

Crystal Data: Orthorhombic; commonly metamict. *Point Group:* $2/m\ 2/m\ 2/m$. Crystals are stout prismatic \parallel [001], typically flattened on {010}, may be striated \parallel [001] by twinning, to 5 cm; commonly in parallel to radiating aggregates; massive. *Twinning:* Common on {201}; rare on {101} or {013}.

Physical Properties: *Fracture:* Conchoidal to subconchoidal. *Tenacity:* Brittle. Hardness = 5.5–6.5 VHN = 671–755 D(meas.) = 4.7–5.9, may be less when altered. D(calc.) = n.d. Radioactive.

Optical Properties: Opaque, transparent in thin fragments. *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. $n = 2.25$

R: (470) 15.5, (546) 14.6, (589) 13.4, (650) 13.9

Cell Data: *Space Group:* n.d. $Z =$ n.d.

X-ray Powder Pattern: n.d.

Chemistry:	(1)	(2)		(1)	(2)
U ₃ O ₈	10.50	6.48	Fe ₂ O ₃	2.63	0.78
Nb ₂ O ₅	12.73	20.31	FeO	0.51	
Ta ₂ O ₅	13.89		MnO	trace	
SiO ₂	0.74		PbO	0.20	0.64
TiO ₂	27.70	34.41	MgO	0.12	
ThO ₂	1.34	5.22	CaO	0.09	
(Al, Ce) ₂ O ₃	0.62	0.44	H ₂ O		2.04
(Y, Er) ₂ O ₃	25.64	29.28	LOI	3.00	
			Total	99.71	99.60

(1) Maberly, Canada. (2) Santa Clara, Brazil.

Occurrence: In granite pegmatites; rarely as a detrital mineral.

Association: Gadolinite, columbite, xenotime, monazite, allanite, zircon, garnet, beryl, magnetite, fluorite.

Distribution: Less common than euxenite. Some localities for well-characterized material include: from Rasvåg, Hidra (Hitterö) Island, near Flekkefjord, and many other places in Norway. At Slättåkra, Län Jönköping, Sweden. In Lyndoch Township, and about eight km south of Maberly, Ontario, Canada. In the USA, from Zirconia, Henderson Co., North Carolina; at Marietta, Greenville Co., South Carolina; in the Overlook quarry, Day, Saratoga Co., New York; from the Trout Creek Pass pegmatite district, in Park Co., east of Buena Vista, Colorado; at the Baringer Hill pegmatite, 26 km west of Burnet, Llano Co., Texas. From Santa Clara, near Tocantins, Minas Gerais, Brazil. At Cooglegong, Western Australia. Probably from many places in Madagascar but analyses are lacking for the distinction from abundant euxenite.

Name: From the Greek for *many* and a *mixture*, in reference to the large number of chemical elements contained.

References: (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 787–792. (2) Ewing, R. (1973) Vickers hardness and reflectance determinations for metamict AB₂O₆-type rare earth Ti-Nb-Ta oxides. *Amer. Mineral.*, 58, 942–944. (3) Weitzel, H. and H. Schröcke (1980) Kristallstrukturverfeinerungen von Euxenit, Y(Nb_{0.5}Ti_{0.5})₂O₆, und M-Fergusonit, YNbO₄. *Zeits. Krist.*, 152, 69–82 (in German with English abs.).

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