

APPLE TISSUE BASED BIOSENSOR FOR THIRAM

U.S.K. WELIWEGAMAGE AND A. NAVARATNE

Department of Chemistry, Faculty of Science, University of Peradeniya

Some plant tissues, such as pineapple, tea, apple and potatoe tissues, contain the enzyme; called polyphenol oxidase, which catalyses the oxidation of catechol to *o*-quinone in the primary enzymatic step.

Thiram is a frequently used dithiocarbamate fungicide in vegetable cultivations world wide including Sri Lanka. It is also used as a seed protectant and as a soil spray. The excess amounts of thiram pollute the water resources and soil in agricultural areas. Hence the trace level determination of thiram is highly desirable.

An electrochemical biosensor was developed to detect thiram using the apple tissue polyphenol oxidase. The enzyme interacts with thiram to give an oxidative voltammetric behavior: an oxidation peak was clearly observed at +0.10V vs. SCE in phosphate buffer solution at pH 7. The electrochemical response of thiram-enzyme system depends strongly on the solution pH. The peak current responses observed at pH 1, 3, 5, 7 and 9 were 0.00 μA , 3.00 μA , 6.75 μA , 11.25 μA and 8.75 μA respectively. Further the continuous scanning studies carried out at same medium suggested that the analyte is highly adsorbed on to the electrode surface during this process. The voltammetric response shows a significant dependence on medium pH. The optimum pH for the voltammetric process was found to be 7, where the best pH reported for the reactivity of polyphenol oxidase.

The method was used to detect thiram in a standard solution of 1.0×10^{-6} mol dm⁻³, which was accomplished by preconcentration of analyte on modified electrode prior to cyclic voltammetric analysis. In the preconcentration process, the solution was stirred for an accumulation period of 15 min with applying a potential of 0.00V vs. SCE as the accumulation potential.

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