

## **Modeling and optimization of lipase-catalyzed synthesis of dilauryl adipate ester by response surface methodology**

### **ABSTRACT**

**BACKGROUND:** Adipate esters are used as low-temperature and low-viscosity plasticizers for polyvinyl chloride and its copolymers. In this work, optimization of lipase-catalyzed production of dilauryl adipate was carried out using response surface methodology (RSM) based on a four-factor-five-level central composite rotatable design (CCRD). Immobilized lipase from *Candida antarctica* (Novozym 435) was used as catalyst in this reaction. Various reaction parameters affecting the synthesis of adipate ester, including alcohol/acid molar ratio, amount of enzyme, temperature and reaction time, were investigated. **RESULTS:** Statistical analysis showed that the amount of enzyme was less significant than the other three factors. The optimal conditions for the enzymatic reaction were obtained at 5.7:1 substrate molar ratio using 0.18 g of enzyme at 53.1 °C for 282.2min. Under these conditions the esterification percentage was 96.0%. **CONCLUSIONS:** The results demonstrated that response surface methodology can be applied effectively to optimize the lipase-catalyzed synthesis of adipate ester. The optimum conditions can be used to scale up the process.

**Keyword:** lipase, esterification, adipate ester, response surface methodology, central composite rotatable design