

**Aeschnynite-(Ce)****(Ce, Ca, Fe, Th)(Ti, Nb)<sub>2</sub>(O, OH)<sub>6</sub>**

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**Crystal Data:** Orthorhombic; commonly metamict. *Point Group:*  $2/m\ 2/m\ 2/m$ . Crystals prismatic  $\parallel$  [001], also tabular {010} and striated on {010} parallel to [100], to 10 cm; also massive.

**Physical Properties:** *Cleavage:* {100}, interrupted; parting  $\parallel$  {010} when nonmetamict. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 5–6 VHN = 593–734 D(meas.) = 5.19(5) D(calc.) = 5.617 (synthetic CeTiNbO<sub>6</sub>). Radioactive; magnetic.

**Optical Properties:** Translucent, transparent in very thin fragments. *Color:* Black, brown, light brown to yellow; reddish brown to light brown in transmitted light. *Streak:* Nearly black to brown. *Luster:* Submetallic, resinous to waxy; dull when altered. *Optical Class:* Isotropic when metamict.  $n = 2.26(1)$

**Cell Data:** *Space Group:*  $Pmnb$  (synthetic CeTiNbO<sub>6</sub>).  $a = 7.538$   $b = 10.958$   $c = 5.396$   $Z = 4$

**X-ray Powder Pattern:** Synthetic CeTiNbO<sub>6</sub>. 2.975 (100), 3.024 (80), 3.106 (35), 2.698 (30), 5.48 (25), 4.431 (25), 2.037 (25)

<b>Chemistry:</b>	(1)	(2)		(1)	(2)
Nb <sub>2</sub> O <sub>5</sub>	29.64	23.85	(La, Dy) <sub>2</sub> O <sub>3</sub>	5.60	
Ta <sub>2</sub> O <sub>5</sub>		6.97	Ce <sub>2</sub> O <sub>3</sub>	18.49	19.50
TiO <sub>2</sub>	21.81	22.60	FeO	3.17	4.28
SnO <sub>2</sub>	0.18	trace	CaO	2.75	2.52
ThO <sub>2</sub>	15.75	15.42	LOI	1.07	
(Y, Er) <sub>2</sub> O <sub>3</sub>	1.12	4.53	<hr/>	<hr/>	<hr/>
			Total	99.58	99.67

(1) Miass, Russia. (2) Hidra Island, Norway.

**Polymorphism & Series:** Dimorphous with lucasite-(Ce); forms series with niobaeschnynite-(Ce) and with aeschnynite-(Y).

**Occurrence:** In nepheline syenites and alkali syenite massifs; in granite pegmatites; in carbonatites in alkalic rocks; a detrital mineral in placers.

**Association:** Feldspar, zircon, samarskite, columbite, allanite, titanite.

**Distribution:** From around Miass and Zlatoust, Vishnevyy-Ilmen Mountains, Southern Ural Mountains, Russia. In Norway, on Hidra (Hitterö) Island, from near Arendal, at Frikstad, and elsewhere. In Germany, at Döbschütz and Königshalm, Lausitzer Bergland. From near the Leckbachscharte, Habachtal, and in the Lohninger quarry, near Rauris, Austria. At Val Bedretto and Val Nalps, Tavetsch, Graubünden, Switzerland. In the USA, from south of Darby, Ravalli Co., Montana, and in the Henderson molybdenum mine, Clear Creek Co., Colorado.

**Name:** From the Greek for *shame*, in allusion to the fact that early chemists had difficulty with separations of titanium from zirconium in some samples; *cerium* for the dominant rare-earth element.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 793–797 [eschnynite]. (2) Vlasov, K.A., Ed. (1966) Mineralogy of rare elements, v. II, 489–496. (3) Alexandrov, V.B. (1962) The crystal structure of aeschnynite. Doklady Acad. Nauk SSSR, 142, 181–184. (4) Fleischer, M. (1966) Rare earths in the aeschnynite-priorite series. The status of lyndochite [aeschnynite-(Ce)]. Mineral. Mag., 35, 801–809. (5) 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. (6) (1964) NBS Mono. 25, 3, 24.

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