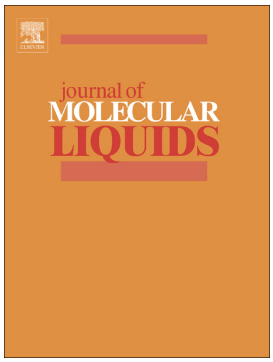

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The effects of temperature, alkyl chain length, and anion type on thermophysical properties of the imidazolium based amino acid ionic liquids

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Abstract

The viscosity, surface tension, and density as well as molar volume and expansion coefficient of imidazolium based amino acid ionic liquids (AAILs) including alaninate ($[ALA]^-$), glycinate ($[GLY]^-$), glutamate ($[GLU]^-$), serinate ($[SER]^-$), and valinate ($[VAL]^-$) anions were investigated at the extended temperature until 373.15 K. Thermophysical as well as electronic properties were taken into account in order to explore the effect of alkyl chain length and anion on these properties. The results indicated that the interaction between ion pairs has a great effect on the properties; the strong interaction caused the higher viscosity and surface tension. The effect of temperature and alkyl chain length as well as anion type on the physicochemical properties was also studied. Raising the temperature resulted in a downward trend on the density, viscosity, and surface tension of all systems. In addition, the hypothetical critical temperatures of the AAILs were estimated making use of the Eötvos and Guggenheim equations. It was shown that the critical temperature decreases with alkyl chain length and its change depends on the ion pair interaction energy density and density of electronic chemical potential. The results of prediction critical temperatures of AAILs using surface tension data

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