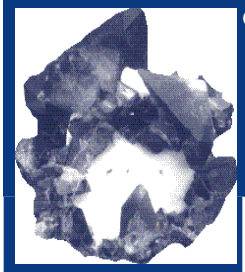


CALIFORNIA GEOLOGICAL SURVEY

BENITOITE CALIFORNIA STATE GEM

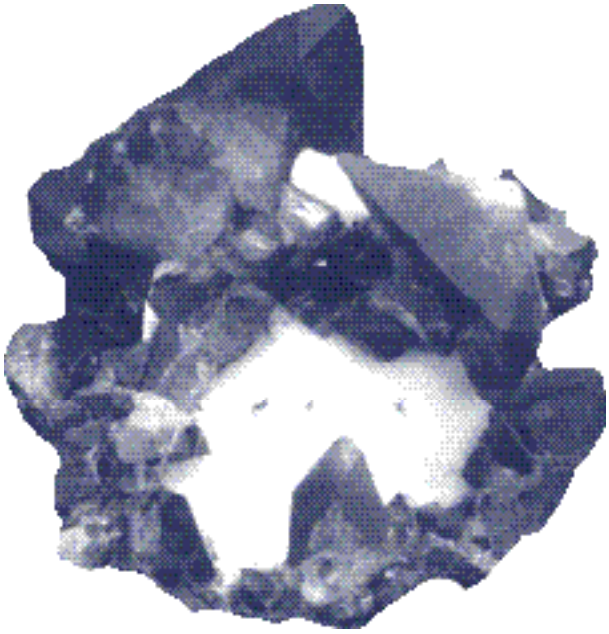
NOTE 11

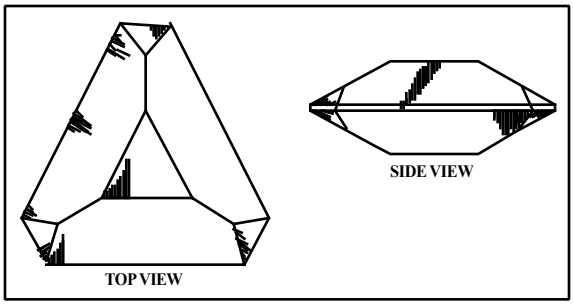
Benitoite (pronounced beh-nee-tow-ite) can occur in rich blue crystals that are as striking and flawless as the finest sapphires. Gem quality benitoite is found only in a small area of San Benito County, California. It has never been found in quantity or as crystals much larger than 5 cm across. The scarcity of this beautiful gem makes it primarily a collector's item. However, a minor amount of high quality benitoite is used to help align and adjust electron microprobe beams.

Benitoite was discovered in 1906 by J.M. Couch at the now well-known Benitoite Gem Mine in San Benito County. The mineral was thought to be sapphire, but jewelers determined that it wasn't. In 1907, George D. Louderback, a mineralogy professor at the University of California identified it as a new mineral species, and named it benitoite after the river, county and nearby mountain range where it was found.

Benitoite crystals occur in a wide range of colors including heliotrope, pink, white, several shades of blue and colorless. A variety of colors and hues in a crystal is common. Color is often zoned and is most intense toward the edges of the flattened triangular crystals and pale, white or colorless in the center. Most of the crystals are translucent and have pale blue or white centers with deep blue outer rims. A small amount of iron detected by emission spectroscopy may occur in deep blue-purple crystals. The violet-blue in some crystals is thought to be caused by titanium sesquioxide.

Benitoite fluoresces a bright deep sky blue under short wave ultraviolet light and x-rays. It's one of the most beautiful fluorescent minerals. At the tips of many benitoite crystals, the blue daylight color of the crystal sometimes gives way to white. These white sections frequently fluoresce pink-red, sometimes fairly brightly, under long wave ultrawave light. A crystal may look blue if seen through the acute faces of the rhombohedron and, when viewed through the obtuse faces it may look colorless.





A common crystal habit of benitoite

CALIFORNIA GEOLOGICAL SURVEY
CALIFORNIA CONSERVATION

Revised 5/2002

BENITOITE FACTS

Color: Blue, purple, heliotrope, pink, white, colorless, often varicolored in a single crystal. Fluoresces bluish under shortwave ultraviolet light and x-rays.

Mode of Occurrence: Occurs as superb crystals near the headwaters of the San Benito River, San Benito County. It also occurs in Eocene sands in southwest Texas and in sands of the Owithe Valley in Belgium.

Environment of Formation: Occurs as crystals in veins in the brecciated zone of a blue schist emplacement in serpentine. It's found with neptunite and joaquinite and is encased in a matrix of white natrolite.

Composition: $BaTiSi_3O_9$ (Barium Titanium Silicate)

Crystal Form: Hexagonal system. Ditrigonal-Dipyramidial class.

Hardness: 6-6 1/2

Luster: Vitreous to subadamantine

Specific gravity: 3.64-3.69

Cleavage: Poor pyramidal or indistinct, fracture concoidal or uneven, brittle.

Habit: Crystals pyramidal, stubby, or tabular, usually flattened along the c-axis, somewhat triangular.

Graphics by Dinah D. Maldonado, California Geological Survey.

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