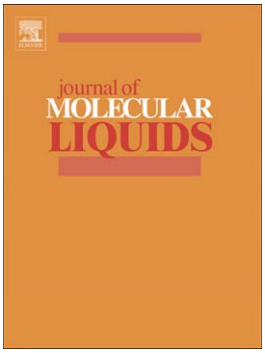

Studies on thermodynamic properties of butyl acetate/Alkan-2-ol binary mixtures: Measurements and properties modeling

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PII: S0167-7322(16)31564-1
DOI: doi:10.1016/j.molliq.2016.11.128
Reference: MOLLIQ 6675

To appear in: *Journal of Molecular Liquids*

Received date: 15 June 2016
Revised date: 24 November 2016
Accepted date: 28 November 2016

Please cite this article as: Mohammad Almasi, M. Aynehband, Studies on thermodynamic properties of butyl acetate/Alkan-2-ol binary mixtures: Measurements and properties modeling, *Journal of Molecular Liquids* (2016), doi:10.1016/j.molliq.2016.11.128

Studies on thermodynamic properties of butyl acetate /Alkan-2-ol binary mixtures: Measurements and properties modeling

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ABSTRACT

In present paper, densities and viscosities of pure butyl acetate, 2-propanol, 2-butanol, 2-pentanol, and their binary mixtures with butyl acetate were measured at temperatures 293.15 to 323.15 K. From these data, excess molar volumes and deviations in viscosity have been calculated. Excess molar volumes are positive over the whole concentration range and increase with rising temperature. Viscosity deviations show negative values for all studied mixtures and increase as temperature increases. The ability of Peng–Robinson (PR), Peng–Robinson–Stryjek–Vera (PRSV), SAFT and PC– SAFT equations for correlation of the volumetric properties was tested. The liquid density of the binary mixture was obtained more accurately by both SAFT and PC– SAFT models with the maximum AAD 0.082% and 0.041%, respectively. Prediction of excess molar volumes by PR and PRSV equations is closely matched with the experimental data with the maximum AAD 1.12% for PR and 0.087% for PRSV model.

Keywords: Density; Viscosity; Butyl acetate; Equations of state

1. Introduction

Renewable fuels and bio based fuel additives are gaining more and more attention due to their ability to cut down greenhouse gas emissions. Butyl acetate is currently considered as a candidate for bio based fuel additives and has a good potential for improving biodiesel properties because of its very low freezing point and a high flash point [1]. Precise predictions of thermodynamic properties of mixtures are vital in designing and optimizing various chemical processes. [2]. Cubic equations of state are the most applicable and the most commonly used models in various industries [3-6]. One of the most popular cubic equations of state is that proposed by Peng and Robinson and is widely used in chemical engineering

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