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Influence of N-1 alkyl substituent on apparent molar properties of 1,2,4-triazolium based ionic liquids in aqueous solutions

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Abstract

Accurate measurements of volumetric and acoustic properties of aqueous ionic liquid solutions govern a key factor in process design and potential engineering applications. Also, such studies can give an appropriate idea about the nature and extent of intermolecular interactions involved between the solute and solvent in solutions. In this perceptive, the density and speed of sound for aqueous solutions of synthesized 1-alkyl-4-(4-sulfobutyl)-1H-1,2,4-triazol-4-ium trifluoromethanesulfonate based ionic liquids were measured as a function of temperature in the range of 293.15 to 328.15 K at atmospheric pressure. Additionally, effects of N-1 linear or branched alkyl substituent of studied ionic liquids in aqueous solutions on such properties were analyzed. Further, from the experimental data, derived parameters such as apparent molar volume (V_ϕ), apparent molar isentropic compression ($K_{s,\phi}$) and limiting apparent molar expansion (E_ϕ^∞) have been evaluated. Moreover, for evaluating the extent of interactions stirring in the solutions, the apparent molar properties at infinite dilution were analyzed through Redlich-Mayer type equations.

Keywords: Ionic liquid; Apparent molar property; Partial molar property; Isentropic compressibility; Redlich-Mayer equation.

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