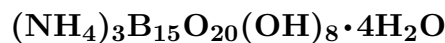


Ammoniorborite



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Crystal Data: Monoclinic. *Point Group:* $2/m$. Microscopic plates, grouped in parallel; commonly as fine-grained granular masses.

Physical Properties: Hardness = n.d. $D(\text{meas.}) = 1.765(4)$ $D(\text{calc.}) = 1.76$ Slowly soluble in H_2O .

Optical Properties: Semitransparent. *Color:* White; colorless in transmitted light. *Optical Class:* Biaxial (+). *Orientation:* $Z \wedge$ elongation $\simeq 7^\circ\text{--}13^\circ$; $Y = b$. *Dispersion:* $r < v$, slight. $\alpha = 1.470$ $\beta = 1.487$ $\gamma = 1.540$ $2V(\text{meas.}) = \sim 60^\circ$

Cell Data: *Space Group:* $C2/c$. $a = 25.27(5)$ $b = 9.65(3)$ $c = 11.56(3)$ $\beta = 94^\circ 17'(5)'$ $Z = 4$

X-ray Powder Pattern: Synthetic.

3.16 (100), 3.09 (100), 5.70 (60), 2.876 (60), 3.01 (50), 8.98 (40), 5.44 (30).

Chemistry:

	(1)	(2)
B_2O_3	74.2	70.15
$(\text{NH}_4)_2\text{O}$	9.8	10.49
H_2O	[16.0]	19.36
Total	[100.0]	100.00

(1) Larderello, Italy; H_2O by difference. (2) $(\text{NH}_4)_3\text{B}_{15}\text{O}_{20}(\text{OH})_8 \cdot 4\text{H}_2\text{O}$.

Occurrence: In boric acid-rich fumarolic lagoons.

Association: Sassolite, larderellite.

Distribution: From Larderello, Val di Cecina, Tuscany, Italy.

Name: For its composition, *ammonium borate*.

Type Material: National Museum of Natural History, Washington, D.C., USA, 93756, 94172, R6167.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 366–367. (2) Clark, J.R. and C.L. Christ (1959) Studies of borate minerals (VII): X-ray studies of ammoniorborite, larderellite, and the potassium and ammonium pentaborate tetrahydrates. *Amer. Mineral.*, 44, 1150–1158. (3) Merlino, S. and F. Sartori (1971) Ammoniorborite: new borate polyion and its structure. *Science*, 171, 377–379.