

Crystal Data: Orthorhombic. *Point Group:* *mm2*. Very rare in acicular crystals; typically as powdery crusts and efflorescences.

Physical Properties: *Cleavage:* On {100}, difficult. *Tenacity:* Somewhat sectile. Hardness = 1–1.5 D(meas.) = 2.255 (synthetic). D(calc.) = 2.262 Soluble in H₂O, alkaline taste; dehydrates readily.

Optical Properties: Transparent. *Color:* Colorless to white, gray, pale yellow; colorless in transmitted light. *Luster:* Vitreous.

Optical Class: Biaxial (-). *Orientation:* $X = b$; $Y = c$; $Z = a$. *Dispersion:* $r < v$, weak. $\alpha = 1.420$ $\beta = 1.506$ $\gamma = 1.524$ $2V(\text{meas.}) = 48^\circ$

Cell Data: *Space Group:* $P2_1bc$ (synthetic). $a = 6.472(2)$ $b = 10.724(3)$ $c = 5.259(2)$
 $Z = 4$

X-ray Powder Pattern: Synthetic.

2.768 (100), 2.372 (60), 2.753 (55), 2.678 (55), 2.684 (50), 2.475 (30), 2.010 (25)

Chemistry: (1) Identification depends on coincidence of X-ray powder pattern and optical properties with synthetic material.

Occurrence: Typically on soils and deposited from saline lakes; uncommon in volcanic fumaroles; in hydrothermal veins related to carbonatites.

Association: Trona, natron, halite.

Distribution: In minor amounts in deserts worldwide. On Vesuvius, Campania, Italy. In Russia, from the Kola Peninsula, on Mts. Rasvumchorr and Kukisvumchorr, and in the Vuonnemiok River valley, Khibiny massif; at Mt. Alluaiv, Lovozero massif; and in the Kovdor massif. From the Ilímaussaq intrusion, Greenland. At Mont Saint-Hilaire, Quebec, Canada. In the USA, crystallized from Borax Lake, Lake Co., and at Deep Spring Lake, Inyo Co., California; at Point of Rocks, east of Springer, Colfax Co., New Mexico. In the Lake Bogoria basin, Rift Valley, Kenya. Around Mt. Erebus, Victoria Land, Antarctica.

Name: From the Greek for *heat* and *natron*, as the dehydration product from heating natron.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 224–225. (2) Wu, K.K. and I.D. Brown (1975) A neutron diffraction study of Na₂CO₃·H₂O. *Acta Cryst.*, 31, 890–892. (3) (1958) NBS Circ. 539, 8.