

# Alkali-Tolerant and Thermostable Esterase from *Aspergillus Nidulans* DFA36: Characterization and Evaluation of its Low Density Polyethylene Degradation Potential

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## ABSTRACT

The present study discusses the purification, characterization and application of esterase from *Aspergillus nidulans* DFA36 in low density polyethylene degradation. By the four-step purification involving precipitation, dialysis, ion-exchange chromatography, gel filtration chromatography, a 13.6-fold purification of the enzyme to homogeneity was achieved. The apparent molecular mass of the esterase was 35 kDa, as found by sodium dodecyl sulphate-polyacrylamide gel electrophoresis. The optimum activity of the enzyme was recorded at pH 9.0 and 70 °C. The enzyme retained 82.1% and 78.6% residual activity, respectively at pH 9.0 and 70 °C for 120 min. Zn<sup>2+</sup> and Na<sup>+</sup> acted as enzyme activators, while Ba<sup>2+</sup>, Cu<sup>2+</sup>, and Mn<sup>2+</sup> proved to be the inhibitors. The  $K_m$  and  $V_{max}$  values of the esterase were 0.003 mM and 37.31 U/ml, respectively thus indicating the high enzyme affinity towards the substrate. After 24 h treatment of the polyethylene glycol infused minimal agar with the partially purified enzyme, plate assay resulted in substantial zone of clearance along the well thereby highlighting the high efficiency of the esterase. The current study implies that the *A. nidulans* DFA36 esterase may be applied as a bio-agent towards mitigating the plastic pollution.

**Keywords:** *Aspergillus nidulans*, Esterase, Alkali tolerance, Thermostability, Plastic pollution

## How to Cite

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