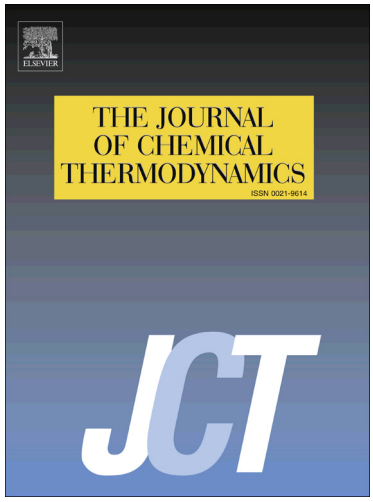

Investigation of solute-solvent interactions in {1-butyl-3-methyl imidazolium-Bis(trifluoromethylsulfonyl)imide+dimethylcarbonate} mixture using physico-chemical properties

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Investigation of solute-solvent interactions in {1-butyl-3-methyl imidazoliumBis(trifluoromethylsulfonyl)imide+dimethylcarbonate} mixture using physicochemical properties

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ABSTRACT:

Physical properties, such as density (ρ), speed of sound (u) and refractive index of [Bmim][NTf_2], DMC and their binary mixtures are measured over the whole composition range as a function of temperature between (303.15 - 323.15) K at atmospheric pressure. Experimental values are used to calculate excess values of molar volumes (V_m^E)/partial molar volumes ($\overline{V}_m^E$)/ partial molar volumes at infinite dilution ($\overline{V}_m^{E,\infty}$)/isentropic compressibility (κ_s^E)/free length (L_f^E), speed of sound (u^E) and isobaric thermal expansion coefficient (α_P^E) for the binary mixture. These excess properties are fitted to the Redlich-Kister equation to obtain the binary coefficients and the standard deviations. A qualitative analysis of these parameters indicates strong intermolecular interactions and the interaction increases with the increase in temperature. Further, through physicochemical properties, an attempt for calorimetric excess chemical potential using different equations is computed at T=308.15K. The present investigation also comprises of evaluation of the acoustic non-linearity parameter (B/A) in the mixtures and calculation of cohesive energy (ΔA), Van der Wall's constants (a, b), distance of closest approach (d). The presence of strong interactions is further supported by IR spectroscopy and the Prigogine–Flory–Patterson (PFP) theory.

Key words: [Bmim][NTf_2]; DMC; density; speed of sound; refractive index; excess thermodynamic parameters.

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