Brannerite  \((\text{U, Ca, Y, Ce})(\text{Ti, Fe})_2\text{O}_6\)

**Crystal Data:** Monoclinic; always metamict.  **Point Group:** 2/m.  As indistinct prismatic crystals, to 30 cm, some showing an orthogonal prism zone; more typically as rounded, detrital grains and pebbles and as irregular embedded grains and masses.

**Physical Properties:**  **Fracture:** Conchoidal.  **Hardness:** 4.5–5.5  **D(meas.):** 4.2–5.43  **D(calc.):** [5.20], 6.37 (synthetic UTi2O6).  **Radioactive.**

**Optical Properties:** Opaque, transparent in very thin fragments.  **Color:** Black, brownish olive-green, yellow-brown to yellow with alteration; yellowish green in transmitted light.  **Streak:** Dark greenish brown to yellowish brown.  **Luster:** Pitchlike to vitreous when fresh, resinous to dull when altered.  **Optical Class:** Isotropic.  **n** = 2.23–2.30  **R:** (400) 13.9, (420) 13.5, (440) 13.1, (460) 12.8, (480) 12.7, (500) 12.5, (520) 12.3, (540) 12.2, (560) 12.1, (580) 12.0, (600) 11.9, (620) 11.8, (640) 11.7, (660) 11.7, (680) 11.6, (700) 11.5

**Cell Data:**  **Space Group:** C2/m (synthetic UTi2O6).  **a =** 9.8123(15)  **b =** 3.7697(6)  **c =** 6.9253(9)  \(\beta = 118.957(6)\)°  \(Z = 2\)

**X-ray Powder Pattern:** Custer Co., Idaho, USA; recrystallized in air at 1000 °C.  3.41 (10), 1.903 (8), 4.73 (6), 3.32 (6), 2.462 (6), 2.276 (6), 1.864 (6)

**Chemistry:**

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Total 100.2 100.00

(1) Custer Co., Idaho, USA.  (2) UTi2O6.

**Polymorphism & Series:** Dimorphous with orthobrannerite (?); forms a series with thorutite.

**Occurrence:** A primary mineral in granite pegmatite and in granitic gneiss; in silicified pebble conglomerates; in hydrothermal quartz and calcite veins; detrital in placers.

**Association:** Uraninite, gold, rutile, xenotime, apatite, zircon.


**Name:** To honor Dr. John Casper Branner (1850–1922), American geologist, formerly Professor of Geology and President of Stanford University, Palo Alto, California, USA.

**Type Material:** National Museum of Natural History, Washington, D.C., USA, 105793, 114997.