ENTHALPY OF FORMATION OF BREWSTERITE

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The natural zeolite brewsterite–Sr having the composition $Sr_{1.30}Ba_{0.66}Na_{0.06}K_{0.02}Al_{4.00}Si_{12.00}O_{32}\cdot 10.10H_2O$ (Strontian, Scottland) was an object of experimental thermochemical investigation on high temperature heat-flux Tian-Calvet microcalorimeter ("Setaram", France). The enthalpy of brewsterite dehydration was measured by "drop" method. The obtained value corresponds to an endotherm of about 36 kJ due to the removal of one mole of water from the framework.

The standard enthalpies of formation from oxides and elements were obtained by high-temperature solution calorimetry in molten $2PbO\cdot B_2O_3$ at T=973 K. To avoid zeolite decomposition at high temperature the "transposed temperature drop solution calorimetry" method was used to measure the sum of enthalpy increment and enthalpy of solution of mineral. Using the literature data on S^o(298.15 K) for brewsterite of the same composition [1] we calculated the value of the Gibbs free energy of formation from the elements.

The first obtained thermodynamic characteristics of natural brewsterite were of considerable importance in estimating the stability fields of this mineral and associated phases and modeling of zeolite synthesis and cation relations processes.

Thermodynamic properties of studied brewsterite at T=298.15 K (kJ/mol)

$\Delta_{dehydr}H^o$	$-\Delta_fH^o_{ox}$	$-\Delta_fH^o_{el}$	S^o	$-\Delta_fH^o_{el}$
362±27	692±45	19005±47	1295.8±1.2	17574±47

Reference:

1. *Paukov I.E., Belitsky I.A., Kovalevskaya Yu.A*. Geokhimiya. 2001. №4. P.461-464 (in Russian).

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