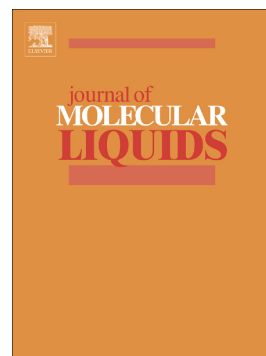


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Determination of liquid–liquid equilibria data for (water + propanoic acid + 3-methylbutan-1-ol) ternary mixture at 293.15 K to 313.15K

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ABSTRACT

Liquid–liquid equilibrium (LLE) data for the ternary mixture of water + propanoic acid + 3-methylbutan-1-ol were determined within the temperature range (293.15 to 313.15) K and atmospheric pressure. The phase diagrams containing solubility and tie-line data show the type-1 behavior of LLE. Refractive index measurements were performed to determine the binodal curves and the tie-line compositions of the equilibrium phases. It has been found that the relative mutual solubility of propanoic acid was higher in solvent phase than aqueous phase. For evaluation of the capability of solvent for extraction of propanoic acid from aqueous solutions, distribution coefficients and separation factors were measured. The high values of separation factors confirm that 3-methylbutan-1-ol is a suitable choice for this purpose. The reliability of the experimental tie-lines was checked through the Othmer–Tobias correlation equation. The NRTL and UNIQUAC models were used to correlate the tie-line data.

Keywords: LLE; NRTL; UNIQUAC; Propanoic Acid; 3-methylbutan-1-ol

1. Introduction

Propanoic acid is an organic acid with many industrial applications [1-4]. It can be produced by chemical synthetic or fermentation processes [2,4]. The recovery of propanoic acid from dilute solutions is very important and holds considerable interest due to its widespread use in industrial as well as economic point of view [5-6]. Knowledge of phase behavior of ternary mixtures containing propanoic acid and (liquid + liquid) equilibrium data is required for the design of liquid propanoic acid extraction processes [7]. Generally, information about phase equilibrium data is very important in recovery and separation processes [8-10]. The selection of the extraction

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