral., 102, 333-337 (in French with English abs.). (2) (1980) Amer. Mineral., 65, 208 (abs. ref. 1). (3) Piret, P. and J.-P. Declercq (1983) Structure cristalline de l'upalite Al[(UO<sub>2</sub>)<sub>3</sub>O(OH)(PO<sub>4</sub>)<sub>2</sub>]·7H<sub>2</sub>O. Un exemple de macle mimétique. Bull. Minéral., 106, 383-389 (in French with English abs.).