

Optimized lipase catalyzed synthesis of adipate ester in a solvent-free system.

ABSTRACT

Immobilized *Candida antarctica* lipase-catalyzed esterification of adipic acid and oleyl alcohol was investigated in a solvent-free system (SFS). Optimum conditions for adipate ester synthesis in a stirred-tank reactor were determined by the response surface methodology (RSM) approach with respect to important reaction parameters including time, temperature, agitation speed, and amount of enzyme. A high conversion yield was achieved using low enzyme amounts of 2.5% w/w at 60C, reaction time of 438 min, and agitation speed of 500 rpm. The good correlation between predicted value (96.0%) and actual value (95.5%) implies that the model derived from RSM allows better understanding of the effect of important reaction parameters on the lipase-catalyzed synthesis of adipate ester in an organic solvent-free system. Higher volumetric productivity compared to a solvent-based system was also offered by SFS. The results demonstrate that the solvent-free system is efficient for enzymatic synthesis of adipate ester.

Keyword: Lipase; Adipate ester; Solvent-free system; Optimization; Response surface methodology.