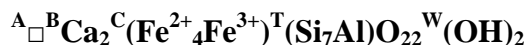


Ferro-ferri-hornblende

Crystal Data: Monoclinic. *Point Group:* 2/m. Crystals acicular to lamellar.

Physical Properties: *Cleavage:* Perfect on {110}. *Fracture:* n.d. *Tenacity:* Brittle.
Hardness = [6] D(meas.) = 3.362 D(calc.) = 3.35

Optical Properties: Transparent. *Color:* Dark green. *Streak:* n.d. *Luster:* Vitreous.
Optical Class: Biaxial (-). $\alpha = 1.697(2)$ $\beta = 1.722(5)$ $\gamma = 1.726(5)$ $2V(\text{meas.}) = 35.7^\circ$
 $2V(\text{calc.}) = 43^\circ$ *Orientation:* $X \wedge a = 26.2^\circ$ (β obtuse), $Y // b$, $Z \wedge c = 11.5^\circ$ (β acute).
Pleochroism: Weak; $X =$ medium gold/brown, $Y =$ dark brown/black, $Z =$ dark gray.
Absorption: $X < Z < Y$.

Cell Data: *Space Group:* C2/m. $a = 9.9307(5)$ $b = 18.2232(10)$ $c = 5.3190(3)$
 $\beta = 104.857(1)^\circ$ $Z = 2$

X-ray Powder Pattern: Traversella iron mine, Val Chiusella, Ivrea, Piemonte, Italy.
8.493 (100), 2.728 (69), 3.151 (47), 2.555 (37), 2.615 (32), 2.359 (28), 3.406 (26)

Chemistry:	(1)	(2)		(1)	(2)
SiO ₂	46.63	43.41	ZnO	0.03	
TiO ₂	0.05		CaO	11.59	11.57
Al ₂ O ₃	4.67	5.26	Na ₂ O	0.56	
FeO _{total}	28.08		K ₂ O	0.63	
FeO	[24.65]	29.66	F	0.02	
Fe ₂ O ₃	[3.81]		Cl	0.38	
MnO	0.48		-O = (F,Cl) ₂	0.09	
MgO	4.99		H ₂ O	[1.82]	1.86
			Total	100.22	100.00

(1) Traversella iron mine, Val Chiusella, Ivrea, Piemonte, Italy; average of 10 electron microprobe analyses, H₂O and FeO:Fe₂O₃ calculated from structure; corresponding to $A_{(Na_{0.10}K_{0.13})_{\Sigma=0.23}} B_{(Ca_{1.93}Na_{0.07})_{\Sigma=2.00}} C_{(Fe^{2+}_{3.21}Mg_{1.16}Mn_{0.06}Fe^{3+}_{0.45}Al_{0.12}Ti_{0.01})_{\Sigma=5.01}} T_{(Si_{7.26}Al_{0.74})_{\Sigma=8.00}} O_{22} W_{[(OH)_{1.89}F_{0.01}Cl_{0.10}]_{\Sigma=2.00}}$. (2) $A_{\square} B Ca_2 C (Fe^{2+}_4 Fe^{3+})^T (Si_7 Al) O_{22} W (OH)_2$.

Mineral Group: Amphibole group, calcium amphibole subgroup.

Occurrence: In a contact metamorphic rock (skarn).

Association: Tremolite, hastingsite, magnesio-hastingsite, quartz, calcite.

Distribution: From the Traversella iron mine, Val Chiusella, Ivrea, Piemonte, Italy.

Name: Signifies an amphibole in the compositional range of *hornblende* with essential $Fe^{2+} > Fe^{3+}$ and in the C structural site.

Type Material: Mineral Museum, University of Pavia, Italy (2015-01).

References: (1) Oberti, R., M. Boiocchi, F.C. Hawthorne, N.A. Ball, F. Cámara, R. Pagano, and A. Pagano (2016) Ferro-ferri-hornblende from the Traversella mine (Ivrea, Italy): occurrence, mineral description and crystal-chemistry. *Mineral. Mag.*, 80(7), 1233-1242. (2) (2017) *Amer. Mineral.*, 102, 695 (abs. ref. 1).