

An Electrochemical Biosensor Based on Properties of Anionic Surfactant on Polymeric Surface for the Electrostatic Determination of some Neurotransmitter Compounds and Drugs

Rasha Abd EL-Latief Ahmed Auf
Dr. Nada Farouk Ahmed Atta

Abstract

An electrochemical sensor was developed by using poly(3, 4-ethylene-dioxythiophene) modified platinum electrode in presence of sodium dodecyl sulphate (SDS). This sensor modified electrode is selective for the determination of some catecholamine neurotransmitters, some dihydroxyl compounds of interest as well as drugs in presence of interference molecules such as uric acid, ascorbic acid and glucose.

Electrochemistry of the indicated compounds was studied at this electrode in the presence and absence of SDS and interesting electrocatalytic effects were found. The presence of SDS in the medium plays a key role in the electrostatic attraction of these compounds towards the polymeric surface and causes repulsion towards the interfering compounds. Cyclic voltammetry (CV), linear sweep voltammetry (LSV), ultraviolet (UV), nuclear magnetic resonance (NMR) and electrochemical impedance spectroscopy (EIS) were studied to verify the voltammetric behavior in micellar media. The designed sensor showed good reproducibility, high stability, sensitivity and anti-interference ability. The sensor was further utilized to determine neurotransmitters and drugs level in human urine and satisfactory results are obtained with low detection limit.

Keywords: Surfactant; Conducting polymers; Sensor; Catecholamine neurotransmitters; Dopamine; Ascorbic acid; Morphine; Atropine; SEM.