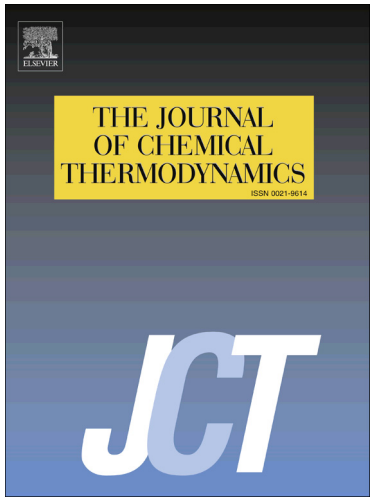

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Solvation thermodynamics of anti-tuberculosis Isoniazid in aqueous and in aqueous electrolytic media

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Abstract

Isoniazid forms one of the most potent antitubercular drugs effective against M. tuberculosis which functions in combination with pyrazinamide, rifampicin and ethambutol drugs. A drug is subjected to many complex processes from the time it is administered to the time the biologic response is affected. The physical properties give an idea of various types of interactions taking place between drug and water molecule. Keeping this in mind we have measured densities (ρ) and speeds of sound (u) of Isoniazid (INH) in aqueous, aqueous sodium chloride and potassium chloride (0.06 mol·kg^{-1} and 0.1 mol·kg^{-1} in water) at three different temperatures i.e. T = (288.15, 298.15 and 308.15) K in the concentration range of (0.01 to 0.1) mol·kg^{-1}. From these experimental data, apparent molar volume $\left(V_\phi\right)$ of solute, isentropic compressibility $\left(\kappa_S\right)$ of solution, apparent molar isentropic compressibility $\left(\kappa_\phi\right)$ of Isoniazid (INH) in water and in aqueous solutions of 0.06 and 0.1 mol·kg^{-1} sodium chloride and potassium chloride have been calculated. The limiting apparent molar expansivity $\left(E_\phi^0\right)$ of solute and coefficient of thermal expansion $\left(\alpha^*\right)$ of Isoniazid (INH) have also been calculated. Transfer parameters have been interpreted from the point of view of concentration dependence of solute-solvent interactions. Infinite dilution values of V_ϕ and κ_ϕ have also obtained from extrapolation to zero molality and have been utilized in obtaining transfer volumes $\left(\Delta_{tr}V_\phi^0\right)$ and transfer compressibility $\left(\Delta_{tr}\kappa_\phi^0\right)$ of Isoniazid (INH) from aqueous solutions of 0.06 mol·kg^{-1} and 0.1 mol·kg^{-1} sodium chloride and potassium chloride at different temperatures. Results are used to analyze the nature of solute-solvent, solute-solute interaction and structure making/breaking ability of solute in the aqueous solution.

Keywords: Density, Speed of sound, Isoniazid (INH), Sodium chloride, Potassium chloride.