

# Sborgite

# NaB<sub>5</sub>O<sub>6</sub>(OH)<sub>4</sub>·3H<sub>2</sub>O

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**Crystal Data:** Monoclinic. *Point Group:* 2/m (synthetic). As euhedral to anhedral crystals, to 1 mm, in sugary-textured to fine-grained aggregates.

**Physical Properties:** Hardness = n.d. D(meas.) = 1.713 (synthetic). D(calc.) = 1.711 Soluble in H<sub>2</sub>O.

**Optical Properties:** Semitransparent. *Color:* [White.]  
*Optical Class:* Biaxial (+).  $\alpha = 1.432\text{--}1.435$   $\beta = \text{n.d.}$   $\gamma = 1.450\text{--}1.488$  2V(meas.) = Small.

**Cell Data:** *Space Group:* C2/c (synthetic).  $a = 11.189(8)$   $b = 16.474(14)$   $c = 13.576(9)$   
 $\beta = 112^\circ 50(2)'$  Z = 8

**X-ray Powder Pattern:** Furnace Creek district, California, USA.  
4.60 (10), 3.30 (8), 3.20 (7), 3.74 (5), 3.18 (5), 4.29 (3), 3.56 (3)

**Chemistry:** (1) Identification depends on identity of X-ray powder pattern and optical data with synthetic material.

**Occurrence:** Formed in pipes at a reduction works for borates from hot spring lagoons, between 32° C and 60° C (Larderello, Italy); deposited in an arid climate in surficial debris above weathering borate-bearing veins and in beds of saline tuffaceous siltstone (Furnace Creek district, California, USA).

**Association:** Borax, thénardite (Larderello, Italy); halite, thénardite (Furnace Creek district, California, USA).

**Distribution:** From Larderello, Val di Cecina, Tuscany, Italy. At several localities in the Furnace Creek district, Death Valley, Inyo Co., California, USA.

**Name:** Honors Professor Umberto Sborgi (1883–1955), Italian chemist, University of Milan, Milan, Italy, a worker in the system Na<sub>2</sub>O–B<sub>2</sub>O<sub>3</sub>–H<sub>2</sub>O.

**Type Material:** University of Florence, Florence, Italy, 16801/702.

**References:** (1) Cipriani, C. (1957) Un nuovo minerale fra i prodotti boriferi di Larderello. *Atti Rend. Accad. Lincei*, 22, 519–525 (in Italian). (2) (1958) *Amer. Mineral.*, 43, 378 (abs. ref. 1). (3) McAllister, J.F. (1961) Sborgite in the Furnace Creek area, California. *U.S. Geol. Surv. Prof. Paper* 424, B299–B301. (4) Merlino, S. and F. Sartori (1972) The crystal structure of sborgite, NaB<sub>5</sub>O<sub>6</sub>(OH)<sub>4</sub>·3H<sub>2</sub>O. *Acta Cryst.*, 28, 3559–3567.