Ferri-obertiite $^{A}Na^{B}Na_2{}^{C}(Mg_3Fe^{3+}Ti)^{T}Si_8O_{22}{}^{W}O_2$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As acicular to lamellar crystals to 300 μm.

Physical Properties: *Cleavage*: Perfect on {110}. *Tenacity*: Brittle. *Fracture*: n.d.
Hardness = n.d. D(meas.) = n.d. D(calc.) = 3.145

Optical Properties: Transparent. *Color*: Pink-orange. *Streak*: n.d. *Luster*: Vitreous.
Optical Class: Biaxial (+). α = 1.664(2) β = 1.680(2) γ = 1.722(2) 2V(meas.) = 66.4(3)°
2V(calc.) = 64.7° *Pleochroism*: *X* = pale pink, *Y* = pinkish orange, *Z* = orange-brown.
Absorption: $X < Y < Z$. *Orientation*: $X \parallel b$, $Y \wedge c$ = 17.8° (in β obtuse), $Z \wedge a$ = 3.5° (in β acute).

Cell Data: *Space Group*: *C*2/*m*. *a* = 9.7901(7) *b* = 17.9354(13) *c* = 5.2892(4) β = 104.142(2)° Z = 2

X-ray Powder Pattern: Rothenberg Volcano, Eifel complex, Rhineland-Palatinate, Germany.
2.704 (100), 3.116, (76), 3.388 (72), 8.931, (72), 2.5299 (67), 2.583 (39), 2.160 (38)

Chemistry:	(1)	(2)
SiO_2	55.32	56.27
TiO_2	7.31	9.35
Al_2O_3	0.34	
Cr_2O_3	0.12	
Fe_2O_3	5.81	9.35
MnO	1.32	
MgO	17.00	14.15
ZnO	0.05	
NiO	0.04	
CaO	2.31	
Na_2O	8.62	10.88
K_2O	1.24	
H_2O	[0.20]	
F	1.22	
Cl	0.01	
$– O = F_2$	0.52	
Total	100.43	100.00

(1) Rothenberg Volcano, Eifel complex, Rhineland-Palatinate, Germany; average of 10 electron microprobe analyses, H_2O calculated to minimize non-negative values of Fe^{2+} and (F+OH+Cl+O) = 2 apfu; corresponds to $^{A}(Na_{0.76}K_{0.22})_{\Sigma=0.98}{}^{B}(Na_{1.61}Ca_{0.35}Mn^{2+}{}_{0.04})_{\Sigma=2.00}{}^{C}(Mg_{3.58}Mn^{2+}{}_{0.11}Fe^{3+}{}_{0.62}Ti^{4+}{}_{0.66}Cr^{3+}{}_{0.01}Zn_{0.01}Ni_{0.01})_{\Sigma=5.00}{}^{T}(Si_{7.82}Ti^{4+}{}_{0.12}Al_{0.06})_{\Sigma=8.00}O_{22}{}^{W}[O_{1.26}F_{0.55}(OH)_{0.19}]_{\Sigma=2.00}$.
(2) $^{A}Na^{B}Na_2{}^{C}(Mg_3Fe^{3+}Ti)^{T}Si_8O_{22}{}^{W}O_2$.

Occurrence: From vesicles in silicate veins within basaltic scoria.

Mineral Group: Amphibole supergroup, oxo-amphibole group.

Association: Sanidine, α-quartz paramorphic after β-quartz, eifelite, tridymite, rutile, roedderite.

Distribution: From the Rothenberg Volcano, Eifel complex, Rhineland-Palatinate, Germany.

Name: For an oxo-amphibole with Fe^{3+} dominant over Fe^{2+} in the *C* site.

Type Material: Museo di Mineralogia, Dipartimento di Scienze della Terra e dell'Ambiente, Università degli Studi, Pavia, Italy (2015-02).

References: (1) Oberti, R., M. Boiocchi, F.C. Hawthorne, N.A. Ball, and G. Blass (2017) Ferri-obertiite from the Rothenberg quarry, Eifel volcanic complex, Germany: Mineral data and crystal chemistry of a new amphibole end-member. Mineral. Mag., 81(3), 641-651. (2) (2018) Amer. Mineral., 103, 332 (abs. ref. 1).