

Measurement and Correlation of Solubility of Naphthalene in Mixed Solvents

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While there is an abundance of technical literature on the thermodynamics of vapor-liquid equilibria in mixtures, much less attention has been given to the thermodynamics of solubilities of solids in pure and mixed liquid solvents. Such solubilities are of interest in chemical process design, especially when process conditions must be specified to prevent precipitation of a solid, least flow lines be plugged.

The present work deals with the solubility of naphthalene in the ternary mixture containing benzene, chloroform and dioxane. For this purpose, the first step was the investigation of the solubility of naphthalene in the three binary mixtures benzene-chloroform, benzene-dioxane and chloroform-dioxane. The solubility measurements were carried out by means of a dynamic method. The measurements have been done at constant composition at temperatures between 293 K and 378 K. For each pure, binary and ternary solvent, the solubility-temperature data were correlated with several empirical equations.

The data on excess molar Gibbs energies, G^E , of the three binary and the ternary mixtures have been examined on the basis of the ASOG, UNIFAC and Modified UNIFAC (Dortmund) group contribution models which provide a fairly consistent description of phase equilibria and the related excess functions.