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Electroanalytical Application of Molecular Imprinted Polyaniline Matrix for Dapsone Determination in real pharmaceutical samples

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Abstract

An electrochemical sensor based on molecularly imprinted polymer was fabricated for the determination of dapsone (DDS) which represents an antileprotic drug used in animals for the prevention and treatment of diseases. Iron oxide nanoparticles (Fe_3O_4) as magnetic material was first deposited and followed by the electropolymerization of aniline monomer with and without a template molecule (DDS) at the surface of platinum electrode (Pt). The performance of modified surfaces based on the nanocomposite matrix was investigated using cyclic voltammetry and electrochemical impedance spectroscopy techniques while their configuration was characterized using scanning electronic microscopy images, UV-Visible and Fourier transform infrared spectroscopy. The prepared sensor showed very high recognition ability and selectivity for dapsone. The experimental results showed best analytical performances for DDS detection with an adequate sensitivity of 0.272Ω/mol. L^{-1}, a reasonable linear range from $1.0x10^{-7}$ to $1.0x10^{-5}$ M and a low detection limit of $1.25x10^{-5}$ M was obtained. In addition, the developed bioanalytical system was successfully applied for dapsone determination in real samples with high recovery and selectivity.

Keywords: Dapsone sensor; Polyaniline ; Electrodeposition ; Molecularly imprinted polymer ; Fe_3O_4 nanoparticles.

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