

**Thermal stability and vibrational spectra of the sheet borate tuzlaite,
 $\text{NaCa}[\text{B}_5\text{O}_8(\text{OH})_2]\cdot 3\text{H}_2\text{O}$**

VLADIMIR BERMANEC,^{1,*} KREŠIMIR FURIĆ,² MAŠA RAJIĆ,³ AND GORAN KNIEWALD⁴

¹Mineraloško petrografski zavod, Geološki odsjek, Prirodoslovno matematički fakultet, Horvatovac bb, HR-10000 Zagreb, Croatia

²Molecular Physics Laboratory, Rudjer Bošković Institute, POB 180, 10002 Zagreb, Croatia

³Brodarski Institut, HR-10000 Zagreb, Croatia

⁴Center for Marine and Environmental Research, Rudjer Bošković Institute, POB 180, 10002 Zagreb, Croatia

ABSTRACT

Tuzlaite, a hydrated pentaborate from the Tuzla evaporite deposit in Bosnia and Herzegovina, was analyzed for water content and loss upon heating using thermal analysis methods and vibrational spectroscopy. The resulting phases were identified by X-ray diffraction. The heating of tuzlaite results in a gradual loss of water over several dehydration steps. Two coordinated H_2O molecules escape at 191 °C. Between 248 and 298 °C two hydroxyl groups are eliminated, with an associated structural transformation. A continuous escape of the third water molecule occurs above 300 °C. A phase relationship model for different hydrated borate minerals implies the possible formation pathway of tuzlaite by sequential polymerization of the borate polyanion.