Characterization of Cross-Linked Lipase Aggregates

Commercially available microbial lipases from different sources were immobilized as cross-linked enzyme aggregates (CLEAs) using different precipitants and glutaraldehyde as cross-linkers. These CLEAs were assayed based on esterification between lauric acid and n-propanol in solvent-free systems. Precipitants were found to have a profound influence on both specific activities and total activity recovery of CLEAs, as exemplified by Candida antarctica lipase B (CALB). Among the CLEAs of CALB studied, those obtained using PEG600, ammonium sulfate, PEG200 and acetone as precipitants were observed to attain over 200% total activity recovery in comparison with acetone powder directly precipitated from the liquid solution by acetone. PEG200 precipitated CLEA gave the best specific activity (139% relative to acetone powder). The results of kinetic studies showed that $V_{\max}/K_m$ does not significantly change upon CLEA formation. This work presents a characterization of CLEAs based on an esterification activity assay, which is useful for exploring the synthetic application potential of CLEA technology with favorable perspectives.

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