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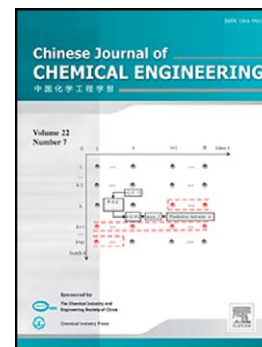
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Viscosity of aqueous ionic liquids analogues as a function of water content and temperature

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Abstract

Ionic liquids analogues known as Deep Eutectic Solvents (DESs) are gaining a surge of interest by the scientific community and many applications involving DESs have been realized. Moisture content is one of the important factors that affects the physical and chemical characteristics of these fluids. In this work, the effect of mixing water with three common type III DESs on their viscosity was investigated within the water mol fraction range of (0-1) and at the temperature range (298.15-353.15 K). Similar trends of viscosity variation with respect to molar composition and temperature were observed for the three studied systems. Due to the asymmetric geometry of the constituting molecules in these fluids, their viscosity could not be modelled effectively by the conventional Grunberg and Nissan model, and the Feng-He model was used to address this issue with excellent performance. All studied aqueous DES mixtures showed negative deviation in viscosity as compared to ideal mixtures. The degree of intermolecular interactions with water reaches a maximum at a composition of 30% aqueous DES solution. Reline, the most studied DES in the literature, showed the highest deviation. The information presented in this work on the viscosity of aqueous DES solutions may serve in tuning this important property for diverse industrial applications involving these novel fluids in fluid flow, chemical reactions, liquid-liquid separation and many more.

Keywords: *eutectic; ionic liquids; viscosity; interaction; prediction; DES*

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