Kinetic study of liquid lipase-catalyzed glycerolysis from olive oil using Lipozyme TL 100L

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Abstract

Monoacylglycerol (MAG) and diacylglycerol (DAG) are two natural components found in most edible oils and fats. Conventional synthesis of MAG and DAG is usually conducted by glycerolysis of triacylglycerol (TAG) at high temperatures (above 200 °C) in the presence of an alkaline catalyst. In this work, the synthesis of MAG and DAG using enzymatic glycerolysis of olive oil was investigated using Tween 80 as surfactant, n-butanol as co-surfactant and the novel lipase in free/liquid formulation Lipozyme TL 100L as catalyst. Experimental design was used to evaluate the effect of enzyme load and reaction temperature on the feedstock conversion. Enzyme load and system temperature were significant variables in the statistical design and the best condition was found at 35 °C, 7.5 vol% of Lipozyme TL 100 and 2:1 molar ratio (glycerolysis:oil) with conversion of TAG at approximately 98 % after 2 h of process. A mathematical model based on the Ping-Pong Bi-Bi mechanism was used to describe the reaction kinetics. The model adequately described the behavior of the system and can be a useful tool for the design of reactors in larger scales.

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