

Investigation of Excess Thermodynamic Properties in Multicomponent Solutions

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Abstract: *Excess thermodynamic properties provide a quantitative measure of deviations from ideal solution behavior and play a crucial role in understanding intermolecular interactions in liquid mixtures. This research investigates excess properties such as excess molar volume, excess Gibbs free energy, excess enthalpy, and excess compressibility in multicomponent (particularly ternary) solutions. Experimental approaches based on density and ultrasonic velocity measurements are discussed alongside theoretical and semi-empirical models. The study highlights how molecular size, polarity, composition, and temperature influence these properties. An extended literature review up to 2019 is included, along with graphical analysis of excess functions. The results demonstrate that excess properties are essential for interpreting molecular interactions and have significant applications in chemical engineering, pharmaceuticals, and material science.*

Keywords: Excess thermodynamic properties, multicomponent solutions, ternary mixtures, molecular interactions, excess molar volume, compressibility.