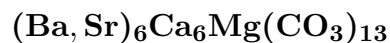


Benstonite

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Crystal Data: Hexagonal. *Point Group:* $\bar{3}$. Rhombohedral crystals, to 1 cm; typically as cleavable masses with a fine mosaic structure.

Physical Properties: *Cleavage:* On $\{31\bar{4}2\}$, good. Hardness = 3–4 $D(\text{meas.}) = 3.596\text{--}3.66$ $D(\text{calc.}) = 3.695$ Fluoresces red or yellow under LW UV, SW UV, and X-rays; strong red phosphorescence.

Optical Properties: Translucent. *Color:* Snow-white, ivory, very pale yellow, pale yellowish brown.

Optical Class: Uniaxial (–). $\omega = 1.690(1)$ $\epsilon = 1.527(1)$

Cell Data: *Space Group:* $R\bar{3}$. $a = 18.280(9)$ $c = 8.652(8)$ $Z = 3$

X-ray Powder Pattern: Magnet Cove, Arkansas, USA.
3.08 (95), 3.92 (38), 2.536 (28), 2.127 (23), 1.905 (17), 4.19 (16), 3.53 (10)

Chemistry:	(1)	(2)
CO ₂	31.35	30.61
MnO	0.35	
MgO	1.69	2.16
CaO	19.52	18.00
SrO	4.02	
BaO	43.05	49.23
Total	99.98	100.00

(1) Magnet Cove, Arkansas, USA; corresponds to $(\text{Ba}_{5.27}\text{Sr}_{0.73})_{\Sigma=6.00}\text{Ca}_{6.00}(\text{Mg}_{0.79}\text{Ca}_{0.12}\text{Mn}_{0.09})_{\Sigma=1.00}(\text{CO}_3)_{13.00}$. (2) $\text{Ba}_6\text{Ca}_6\text{Mg}(\text{CO}_3)_{13}$.

Occurrence: In a barite deposit (Magnet Cove, Arkansas, USA); in Alpine veins cutting a carbonatite (Bayan Obo deposit, China).

Association: Barite, calcite, quartz (Magnet Cove, Arkansas, USA); calcite, alstonite, fluorite, sphalerite (Cave-in-Rock, Illinois, USA); huntite, barytocalcite, strontianite, pyrite, phlogopite, monazite, daqingshanite (Bayan Obo deposit, China).

Distribution: In the USA, from the Baroid barite mine about four km east-northeast of Magnet Cove, Hot Spring Co., Arkansas, and in the Minerva No. 1 mine, near Cave-in-Rock, Hardin Co., Illinois. From the Jason Pb–Zn deposits, Macmillan Pass, Yukon Territory, Canada. At Långban, Värmland, Sweden. From Rosh Pinah, Namibia. In the Murun massif, southwest of Olekminsk, Sakha, Russia. From the Jogipatti carbonatite, near Samalpatti, Tamil Nadi, India. In the Bayan Obo Fe–Nb–RE deposit, 130 km north of Baotou, Inner Mongolia, China.

Name: Honoring Orlando J. Benston (1901–1966), metallurgist for the Baroid Division, National Lead Co., Malvern, Arkansas, USA, who supplied the first specimens.

Type Material: Victor Goldschmidt University, Göttingen, Germany, S21351; National Museum of Natural History, Washington, D.C., USA, 120234, 120236.

References: (1) Lippmann, F. (1962) Benstonite, $\text{Ca}_7\text{Ba}_6(\text{CO}_3)_{13}$, a new mineral from the barite deposit in Hot Spring County, Arkansas. *Amer. Mineral.*, 47, 585–598. (2) White, J.S., Jr. and E. Jarosewich (1970) Second occurrence of benstonite. *Mineral. Record*, 1, 140–141. (3) Effenberger, H. (1979) Kristallstruktur und chemische Formel des Benstonits, $\text{Ba}_6\text{Ca}_6\text{Mg}(\text{CO}_3)_{13}$. *Neues Jahrb. Mineral., Abh.*, 136, 326–337 (in German with English abs.).