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Mohamed Nageib, A.[a] , Tariq Jameel, A.[b] , Ahmad, F.B.[a c]

Immobilization of alpha-naphthyl acetate esterase (ANAE) on k-carrageenan for potential biosensor application in pesticide detection
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[a] Department of Biotechnology Engineering, International Islamic University Malaysia, Kuala Lumpur, Malaysia
[b] Department of Chemical Engineering, Aligarh Muslim University, Aligarh, 202002, India
[c] Department of Mechanical Engineering, University of Malaya, Kuala Lumpur, 50603, Malaysia

Abstract
In this study, alpha-naphthyl acetate esterase (ANAE) extracted from Atta (wholemeal) wheat flour and grinded wheat grains was immobilized on k-carrageenan beads that were amino-functionalized using 2% polyethyleneimine (PEI). ANAE is a plant esterase enzyme extracted from wheat, where its activity can be inhibited by organophosphate (OP) pesticide for biosensor applications. SDS-PAGE (sodium dodecyl sulfate polyacrylamide gel electrophoresis) was conducted for ANAE to investigate its molecular weight. ANAE in both free and immobilized states have been investigated for its protein concentration, loading efficiency, activity and reusability and optimum temperature and pH. The study showed that the relative activity of ANAE remained to be higher than 90%, up to temperature of 50 °C. Regardless of the source of wheat for ANEA extraction, the optimum pH for ANAE was at pH 7–9. The optimum temperature for immobilized ANAE from both sources of wheat were within 35–40 ℃, which was slightly lower than that for ANAE in free state. ANAE survived washing and activity assay for 11 cycles, regardless of wheat sources for ANAE extraction. © 2021

Author Keywords
Alpha-naphthyl acetate esterase; Biosensor; Carrageenan; Enzyme immobilization; Organophosphate pesticide

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Correspondence Address
Ahmad F.B.; Department of Biotechnology Engineering, Malaysia; email: farahahmad@iium.edu.my

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