

Thermoacoustic Properties and their Significance in Solvent–Solute Interactions

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Abstract: *Thermoacoustic properties play a vital role in understanding molecular interactions in liquid systems, particularly solvent–solute mixtures. These properties—such as ultrasonic velocity, isentropic compressibility, acoustic impedance, intermolecular free length, and relaxation strength—offer valuable insights into structural and interactional changes at the molecular level. This paper presents a detailed investigation of thermoacoustic parameters in liquid mixtures, emphasizing their role in analyzing solvent–solute interactions. Experimental techniques involving ultrasonic interferometry and density measurements are discussed along with theoretical correlations. The study also includes an extended literature review up to 2020, graphical analysis, and interpretation of results. The findings highlight how thermoacoustic properties can effectively reveal hydrogen bonding, dipole interactions, and structural organization in solutions, making them crucial for applications in chemistry, pharmaceuticals, and materials science.*

Keywords: Thermoacoustic properties, ultrasonic velocity, compressibility, solvent–solute interaction, acoustic impedance, liquid mixtures.