

Biosensors based on sphyraena barracuda muscle cholinesterase inhibition for insecticides (chlorpyrifos, malathion, diazinon and dimethoate) detection

ABSTRACT

Fish is a living organism that can be used as a sensitive biomarker, while their enzyme such cholinesterase (ChE) acts as a biosensor device that is able to detect the presence of organophosphate in the water. This study was carried out to extract and purify the ChE enzyme from the muscle tissue of *Sphyraena barracuda*. The muscle tissue was homogenized and then purified via ion exchange chromatography method using DEAE cellulose as the matrix of column. Ellman assay followed by Bradford assay was carried out to determine the enzyme activity and protein content, respectively. The *Sphyraena barracuda* ChE was successfully purified at the total recovery of 32.74 % with 2.26 purification fold. The optimal conditions for the ChE activity were determined at pH 9 of Tris-HCl buffer and at temperature of 25 °C. The enzyme was also specific to ATC substrate due to its high catalytic efficiency. All organophosphate tested at concentration of 1 mg/L were able to inhibit the activity of ChE; chlorpyrifos (100 %), malathion (100 %), diazinon (91.5 %) and dimethoate (35.8 %). These findings showed that the partially purified ChE from muscle tissue of *Sphyraena barracuda* is another alternative bioindicator candidate for the detection of organophosphate in water.