Adranosite-(Fe) $(NH_4)_4NaFe_2(SO_4)_4Cl(OH)_2$

Crystal Data: Tetragonal. *Point Group*: 4/*m* 2/*m* 2/*m*. Crystals tetrahedral, to 1 mm, with dominant {100}, {110}, and {111}; also as divergent sprays of acicular crystals.

Physical Properties: *Cleavage*: Present on {001}. *Fracture*: n.d. *Tenacity*: n.d. Hardness = n.d. D(meas.) = 2.18(1) D(calc.) = 2.195

Optical Properties: Transparent. *Color*: Pale yellow. *Streak*: White. *Luster*: Vitreous. *Optical Class*: Uniaxial (-). ω = 1.58(1) ε = 1.57(1)

Cell Data: *Space Group*: $I4_1/acd$. a = 18.261(2) c = 11.562(1) Z = 8

X-ray Powder Pattern: La Fossa Crater, Vulcano, Aeolian Islands, Italy.
9.134 (100), 4.569 (83), 3.047 (79), 6.462 (36), 3.232 (29), 2.891 (11), 4.135 (10)

Chemistry:

	(1)	(2)
Na_2O	5.01	4.69
K_2O	0.82	
Fe_2O_3	15.77	24.18
Al_2O_3	5.11	
SO_3	50.96	48.18
Cl	3.71	5.37
$(NH_4)_2O$	[15.76]	15.77
H_2O	[2.75]	2.73
–O=Cl	0.84	1.21
Total	99.05	100.00

(1) La Fossa Crater, Italy; average of 12 electron microprobe analyses, H_2O calculated from structure refinement, $(NH_4)_2O$ calculated from the difference between the theoretical value of the site and the K content; corresponding to $(NH_4)_{3.89}K_{0.11}]_{\Sigma=4.00}Na_{1.04}(Fe_{1.27}Al_{0.64})_{\Sigma=1.91}(SO_4)_{4.10}Cl_{0.67}(OH)_{1.96}$.
(2) $(NH_4)_4NaFe_2(SO_4)_4Cl(OH)_2$.

Occurrence: A sublimate found on pyroclastic breccia in volcanic fumaroles (Italy); an anthropogenic product of a burning coal dump (Anna mine, near Aachen, North Rhine-Westphalia, Germany).

Association: Thermessaite, pseudocotunnite, bismuthinite or barberiite, salammoniac, anhydrite, sassolite, sulfur (Italy); clairite, tschermigite, rostite/khademite, boussingaultite/mohrite (Germany).

Distribution: From La Fossa Crater, Vulcano, Aeolian Islands, Italy.

Name: As the Fe^{3+} analog of *adranosite* – the base name for the ancient god of fire Adranos.

Type Material: Reference Collection, Department of Chemistry, University of Milan (# 2010-02) and the Museum "C.L. Garavelli," Department of Earth and Geoenvironmental Sciences, University of Bari (N 9389), Italy. Anthropogenic material from the Natural History Museum, Vienna, Austria (N 9389).

References: (1) Mitolo, D., F. Demartin, A. Garavelli, I. Campostrini, D. Pinto, C.M. Gramaccioli, P. Acquafredda, and U. Kolitsch (2013) Adranosite-(Fe), $(NH_4)_4NaFe_2(SO_4)_4Cl(OH)_2$, a new ammonium sulfate chloride from La Fossa Crater, Vulcano, Aeolian Islands, Italy. Can. Mineral., 51, 57-66. (2) (2014) Amer. Mineral., 99, 2437 (abs. ref. 1).