LIPASE PURIFICATION: THE REVIEW OF CONVENTIONAL AND NOVEL METHODS

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Abstract

The current review covers recent trends in the literature regarding methods and techniques of lipase purification and extraction from different sources including microbial, plant and mammalian lipases.

However, due to the cost efficiency, a large number of lipases are isolated and purified to homogeneity from fungal and bacterial sources. Nowadays, lipases are considered of great importance among biocatalysts due to their ability to catalyze a wide range of reactions in both aqueous and non-aqueous environments. Lipases are chemo-, regio-, and enantio-specific, they are used in different industries, including food manufacturing, detergents, biodiesel production and pharmaceuticals. The success in lipase purification to homogeneity is largely attributed to the combination of both traditional (conventional) and novel methods of protein purification. Among the conventional methods in this article we highlighted such methods as: (1) precipitation techniques by using ammonium sulfate and some organic solvents, (2) chromatographic methods of gel–filtration, ion–exchange and affinity chromatography, and (3) membrane processes. For the novel methods of lipase purification, we described (1) Recombinant Technologies, (2) Aqueous Two-Phase Systems, (3) Reverse Micelle Systems, and (4) Aqueous Two-Phase Flotation.

Generally, in order to purify the lipase with high purity and high yields, a multiple step procedure is applied. These multiple step systems of lipase purification consist of both conventional and novel methods, the conventional methods comprise of protein precipitation techniques with the precipitation agents such as ammonium sulfate or organic solvents; chromatography (ion – exchange, gel – filtration or affinity chromatography); ultrafiltration and/or other membrane techniques; novel methods of lipase purification include recombinant technologies, where the lipase-encoding gene is recloned into another host cell and expressed with a specific tag; aqueous two-phase systems, aqueous two-phase flotation and reverse micellar systems, which incorporate the usage of two different aqueous systems. The new developments in both conventional and novel methods of lipase purification allow both researchers and industries to purify lipases with higher yields and a lesser amount of purification steps needed. The introduction of recombinant technologies in lipase production had increased the purity of the enzyme as well as its yield while bringing down the cost of the overall procedure. The works presented in this paper describe developing technologies such as ATPS, ATPF, and RME that once maturated would bring about changes in protein purification strategies, that would allow the fastest and cheapest way for industrial lipase production.

***Key words**: Lipase, Lipase Purification, Aqueous Two-Phase system, Aqueous Two-Phase flotation, Reverse Micelle system, Recombinant technologies, Immunopurification.*