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Thermodynamic and interaction studies of binary liquid mixtures on the basis of Flory's statistical theory and empirical relations

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Abstract

A number of important and useful thermodynamic properties of seven binary liquid mixtures namely DPGDME + methanol, 1-propanol, 1-pentanol, 1-heptanol at 298.15K and oxolane + aniline, N-methyl aniline, N-ethyl aniline at 303.15K, 313.15K & 323.15K have been computed on the basis of the most widely accepted Flory's statistical Theory (FST). The component DPGDME is basically dipropylene glycol dimethyl ether and oxolane known as tetrahydrofuran are the key ethereal liquids with which the interactions of popular solvents are analyzed. Also, some thermodynamics properties of aforesaid mixtures were calculated from the recently proposed empirical correlations using density and ultrasonic velocity. The theoretical results are compared with the experimental findings yielding quite satisfactory agreement. The results are discussed in the light of interactions operating in the systems.

Keywords: Thermodynamic properties, Binary mixtures, FST, empirical correlations, interactions.

1. Introduction

The key factor in determining the thermodynamic properties of any pure substance is the intermolecular forces viz. electrostatic forces, induction forces, chemical forces and dispersion forces prevalent between the molecules of a substance depending on the type of molecules in the vicinity of each other. The study of thermodynamic properties of mixture of pure components is intricate and cumbersome due to interaction between similar and dissimilar components which

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