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ELECTROCHEMICAL DETECTION OF TETRACYCLINE AS EMERGENT POLLUTANT IN WATER USING CARBON NANOFIBER-$CoAl_2O_4$ ELECTRODE

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Abstract

The aim of this study was to develop an electrochemical procedure for the advanced detection of tetracycline (TC) in water using $CoAl_2O_4$ dispersed onto carbon nanofiber-epoxy composite electrode substrate, which was selected from a series of tested carbon-based electrode substrates, *i.e.*, commercial glassy-carbon and boron-doped diamond electrodes and home-made carbon nanotube-epoxy and carbon nanofiber-epoxy composites. Carbon nanofiber-epoxy composite electrode was found the best host for $CoAl_2O_4$ modifier based on the electrocatalytic effect towards TC oxidation and detection using cyclic voltammetry (CV) technique. The electrochemical techniques applied for electrochemical detection applications were CV, differential-pulse voltammetry (DPV), square-wave voltammetry (SWV) and chronoamperometry (CA). All the tested electrochemical techniques allowed TC determination and the electroanalytical parameters varied related to the technique type. DPV operated at the step potential of 50 mV and the modulation amplitude of 200 mV allowed the lowest limit of detection of 9 nM for TC determination. The recovery test applied for real surface water spiked with known TC concentrations among the reproducibility and the repeatability showed the great potential for the advanced quantitative determination of TC in real water or in pharmaceutical formulations.

Keywords: carbon nanofiber-epoxy electrode, substrate modification, tetracycline voltammetric/amperometric detection

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