

Delhuyarite-(Ce)

Crystal Data: Monoclinic. *Point Group:* 2/m. As irregular to prismatic crystals to 0.3 mm.

Physical Properties: *Cleavage:* None. *Fracture:* Irregular to sub-conchoidal. *Tenacity:* n.d. Hardness = 5-6 (by analogy with chevkinite-group minerals). *D(meas.)* = n.d. *D(calc.)* = 5.196

Optical Properties: Translucent. *Color:* Brown-black. *Streak:* Dark brown. *Luster:* Adamantine. *Optical Class:* Biaxial (-). *n(calc.)* = 1.94 *Absorption:* Strong. *Pleochroism:* Strong; rust-red to nearly opaque.

Cell Data: *Space Group:* C2/m. *a* = 13.6020(6) *b* = 5.7445(3) *c* = 10.9996(5) β = 100.721(4)° *Z* = 2

X-ray Powder Pattern: Nya Bastnäs Fe-Cu-REE mines, Skinnskatteberg, Västmanland, Sweden. 3.211 (100), 10.808 (99), 2.726 (91), 2.702 (83), 3.037 (71), 4.611 (71), 3.170 (66)

Chemistry:	(1)	(2)	(1)	(2)
CaO	0.76		La ₂ O ₃	14.58
Fe ₂ O ₃	12.86	11.86	Ce ₂ O ₃	23.29
MgO	2.43	2.99	Pr ₂ O ₃	1.89
Al ₂ O ₃	0.73		Nd ₂ O ₃	6.13
SiO ₂	18.16	17.84	Sm ₂ O ₃	0.74
TiO ₂	0.09		Gd ₂ O ₃	0.37
WO ₃	15.53	17.22	Dy ₂ O ₃	0.03
F	0.05		Er ₂ O ₃	0.04
Cl	0.03		Yb ₂ O ₃	0.12
H ₂ O	[1.33]	1.34	Y ₂ O ₃	0.22
			-O = F ₂	0.02
			-O = Cl ₂	0.01
			Total	99.35
				100.00

(1) Nya Bastnäs mines, Västmanland, Sweden; average of 4 electron microprobe analyses, all Fe is trivalent based on bond distances and charge balance, H₂O calculated from structure, OH⁻ confirmed by Fourier transform infrared spectroscopy; corresponds to (Ce_{1.89}La_{1.19}Nd_{0.48}Pr_{0.15}Sm_{0.06}Gd_{0.03}Y_{0.03}Ca_{0.18})Σ=4.01(Fe³⁺_{2.14}W_{0.89}Mg_{0.80}Al_{0.19}Ti_{0.02})Σ=4.04Si_{4.01}O₂₀(OH_{1.96}F_{0.04})Σ=2.00.
(2) Ce₄Mg(Fe₂³⁺W)□(Si₂O₇)₂O₆(OH)₂.

Mineral Group: Chevkinite group.

Occurrence: As inclusions in a mass of cerite-(Ce) and percleveite-(Ce) in a metasomatic skarn, REE deposit of the 'Bastnäs-type'.

Association: Cerite-(Ce), percleveite-(Ce), tremolite-actinolite, bastnäsite-(Ce), magnetite, quartz, chalcopyrite, ferriallanite-(Ce), törnebohmite-(Ce), scheelite.

Distribution: From Nya Bastnäs Fe-Cu-REE mines (Riddarhyttan ore field), Skinnskatteberg, Västmanland, Sweden.

Name: Honors mineral chemists and metallurgists, Juan José (1754-1796) and Fausto Fermín (1755-1833) de Elhuyar y de Lubice, French-Basque brothers who first isolated tungsten metal in 1783. The suffix, (Ce), indicates the dominant REE in the essential composition.

Type Material: Department of Geosciences, Swedish Museum of Natural History, Stockholm, Sweden (NRM 19060375).

References: (1) Holstam, D., L. Bindi, U. Hålenius, and U.B. Andersson (2017) Delhuyarite-(Ce) - Ce₄Mg(Fe₂³⁺W)□(Si₂O₇)₂O₆(OH)₂ - a new mineral of the chevkinite group, from the Nya Bastnäs Fe-Cu-REE deposit, Sweden. *Eur. J. Mineral.*, 29(5), 897-905. (2) (2018) *Amer. Mineral.*, 103, 1712 (abs. ref. 1).