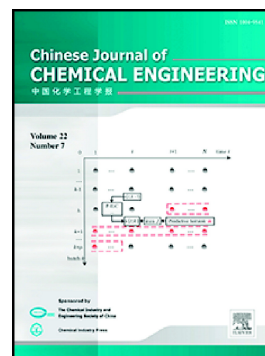


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Chemical Engineering Thermodynamics

Temperature-dependent aggregation of bio-surfactants in aqueous solutions of galactose and lactose: Volumetric and viscometric approach

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Abstract

Modulation in the aggregation behaviour of bio-surfactants (bile salts), sodium cholate (NaC) and sodium deoxycholate (NaDC) in aqueous solutions of carbohydrates (galactose and lactose) have been investigated by measuring the density (ρ), speed of sound (u) and viscosity (η) of the mixtures at different temperatures 293.15, 298.15, 303.15, 308.15 and 313.15K. The density and speed of sound data have been used to calculate various volumetric and compressibility parameters such as apparent molar volume (V_ϕ), isentropic compressibility (κ_s), apparent molar adiabatic compression ($\kappa_{s,\phi}$) to get a better insight into the micellization mechanism of bile salts. Further, the viscosity data have been studied in the light of relative viscosity (η_r) and viscous relaxation time (τ). Some derived parameters such as free volume (V_f), internal pressure (π_i) and molar cohesive energy (MCE) of NaC and NaDC in aqueous solution of saccharides have also been calculated from viscosity data in conjunction with density and speed of sound values. All the calculated and derived parameters provide qualitative information regarding the nature of interactions i.e. solute-solute, solute-solvent and solvent-solvent in the solution.

Keywords: Density; speed of sound; apparent molar volume; isentropic compressibility; viscosity; relative viscosity.

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