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Analytical description and prediction of the alkaline metals specific electric conductivity in the range Li...Fr

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Abstract

In modern theoretical chemistry, the analysis and prediction of the properties of chemical elements, simple substances, individual compounds and their mixtures make it possible to clarify the available and obtain missing reference values of a number of fundamental properties. The use of approximate calculation methods from known reference data makes it possible to estimate the numerical values of properties that are difficult to obtain experimentally. In this paper, an analytical description of the specific electrical conductivity is given for alkali metal melts. Alkali metal melts were selected as the object of research. Alkali metal melts are of practical importance as liquid metal thermofors in chemical power sources, including nuclear power. The metal melts specific electrical conductivity is one of the main transport properties of the electrolytes. Analytical and graphical dependences of the specific electrical conductivity κ of the alkali metal melts on the metal order number in the Periodic system of elements and the temperature: $\kappa = f(Z)$; $\kappa = f(T)$, $\kappa/Z = f(Z)$. Using analytical descriptions the values of κ were calculated for temperatures from 400 to 1000 K, and also for temperatures higher than the melting temperature of metals at 5, 10, 50, 75, 100, 150 and 200°. There present the description of the interrelation properties κ (при $T_{\text{пл}}+n$) = $f(\kappa$ при $T_{\text{пл}}+5)$ and the dependence of the specific conductivity of alkali metal melts on their secific electrical conductivity in the solid state $\kappa = f(\kappa_{\text{Me}_{\text{TB}}})$. The comparative analysis of the specific electrical conductivity values were obtained by the proposed methods. M.Kh. Karapetyans comparative methods were applied for the description.

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