



**Ultrasonic studies of molecular interactions in 1,4-dioxane+water mixture at different concentrations**

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**ABSTRACT**

*The densities, viscosities, and ultrasonic speeds of 1,4-dioxane + water mixtures have been measured at three different concentrations (0.568M, 1.136M, 1.705M) and at a constant temperature 308.15 K. The results are discussed in terms of different theories of propagation of ultrasonic waves. From the velocity, density and viscosity data values, various acoustical parameters namely, adiabatic compressibility( $\beta_{ad}$ ), intermolecular free length( $L_f$ ), free volume( $V_f$ ), Rao's constant( $R$ ), Wada's constant( $W$ ), relaxation time( $\tau$ ), specific acoustic impedance( $Z$ ), classical sound absorption( $\alpha/f^2$ )<sub>class.</sub>, internal pressure( $\pi_i$ ), molar cohesive energy(MCE), relative association( $R_A$ ), Gibb's free energy( $\Delta G$ ), solvation number( $S_n$ ) have been calculated. All these parameters have been discussed separately to throw light on the solute-solvent and solute-solute interactions. The viscosity data have been analyzed in terms of solute-solvent and solute-solute interactions. The compressibilities obtained from the data supplemented with their ultrasonic speeds indicate the electrostriction of the solvent molecules around the ions.*

**Keywords:** Solute-solvent interactions, free volume, relaxation time, classical sound absorption, Gibb's free energy.

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