

Measurement and Correlation of Vapor-Liquid Equilibrium for Mixtures Composed of Alcohol + Ketone Systems

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The vapor-liquid equilibrium (VLE) for mixtures composed of alcohol and ketone shows strong non-ideality such as azeotrope or immiscibility due to differences in the polarity of molecules. The alcohols contain both hydrogen donor and acceptor whereas the ketones contain only hydrogen acceptors with respect to hydrogen-bonding formation. Thus, the phase equilibrium behaviors of such mixtures are quite complex and highly dependent on the range of concentration. For the understanding of such behavior, phase equilibrium data were collected from the literature and several missing experimental data were measured. The VLE for ethanol + methyl isobutyl ketone, 1-butanol + methyl ethyl ketone and 1-butanol + methyl propyl ketone were measured using a circulation-type phase equilibrium measurement apparatus at constant pressure. The collected data from literature and new experiments were correlated by well-known excess Gibbs free energy models such as Wilson / NRTL /UNIQUAC. The effect of hydrogen bonding formation was examined using the Nonrandom Lattice Fluid Equation of State with Hydrogen Bonding (NLF-HB EOS) and the calculation results were compared with excess Gibbs free energy models.