Solid-liquid phase diagrams of bynary mixtures formed by 1-octanol, 1-decanol, caprilic acid and capric acid

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The growing demand for biofuels will generate further opportunities for replacing petrochemicals by products derived from renewable sources, such as bioethanol and sugar based products or chemicals derived from fats and oils. Oleochemical industry profits may further increase if the byproducts of the all process stages, that should be rich in fatty acids, triacylglycerols, small amounts of fatty alcohols and so on, were utilized from the point of oil extraction to glycerol separation from biodiesel. Develop and enhance a separation process is necessary to have information and data about the physicochemical properties of raw materials and products as well as to know its properties behavior under equilibrium conditions. All of these data are fundamental to develop and optimize separation processes minimizing the processes cost.

In the present study were investigated using the DSC technique the solid-liquid equilibrium of the four binary mixtures formed by fatty alcohol + fatty acid, caprylic acid + 1-octanol, caprylic acid + 1-decanol, capric acid + 1-octanol and capric acid + 1-decanol. The interest in such mixtures is attributed to fact that both compounds, fatty acids and fatty alcohols, are present in the vegetable oil extraction and the biodiesel production. Both compounds are considered byproducts of the biodiesel production but, after the separation processes are considered products with high added value.

It was observed through the phase diagrams of the studied systems that all exhibit a eutetic point at the alcohol rich region. Moreover, it is clear the occurrence of the peritectic reaction in the caprylic acid + 1-decanol and capric acid + 1-decanol systems. For the systems caprylic acid + 1-octanol and capric acid + 1-octanol, it is probably that the peritectic reaction occurs too, but the proximity of the observed transitions requires other techniques able to confirm the occurrence of such reaction.

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