

Optimisation study of large-scale enzymatic synthesis of oleyl oleate, a liquid wax ester, by response surface methodology

ABSTRACT

An optimisation study of the large-scale enzymatic synthesis of a liquid wax ester from oleic acid and oleyl alcohol using Novozym 435 was carried out. Investigations were performed in batch mode with a stirred tank reactor (STR) with one multi-bladed impeller. Response surface methodology (RSM) based on a five-level, three-variable central composite rotatable design (CCRD) was used to evaluate the interactive effects of various parameters. The parameters are amount of enzyme (A) (90–120 g), impeller speed (B) (100–400 rpm) and temperature (C) (40–60 °C). The optimum conditions derived via RSM at a fixed reaction time of 1 h were successfully optimised as A = 104 g, B = 388.0 rpm and C = 49.7 °C. The actual experimental yield was 96.7% under the optimum conditions, which compared well with the maximum predicted value of 97.6%. Copyright © 2005 Society of Chemical Industry

Keyword: response surface methodology, central composite rotatable design, liquid wax ester, Novozym 435, esterification