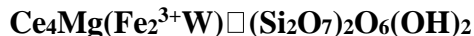


**Delhuyarite-(Ce)**

**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)  $\beta$  = 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)

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

(1) Nya Bastnäs mines, Västmanland, Sweden; average of 4 electron microprobe analyses, all Fe is trivalent based on bond distances and charge balance, H<sub>2</sub>O calculated from structure, OH<sup>-</sup> confirmed by Fourier transform infrared spectroscopy; corresponds to (Ce<sub>1.89</sub>La<sub>1.19</sub>Nd<sub>0.48</sub>Pr<sub>0.15</sub>Sm<sub>0.06</sub>Gd<sub>0.03</sub>Y<sub>0.03</sub>Ca<sub>0.18</sub>) $\Sigma=4.01$ (Fe<sup>3+</sup><sub>2.14</sub>W<sub>0.89</sub>Mg<sub>0.80</sub>Al<sub>0.19</sub>Ti<sub>0.02</sub>) $\Sigma=4.04$ Si<sub>4.01</sub>O<sub>20</sub>(OH<sub>1.96</sub>F<sub>0.04</sub>) $\Sigma=2.00$ .

(2) Ce<sub>4</sub>Mg(Fe<sub>2</sub><sup>3+</sup>W)□(Si<sub>2</sub>O<sub>7</sub>)<sub>2</sub>O<sub>6</sub>(OH)<sub>2</sub>.

**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), törnebohmitite-(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) - Ce<sub>4</sub>Mg(Fe<sub>2</sub><sup>3+</sup>W)□(Si<sub>2</sub>O<sub>7</sub>)<sub>2</sub>O<sub>6</sub>(OH)<sub>2</sub> - 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).