

Pseudomonas fluorescens lipase immobilized onto NH₂-MIL-53 MOF for effective transesterification of (R,S)-4-fluoromandelic acid enantiomers

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Abstract

A new heterogeneous bio-catalyst was prepared by the immobilization of *pseudomonas fluorescens* lipase (PFL) onto metal-organic frameworks (MOF), NH₂-MIL-53(Fe), using covalent cross-linking. The immobilized lipase [PEG-PFL@NH₂-MIL-53(Fe)] was firstly applied for enantioselective transesterification of (R,S)-4-fluoromandelic acid (4-FMA) with acyl acetate. The effects of temperature, substrate ratio, and reaction time on conversion rates and enantiomer excess were investigated. Experimental results show that the catalytic activity, enantioselectivity, and the thermal stability of PFL are significantly improved by polyethylene glycol (PEG) modification and immobilization. By optimizing the reaction conditions, the excellent results were obtained with conversion of 49.6% and enantiomer excess of 98.0% for the immobilized PFL catalyzed transesterification reaction. Furthermore, the immobilized lipase possesses excellent reusability with 83% of its initial activity after four cycles.

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