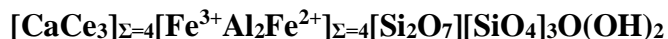


Ferriperbøeite-(Ce)

Crystal Data: Monoclinic. *Point Group:* 2/m. Prismatic crystals elongate along [010], to 500 μm .

Physical Properties: *Cleavage:* Good on {100}, imperfect on {001}. *Fracture:* n.d.
Tenacity: Brittle. *Hardness* = 6-7 *D(meas.)* = n.d. *D(calc.)* = 4.610

Optical Properties: Translucent. *Color:* Brownish black. *Streak:* Brown. *Luster:* Vitreous.
Optical Class: Biaxial (+). *n(calc.)* = 1.84 (from Gladstone-Dale relationship). $2V = 65(5)^\circ$
Pleochroism: Strong, from green through orange-brown, to deep red.

Cell Data: Space Group: $P2_1/m$. $a = 8.9320(4)$ $b = 5.7280(3)$ $c = 17.5549(9)$ $\beta = 116.030(4)^\circ$ $Z = 2$

X-ray Powder Pattern: Nya Bastnäs deposit, Västmanland, Sweden.

2.997 (100), 2.633 (60), 3.520 (45), 2.868 (45), 2.771 (40), 2.100 (35), 2.682 (34)

Chemistry:	(1)	(2)	(1)	(2)	(1)	(2)
CaO	4.53	5.01	Yb ₂ O ₃	0.01	TiO ₂	0.05
La ₂ O ₃	17.62		Lu ₂ O ₃	0.02	P ₂ O ₅	0.08
Ce ₂ O ₃	21.57	43.93	Y ₂ O ₃	0.06	F	0.21
Pr ₂ O ₃	1.52		MgO	2.03	-O = Cl ₂	0
Nd ₂ O ₃	4.08		FeO	[2.89]	-O = F ₂	0.09
Sm ₂ O ₃	0.28		Fe ₂ O ₃	[7.92]	Cl	0.02
Gd ₂ O ₃	0.07		Al ₂ O ₃	8.27	H ₂ O	[1.50] 1.61
Dy ₂ O ₃	0.02		SiO ₂	25.96	Total	98.68 100.00
Ho ₂ O ₃	0.06			26.80		

(1) Nya Bastnäs deposit, Västmanland, Sweden; average of 2 electron microprobe analyses supplemented by FTIR and Mössbauer spectroscopy, H₂O calculated on the basis of OH=1.87 pfu, Fe²⁺/Fe³⁺ apportioned for charge balance; corresponds to (Ca_{0.92}La_{1.23}Ce_{1.50}Pr_{0.10}Nd_{0.27}Sm_{0.02}Y_{0.01})_{Σ=4.05}(Al_{1.85}Fe²⁺_{0.46}Fe³⁺_{1.13}Mg_{0.57}Ti_{0.01})_{Σ=4.02}(Si_{4.92}P_{0.01})_{Σ=4.93}O₂₀[(OH)_{1.87}F_{0.12}Cl_{0.01}].

(2) [CaCe₃]_{Σ=4}[Fe³⁺Al₂Fe²⁺]_{Σ=4}[Si₂O₇][SiO₄]₃O(OH)₂.

Polymorphism & Series: Solid solution with västmanlandite-(Ce), perhaps with perbøeite-(Ce).

Mineral Group: Gatelite supergroup, gatelite group.

Occurrence: In crystal aggregates, largely replacing cerite-(Ce), in a Fe-Cu-REE skarn deposit.

Association: Cerite-(Ce), törnebohmitte-(Ce), ferriallanite-(Ce) (Nya Bastnäs); biraite-(Ce), Mg-analogue to biraite-(Ce), ferriallanite-(Ce), monazite-(Ce), winchite, dolomite, calcite, barite (Ren carbonatite sill).

Distribution: From the Nya Bastnäs Fe-Cu-REE skarn deposit, Bergslagen mining region (Skinnskatteberg) and Högfors Fe mines, Riddarhyttan, Västmanland, and the Rödbergsgruvan Fe mine, Nora, Örebro, Sweden. At the Biraya REE-Fe ore deposit, Vitim highland, Irkutskaya Oblast' and Mochalin Log, Potanin Mountains, southern Urals, Chelyabinsk Oblast', Russia. In the Ren carbonatite sill, Monashee Mountains, British Columbia, Canada.

Name: By analogy to IMA nomenclature for the epidote supergroup, it recognizes a member of the epidote-törnebohmitte polysomatic series and emphasizes the relationship with *perbøeite-(Ce)*.

Type Material: Swedish Museum of Natural History, Stockholm, Sweden (#52:414).

References: (1) Bindi, L., D. Holtstam, G. Fantappiè, U.B. Andersson, and P. Bonazzi (2018) Ferriperbøeite-(Ce), [CaCe₃]_{Σ=4}[Fe³⁺Al₂Fe²⁺]_{Σ=4}[Si₂O₇][SiO₄]₃O(OH)₂, a new member of the polysomatic epidote-törnebohmitte series from the Nya Bastnäs Fe-Cu-REE deposit, Sweden. *Eur. J. Mineral.*, 30(3), 537-544. (2) (2019) *Amer. Mineral.*, 104(4), 625-626 (abs. ref. 1). (3) Bonazzi, P., D. Holtstam and L. Bindi (2019) Gatelite-supergroup minerals: recommended nomenclature and review. *Eur. J. Mineral.*, 31, 173-181.