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Analytical description of thermodynamic properties of alkaline metals and calculation them for francium

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Abstract

At present, the Periodic System of elements of D.I. Mendeleyev includes 7 periods of chemical elements. The properties of known and newly discovered elements can be predicted and calculated by various methods. Of great importance is calculation methods, predicting and modeling the thermodynamic properties of elements and simple substances. The metals of Periodic System 1A- and 2A-groups are part of modern thermofors. Liquid thermofors widely use in the chemical industry, metallurgy, nuclear energy. Thermofors thermodynamic data can be obtained both by means of experiment and by calculation methods. In this paper, analytical and graphical dependences of the thermodynamic properties (isobaric heat capacity, enthalpy difference at 298.15 K and O, sublimation enthalpy, entropy) of alkali metals depending on their order numbers and their atomic radiuses are presented. Analytical dependences made it possible to predict the thermodynamic properties for francium. For the function $F = f(Z)$ (F – property, Z – order number), the numerical values are taken from the maximum correlation coefficient and the minimum root-mean-square deviation. Graphical dependencies are constructed from the equations obtained. Also an analytical description is given for the relationship of properties «enthalpy difference at 298.15 K and O – isobaric heat capacity», «entropy – isobaric heat capacity», «sublimation enthalpy at 298.15 K – sublimation enthalpy at 0 K».

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