Volumetric, acoustic, optical and spectroscopic studies of binary mixtures of the ionic liquid, 1-butyl-3-methyl imidazolium bis(trifluoromethylsulfonyl)imide and diethyl carbonate

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ABSTRACT

The properties, density, speed of sound and refractive index of 'IL' [Bmim][NTf2], diethyl carbonate and their binary mixtures are measured over the whole composition range as a function of temperature between 303.15 and 323.15 K at atm. pressure. These values are used to calculate the excess molar volumes, excess partial molar volumes, partial molar volumes at infinite dilution, excess isentropic compressibility, free length, speeds of sound and isobaric thermal expansion coefficient for the mixture. Various rules were used to predict the refractive indices and the data have been compared with the experimental results. These excess properties are fitted to the Redlich–Kister type 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. This was further supported by IR spectroscopy. In addition, analysis of data of the mixture was done through the Prigogine–Flory–Patterson theory.

KEYWORDS: Ionic liquid [Bmim][NTf2] DEC density speed of sound excess thermodynamic parameters PFP theory