

Extraction and reimmobilization of used commercial lipase from industrial waste

ABSTRACT

In industrial application, immobilized lipase are typically not reused and served as industrial waste after a certain process is completed. The capacity on the reusability of the spent lipase is not well studied. This current study embarks on reusing the remaining lipase from the spent immobilized enzyme. Active lipases were recovered using a simple reverse micellar extraction (RME). RME is the extraction process of targeted biomolecules using an organic solvent and a surfactant. This method was the first attempt reported on the recovery of the lipase from the used immobilized lipase. RME of the spent lipase was done using the nonionic Triton X-100 surfactant and toluene. Various parameters were optimized to maximize the lipase recovery from the used immobilized lipase. The optimum forward extraction condition was 0.075 M KCl, and backward conditions were at 0.15 M Triton X-100/toluene (pH 6, 2 M KCl) with recovery of 66%. The extracted lipase was immobilized via simple adsorption into the ethanol pretreated carrier. The optimum conditions of immobilization resulted in 96% of the extracted lipase was reimmobilized. The reimmobilized lipase was incubated for 20 h in pH 6 buffer at 50 °C of water bath shaker. The reimmobilized lipase still had 27% residual activity after 18 h of incubation, which higher thermal stability compared to the free lipase. In conclusion, the free lipase was successfully extracted from the spent immobilized lipase and reimmobilized into the new support. It exhibited high thermal stability, and the reusability of the spent lipase will promote continued use of industrial lipase and reduce the cost of the manufacturing process.

Keyword: Industry; Immobilized lipase; Extraction; Reverse micellar extraction; Recovery