Density, Viscosity and Speed of Sound of Binary Mixtures of 1-Butyl-3-Methylimidazolium Hexafluorophosfate + Dimethyl Sulphoxide at Different Temperatures and Atmospheric Pressure

Ricardo Tôrres [C, S]
Centro Universitário da FEI, Departamento de Engenharia Química, São Bernardo do Campo, São Paulo, Brazil
belchior@fei.edu.br

Heloisa Hoga and Pedro Volpe
Universidade Estadual de Campinas, Instituto de Química - Departamento de Físico-química, Campinas, São Paulo, Brazil

Ionic liquids (ILs) or room-temperature ionic liquids (RTILs) are organic salts with melting point below 100 ^{o}C, resulting from the combination of organic cations and various anions. Ionic liquids are viewed as a novel class of green solvents that attract attention of both industry and academy due to unique properties. They have been used as substitute for traditional organic solvents in many chemical processes. In the present study, density, viscosity and speed of sound of the solutions of 1-butyl-3-methylimidazolium hexafluorophosfate [BMIM][PF6] + dimethyl sulphoxide (DMSO) have been measured over the entire composition range at (298.15, 303.15, 308.15 and 313.15) K and atmospheric pressure. Both pure liquid and mixture viscosity were measured using a Stabinger viscosimeter (Anton Paar SVM 3000M). Density and speed of sound were measured using a commercial density and speed of sound measurement apparatus (Anton Paar DSA 5000 densimeter and speed of sound analyzer). Excess molar volume, deviation in viscosity and deviation in isentropic compressibility have been calculated from the data and fitted to the Redlich-Kister polynomial. For all properties, the values are negative over the entire composition range. Deviation in isentropic compressibility decreases whereas excess molar volume and deviation in viscosity increase with increasing in temperature. The results have been discussed in terms of the ion-dipole interactions of the cations of liquid ionic with the organic compound.