Optimization and kinetic study on the synthesis of palm oil ester using Lipozyme TL IM

ABSTRACT

Enzymatic synthesis of palm oil esters (POE) was carried out via alcoholysis of palm oil (PO) and oleyl alcohol (OA) catalyzed by Lipozyme TL IM. The optimum reaction conditions were: temperature: 60 ℃; enzyme load: 24.7 wt%; substrate ratio: 1:3 (PO/OA), impeller speed: 275 rpm and reaction time: 3 h. At the optimum condition, the conversion of POE was 79.54%. Reusability study showed that Lipozyme TL IM could be used for 5 cycles with conversion above 50%. The alcoholysis reaction kinetic follows the Ping-Pong Bi-Bi mechanism characterized by the Vmax, Km(PO), and Km(OA) values of 32.7 mmol/min, 0.3147 mmol/ml and 0.9483 mmol/ml, respectively. The relationship between initial reaction rate and temperature was also established based on the Arrhenius law.

Keyword: Lipozyme TL IM; Enzymatic esterification; Kinetic study; Ping-Pong Bi-Bi model; Palm oil esters synthesis