

**Fergusonite-beta-(Ce)****(Ce, La, Nd)NbO<sub>4</sub>**

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**Crystal Data:** Monoclinic, metamict. *Point Group:* 2. As prismatic crystals terminated by dipyrramids; as anhedral grains, to 1 mm.

**Physical Properties:** *Fracture:* Subconchoidal. *Tenacity:* Brittle. *Hardness* = 6  
D(meas.) = 5.34–5.44 D(calc.) = 5.99

**Optical Properties:** Semitransparent. *Color:* Red to reddish brown. *Streak:* Pale rose.  
*Luster:* Vitreous to greasy; adamantine.  
*Optical Class:* Isotropic.  $n = 2.155$

**Cell Data:** *Space Group:* *I*2.  $a = 5.19$   $b = 11.34$   $c = 5.48$   $\beta = 84^\circ 57'$   $Z = 4$

**X-ray Powder Pattern:** “Northern China”; after heating at 1000 °C for 1 hour.  
3.24 (10), 3.058 (10), 1.965 (10), 1.910 (8), 1.706 (8), 1.677 (8), 1.608 (8)

<b>Chemistry:</b>	(1)	(2)	(1)	(2)
U <sub>3</sub> O <sub>8</sub>		1.01	RE <sub>2</sub> O <sub>3</sub>	46.88
UO <sub>3</sub>	0.07		Fe <sub>2</sub> O <sub>3</sub>	0.66
Nb <sub>2</sub> O <sub>5</sub>	42.98	41.78	FeO	0.95
Ta <sub>2</sub> O <sub>5</sub>	0.09	1.00	MnO	0.03
SiO <sub>2</sub>	0.03		CaO	1.26
TiO <sub>2</sub>	0.12	0.05	H <sub>2</sub> O <sup>+</sup>	n.d.
ThO <sub>2</sub>	8.01	0.88	H <sub>2</sub> O <sup>-</sup>	trace
UO <sub>2</sub>	0.03		<hr/>	
			Total	100.45
				97.70

(1) “Northern China”; RE = La 24.0%, Ce 42.7%, Pr 7.24%, Nd 21.5%, Sm 2.69%, Eu 0.49%, Gd 1.04%, Dy 0.36%. (2) Chernigovsky region, Ukraine; RE = La 15.0%, Ce 40.8%, Pr 4.9%, Nd 19.2%, Sm 1.55%, Eu 0.31%, Gd 0.50%, Tb 0.12%, Dy 0.25%, Ho 0.05%, Yb 0.12%, Lu 0.02%, Y 17.18%; corresponding to (RE<sub>0.98</sub>Ca<sub>0.06</sub>U<sub>0.01</sub>Th<sub>0.01</sub>)<sub>Σ=1.06</sub>(Nb<sub>0.94</sub>Fe<sub>0.03</sub>Ta<sub>0.01</sub>)<sub>Σ=0.98</sub>O<sub>4</sub>.

**Polymorphism & Series:** Dimorphous with fergusonite-(Ce).

**Occurrence:** In magnesian skarn around carbonatite-derived dolomitic marble (“Northern China”); in carbonatite (Chernigovsky region, Ukraine).

**Association:** Diopside, phlogopite, cerian apatite, calcite (“Northern China”); olivine, phlogopite, calcite, magnetite, monazite (Chernigovsky region, Ukraine).

**Distribution:** From an undisclosed locality [eastern Bayan Obo Fe–Nb–RE deposit, 130 km north of Baotou, Inner Mongolia] in “Northern China”. In the Chernigovsky region, Ukraine.

**Name:** In allusion to its dimorphous relation to *fergusonite-(Ce)*.

**Type Material:** n.d.

**References:** (1) Kuo Chi-Ti, Wang I-Hsien, Wang Hsien-Chueh, Wang Chung-Kang, and Hou Hung-Chuan (1973) Studies on minerals of the fergusonite group [brocenite = fergusonite-beta-(Ce)]. *Geochimica*, 2, 86–92 (in Chinese). (2) (1975) *Amer. Mineral.*, 60, 485 (abs. ref. 1). (3) Chashka, A.I., E.Y. Marchenko, V.A. Khovostova, and A.V. Bykova (1976) Brocenite [fergusonite-beta-(Ce)] – the first finding in the USSR. *Zap. Vses. Mineral. Obshch.*, 105, 457–463 (in Russian). (4) Peishan Zhang and Pejie Tao (1987) Characteristics of the fergusonite- and aeschynite-group minerals in China. *Zhongguo Xitu Xuebao*, 5(1), 1–7 (in Chinese). (5) (1987) *Chem. Abs.*, 107, 241 (abs. ref. 4).