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Enzyme Stabilization by Immobilization for an Industrial Uses

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Background and Aim: Lipases are among the industrial enzymes most used because of their high activity and stability as well as the wide range of substrates they can catalyze. Their use requires immobilization to allow their reuse and easy separation of the reaction mixture. This technique may also improve other enzymatic properties such as stability or activity and selectivity, etc. Stability is a key factor that can limit the use of all enzymes. In the present study, phospholipase Lecitase Ultra (LU) and *Thermomyceslanuginosus* lipase (TLL) were immobilized in octyl-agarose (OC) beads. The aim was to find a strategy to improve the stability of immobilized enzymes and Limiting their desorption in the reaction medium.

Methods: The immobilization of the lipase used in this study is based on the interfacial activation of the lipase on the hydrophobic support surface. Phospholipase Lecitase Ultra (LU) and *Thermomyceslanuginosus* lipase (TLL) were immobilized on Octylagarose using two enzyme charges. Subsequently, all preparations were treated with glutaraldehyde (Glu), polyethyleneimine (PEI) or sequentially with Glu and PEI. These treatments can make it possible to stabilize the physically immobilized lipases by avoiding enzymatic desorption by intermolecular crosslinking.

Results: During these treatments, LU retained about 90% of the activity, and TLL over 80%, and the PEI bound to these biocatalysts was maintained fairly. Thus, this new strategy has probed to be useful for co-immobilizing two enzymes, thereby allowing the recovery and reuse of the most stable enzyme in other hydrolysis or synthetic processes without any other activation.

Conclusion: The treatment with PEI was more effective in increasing enzymatic stability, while glutaraldehyde had a significant stabilizing effect. This enzymatic stabilization was more significant when using heavily loaded preparations where intermolecular crosslinking was easier to achieve.

Enzymatic immobilization; Polyethyleneimine; Glutaraldehyde; Enzymatic desorption; Thermal stability