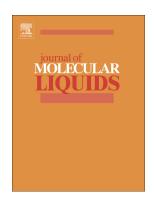
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Thermodynamic study of the soluting effect in aqueous ionic liquid - monosaccharide solutions by the vapor pressure osmometry



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# **ACCEPTED MANUSCRIPT**

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# Thermodynamic study of the soluting effect in aqueous ionic liquid - monosaccharide solutions by the vapor pressure osmometry

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#### **Abstract**

In this work, to study vapor-liquid equilibria of several ternary ionic liquid + carbohydrate + water and binary ionic liquid + water systems, water activity measurements have been made using the vapor pressure osmometry (VPO) technique at 308.15 K. Three imidazolium-based ionic liquids (ILs) 1-butyl-3-methylimidazolium tetrafluoroborate ([Bmim][BF4]), 1-butyl-3-methylimidazolium bromide ([Bmim][Br]), and 1-butyl-3-methylimidazolium hydrogen sulfate ([Bmim][HSO4]) and four monosaccharide carbohydrates L-(+)-arabinose, D-(+)-xylose, D-(+)-glucose, and D-(-)-fructose were selected. The hydrophilicities of the investigated ILs follow the order: [Bmim][HSO4] > [Bmim][Br] >> [Bmim][BF4]. Our results showed that the unfavorable IL-carbohydrate interactions can be lead to reducing the water activity and vapor pressure of ternary solution relative to the semi-ideal solution model ( $\Delta a_w < 0$  and  $\Delta p - (\Delta p^{\circ}_{IL} + \Delta p^{\circ}_{C}) < 0$ ). For the systems that had extreme negative departure from the semi-ideal behavior ([Bmim][BF4]/carbohydrate) aqueous biphasic system (ABS) is formed in the concentrations higher than the critical values. For these systems, magnitudes of the negative departures from the

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