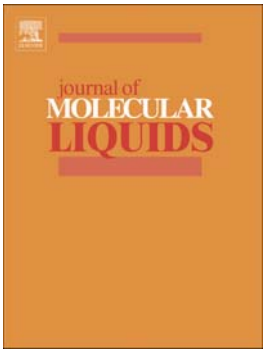

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Microwave dielectric relaxation spectroscopy studies on associative polar binary mixtures of nitrobenzene with primary alcohols

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Abstract

The microwave dielectric relaxation behaviors of binary mixtures of nitrobenzene with primary alcohols (ethanol, 1-propanol and 1-butanol) have been studied at different temperatures using Time Domain Reflectometry method. The complex dielectric spectra of pure and mixture solutions were fitted with Debye model using least square method. The obtained static dielectric constant, relaxation time constant values were plotted against mole fraction of solute. The computed dielectric parameters such as excess dielectric constant, excess inverse relaxation time and effective Kirkwood correlation factors were used to interpret the intermolecular interaction and dynamic change in the solution. Moreover, the mixing effect of nitrobenzene in different chain length alcohols has been explored by concentration dependent excess dielectric constant values. The positive molar enthalpy values of mixtures indicate that heat energy is absorbed in process of dielectric reorientation. Furthermore, heterogeneous interaction between solute and solvent functional group was confirmed by equi-molar FT-IR spectra analysis.

Keywords: Binary mixtures, Dielectric relaxation, Thermodynamics, Hydrogen bond interaction, Time Domain Reflectometry (TDR).

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