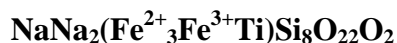


**Ferro-obertiite**

**Crystal Data:** Monoclinic. *Point Group:* 2/m. As prismatic to acicular crystals, to 1.25 mm, elongated on [001].

**Physical Properties:** *Cleavage:* Perfect on {110} with 56° intersections. *Fracture:* Splintery. *Tenacity:* Brittle. *Hardness* = 6 D(meas.) = n.d. D(calc.) = 3.330

**Optical Properties:** Transparent. *Color:* Black. *Streak:* Gray. *Luster:* Vitreous. *Pleochroism:* X = dark brown, Y = brown, Z = dark gray. *Orientation:* X ^ a = 77.3° (in β acute), Y || b, Z ^ c = 91.2° (in β obtuse). *Optical Class:* Biaxial (+). a = 1.671(1) β = 1.674(1) γ = 1.675(1) 2V(meas.) = 60(3)° 2V(calc.) = 59.9°

**Cell Data:** *Space Group:* C2/m. a = 9.845(4) b = 18.018(8) c = 5.296(3) β = 103.86(3)° Z = 2

**X-ray Powder Pattern:** Coyote Peak, Humboldt County, California, USA. 2.722 (100), 8.448 (80), 3.407 (60), 3.144 (50), 2.596 (50), 2.533 (40), 2.178 (30)

<b>Chemistry:</b>	(1)	(2)		(1)	(2)
SiO <sub>2</sub>	52.47	50.65	Na <sub>2</sub> O	8.70	9.80
Al <sub>2</sub> O <sub>3</sub>	0.09		K <sub>2</sub> O	1.51	
TiO <sub>2</sub>	6.51	8.42	Li <sub>2</sub> O	0.17	
Fe <sub>2</sub> O <sub>3</sub>	[4.54]	8.41	F	0.51	
FeO	18.43	22.72	H <sub>2</sub> O	0.58	
MgO	5.74		<u>-O=F</u>	<u>0.21</u>	
MnO	0.15		Total	100.09	100.00
CaO	0.90				

(1) Coyote Peak, Humboldt County, California, USA; average of 10 electron microprobe analyses, Fe<sup>3+</sup> calculated from structure analysis; corresponding to <sup>A</sup>(Na<sub>0.72</sub>K<sub>0.29</sub>)(Na<sub>1.85</sub>Ca<sub>0.15</sub>)(Mg<sub>1.30</sub>Fe<sup>2+</sup><sub>2.35</sub>Mn<sup>2+</sup><sub>0.02</sub>Fe<sup>3+</sup><sub>0.52</sub>Al<sub>0.01</sub>Ti<sub>0.75</sub>Li<sub>0.10</sub>)(Si<sub>7.99</sub>Al<sub>0.01</sub>)O<sub>22</sub>(O<sub>1.16</sub>F<sub>0.25</sub>OH<sub>0.59</sub>). (2) NaNa<sub>2</sub>(Fe<sup>2+</sup><sub>3</sub>Fe<sup>3+</sup>Ti)Si<sub>8</sub>O<sub>22</sub>O<sub>2</sub>.

**Polymorphism & Series:** Forms a series with oberite.

**Mineral Group:** Oxo amphibole.

**Occurrence:** As metasomatic reaction products in lithic-wacke sandstone fragments in an alkali diatreme.

**Association:** Aegirine, alkali feldspar.

**Distribution:** From Coyote Peak, Humboldt County, California, USA.

**Name:** To conform to IMA nomenclature for a ferrous (*ferro*)-dominant analog of *oberite*.

**Type Material:** Royal Ontario Museum, Toronto, Canada (M54035).

**References:** (1) Hawthorne, F.C., N.A. Ball, and G.K. Czamanske (2010) Ferro-obertiite, NaNa<sub>2</sub>(Fe<sup>2+</sup><sub>3</sub>Fe<sup>3+</sup>Ti)Si<sub>8</sub>O<sub>22</sub>O<sub>2</sub>, a new mineral species of the amphibole group from Coyote Peak, Humboldt county, California. *Can. Mineral.*, 48, 301-306. (2) (2011) *Amer. Mineral.*, 96, 941 (abs. ref. 1). (3) Hawthorne, F.C., R. Oberti, G.E. Harlow, W.V. Maresch, R.F. Martin, J.C. Schumacher, and M.D. Welch (2012) Nomenclature of the amphibole supergroup. *Amer. Mineral.*, 97, 2031-2048.