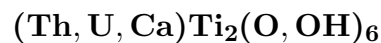


# Thorutite



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**Crystal Data:** Monoclinic; always metamict. *Point Group:* 2, *m*, or 2/*m*. As short prismatic crystals, to 2 cm.

**Physical Properties:** *Fracture:* Conchoidal. Hardness = 5–6 *D*(meas.) = 5.82; 6.0(5) (synthetic ThTi<sub>2</sub>O<sub>6</sub>). *D*(calc.) = [5.65]; 6.08 (synthetic ThTi<sub>2</sub>O<sub>6</sub>).

**Optical Properties:** Translucent. *Color:* Black; brown on thin edges. *Streak:* Pale brown. *Luster:* Resinous.

*Optical Class:* Isotropic. *n* = > 2.1

**Cell Data:** *Space Group:* C2, *Cm*, or C2/*m* (synthetic ThTi<sub>2</sub>O<sub>6</sub>). *a* = 9.822(5) *b* = 3.824(2) *c* = 7.036(5) *β* = 118.84(5)° *Z* = 2

**X-ray Powder Pattern:** Kutuyur-Tyube deposit, Russia; after heating at 1000 °C. 3.17 (7), 1.728 (6), 1.695 (6), 1.632 (3), 2.72 (2), 1.226 (2), 4.35 (1.5)

## Chemistry:

	(1)
UO <sub>3</sub>	0.14
Nb <sub>2</sub> O <sub>5</sub>	1.12
Ta <sub>2</sub> O <sub>5</sub>	0.08
SiO <sub>2</sub>	0.44
TiO <sub>2</sub>	36.1
ThO <sub>2</sub>	54.10
UO <sub>2</sub>	1.43
Al <sub>2</sub> O <sub>3</sub>	1.50
Fe <sub>2</sub> O <sub>3</sub>	1.10
CaO	1.07
H <sub>2</sub> O	0.94
LOI	1.72
Total	99.74

(1) Kutuyur-Tyube deposit, Russia; corresponds to (Th<sub>0.87</sub>Ca<sub>0.08</sub>Fe<sub>0.06</sub><sup>2+</sup>U<sub>0.02</sub><sup>4+</sup>)<sub>Σ=1.03</sub>(Ti<sub>1.92</sub>Al<sub>0.09</sub>Nb<sub>0.03</sub>)<sub>Σ=2.04</sub>(O, OH)<sub>6</sub>.

**Polymorphism & Series:** Forms a series with brannerite.

**Occurrence:** In veins of microcline and sericitized nepheline, in a syenite massif.

**Association:** Thorite, zircon, calcite, barite, galena.

**Distribution:** Kutuyur-Tyube thorium deposit, near Urusai Peak, Sokh River basin, Alai Range, Kyrgyzstan.

**Name:** For the composition, THORium, Uranium, and TITanium.

**Type Material:** All-Union Research Institute of Mineral Resources, Moscow, Russia.

**References:** (1) Gotman, Y.D. and I.A. Khapaev (1958) Thorutite – a new mineral of the group of titanites of thorium. *Zap. Vses. Mineral. Obshch.*, 87, 201–202 (in Russian). (2) (1958) *Amer. Mineral.*, 43, 1007 (abs. ref. 1). (3) Povilaitis, M.M. (1963) On the new minerals lodochnikite, absite, and thorutite. *Zap. Vses. Mineral. Obshch.*, 92, 113–123 (in Russian). (4) Ruh, R. and A.D. Wadsley (1966) The crystal structure of ThTi<sub>2</sub>O<sub>6</sub> (brannerite) [= thorutite]. *Acta Cryst.*, 21, 974–978.