

Liquid-Liquid-Equilibrium of System Containing Glycerol, Ethanol and Biodiesel from Crambe (*Hochst abyssinica*) oil at (293.15 – 318.15)K

¹Basso, R.C.; ¹Meirelles, A.J.A.; ¹Batista, E.A.C.

¹UNICAMP

1-University of Campinas, Brazil

In Brazil, the production of biodiesel by transesterification using ethanol as a reagent is more relevant due to availability and low price. In this process two immiscible phases are formed one rich in glycerol and the other one rich biodiesel; the excess of ethanol distributes in both phases. The Liquid-Liquid-Equilibrium (LLE) data are important and useful in the study of the kinetic of the transesterification reaction; as well in study of the purification steps, when the separation of glycerol, ethanol and ethyl ester is desired. Crambe seed presents high oil content (about 35 %) and a particular characteristic in fatty acid profile, rich in mono-unsaturated fatty acid (about 75 %) with a high content of erucic acid (about 55 %) that makes it improperly to human dietary and an interesting raw material to biodiesel production (fatty acid ethyl ester-FAEE). The goal of this research was to determine the LLE of systems containing glycerol, ethanol and FAEE produced from crambe oil, at temperatures of 298.15 and 318.15 K. LLE diagrams of these systems showed that ethanol distributes in both FAEE-rich and glycerol-rich phases. Ethanol presented more affinity to the glycerol-rich phase than to FAEE-rich phase. The solubility in the ternary mixture increases with increasing of temperature, but the tie line behavior is about similar. The experimental data were correlated by the NRTL model and the average percent absolute deviations in phase composition were satisfactory. These parameters will be useful in computational simulation of biodiesel production to ensure the assurance of the results.

Keywords: biodiesel; crambe oil; liquid liquid equilibrium; NRTL model

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