

Sborgite



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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. $D(\text{meas.}) = 1.713$ (synthetic). $D(\text{calc.}) = 1.711$
Soluble in H_2O .

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

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 $\text{Na}_2\text{O}\text{--}\text{B}_2\text{O}_3\text{--}\text{H}_2\text{O}$.

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, $\text{NaB}_5\text{O}_6(\text{OH})_4 \cdot 3\text{H}_2\text{O}$. *Acta Cryst.*, 28, 3559–3567.