

A tapered fibre optics biosensor for histamine detection

ABSTRACT

Purpose: This paper aims to estimate the level of histamine in fish and fish products, as it is very important because of their implication in fish poisoning in humans; hence, ascertaining histamine levels in the aforementioned serves as a chemical index for spoilage.

Design/methodology/approach: A technique was developed to immobilize an ordered multilayer of diamine oxidase (DAO) by means of chemical cross-linking on the biconical taper surface stepwisely alternating between chitosan, glutaraldehyde and the enzyme. A spectrophotometric signal results from horseradish peroxidase catalyzed reduction of H₂O₂, a secondary product of the oxidative deamination of histamine monitored at 450 nm.

Findings: The biosensor showed a linear response range up to 1.5 mM, a good sensitivity of 0.64 mM⁻¹ with detection and quantification limits towards histamine of 0.086 mM (15.8 ppm) and 0.204 mM (37.7 ppm) and a linear response range of 0-1.5 mM. It showed a response and recovery time of 14 sec and operational stability up to 40 repeated analyses without significant loss of sensitivity.

Practical implications: The developed biosensor has a good potential for use in the quantitative determination of histamine in seafood.

Originality/value: The paper described an outcome of an experimental work on tapered fibre optics (taper)-based biosensor coated with DAO embedded into a chitosan membrane to measure histamine.

Keyword: Biosensors; Chitosan; Diamine oxidase; Histamine; Tapered fibre optic