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Thematic course: Investigation of the influence of temperature on electrical conductivity of aqueous solutions of electrolytes. Part 3.

Nitrates

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Abstract

One of the important properties of solutions is the electrical conductivity that is able to conduct an electric current. Solutions containing mobile ions and are formed by dissociation in the respective solvents have electrical conductivity. These substances depending on the nature form solutions – strong or weak electrolytes. Electrical conductivity χ and the equivalent electrical conductivity λ are used to judge electrical conductivity. It is known that at a decrease in the concentration of the electrolyte solution λ increases, reaching infinite dilution (for $C \rightarrow 0$) of maximum λ_∞ (λ_∞ – equivalent electrical conductivity at infinite dilution). Dissociation degree is 1 at infinitely dilute solution of electrolyte. At this λ_∞ is equal to the sum of limit mobilities of ions constituting the electrolyte of ions. As a rule, mobile values of constituting electrolyte ions at 298 K are listed in reference books mainly for aqueous solutions.

Temperature also influences electrical conductivity of electrolyte solutions. At the increase in temperature, the electrical conductivity of electrolyte solution increases due to increased mobility of the electrolyte ions. Therefore, the effect of temperature on the electrical conductivity λ_∞ is considered to be as an additive dependence of ions' mobility of the electrolyte from temperature in literature. This dependence is usually linear. It was stated in works [1, 2] the dependence of the equivalent conductivity at infinite dilution λ_∞ from temperature is described by the exponential Arrhenius equation $\lambda_\infty = A \cdot \exp(-E/(RT))$ by strong electrolyte solutions (strong acids and bases), as well as some for the solutions of weak electrolytes. This article presents the results of the study of temperature effect of on the electrical conductivity for aqueous solutions of nitric acid salts. It is shown that Arrhenius exponential equation describes more precisely the dependences of limit equivalent conductivity from temperature for aqueous solutions nitrates: of ammonium nitrate, sodium, potassium, magnesium, barium, calcium, copper, nickel, aluminum, zinc and silver in comparison with known linear equation.

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