Benitoite $BaTiSi_3O_9$

Crystal Data: Hexagonal. *Point Group:* $\bar{6}2m$. Flat pyramidal crystals, tabular on {0001}, triangular or hexagonal in outline, to 6 cm. *Twinning:* By rotation about [0001].

Physical Properties: *Cleavage:* Poor on $\{10\bar{1}1\}$. *Fracture:* Conchoidal. Hardness = 6–6.5 D(meas.) = 3.65 D(calc.) = 3.68 Blue fluorescence under SW UV; intense blue cathodoluminescence.

Optical Properties: Transparent to translucent. *Color:* Sapphire-blue, white to colorless, pink; commonly bicolored. *Luster:* Vitreous.
Optical Class: Uniaxial (+). *Pleochroism:* O = colorless; E = purple, indigo, greenish blue.
ω = 1.756–1.757 ϵ = 1.802–1.804

Cell Data: *Space Group:* $P\bar{6}2c$. $a = 6.6410(7)$ $c = 9.7597(10)$ $Z = 2$

X-ray Powder Pattern: San Benito Co., California, USA. (ICDD 26-1036).
3.71 (100), 2.72 (90), 2.86 (75), 5.73 (65), 2.169 (60), 3.30 (50), 3.13 (50)

Chemistry:

	(1)	(2)	(3)
SiO_2	43.68	42.62	43.60
TiO_2	20.09	19.44	19.32
BaO	36.33	37.27	37.08
Na_2O		0.14	
Total	100.10	99.47	100.00

(1) San Benito Co., California, USA. (2) Do.; by electron microprobe. (3) $BaTiSi_3O_9$.

Occurrence: In natrolite veins cutting glaucophane schist in a serpentine body (San Benito Co., California, USA); in a magnesio-riebeckite-quartz-phlogopite-albite dike cutting serpentinite (Ohmi, Japan).

Association: Neptunite, joaquinite, natrolite (San Benito Co., California, USA); ohmilite, bario-orthojoaquinite, leucosphenite (Ohmi, Japan).

Distribution: In the USA, in California, at the Gem mine, Mina Numero Uno, the Victor and Junilla claims, and on Santa Rita Peak, San Benito Co.; from Big Creek–Rush Creek, Fresno Co.; and on Trumbull Peak, near Incline, Mariposa Co.; in the Diamond Jo quarry, Magnet Cove, Hot Spring Co., Arkansas From Ohmi, Niigata Prefecture, Japan. At Broken Hill, New South Wales, Australia.

Name: For the occurrence in San Benito Co., California, USA.

Type Material: n.d.

References: (1) Louderback, G.D. (1907) Benitoite, a new California gem mineral. Univ. Calif., Bull. Dept. Geol., 5, 149–153. (2) Louderback, G.D. (1909) Benitoite, its paragenesis and mode of occurrence. Univ. Calif., Bull. Dept. Geol., 5, 331–380. (3) Fischer, K. (1969) Verfeinerung der Kristallstruktur von Benitoit $BaTi[Si_3O_9]$. Zeits. Krist., 129, 222–243 (in German with English abs.). (4) Laird, J. and A.L. Albee (1972) Chemical composition and physical, optical and structural properties of benitoite, neptunite and joaquinite. Amer. Mineral., 57, 85–102. (5) Wise, W.S. and R.H. Gill (1977) Minerals of the Benitoite Gem mine. Mineral. Record, 8, 442–452. (6) Laurs, B.M., W.R. Rohtert, and M. Gray (1997) Benitoite from the New Idria District, San Benito County, California. Gems & Gemology, 33, 166–187.