Ammonioalunite $(NH_4)Al_3(SO_4)_2(OH)_6$

Crystal Data: Hexagonal. *Point Group:* $\overline{3}\ 2/m$ or $3m$. As rhombohedral crystals, to 20 μm, forming granular masses.

Physical Properties: *Cleavage:* On [{0001}, perfect.] (by analogy with the alunite group). Hardness = 2–3 D(meas.) = 2.4 D(calc.) = 2.58

Optical Properties: Semitransparent. *Color:* Grayish white; colorless in thin section. *Streak:* White. *Luster:* Vitreous.
Optical Class: Uniaxial (+). $\omega = 1.590(5)$ $\epsilon = 1.602(5)$

Cell Data: *Space Group:* $R\overline{3}m$ or $R3m$. $a = 7.013(1)$ $c = 17.855(5)$ $Z = 3$

X-ray Powder Pattern: The Geysers, California, USA.
3.023 (100), 5.04 (93), 2.996 (50), 1.917 (32), 2.353 (31), 1.753 (21) 3.514 (19)

Chemistry:

	(1)	(2)	(3)
SO_3	35.96	41.35	40.73
SiO_2	11.6		
Al_2O_3	33.0	37.95	38.90
$(NH_4)_2O$	5.39	6.20	6.62
Na_2O	0.17	0.20	
K_2O	0.19	0.22	
H_2O	12.24	14.08	13.75
Total	98.6	[100.00]	100.00

(1) The Geysers, California, USA; by inductively coupled Ar-plasma spectrometry, S by a Leco S analyzer, K by AA, and H and N by a CHN analyzer. (2) Do.; analysis (1) recalculated after deduction of amorphous SiO_2; corresponds to $[(NH_4)_{0.92}Na_{0.02}K_{0.02}]_{\Sigma=0.96}Al_{2.88}(SO_4)_{2.00}(OH)_{5.60}\bullet 0.23H_2O$. (3) $(NH_4)Al_3(SO_4)_2(OH)_6$.

Mineral Group: Alunite group.

Occurrence: Formed in hot springs under very acid conditions, rich in ammonium and sulfate, poor in potassium, below 100 °C.

Association: Ammoniojarosite, amorphous SiO_2.

Distribution: From The Geysers, Sonoma Co., California, USA.

Name: As the *ammonium* analog of *alunite*.

Type Material: National Museum of Natural History, Washington, D.C., USA, 145596.

References: (1) Altaner, S.P., J.J. Fitzpatrick, M.D. Krohn, P.M. Bethke, D.O. Hayba, J.A. Goss, and Z.A. Brown (1988) Ammonium in alunites. Amer. Mineral., 73, 145–152.