

Rutherfordine

U⁶⁺O₂(CO₃)

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Crystal Data: Orthorhombic. *Point Group:* *mm*2. Crystals are lathlike, elongated along [001], with large {100}, {010}, {001}, to 3 mm; commonly radiating, fibrous, matted, in pulverulent, earthy to very fine-grained dense masses.

Physical Properties: *Cleavage:* On {010}, perfect; on {001}, less perfect. Hardness = n.d. D(meas.) = 5.7 D(calc.) = 5.682 Radioactive.

Optical Properties: Semitransparent. *Color:* Pale yellow, straw-yellow, greenish yellow, orange, amber-brown, may be zoned. *Luster:* Dull to earthy, silky if fibrous. *Optical Class:* Biaxial (+). *Pleochroism:* Slight; X = colorless; Y = pale yellow; Z = pale greenish yellow. *Orientation:* X = b; Y = c; Z = a. $\alpha = 1.715\text{--}1.723$ $\beta = 1.728\text{--}1.730$ $\gamma = 1.755\text{--}1.795$ 2V(meas.) = Large. 2V(calc.) = 53°

Cell Data: *Space Group:* *Imm*2. *a* = 4.840(1) *b* = 9.273(2) *c* = 4.298(1) *Z* = 2

X-ray Powder Pattern: Uluguru Mountains, Tanzania.
4.61 (100), 4.30 (70), 3.23 (40), 3.92 (30), 2.64 (25), 2.309 (20), 2.062 (20)

Chemistry:	(1)	(2)	(3)
CO ₂	13.1	13.6	13.33
UO ₃	86.7	86.6	86.67
H ₂ O ⁺	0.2		
Total	[100.0]	100.2	100.00

(1) Uluguru Mountains, Tanzania; recalculated to 100% from an original total of 100.3%, after deduction of Pb and Ca as kasolite and uranophane, and remaining FeO and CaO as impurities.

(2) Katanga Province, Congo. (3) UO₂(CO₃).

Occurrence: A secondary mineral formed as a weathering product of uraninite.

Association: Uraninite, becquerelite, masuyite, schoepite, kasolite, curite, boltwoodite, vandendriesscheite, billietite, metatorbernite, fourmarierite, studdite, sklodowskite.

Distribution: From the Uluguru Mountains, Morogoro district, Tanzania. At Shinkolobwe, from Kalongwe, and in the Musonoi mine, near Kolwezi, Katanga Province, Congo (Shaba Province, Zaire). In the USA, from Beryl Mountain, Acworth, Sullivan Co., and in the Palermo mine, near North Groton, Grafton Co., New Hampshire; at Newry, Oxford Co., Maine. In Utah, from the Delta mine, Emery Co., and in the "C" group of claims and the Jomac mine, White Canyon district, San Juan Co.; from the Lucky Mc No. 20 mine, Wind River Basin, Fremont Co., Wyoming; near McCoy, Eagle Co., and in the Maybell area, Moffat Co., Colorado; from the Apex uranium mine, Reese River district, Lander Co., Nevada. In England, at Loe Warren zawn, 0.75 km west of Botallack, St. Just, and in the South Terras mine, St. Stephen-in-Brannel, Cornwall. At the Les Mares and Rabéjac uranium deposits, south of Lodève, Hérault, France. From the Krunkelbachtal mine, near Menzenschwand, Black Forest, Germany. In Australia, from the Nabarlek uranium deposit, Northern Territory, and at the Coppertop mine, Peake and Denison Ranges, South Australia.

Name: Honors Professor Ernest Rutherford (1871–1937), New Zealand–English atomic physicist.

Type Material: Natural History Museum, Paris, 109.1083; National Museum of Natural History, Washington, D.C., USA, 93291.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 274–275. (2) Frondel, C. and R. Meyerowitz (1956) Studies of uranium minerals (XIX): rutherfordine, diderichite, and clarkeite. *Amer. Mineral.*, 41, 127–133. (3) Clark, J.R. and C.L. Christ (1956) Some observations on rutherfordine. *Amer. Mineral.*, 41, 844–850. (4) Finch, R.J., M.A. Cooper, and F.C. Hawthorne (1999) Refinement of the crystal structure of rutherfordine. *Can. Mineral.*, 37, 929–938.

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