DIFFERENTIAL PLUS VOLTAMMETRIC DETERMINATION OF CEFIXIME ON A PARAMAGNETIC MgFe₂O₄ FERRITE NANOPARTICLES MULTIWALLED CARBON NANOTUBE MODIFIED ELECTRODE

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Cefixime is an oral third generation cephalosporin antibiotic. It is used to treat gonorrhea,[1] tonsilitis,[2] and pharyngitis [1]. In this work, MWCNTs were decorated with MgFe₂O₄ nanoparticles to modify a glassy carbon electrode to develop a sensitive, selective, and fast method for the determination of cefixime at trace levels. This method is based on the different properties of the mediators plus nanoparticles such as strong adsorptive ability, huge specific area, subtle electronic properties, and excellent electrocatalytic activity [3-5].

Five milliliters of the buffer solution (pH 4.0) was transferred into an electrochemical cell using a three-electrode system containing the modified electrode as a working electrode. Then, the cyclic voltammogram (CV) was recorded in the potential range of 0.0 to 1.2V with a scan rate of 100 mV s⁻¹. The peak current was measured and recorded as a blank signal (Iₘ). Once the background voltammogram was obtained, aliquots of the sample solution containing 5 mL of the buffer solution, pH 4.0, plus a sufficient amount of cefixime solution were introduced into the cell. The peak current was measured and recorded as a sample signal (Iₜ). The difference in the current (Iₜp - Iₘ) was considered as a net signal (Alp) for each of the experiments. A calibration graph was prepared by plotting the net peak currents vs. cefixime concentrations in the solutions.

The electrochemical results discussed above demonstrate the electrochemical response of cefixime on the MgFe₂O₄–MWCNTs modified electrode. It was shown that the proposed method outperforms the other reported electrochemical methods in analyzing cefixime with a satisfactory sensitivity, a linear dynamic range and with a low experimental detection limit of 0.01 μmol L⁻¹. Based on our findings, this modified electrode can properly be used for the determination of cefixime in pharmaceutical and urine samples with satisfactory results.

References