

# Ulrichite

# CaCu(UO<sub>2</sub>)(PO<sub>4</sub>)<sub>2</sub>·4H<sub>2</sub>O

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**Crystal Data:** Monoclinic. *Point Group:* 2/m. As crystals, composed of flat prismatic fibers with complex terminations, to 1 mm, in radial aggregates. *Twining:* On {100}, common.

**Physical Properties:** Hardness = ~3.5 D(meas.) = n.d. D(calc.) = 3.71 Radioactive.

**Optical Properties:** Transparent to translucent. *Color:* Pale apple-green to lime-green; in transmitted light, pale green. *Streak:* White. *Luster:* Vitreous.

*Optical Class:* Biaxial (-) (?). *Orientation:* Parallel extinction, length slow.  $\alpha = 1.622(2)$   
 $\beta = \text{n.d.}$   $\gamma = 1.634(2)$  2V(meas.) = n.d.

**Cell Data:** *Space Group:* C2/m.  $a = 12.79(3)$   $b = 6.85(2)$   $c = 13.02(3)$   $\beta = 91.03(7)^\circ$   
Z = 4

**X-ray Powder Pattern:** Lake Boga quarry, Australia.

6.389 (100), 3.193 (45), 2.879 (20), 4.498 (15), 2.373 (15), 5.602 (14), 3.480 (14)

## Chemistry:

	(1)	(2)
UO <sub>3</sub>	46.36	45.00
P <sub>2</sub> O <sub>5</sub>	22.09	22.33
CuO	11.02	12.51
CaO	9.23	8.82
H <sub>2</sub> O	9.9	11.34
Total	98.60	100.00

(1) Lake Boga quarry, Australia; by electron microprobe, average of 14 analyses, H<sub>2</sub>O by CHN analyzer on a separate sample; corresponds to Ca<sub>1.09</sub>Cu<sub>0.92</sub>(UO<sub>2</sub>)<sub>1.07</sub>(PO<sub>4</sub>)<sub>2.06</sub>·3.65H<sub>2</sub>O.

(2) CaCu(UO<sub>2</sub>)(PO<sub>4</sub>)<sub>2</sub>·4H<sub>2</sub>O.

**Occurrence:** A secondary mineral in miarolitic cavities in pegmatoidal granite.

**Association:** Turquoise-chalcosiderite, cyrilovite, torbernite, libethenite, sampleite, saléeite, fluorapatite.

**Distribution:** From the Lake Boga granite quarry, near Swan Hill, Victoria, Australia.

**Name:** To honor George Henry Frederick Ulrich (1830–1900), for his contributions to the mineralogy of Victoria, Australia.

**Type Material:** Museum Victoria, Melbourne, Australia, M38576.

**References:** (1) Birch, W.D., W.G. Mumme, and E.R. Segnit (1988) Ulrichite: a new copper calcium uranium phosphate from Lake Boga, Victoria, Australia. *Australian Mineral.*, 3, 125–131.

(2) (1990) *Amer. Mineral.*, 75, 243 (abs. ref. 1).