Barberiite NH_4BF_4

Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. Crystals rare, pseudohexagonal, tabular to platy on {001}, typically elongated along [010] or [100], to 300 μm; commonly in globular aggregates, to 2 mm.

Physical Properties: Hardness = n.d. VHN = 13.0–15.4, 14.2 average (25 g load). D(meas.) = 1.89(3) D(calc.) = 1.90 Very soluble in H_2O; decomposes in humid air.

Optical Properties: Transparent to translucent. *Color:* Colorless. *Streak:* White. *Luster:* Vitreous.
Optical Class: Biaxial, (+) or (–). n = [1.3081] 2V(meas.) = 90(2)°

Cell Data: *Space Group: Pnma.* $a = 9.0615(7)$ $b = 5.6727(6)$ $c = 7.2672(6)$ Z = 4

X-ray Powder Pattern: Vulcano, Italy.
3.183 (100), 3.540 (90), 2.898 (80), 4.472 (75), 2.163 (70), 2.536 (65), 2.282 (65)

Chemistry:

	(1)	(2)
Na	0.4	
K	2.2	
NH_4	16.6	17.21
BF_4	79.8	82.79
F	0.3	
Cl	0.6	
Br	0.1	
Total	100.0	100.00

(1) Vulcano, Italy; by ion chromatography, after deduction of some NH_4, F, Cl, and Br as sal ammoniac, corresponds to $[(NH_4)_{0.96}K_{0.06}Na_{0.02}]_{\Sigma=1.04}BF_4$. (2) NH_4BF_4.

Occurrence: Formed by fumarolic activity, stable at ground temperatures between 200 °C and 600 °C.

Association: Malladrite, realgar, bismuthinite, cannizzarite, galenobismuthite, sphalerite, sulfur, sal ammoniac, sassolite.

Distribution: From the Fossa crater, Vulcano, Lipari Islands, Italy.

Name: To honor Franco Barberi, Professor of Vulcanology, University of Pisa, Pisa, Italy, who promoted studies of Vulcano.

Type Material: Bari University, Bari, Italy (4/nm).

References: (1) Garavelli, A. and F. Vurro (1994) Barberiite, NH_4BF_4, a new mineral from Vulcano, Aeolian Islands, Italy. Amer. Mineral., 79, 381–384. (2) Caron, A.P. and J.L. Ragle (1971) Refinement of the structure of orthorhombic ammonium tetrafluoroborate, NH_4BF_4. Acta Cryst., 27, 1102–1107.