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Electrostriction of water and lower alcohols around ammonium nitrate – volumetric approach

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Abstract: Physicochemical properties and nature of the interactions in solutions of ammonium nitrate in water or lower alcohols (methanol, ethanol and *n*-propanol) have been investigated. The density was measured in the temperature range from $T = (293.15 \text{ to } 313.15)$ K for $\{\text{NH}_4\text{NO}_3 + \text{H}_2\text{O}\}$ and $\{\text{NH}_4\text{NO}_3 + \text{MeOH}\}$ binary mixtures and in temperature range $T = (293.15 \text{ to } 323.15)$ K for $\{\text{NH}_4\text{NO}_3 + \text{EtOH}\}$ and $\{\text{NH}_4\text{NO}_3 + n\text{-PrOH}\}$ at atmospheric pressure ($p = 1 \cdot 10^5$ Pa). From experimental densities, the apparent molar volumes and partial molar volumes in a whole concentration range, as well as at infinite dilution were obtained. According to volumetric results obtained for solutions of NH_4NO_3 in short-chain alcohols and water, values for the electrostrictive volume of the ammonium nitrate, \bar{V}_{el} , solvation number, n , and ionic transfer volumes between solvents, $\Delta_t \bar{V}^\circ(\text{NH}_4\text{NO}_3, \text{w} \rightarrow \text{s})$, are obtained and discussed. Based on these values and features the electrolyte effect on surrounding molecules were estimated and discussed.

Keywords: Ammonium nitrate; Volumetric properties; Interactions; Electrostriction; Ionic transfer volumes; Solvation number.

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