Isothermal vapor-liquid equilibrium and excess properties for binary mixtures of butylacetate, 3-methyl-1-butanol and 1-hexanol

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Biobutanol is gaining attention as transprotation fuels because of its similarity in properties to gasoline. Its low volatile, high flash point, and low vapor pressure make it more desirable than bioethanol. Biobutanol production from sugar, which is known as ABE (Acetone, Butanol, Ethanol) fermentation, has the economical disadvantages of its high cost of the substrate, low productivity and its separation from fermentation broth. To acquire the knowledge about the separation processes, thermodynamic equilibrium data for butanol and byproduct containing mixtures are needed. The isothermal vapor-liquid equilibrium data of {butylacetate + 3-methyl-1-butanol}, {butylacetate + 1-hexanol} and {3-methyl-1-butanol + 1-hexanol} binary systems were determined by headspace gas chromatography(HSGC) at 343.15 K. The Wilson, NRTL and UNIQUAC model were used to fit the experimental data. In addition, the excess molar volumes(V^E) and refractive indices(△R) for the binary mixtures were measured at 298.15 K. The experimental data were correlated with the Redlich-Kister equation.