

Solid-liquid Equilibria and deviation in viscosity for binary systems of hexanoic acid with acetic acid, propionic acid, butyric acid and valeric acid

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In recent years, a relatively new biofuel with four carbon atoms, bio-butanol, has shown promise because of its advantages compared to bioethanol. However, some problems are still obstacle for commercialization of bio-butanol. The separation and purification of fermented products is one of them. The design of industrial separation or purification processes based on crystallization is importance when dealing with thermally-sensitive mixtures. The aim of this study is therefore to determine the equilibrium data and mixture properties for binary mixtures, which encounter in the bio-butanol fermentation. In details, the solid-liquid equilibrium data for hexanoic acid with C₂ to C₅ carboxylic acids: {acetic acid + hexanoic acid}, {propionic acid + hexanoic acid}, {butyric acid + hexanoic acid} and {valeric acid + hexanoic acid} were measured at atmospheric pressure by the visual method. The experimental SLE data were correlated with the NRTL and UNIQUAC activity coefficient model. In addition, viscosity was determined at 298.15 K~318.15 K for the same binary systems and the deviation in viscosity were determined at different temperatures and fitted using the Redlich-Kister equation.