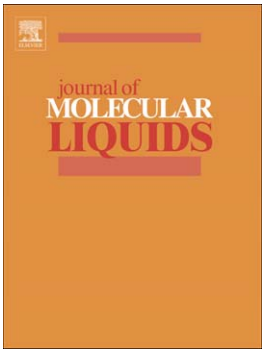

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Vickramjeet Singh, Parampaul K. Banipal, Ramesh L. Gardas, Tarlok S. Banipal

PII: S0167-7322(16)30212-4
DOI: doi: 10.1016/j.molliq.2016.08.022
Reference: MOLLIQ 6182

To appear in: *Journal of Molecular Liquids*

Received date: 25 January 2016
Accepted date: 6 August 2016

Please cite this article as: Vickramjeet Singh, Parampaul K. Banipal, Ramesh L. Gardas, Tarlok S. Banipal, Speed of sound and apparent molar isentropic compression of 1-butyl-3-methylimidazolium bromide in aqueous monosaccharide solutions, *Journal of Molecular Liquids* (2016), doi: 10.1016/j.molliq.2016.08.022

Speed of Sound and Apparent Molar Isentropic Compression of 1-Butyl-3-methylimidazolium Bromide in Aqueous Monosaccharide Solutions

Vickramjeet Singh[a], Parampaul K. Banipal[a], Ramesh L. Gardas[b], Tarlok S. Banipal[a#]

[a]Department of Chemistry, Guru Nanak Dev University, Amritsar - 143005, INDIA

[b]Department of Chemistry, Indian Institute of Technology, Madras, Chennai - 600 036, INDIA

[#]Corresponding author: Phone: +91 183 2451357. Fax: +91 183 2258819/20.

E-mail: tsbanipal@yahoo.com (TSB)

ABSTRACT

The nature of intermolecular interactions occurring between ionic liquid, 1-butyl-3-methylimidazolium bromide, [Bmim]Br and monosaccharides viz. D(−)-ribose and D(−)-arabinose have been studied by measuring the speed of sound of [Bmim]Br in water and in (0.10, 0.20, 0.30, and 0.40) mol·kg^{-1} aqueous monosaccharides solutions at temperatures (288.15 to 318.15) K and at 101.3 kPa. Infinite dilution partial molar isentropic compression, $K_{s,2}^{\circ}$ and the empirical parameters (S_K and B_k) have been calculated from apparent molar isentropic compression, $K_{s,2,\phi}$, by using Redlich-Mayer type of equation. The isentropic compression of transfer, $\Delta_t K_{s,2}^{\circ}$ have also been calculated and was found to be positive, which increase with increase in concentration of monosaccharide and temperature. Positive $\Delta_t K_{s,2}^{\circ}$ values observed suggest the dominance of hydrophilic-ionic interactions between ions of [Bmim]Br and monosaccharides. Effect of stereochemistry of monosaccharides on the solvation behavior of [Bmim]Br has also been discussed.

Keywords: Monosaccharides; 1-butyl-3-methylimidazolium bromide; speed of sound; isentropic compression of transfer

1. Introduction

Ionic liquids are molten salts having melting point below 100^{o} C, and are formed by the combination of cations and anions. The cation can be bulky long chain that is weakly coordinated to smaller organic or inorganic anion. Unlike classical salts like NaCl, KCl, etc. which need a molecular solvent to dissociate into anions and cations, the ionic liquids (ILs) are self-dissociated and do not require solvent to dissociate into anions and cations [1-3]. The