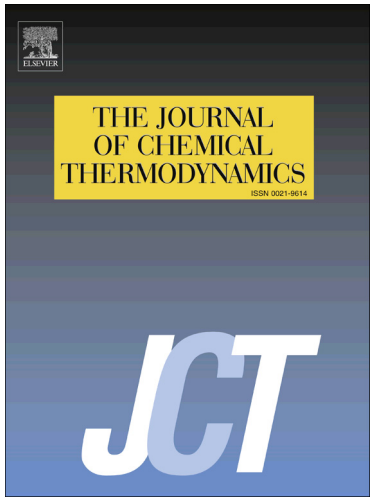

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Molecular interactions of some amino acids in aqueous 1-butyl-3-methylimidazolium bromide solutions at different temperatures: A volumetric approach

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ABSTRACT

Apparent molar volumes, $V_\emptyset$ of amino acids i.e. glycine, L-alanine, L-serine, L-threonine and DL-α-aminobutyric acid in pure water and in aqueous solutions of imidazolium based ionic liquid, 1-butyl-3-methylimidazolium bromide, $[BMIm][Br]$ were determined from precise density measurements at temperatures T = (288.15-318.15) K and at atmospheric pressure. Partial molar volumes V_2^o and partial molar volumes of transfer, $\Delta_{tr}V_2^o$ of amino acids in aqueous $[BMIm][Br]$ solutions have been obtained from the $V_\emptyset$ data. The V_2^o values follow the order: L-threonine > DL-α-aminobutyric acid > L-serine > L-alanine > glycine. Positive $\Delta_{tr}V_2^o$ values for all the studied amino acids indicate the dominance of hydrophilic-ionic interactions between amino acids and $[BMIm][Br]$. The partial molar expansibilities $(\partial V_2^o/\partial T)_P$ and their second order derivatives $(\partial^2 V_2^o/\partial T^2)_P$, volumetric interaction parameters, V_{AB} and V_{ABB}, hydration number, n_H have been calculated. The charged end groups, V_2^o (NH_3^+, COO^-), side chain contributions of the amino acids, $V_2^o(R)$ and apparent specific volume, $v_\emptyset$ have also been obtained from V_2^o and $V_\emptyset$ data. The results have been interpreted in terms of possible molecular interactions.

Keywords: Amino acids, 1-butyl-3-methylimidazolium bromide, Partial molar volumes, Partial molar expansibilities, Volumetric interaction parameters, Hydration number, Apparent specific volume

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