

Borax

$\text{Na}_2\text{B}_4\text{O}_5(\text{OH})_4 \cdot 8\text{H}_2\text{O}$

©2001-2005 Mineral Data Publishing, version 1

Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals are commonly short to long prismatic [001] and somewhat flattened on {100}, showing {100}, {110}, {001}, $\{\bar{1}12\}$, $\{\bar{1}11\}$, {010}, {021}, to 10 cm, typically distorted; commonly massive. *Twinning:* Rare on {100}.

Physical Properties: *Cleavage:* {100}, perfect; {110}, less perfect; {010}, in traces. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 2–2.5 $D(\text{meas.}) = 1.715(5)$ $D(\text{calc.}) = 1.70$ Soluble in H_2O , slightly sweetish alkaline taste; rapidly dehydrates in air to tincalconite; diamagnetic.

Optical Properties: Translucent to opaque. *Color:* Colorless to white, pale gray, pale blue, pale green; colorless in transmitted light. *Streak:* White. *Luster:* Vitreous to resinous, may be earthy.

Optical Class: Biaxial (-). *Orientation:* $X = b$; $Z \wedge c = -55^\circ 35'$. *Dispersion:* $r > v$, strong, crossed. $\alpha = 1.4466$ $\beta = 1.4687$ $\gamma = 1.4717$ $2V(\text{meas.}) = \text{n.d.}$ $2V(\text{calc.}) = 39^\circ 58'$

Cell Data: *Space Group:* $C2/c$. $a = 11.8790(2)$ $b = 10.6440(2)$ $c = 12.2012(2)$
 $\beta = 106.617(1)^\circ$ $Z = 4$

X-ray Powder Pattern: Synthetic.

2.576 (100), 2.565 (95), 4.86 (80), 2.848 (65), 2.833 (60), 5.69 (50), 3.936 (45)

Chemistry: (1) Modern analyses are lacking; natural occurrences produce a nearly pure mineral.

Occurrence: In evaporite deposits, salt lakes, playas, commonly well-crystallized; as an efflorescence on soils in arid regions.

Association: Inyoite, ulexite, colemanite, kernite, kurnakovite, trona, apthitalite, glauberite, calcite, nitratine, gaylussite, hanksite, halite, gypsum.

Distribution: An ore of boron in some deposits, with numerous minor occurrences. Originally collected from a number of salt lakes in the Ladakh district, Kashmir to north of Lhasa, Tibet, China, along the Qinghai Province-Xizang Plateau. In the Kirka borate deposit, Kütahya Province, Turkey. From the Inder borate deposit, Kazakhstan. In Argentina, large reserves at the Loma Blanca deposit, eight km southwest of Coranzulí, Jujuy Province; in the Tincalayu borax deposit, Salar del Hombre Muerto, Salta Province. In the USA, in California, commercial deposits at Borax Lake, Lake Co.; Searles Lake, San Bernardino Co.; in the Kramer borate deposit, Boron, Kern Co.; from Furnace Creek and Resting Springs, Death Valley, Inyo Co.; found in Rhodes Marsh, Teels Marsh, and others in Mineral Co., Nevada; and at Alkali Flat, Doña Ana Co., New Mexico.

Name: From the Arabic for *white*.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 339–341. (2) Giese, R.F., Jr. (1968) A refinement of the crystal structure of borax $\text{Na}_2\text{B}_4\text{O}_5(\text{OH})_4 \cdot 8\text{H}_2\text{O}$. *Can. Mineral.*, 9, 573. (3) Levy, H.A. and G.C. Lisensky (1978) Crystal structures of sodium sulfate decahydrate (Glauber's salt) and sodium tetraborate decahydrate (borax). Redetermination by neutron diffraction. *Acta Cryst.*, 34, 3502–3510. (4) (1979) NBS Mono. 25, 16, 66.