Equations of State for Alkali Halides over a Wide Range of Temperatures and Pressures

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The adequacy of description for the thermodynamic properties of matter is of importance in the case of analysis and modeling of physical processes under extreme conditions of high temperatures and high pressures. The equation of state for materials with proper inclusion of phase transitions largely defines the reliability of the calculation results. We propose a semi-empirical equations-of-state model, which takes into account the polymorphs transformation, melting, and evaporation effects. Multi-phase equations of state for five alkali halides, namely lithium fluoride, sodium chloride, potassium chloride, potassium bromide, and cesium iodide, are constructed on the basis of the model developed. Calculation results are compared with available experimental data in a broad region of the phase diagram. The most essential static and dynamic high-temperature, high-pressure experiments are described for each of the substances investigated. The equations of state obtained can be used efficiently in numerical simulations of unsteady-state hydrodynamic processes at high energy densities.