Fabrication and Application of Bismuth-Film Modified Glassy Carbon Electrode as sensor for Highly Sensitive Determination of Cetirizine Dihydrochloride in Pharmaceutical Products and Water Samples

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The considerable necessity to detect and analyze cetirizine dihydrochloride (CTZ) residues has motivated the development of cost-effective and high-performance sensing probes. A highly sensitive, square wave anodic stripping voltametric (SW-ASV) methodology has been employed in correspondence with a bismuth-film plated glassy carbon electrode (BiF/GCE) for the establishment of the CTZ drug at trace levels in an aqueous media of pH 8.0. The nature and mechanism of the electrode reactions have been ascribed at BiF/GCE for the square wave and cyclic voltammetry techniques. Under the optimized parameters and at pH 8.0, a well-defined square wave (SW) anodic stripping peak at + 0.48 V versus Ag/AgCl was detected. The plot of the anodic current versus known concentrations of CTZ was linear in the range of $[5.0 \times 10^{-9} - 1.2 \times 10^{-6} \text{ mol L}^{-1}]$ ($R^2=0.999$) with limits of detection (LOD) and calculation (LOQ) of 1.5×10^{-9} and $5.0 \times 10^{-9} \text{ mol L}^{-1}$, respectively. The acquired SW-ASV technique was successfully employed for the determination of nano concentrations of CTZ in pharmaceutical preparations and water samples on BiF/GCE. These method provides a good correlation with the data obtained for the deduction of CTZ in numerous matrices through the spectrophotometric approach.

Keywords: Stripping voltammetry; Cetirizine dihydrochloride; Bi film modified electrode; Glassy carbon electrode; Pharmaceutical preparations; Environmental water.

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