Differential Pulse Voltammetric Atropin Nanosensor Utlizing β Zeolite

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Abstract Atropin (AT) has wide medical applications, e.g. for dilating the pupils in the ophthalmic operations, as an antispasmodic and as an antidote for poisoning of opium, eserine and muscarine. Till now, the commonly employed techniques for the determination of the drug in bulk form, pharmaceutical formulation, and biological fluids are based on HPLC, LC/MS, spectroscopy, and microbiological assays. Since these techniques have expensive instrumentation and running costs, the use of simpler, faster, and cheaper, yet sensitive, electrochemical techniques can be interesting alternatives, especially those based on electroanalytical techniques. Modification of electrodes with suitable materials facilitates the electrochemistry of the redox biological compounds, which generally results in increased ivity and sensitivity of the determinations. Among these methods, chemically modified electrodes (CMEs) have been applied for the determination of drugs in real samples. Zeolite-modified electrodes (ZMEs), the important type of the CMEs, have been largely developed during the past two decades because they enable to combine the intrinsic properties of the zeolites with electron transfer reactions. Zeolite-modified carbon paste electrodes (ZMCPEs) have been largely and successfully applied for electroanalytical purposes. In these work, the nano Cesium-β Zeolite modified electrode was prepared by ion exchange process for rapid determination of Atropin. The effect of the composition of Agar-based electrode on its voltammograms was evaluated in acidic solution with 5.9 × 10−3 M AT. It was found that addition of nano Cesium-β Zeolite to the Agar would generate the peak current of AT because of its catalytic effect on redox process. The pH affects the peak potential of AT. The best voltammogram was obtained at pH 2.0. The linear dynamic range was 1.0 × 10−3 – 1.0 × 10-2 M under the optimized experimental conditions. The detection limit was 6.2 × 10-4 M. The effect of potential scan rate on the voltammetric parameters of AT was investigated. The proposed nanosensor was applied to the determination of AT in commercial samples, successfully.

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