Study on response surface methodology (RSM) of lipase-catalyzed synthesis of palm-based wax ester

Abstract

The synthesis of wax ester using refined, bleached and deodorized (RBD) palm oil and oleyl alcohol catalyzed by lipozyme IM was carried out. Response surface methodology (RSM) based on a five-level, four-variable central composite rotatable design (CCRD) was used to evaluate the interactive effects of synthesis, of reaction time (2.5–10 h), temperature (30–70 °C), amount of enzyme (0.1–0.2 g) and substrate molar ratio (palm oil to oleyl alcohol, 1:1–1:5) on the percentage yield of wax esters. The optimum conditions derived via RSM were: reaction time 7.38 h, temperature 53.9 °C, amount of enzyme 0.149 g, and substrate molar ratio 1:3.41. The actual experimental yield was 84.6% under optimum condition, which compared well to the maximum predicted value of 85.4%.

Keyword: Response surface methodology (RSM), Central composite rotatable design (CCRD), Palm oil, Lipozyme, Alcoholysis, Wax ester