

**Euxenite-(Y)****(Y, Ca, Ce, U, Th)(Nb, Ta, Ti)<sub>2</sub>O<sub>6</sub>**

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**Crystal Data:** Orthorhombic; typically metamict. *Point Group:*  $2/m\ 2/m\ 2/m$ . As stout prismatic crystals, to 10 cm, may be flattened || [100] or [010]; commonly in parallel, subparallel, or radiating aggregates; compact massive. *Twining:* Common on {201}; rare on {101} or {013}.

**Physical Properties:** *Fracture:* Conchoidal to subconchoidal. *Tenacity:* Brittle. Hardness = 5.5–6.5 VHN = 633–692 (50 g load). D(meas.) = 5.3–5.9 D(calc.) = [5.16] Radioactive.

**Optical Properties:** Opaque, translucent on thin edges. *Color:* Black, brownish black, greenish black; brown to yellow-brown in transmitted light. *Streak:* Yellowish, grayish, or reddish brown. *Luster:* Brilliant submetallic, waxy to resinous on fractures.

*Optical Class:* Isotropic.  $n = 2.06\text{--}2.24$

$R_1\text{--}R_2$ : (470) 13.7–15.6, (546) 13.0–15.6, (589) 12.5–15.0, (650) 12.4–15.0

**Cell Data:** *Space Group:*  $Pcmm$  (synthetic  $YNbTiO_6$ ).  $a = 5.5528(6)$   $b = 14.6432(20)$   
 $c = 5.1953(7)$   $Z = 4$

**X-ray Powder Pattern:** Risør, Norway; after heating at 1200 °C.  
2.99 (100), 3.66 (40), 2.95 (40), 2.60 (30), 1.830 (30), 1.727 (30), 2.78 (25)

<b>Chemistry:</b>	(1)		(1)		(1)
UO <sub>3</sub>	0.04	SnO <sub>2</sub>	0.12	MnO	0.59
Nb <sub>2</sub> O <sub>5</sub>	41.43	UO <sub>2</sub>	0.67	PbO	0.37
Ta <sub>2</sub> O <sub>5</sub>	3.84	Al <sub>2</sub> O <sub>3</sub>	0.13	MgO	0.13
SiO <sub>2</sub>	0.07	Ce <sub>2</sub> O <sub>3</sub>	4.34	CaO	4.86
TiO <sub>2</sub>	16.39	(Y,Er) <sub>2</sub> O <sub>3</sub>	18.22	H <sub>2</sub> O <sup>+</sup>	1.90
ThO <sub>2</sub>	4.95	Fe <sub>2</sub> O <sub>3</sub>	1.32	H <sub>2</sub> O <sup>-</sup>	0.06
ZrO <sub>2</sub>	0.04	FeO	0.77		
				Total	100.24

(1) Lyndoch Township, Ontario, Canada.

**Occurrence:** From granite pegmatites; as a component of detrital black sands.

**Association:** Albite, microcline, biotite, muscovite, ilmenite, monazite, xenotime, zircon, beryl, magnetite, garnet, allanite, gadolinite, aeschynite-(Y), thorite, uraninite, betafite, columbite.

**Distribution:** Numerous localities worldwide. In Norway, from Jølster, Söndfjord; at Alve, on Tromö Island; on Hydra (Hitterö) Island, near Flekkefjord; at many other places between Tvedestrand and Arendal, and in Iveland and Evje Parishes, Sättersdal. In Sweden, in the Ruotevare Fe–Ti deposit, near Kvikkjøkk, Norrbotten; at Ytterby, on Resarö Island, near Vaxholm; and elsewhere. From Huntilla, Pitkäranta district, Lake Ladoga, Karelia, Russia. In Madagascar, large crystals from Vohimasina; Ambatofotsikely; Ankazobe, near Ambohitantely; Ambolotara; Ranomafana; and elsewhere. In Brazil, from Santa Clara, Pomba, and Espirito Santo, Minas Gerais. In Canada, from Lyndoch, Sabine, and Mattawan Townships, and elsewhere in Ontario; also in Quebec. In the USA, from the Rutherford pegmatite, Amelia Co., the Nanco pegmatite, Bedford Co., and others in Virginia; from Morton, Delaware Co., Pennsylvania; at Encampment, Carbon Co., Wyoming; from Guffey, Park Co., near Bergen Park, Jefferson Co., and the Colorado feldspar pegmatite, Fremont Co., Colorado.

**Name:** From the Greek for *hospitable*, in allusion to the wide variety of rare elements in its composition.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 787–792. (2) Berman, J. (1955) Identification of metamict minerals by X-ray diffraction. *Amer. Mineral.*, 40, 805–827. (3) Ewing, R. (1973) Vickers hardness and reflectance determinations for metamict AB<sub>2</sub>O<sub>6</sub>-type rare earth Ti-Nb-Ta oxides. *Amer. Mineral.*, 58, 942–944. (4) Ewing, R.C. (1976) A numerical approach toward the classification of complex, orthorhombic, rare-earth, AB<sub>2</sub>O<sub>6</sub>-type Nb-Ta-Ti oxides. *Can. Mineral.*, 14, 111–119. (5) Weitzel, H. and H. Schröcke (1980) Kristallstrukturverfeinerungen von Euxenit, Y(Nb<sub>0.5</sub>Ti<sub>0.5</sub>)<sub>2</sub>O<sub>6</sub>, und M-Fergusonit, YNbO<sub>4</sub>. *Zeits. Krist.*, 152, 69–82 (in German with English abs.).

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