

Kinetics of enzymatic synthesis of liquid wax ester from oleic acid and oleyl alcohol

ABSTRACT

The kinetics of wax ester synthesis from oleic acid and oleyl alcohol using immobilized lipase from *Candida antarctica* as catalyst was studied with different types of impeller (Rushton turbine and AL-hydrofoil) to create different mixing conditions in 2l stirred tank reactor. The effects of catalyst concentration, reaction temperature, and impeller tip speed on the synthesis were also evaluated. Rushton turbine impeller exhibited highest conversion rate at lower impeller tip speed as compared to AL-hydrofoil impeller. A second-order reversible kinetic model from single progress curve for the prediction of fractional conversion at given reaction time was proposed and the corresponding kinetic parameter values were calculated by non-linear regression method. The results from the simulation using the proposed model showed satisfactory agreement with the experimental data. Activation energy shows a value of 21.77 Kcal/mol. The thermodynamic parameters of the process, enthalpy and entropy, were 21.15 Kcal/mol and 52.07 cal/mol.K, respectively.

Keyword: Wax ester; Immobilized lipase; Esterification; Kinetics