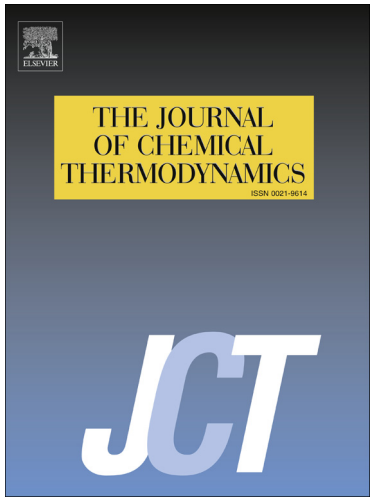

Studies on molecular interactions of some neurotransmitters in water using volumetric and compressibility measurements at T = (278.15, 288.15 and 298.15) K

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Studies on molecular interactions of some neurotransmitters in water using volumetric and compressibility measurements at T = (278.15, 288.15 and 298.15) K

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ABSTRACT

The systematic measurements of densities (ρ) and speeds of sound (u) of aqueous binary mixtures of bioactive amino acid neurotransmitters *viz.* gamma amino butyric acid, glycine hydrochloride and sodium glutamate at different temperatures *i.e.* T = (278.15, 288.15 and 298.15) K within the concentration range of (0.05 – 0.35) mol . kg^{-1} have been carried out. The obtained data of densities and speeds of sound were used to calculate different derived parameters such as apparent molar volume of solute (V_ϕ), isentropic compressibility of solution (κ_s) and apparent molar isentropic compressibility of solute (κ_ϕ) of gamma amino butyric acid, glycine hydrochloride and sodium glutamate in water at different temperatures. The limiting values of apparent molar volume (V_ϕ^0) of solute, apparent molar isentropic compressibility $(\kappa_\phi^0)$of solute and apparent molar expansivity (E_ϕ^0) have also been obtained. The coefficient of thermal expansion (α^*), second derivative of limiting apparent molar volume $(\partial^2 V_\phi^0 / \partial T^2)$and hydration number (n_H) of the water soluble neurotransmitters have also been computed. The results have been interpreted in terms of various interactions among solute and solvent molecules such as hydrogen bonding, solute-solute and solute-solvent interactions and structure making and structure breaking tendencies of the solutes in water. The Scaled particle theory has been used to interpret volumetric results.

Keywords: Density, Speed of sound, Amino acid neurotransmitter, Scaled particle theory.