Dev. Chem. Eng. Mineral Process. 13(5/6), pp. 605-616, 2005.

Enzymatic Enantioselective Acylation of Sterically Aromatic Secondary Alcohol

Lee-Suan Chua and Mohamad Roji Sarmidi*

Dept of Bioprocess Engineering, Faculty of Chemical and Natural Resources Engineering, Universiti Teknologi Malaysia, 81310 UTM Skudai, Johor, Malaysia.

This study focused on the kinetic resolution of (R,S)-1-phenylethanol using lauric acid as acyl donor. The enantioselective esterification was catalysed by immobilised lipases in organic media. From exploratory experiments, several commercial immobilised lipases were screened for their efficiency in resolving the racemic alcohol. They were lipases from Pseudomonas cepacia, Candida antarctica and Candida rugosa (Candida cylindracea) with different immobilisation methods. The cross-linked enzyme crystal of P. cepacia lipase (ChiroCLEC-PC) and the carrier-fixed lyophilised C. antarctica lipase B (Chirazyme L2, c.-f., C3, lyo) showed the highest performance in term of enzyme activity as well as enzyme enantioselectivity. They were selective towards the R-enantiomer of 1-phenylethanol with enantiomeric ratio (E) above 200. The presence of S-enantiomers in the racemic alcohol did not cause inhibition to the resolution. Kinetic studies were carried out by varying the substrates concentration at the determined reaction conditions. Both enzymes required three-fold molar excess of lauric acid over (R,S)-1-phenylethanol (50 mM) in order to achieve the highest initial reaction rate. When using the molar excess of (R,S)-1-phenylethanol, equilibrium conversion dropped due to enzyme deactivation.
Keywords: Kinetic resolution; immobilised lipase; enantioselectivity; optically active alcohol.

* *Author for correspondence (mroji@fkkksa.utm.my).*