Thermodynamic Properties of Acetic Acid + Hydrocarbons Mixtures

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For the design of separation equipment and to test theories of solutions, there is a constant need for reliable vapor-liquid equilibrium and excess enthalpy data. The purpose of this work is the determination of the vapor-liquid equilibria for binary mixtures of acetic acid with pentane, cyclohexane and 1-hexene.

A static apparatus with on-line analysis of the vapor phase has been used for the measurements. It allows pressure measurements from 100 kPa to 2000 kPa using a differential pressure gage (Ref. Validyne) and temperature range from 300 K to 500 K. For the on-line analysis of the vapor phase, the measurement cell is connected to a Gas Chromatograph (HP 6890) equipped with an FID. The apparatus was calibrated using literature vapor pressures of n-hexane.

The vapor pressure and the vapor phase composition for the three binary mixtures were measured at temperatures between 353.15 K and 453.15 K.

The data were correlated with the Antoine equation. Molar excess Gibbs energies GE were calculated for several constant temperatures and fitted to a fourth-order Redlich-Kister equation using Barker's method.

The data on excess molar Gibbs energies of the three binary mixtures have been examined on the basis of the Modified UNIFAC (Dortmund) group contribution model.