

Enzymatic synthesis of methyl adipate ester using lipase from *Candida rugosa* immobilised on Mg, Zn and Ni of layered double hydroxides (LDHs)

ABSTRACT

The enzymatic synthesis of methyl adipate via green esterification of adipic acid and methanol in hexane has been studied. Lipase from *Candida rugosa* immobilised onto various layered double hydroxides (LDHs) by a reproducible and simple method of physical adsorption was used as biocatalyst with promising result. Mg/Al-NO₃⁻, Zn/Al-NO₃⁻ and Ni/Al-NO₃⁻ of LDHs with molar ratio of M²⁺/M³⁺ = 4:1 were synthesised by co-precipitation method with continuous agitation. The percentages of protein loading on Mg/Al-NO₃⁻, Zn/Al-NO₃⁻ and Ni/Al-NO₃⁻ were 71%, 67% and 58%, respectively, due to the larger surface area, porosity and basal spacing of the supports. Parameter studies of reaction time, reaction temperature, water activity, thermostability, storage, leaching and reusability were investigated and optimised. Optimum conditions to produce adipate ester upto 80 % were reaction time; 2.5 h, temperature; 50 °C, and water activity; 0.53, respectively. Increased in optimisation conditions and enhanced stability properties were found after immobilisation compared to the native lipase. © 2007 Elsevier B.V. All rights reserved.

Keyword: Adipate, Lipase, Immobilisation, Layered double hydroxides, Biocatalyst