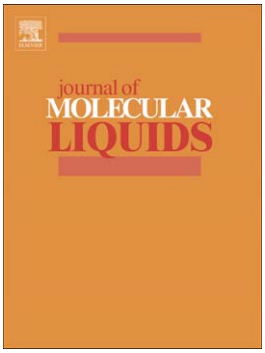

Mesomeric effect on thermodynamic parameters of binary liquid mixtures of *N*-methyl formamide and o-substituted anilines

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Mesomeric effect on Thermodynamic parameters of binary liquid mixtures of N-methyl formamide and o- substituted anilines

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Abstract

In the present investigation, the densities (ρ) and viscosities (η) are reported for binary mixtures N-methylformamide with o-substituted aniline (2-chloroaniline, 2-methylaniline and 2-methoxyaniline) over the entire composition range from 303.15 K to 318.15 K and at atmospheric pressure 0.1 MPa. The experimental data is used to calculate excess volume (V^E), deviation in viscosity ($\Delta\eta$) and excess Gibbs energy of activation of viscous flow (G^{*E}). The excess partial molar volumes, $\overline{V}^{\mathrm{E}}_{\mathrm{m},1}$ and $\overline{V}^{\mathrm{E}}_{\mathrm{m},2}$ and excess partial molar volumes $\overline{V}^{\circ\mathrm{E}}_{\mathrm{m},1}$ and $\overline{V}^{\circ\mathrm{E}}_{\mathrm{m},2}$ at infinite dilution have also been calculated. The variations in these properties with composition for all the binary mixtures suggest loss of dipolar association, difference in size and shape of the component molecules, dipole-dipole interaction and hydrogen bonding between N-methylformamide with o-substituted aniline. Furthermore, the FTIR spectra have been recorded at 298.15 K and found to be useful for understanding the presence of hydrogen bonding between nitrogen atom of amino group of o-substituted aniline and hydrogen atom of the amide group of N-methylformamide in the liquid mixtures. A good agreement is obtained between excess quantities and spectroscopic data.

Keywords: partial molar volume; hydrogen bonding; o-substituted aniline; FTIR spectra