

## Physicochemical study of esterification and transesterification reactions in a system triacylglycerols – oleic acid – ethanol under acid catalysis

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### Abstract

The results of phase composition investigation in the system TAG – OIA – EtOH (where TAG – triacylglycerol (sunflower oil), OIA – oleic acid, EtOH – ethanol) are presented. The chosen system simulates the composition of waste vegetable oils. The mutual solubility of components and a phase diagram of the ternary system were determined. The role of OIA as cosolvent for the TAG and EtOH was shown. The change of composition from two-phase state to single-phase state upon OIA content in the composition over 23-30 wt% was observed. The phase diagram presents the binodal curves at temperatures from 20 to 70 °C.

The possibility of the processes realization in the diffusion and the kinetic regime for the esterification and transesterification reactions was studied theoretically and experimentally. The influence of phase composition of the system on regime and kinetic parameters of the interaction was shown. The effective rate constant,  $k_{eff}$ , and the activation energy  $E_a$  were chosen as the kinetic parameters of the process.