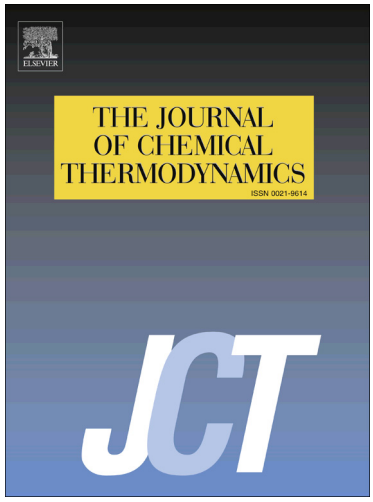

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Sudip Mondal, Sudhakar S. Dhondge, Lalitmohan J. Paliwal, Vijay M. Tangde, Santosh P. Jengathe

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Physicochemical properties of an anticonvulsant drug sodium valproate in aqueous and in mixed aqueous solutions at different temperatures

Sudip Mondal [a, b], Sudhakar S. Dhondge [a]*, Lalitmohan J. Paliwal [b], Vijay M. Tangde [b], Santosh P. Jengathe [a, b]

[a] P.G. Department of Chemistry, S.K. Porwal College, Kamptee, Dist. Nagpur 441001, India

[b] Department of Chemistry, R. T. M. Nagpur University, Nagpur 440033, India

Abstract

The study of fundamental thermodynamic properties of aqueous solutions is very important to derive the information about solute-solvent and solute-solute interactions. Sodium valproate is a very important drug used for treatment of epilepsy, anorexia nervosa, panic attack, anxiety disorder *etc.* In this communication we report apparent molar volume of solute (V_ϕ), limiting apparent molar volume of solute (V_ϕ^0), limiting apparent molar expansivity of solute (E_ϕ^0), thermal expansion coefficient (α^*), double derivative of limiting apparent molar volume $(\partial^2 V_\phi^0 / \partial T^2)$, Jones–Dole equation viscosity *A*, *B* and *D* coefficients, temperature derivative of *B* coefficient *i.e.*, (dB/dT) and hydration number (n_H) for aqueous solutions of Sodium valproate and solutions of Sodium valproate in aqueous solutions of sodium chloride and dextrose. The above parameters have been obtained from measured values of densities (ρ) and absolute viscosities (η) for aqueous binary mixtures of sodium valproate and for the ternary mixtures of sodium valproate in 0.06 mol·kg^{-1} aqueous solutions of sodium chloride and in 0.06 mol·kg^{-1} aqueous solutions of dextrose in the concentration range (0.01 – 0.1) mol·kg^{-1} as a function of temperature at *T*/K = (288.15, 298.15 and 308.15) and at atmospheric pressure. The values of limiting apparent molar volume of transfer $(\Delta_{tr} V_\phi^0)$, and viscosity *B*-coefficient of transfer $(\Delta_{tr} B)$ have also been calculated. The transition state theory was used to obtain the Gibbs free energy of activation of viscous flow per mole of solvent $(\Delta\mu_1^{0\#})$ and per mole of solute $(\Delta\mu_2^{0\#})$. The related activation parameters like $\Delta S_2^{0\#}$ and $\Delta H_2^{0\#}$ have also been derived. Co-sphere overlap model has been used to understand the results in terms of molecular interactions (hydrophilic, hydrophobic and ionic interactions). The results have