

Salting-Out Effect on the Liquid-Liquid Equilibrium of Two Ternary Systems

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The solubility of an organic solute in aqueous solutions can be altered by addition of inorganic salts such as KCl or NaCl, because the solubility of a non-electrolyte decreases by the addition of a salt due to a phenomenon which is called the salting-out effect. Extensive studies have been conducted on the effect of various salts on the solubility of non-electrolytes in water. The salting-out effect on liquid-liquid equilibria has been the topic of investigation, as it has the potential for new applications in separations by preferential solvent extraction.

The present work reports the equilibrium data for the systems: water/propionic acid/isopropyl methyl ketone (IPMK) and water/propionic acid/isobutyl methyl ketone (IBMK) at 303, 313 and 323 K. The effect of the addition of sodium chloride (NaCl) and potassium chloride (KCl) on the distribution of propionic acid between the two phases has been investigated and selectivity curves are presented in the presence and absence of salt showing the influence of NaCl and KCl on the extraction of propionic acid from aqueous solutions by IBMK and IPMK. Thermodynamic consistency of the tie-line data was ascertained by making the Othmer-Tobias plots. Calculated data resulting from the NRTL and UNIQUAC activity coefficient models using the HYSYS software have been compared with the experimental data and good agreement was shown.