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Analytical description of the specific electric conductivity of halogenides KHal melts and its calculation for the KAt melt

© **Ivan K. Garkushin**,*+ **Olga V. Lavrenteva**, **Yana A. Andreeva**, and **Karina R. Gilmanova**
Department of General and Inorganic Chemistry. Samara State Technical University.
Molodogvardeyskaya St., 244. Samara, 443100. Samara Region. Russia.
Phone: +7 (846) 278-44-77. E-mail: gik49@yandex.ru

*Supervising author; +Corresponding author

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Abstract

In this paper, the analytical description of the specific conductivity of the potassium halogenides melts KHal (Hal – F, Cl, Br, I) is presented. The analitical description is provided on dependence of the specific conductivity on the halogen order number æ = f(Z), the ionic radius of halogen-ion æ = f(r), the ionic potential æ = f(1/r), the electronegativity difference æ = f(Δχ) ((Δχ = χ (Hal) – χ(K)). The interrelation of a reduced property with an order number æ/Z = f(Z) is considered. According to the obtained analytical dependencies, the calculation of the value of the potassium astatide specific conductivity is given for temperatures above the melting point on 5, 10, 50, 75, 100, 150 и 200°, in literature Information for KAt absent. The calculation was carried out using comparative methods for calculating M.Kh. Karapetyan in the coordinates of "property-parameter" and "property-property." Least squares method was applied for processing the analytical description results with the choice of optimal dependencies on the maximum correlation coefficient and the minimum standard deviation. The analysis of the interrelation of the calculated numerical values with similar characteristics for NaAt и LiAt is presented. Comparison of the specific conductivity obtained numerical values of the astatide potassium melt showed good consistency with the values æ obtained from the straight line dependence $æ_{T_{пл}+n} = a \cdot æ_{T_{пл}+5}$ (n = 10°…200°) and also with similar characteristics for lithium astatide and sodium astatide. The analytical calculation results allow to describe the temperature dependence of the potassium halogenides specific conductivity, including KAt. The calculation method can be used to describe the melts specific conductivity in the same type series of compounds of alkaline and alkaline-earth elements that make up electrolytes for chemical current sources.

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