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Investigation of temperature effect on the electrical conductivity of alcohol solutionssodium and potassium alcoholates

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Abstract

Earlier, we studied the electrical conductivity of inorganic salts in a number of alcohols (ethanol, propanol-2, and butanol-1) at room temperature and found that alcoholic solutions of inorganic salts are weak electrolytes. It is known that an increase in the temperature of salt solutions leads to an increase in electrical conductivity due to an increase in the mobility of their ions in the solvent medium. To study the temperature dependence of the electrical conductivity of aqueous solutions of electrolytes, we proposed an approach based on the study of the effect of temperature on the equivalent electrical conductivity of solutions at infinite dilution λ_∞. Using this approach, we studied the electrical conductivity of aqueous solutions of a number inorganic salts (nitrates, acetates, and phosphates), carboxylic acids, and amino acids as a function of temperature. It was found that for these solutions the dependence $\lambda_\infty(T)$ is described by the exponential Arrhenius equation $\lambda_\infty = A \cdot \exp(-E/(RT))$. This equation was used to describe the temperature dependence of the ultimate equivalent conductivity for solutions of a number of inorganic salts (calcium and nitrate calcium, cadmium, lithium and potassium iodides, chloride, iodide and ammonium nitrate, silver nitrate and sodium bromide) in ethanol. This article investigated and demonstrated the possibility of describing the experimental data $\lambda_\infty(T)$ for solutions of ethylates, propylates and isopropylates of sodium and potassium in the corresponding alcohols (ethylates in ethanol, propylates in propanol, isopropylates in isopropyl alcohol) using the same equation.

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