Cebaite-(Ce) $Ba_3Ce_2(CO_3)_5F_2$

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Crystal Data: Monoclinic. *Point Group:* $2/m$. As tabular grains, to 0.2 mm, and granular aggregates.

Physical Properties: *Cleavage:* On $\{30\overline{1}\}$ (?), imperfect. *Fracture:* Uneven.
Hardness = 4.5–5 D(meas.) = 4.31–4.66 D(calc.) = 4.81

Optical Properties: Semitransparent. *Color:* Yellow-orange to wax-yellow. *Streak:* Yellow-orange to pale gray. *Luster:* Vitreous to waxy.
Optical Class: Biaxial (–). $\alpha = 1.598$–1.604 $\beta = 1.735$ $\gamma = 1.740$–1.748 2V(meas.) = 5°–10°

Cell Data: *Space Group:* $C2/m$. $a = 21.42(5)$ $b = 5.078(5)$ $c = 13.30(5)$ $\beta = 94.8(2)°$
$Z = 4$

X-ray Powder Pattern: Bayan Obo deposit, China.
3.25 (10), 1.99 (9), 3.98 (8), 2.11 (8), 2.20 (4), 2.52 (3), 2.35 (3)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
P_2O_5	0.07			CaO	0.29	0.61	
CO_2	23.43	[21.42]	21.36	SrO	0.62	1.43	
RE_2O_3	29.03	28.34	31.86	BaO	43.28	42.77	44.64
Al_2O_3	0.03			Na_2O	0.28	0.10	
Fe_2O_3	0.42			K_2O	0.37		
ThO_2	0.71	0.92		F	3.81	3.76	3.69
FeO		0.16		$-O = F_2$	1.60	1.58	1.55
MnO		0.16		Total	100.74	[98.09]	100.00

(1) Bayan Obo deposit, China; RE = La 31.69%, Ce 46.94%, Pr 5.15%, Nd 12.63%, Sm 1.36%, Eu 0.24%, Gd 0.43%, Tb 0.28%, Dy 0.18%, Er 0.11%, Tm 0.09%, Yb 0.02%, Y 0.88%; stated to correspond to $(Ba_{2.73}Na_{0.09}K_{0.07}Sr_{0.06}Ca_{0.05})_{\Sigma=3.00}(RE_{1.71}Fe^{3+}_{0.05}Th_{0.03}P_{0.01})_{\Sigma=1.80}$ $C_{5.15}O_{15.95}F_{1.94}$. (2) Khibiny massif, Kola Peninsula, Russia; by electron microprobe, CO_2 calculated for stoichiometry; $RE_2O_3 = La_2O_3$ 5.67%, Ce_2O_3 14.45%, Pr_2O_3 1.63%, Nd_2O_3 5.54%, Sm_2O_3 0.48%, Eu_2O_3 0.07%, Gd_2O_3 0.5%; corresponds to $(Ba_{2.90}Sr_{0.14}Ca_{0.11}Na_{0.03}Mn_{0.02})_{\Sigma=3.20}$ $RE_{1.82}(CO_3)_5F_{2.06}$. (3) $Ba_3Ce_2(CO_3)_5F_2$.

Occurrence: In carbonatite-derived dolomitic marble (Bayan Obo deposit, China); in a differentiated alkalic massif (Khibiny massif, Kola Peninsula, Russia).

Association: Zhonghuacerite-(Ce), aegirine, fluorite, barite, apatite (Bayan Obo deposit, China); mckelveyite-(Ce), ewaldite, cordylite-(Ce), donnayite-(Ce) (Khibiny massif, Kola Peninsula, Russia).

Distribution: From the Bayan Obo Fe–Nb–RE deposit, 130 km north of Baotou, Inner Mongolia, China. At the Khibiny massif, Kola Peninsula, Russia. From the Upohlava conglomerates, Slovakia.

Name: For two of the essential elements, CErium and BArium.

Type Material: n.d.

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