

Modeling of the VLE for ternary systems of water +ethanol +ionic liquids using the Peng-Robinson equation of state and UNIQUAC activity model

Ahmad Reza Bahmani¹, Saeed Poshtdar² and Marzie Bahmani³

Department of Chemical Engineering, Shiraz University of Technology, Shiraz-Iran
Ar.bahmani@sutech.ac.ir

Abstract

In this work, isobaric vapor liquid equilibrium VLE data for ethanol-water containing ionic liquids [bmim] [BF₄], [bmim] [Cl], [emim] [BF₄] and [emim] [Cl] were presented at 100kPa, and the effect of ionic liquids on the VLE of ethanol-water system was discussed. Activity coefficients of the volatile components were obtained by a thermodynamic model of the liquid phase. Vapor liquid equilibrium (VLE) of ternary mixtures is estimated by applying thermodynamic models. Peng–Robinson (PR) equation of state and UNIQUAC activity model are applied to model the fluid phase equilibrium at different temperatures and P=100 kpa. The results of this study show that PR EoS and UNIQUAC model are good for estimation of the vapor phase and liquid phase respectively, due to the low deviation from experimental data.

Keyword: Ionic liquid-UNIQUAC-Peng-Robinson- Vapor liquid equilibrium

¹ -Master of chemical, petroleum & gas engineering

² -Bachelor of chemical engineering, university of mazandaran

³ - Bachelor of chemical engineering, university of yasuj