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Purification, characterization and potential uses of Fish Lipase: A Review

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Abbreviations:
SDS-PAGE: Sodium Dodecyl Sulfate Polyacrylamide Gel Electrophoresis, TG: Triglyceride, Disc-PAGE: Discontinuous Polyacrylamide Gel Electrophoresis, PEG: Polyethylene Glycol.

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Abstract
The use of enzymes created opportunities for developing a green, sustainable and modern industrial chemistry due to excellent specificity, being atom economic, mild reaction conditions, energy-saving process and simplicity. In particular the use of hydrolytic enzymes in the industrial enzyme market is growing steadily. Lipases are glycerol ester hydrolyses that catalyze the hydrolysis of triglycerides to free fatty acids and glycerol. The isolation and purification of lipases is reported in various models. Purification methods used are generally depended on nonspecific techniques such as precipitation, hydrophobic interaction chromatography, gel filtration, and ion exchange chromatography. Lipases occupy a place of prominence among biocatalysts owing to their novel and multifold applications in oleochemistry, organic synthesis, detergent formulation and nutrition. Fish lipases may demonstrate novel activities that have potential applications for bioindustrial catalysis. Inspite of great advances in technology, there is a paucity of information available on the purification and characterization of lipase from lower vertebrate like fishes. This review reports on purification, and characterization of fish lipases and various applications along with the structure and mechanism of action of lipase are also discussed.

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1. Introduction

The use of hydrolytic enzymes such as Protease, Lipase and Amylase in the industrial enzyme market is growing steadily due to their excellent specificity, being atom economic, mild reaction conditions, energy-saving process and simplicity. Enzymes are biological catalysts, compounds that speed up a chemical reaction without being used up or altered in the reaction. Because of improved understanding of production biochemistry, the fermentation processes, and recovery methods, an increasing number of enzymes can be produced affordably (Sharma et al., 2001).

1.1 Lipases

Lipases (triacylglycerol acyl hydrolases, E.C. 3.1.1.3) are defined as glycerol ester hydrolases that catalyze the hydrolysis of triglycerides to free fatty acids and glycerol. Lipases catalyse esterification, interesterification, acidolysis, alcoholysis and aminolysis in addition to the hydrolytic activity on triglycerides (Joseph et al., 2008). They are ubiquitous enzymes of considerable physiological significance and industrial potential. Interest in lipases has been increasing in the past few years because of the actual and potential uses of this enzyme in applications like hydrolysis of fats and oils, organic syntheses, modification fats, chemical analyses and flavor enhancement in food production (Table 1).

1.2 Scientific Utility