COMPONENTS OF MAGMATIC MELTS AND THE CORRECTNESS OF THEIR THERMODYNAMIC PROPERTIES

KARZHAVIN V. K. Geological Institute of the Kola Science Centre Russian Academy of Science, Apatity, RUSSIA

The information about thermodynamic properties of substances is given in some papers and reference media as intercoordinated data on temperature-dependence of thermal capacity, entropy, enthalpy of formation and Gibbs energy. There are, however, great discrepancies in the data on the number of substances. They concern thermodynamic properties of compounds in a metastable state under standard conditions, which are offered, or used, for the study of crystallization of complex magmatic systems or for a construction of phase diagrams.

To substantiate the applicability of the discussed thermodynamic properties of chemical compounds, we have considered sodium tetraborate as a representative example. The given chemical compound is one of most thoroughly investigated experimentally (calorimetry) in a wide temperature interval, and the thermodynamic properties of this compound in liquid, glassy and crystalline states have been determined. The carried out research has allowed us to establish a definite relationship between thermodynamic functions of phases in a wide temperature interval. So, the difference in the entropy, enthalpy of formation and Gibbs energy between glassy and crystalline phases of a substance is described by the equation as analogy equation Gibbs. The melts are thermodynamically nonequilibrum and metastable. Depending on conditions of phase transformations (crystallization, vitrification), metastable phases are formed along with stable. The analysis and registration of their properties when constructing an objective picture of phase transformations in multisystems contributes to the study of crystallization paths of a liquid phase both in equilibrium, and in nonequilibrum conditions.