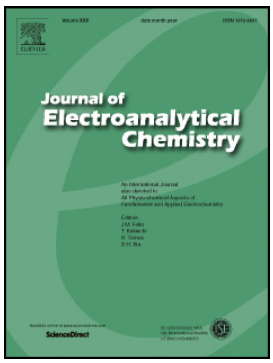

Electrochemical oxidation of acetaminophen in the presence of diclofenac and piroxicam - Synthesis of new derivatives and kinetic investigation of toxic quinone imine/drugs interactions

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Electrochemical Oxidation of Acetaminophen in the Presence of Diclofenac and Piroxicam - Synthesis of New Derivatives and Kinetic Investigation of Toxic Quinone Imine/Drugs Interactions

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Abstract

In this research, electrochemical oxidation of acetaminophen was investigated in the presence of steroidal anti-inflammatory drugs diclofenac and piroxicam by cyclic voltammetry and controlled-potential coulometry techniques. The results indicated that N-acetyl-p-benzoquinone-imine (NAPQI), produced by electrooxidation of acetaminophen, reacts with diclofenac and piroxicam, via the Michael addition reaction. Corresponding products were electrochemically synthesized in aqueous solutions using a carbon electrode in an undivided cell. These products were identified by spectroscopic methods (FT-IR, ^{1}HNMR, ^{13}CNMR and MS). The homogeneous rate constants (k_{obs}), based on the suggested electrode mechanism (*i.e.* EC), were estimated by comparing the experimental cyclic voltammetric responses with those digital simulated results. A comparison of the estimated k_{obs} for the reaction of electrochemically generated N-acetyl-para benzoquinn-imine (NAPQI) with steroidal anti-inflammatory drugs revealed that $k_{obs\ (piroxicam)} > k_{obs(diclofenac)}$ at biological pH.

Keywords: Acetaminophen; Drug-drug interactions; Diclofenac; Piroxicam; Cyclic voltammetry

1. Introduction

Drug-drug interactions (DDIs) are a common problem encountered during the patients' treatments with different drugs which sometimes results in serious or even fatal adverse events [1-3]. Such interactions can also cause partial or complete abolishment of treatment efficacy [4, 5] and are important in clinical medicine because of their significance in therapeutics [6]. A