

Electrochemical Study of Interaction of Thiol Containing Proteins with As (III)

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Abstract : The affinity of thiol group with heavy metals is a well-established phenomenon. The present investigation has been focused on electrochemical response of cysteine and thioredoxin against arsenite (As III) on indium tin oxide (ITO) electrodes. It was observed that both the compounds produce distinct response in free and immobilised form at the electrode. The SEM, FTIR, and impedance studies of the modified electrode were conducted for characterization. Various parameters were optimized to achieve As (III) effect on the reduction potential of the compounds. Cyclic voltammetry and linear sweep voltammetry were employed as the analysis techniques. The optimum response was observed at neutral pH in both the cases, at optimum concentration of 2 mM and 4.27 μM for cysteine and thioredoxin respectively. It was observed that presence of As (III) increases the reduction current of both the moieties. The linear range of detection for As (III) with cysteine was from 1 to 10 mg L^{-1} with detection limit of 0.8 mg L^{-1} . The thioredoxin was found more sensitive to As (III) and displayed a linear range from 0.1 to 1 mg L^{-1} with detection limit of 10 $\mu\text{g L}^{-1}$.

Keywords : arsenite, cyclic voltammetry, cysteine, thioredoxin

Conference Title : ICEB 2018 : International Conference on Electrochemical Biosensors

Conference Location : Singapore, Singapore

Conference Dates : March 22-23, 2018