

**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  $\mu\text{m}$ ; 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<sub>2</sub>O; decomposes in humid air.

**Optical Properties:** Transparent to translucent. *Color:* Colorless. *Streak:* White. *Luster:* Vitreous.

*Optical Class:* Biaxial, (+) or (-).  $n = [1.3081]$   $2V(\text{meas.}) = 90(2)^\circ$

**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 <sub>4</sub>	16.6	17.21
BF <sub>4</sub>	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<sub>4</sub>, F, Cl, and Br as sal ammoniac, corresponds to  $[(\text{NH}_4)_{0.96}\text{K}_{0.06}\text{Na}_{0.02}]_{\Sigma=1.04}\text{BF}_4$ . (2) NH<sub>4</sub>BF<sub>4</sub>.

**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) Barberiiite, NH<sub>4</sub>BF<sub>4</sub>, 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<sub>4</sub>BF<sub>4</sub>. *Acta Cryst.*, 27, 1102–1107.