

Biraite-(Ce)

Crystal Data: Monoclinic. *Point Group:* 2/m. As prismatic crystals, to 0.1 mm.

Physical Properties: *Cleavage:* n.d. *Fracture:* n.d. *Tenacity:* Brittle. *Hardness* = 5
VHN = 777 (n.d. load). *D(meas.)* = n.d. *D(calc.)* = 4.76

Optical Properties: Translucent. *Color:* Brown, light brownish to colorless in transmitted light.
Streak: White. *Luster:* Vitreous.

Optical Class: Biaxial (-). $\alpha = 1.785(1)$ $\beta = 1.810(2)$ $\gamma = 1.820(1)$ $2V(\text{meas.}) = 66(1)^\circ$
 $2V(\text{calc.}) = 64^\circ$ *Pleochroism:* None. *Dispersion:* Weak, $r < v$.

Cell Data: *Space Group:* $P2_1/c$. $a = 6.505(7)$ $b = 6.744(2)$ $c = 18.561(4)$ $\beta = 108.75(2)^\circ$
 $Z = 4$

X-ray Powder Pattern: Biraia cabonatite dike, Northern Irkutsk district, Siberia, Russia.
2.92 (100), 3.30 (50), 2.65 (50), 2.23 (50), 4.41 (40), 3.61 (40), 3.14 (40)

Chemistry:	(1)		(1)
SiO ₂	21.07	Ce ₂ O ₃	29.58
TiO ₂	0.17	Nd ₂ O ₃	7.53
FeO	7.68	Pr ₂ O ₃	2.71
MnO	1.39	Sm ₂ O ₃	0.70
MgO	1.81	F	0.58
CaO	0.66	CO ₂	7.71
Na ₂ O	0.10	H ₂ O ⁻	1.71
BaO	0.24	-O = F	0.24
La ₂ O ₃	16.52	Total	99.92

(1) Biraia cabonatite dike, Northern Irkutsk district, Siberia, Russia; average of 8 electron microprobe analyses supplemented by IR spectroscopy; corresponds to [(Ce_{1.01}La_{0.57}Nd_{0.25}Pr_{0.09}Sm_{0.02}) $\Sigma=1.94$ Ca_{0.07}Na_{0.02}Ba_{0.01}] $\Sigma=2.04$ (Fe_{0.60}Mg_{0.25}Mn_{0.11}Ti_{0.01}) $\Sigma=0.97$ (CO₃)_{0.99}[Si_{1.97}(O_{6.87}F_{0.17}) $\Sigma=7.04$].

Occurrence: In a vein that cuts fenite fragments in a carbonatite.

Association: Cordylite-(Ce), cordylite-(La), aragonite, dolomite, ancylite-(Ce), ancylite-(La), hydroxylbastnäsite-(Ce), daqingshanite-(Ce), daqingshanite-(La), tremolite, winchite, ferriallanite-(Ce), törnebohmite-(Ce), cerite, chevkinite-(Ce), belkovite, humite, fergusonite-(Ce), fergusonite-(Nd), pyrochlore, barite, monazite-(Ce).

Distribution: From the Biraia cabonatite dike, 145-150 km east of Bodaibo, Northern Irkutsk district, Siberia, Russia.

Name: For the locality that produced the first specimens, the *Biraia* cabonatite dike and the dominant rare earth element, *Cesium*.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (#91375).

References: (1) Konev, A., M. Pasero, D. Pushcharovsky, S. Merlino, A. Kashaev, L. Suvorova, Z. Ushchapovskaya, N. Nartova, Y. Lebedeva, and N. Chukanov (2005) Biraite-(Ce), Ce₂Fe²⁺(CO₃)(Si₂O₇), a new mineral from Siberia with a novel structure type. *Eur. J. Mineral.*, 17, 715-721. (2) (2006) *Amer. Mineral.*, 91, 1201-1202 (abs. ref. 1).