

Experimental and Theoretical Investigation of Surface Tension of Organic Liquids and Their Binary and Ternary Mixtures

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Abstract

The study of surface tension of organic mixtures has captured the interest of several researchers due to their importance in many engineering applications such as, enhancement of oil recovery, and drug and food formation. In this study, surface tension (γ) and density (ρ) of binary systems {Nonane + Toluene, Nonane + Benzene, Nonane + Cyclooctane, Hexadecane + Toluene, Hexadecane + Benzene, and Hexadecane + Cyclooctane} and ternary systems {Nonane + Toluene + Cyclooctane, Nonane + Benzene + Cyclooctane, Hexadecane + Toluene + Cyclooctane, and Hexadecane + Benzene + Cyclooctane} were evaluated at normal atmospheric pressure, varying temperatures of 298.2 K, 303.2 K, 308.2 K and 313.2 K, and different mole fractions. The surface tension of these organic mixtures was measured using DuNouy Ring Device. The results were compared with the theoretical values obtained from Brock Bird relation, and Goldsack and Sarvas method with overall average absolute relative deviation (ADD %) of 9.52 % and 3.59 %, respectively. A fitting equation of Redlich-Kister was also applied to the binary systems and an overall average absolute relative deviation (ADD %) of 0.12 % was obtained. The calculated deviations indicate a reasonable agreement between theoretical and experimental values.