Salting Effect in Partially Miscible Systems of Water/Acétic Acid/1-Butanol at 298.15k: Experimental Study and Estimation of New Solvent-Solvent and Salt-Solvent Binary Interaction Parameters for NRTL Model

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Abstract : The presence of salt can either raise or lower the distribution coefficient of a solute acetic acid in liquid- liquid equilibria. The coefficient of solute is defined as the ratio of the composition of solute in solvent rich phase to the composition of solute in diluents (water) rich phase. The phenomena are known as salting–out or salting-in, respectively. The effect of monovalent salt, sodium chloride and the bivalent salt, sodium sulfate on the distribution of acetic acid between 1-butanol and water at 298.15K were experimentally shown to be effective in modifying the liquid-liquid equilibrium of water/acetic acid/1-butanol system in favour of the solvent extraction of acetic acid from an aqueous solution with 1-butanol, particularly at high salt concentrations of both salts. All the two salts studied are found to have to salt out effect for acetic acid in varying degrees. The experimentally measured data were well correlated by Eisen-Joffe equation. NRTL model for solvent mixtures containing salts was able to provide good correlation of the present liquid-liquid equilibrium data. Using the regressed salt concentration coefficients for the salt-solvent interaction parameters and the solvent-solvent interaction parameters obtained from the same system without salt. The calculated phase equilibrium was in a quite good agreement with the experimental data, showing the ability of NRTL model to correlate salt effect on the liquid-liquid equilibrium.
Keywords : activity coefficient, Eisen-Joffe, NRTL model, sodium chloride
Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development
Conference Location : Chicago, United States
Conference Dates : December 12-13, 2020