

Effect of alcohol chain length on the optimum conditions for lipase-catalysed synthesis of adipate esters

ABSTRACT

Immobilized *Candida antarctica* lipase B, Novozym® 435, was used in the esterification of adipic acid and alcohols with different chain lengths (C1–C18). Optimum conditions for the synthesis of adipate esters were obtained using response surface methodology (RSM) with respect to important reaction parameters including time, temperature, substrate molar ratio and amount of enzyme. Alcohol chain length specificity of the enzyme in the synthesis of adipate esters was also determined. Minimum reaction time (215 min) for achieving maximum ester yield was obtained for butyl alcohol. Methanol required an increased time (358 min) and enzyme amount (10.2%, w/w) for attaining maximum yield. The maximum required temperature and time of 65°C and 523 min, respectively, were obtained for the synthesis of dioctadecyl adipate. The results demonstrate that alcohol chain length is a determining parameter in optimization of the lipase-catalyzed synthesis of adipate esters. Reactions under optimized conditions yielded a high percentage of esterification (>97%). The optimum conditions can be used to scale up the process.

Keyword: Esterification; Lipase; Adipate ester; Specificity; Optimization; Response surface methodology