

Abstract:

The work presented here describes a comparative study of the oxidative behaviour of Acetylthiocholine Chloride (ATChCl) on platinum surface in presence and absence of the enzyme acetylcholinesterase (AChE). During electrochemical detection of some of the neurotoxic pesticides, thiocholine (TCh) produced from the enzymatic hydrolysis of acetylthiocholine is oxidised giving an amperometric signal. Selection of an appropriate potential for the oxidation of thiocholine is essential because at certain higher potential electrochemical non-enzymatic hydrolysis of acetylthiocholine takes place that results in a wrong estimation of the toxic component. The oxidation potential of thiocholine found to vary with electrodes type. So the objectives of this study were (i) to know the oxidation potential of thiocholine on bare platinum surface (ii) to know whether the non-enzymatic (electrochemical) oxidation leads to the same hydrolysed products as are obtained during the enzymatic hydrolysis of acetylthiocholine; a topic of significant interest at the present time in the field of amperometric (AChE based) biosensor design and (iii) to understand the role of pH on the hydrolysis/oxidation of thiocholine. Acetylthiocholine was oxidised at a constant potential of 1.6V followed by monitoring of the changes through Cyclic Voltammetry, UV-Vis and NMR spectroscopic methods. The result indicates that unlike the enzymatic one, non-enzymatic electro-oxidation does not follow a hydrolytic path.