Synthesis of fatty esters by polyethylene glycol-modified lipase

ABSTRACT

Monomethoxypolyethylene glycols (PEG) of molecular masses 1900 and 5000 were activated using p-nitrophenyl chloroformate to form PEGï nitrophenyl carbonates (activated PEG) with high yield (96ï 98%). The activated PEG was covalently attached to Candida rugosa lipase. Increasing the molar ratio of activated PEG to the enzyme increased the degree of lipase modification. These modified lipases exhibited specific ester synthesis activities on organic solvents compared with native lipase. The degree of activity enhancement depended on the size of activated PEG used and the degree of modification of the enzyme. Maximal activity was attained after exhaustive of modification. The effects of different solvents, reaction temperature, and fatty acids on the esterification activity and the stability of the modified enzyme were investigated. The optimum esterification temperature (40°C) and preference of fatty acids as acyl donors of the modified lipase were very similar to those of the native enzyme. The modified lipase exhibited higher activity non-polar solvents than in polar solvents, and showed higher temperature, solvent and storage stability then the native lipase.

Keyword: PEG activation; Lipase modification; Esterification; Selectivity; Stability