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Electrochemical Simultaneous Detection of Paracetamol and 4-aminophenol Based on bis-Schiff Base Cobalt Complex

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A simple and sensitive method was proposed for the simultaneous detection of paracetamol (acetaminophen, PR) and 4-aminophenol (4-AP) based on bis-Schiff bases and their cobalt complexes modified glassy carbon electrode. Bis-Schiff bases, namely 2,6-diaminopyridine-o-carboxyl benzaldehyde (L1), 2,6-diaminopyridine-m-carboxyl benzaldehyde (L2), 2,6-diaminopyridine-p-carboxyl benzaldehyde (L3) and their cobalt complexes (noted as C1, C2 and C3) were synthesized and characterized by MS, IR, UV-Vis, fluorescence spectra and thermogravimetric analysis, which were used for modification of glassy carbon electrode by electrodeposition method. The electrochemical behaviors of PR and 4-AP on the modified electrode were studied by cyclic voltammetry. The results showed C1 modified electrode exhibited excellent electro-catalytic activities, high selectivity and sensitivity towards oxidation of PR and 4-AR than that of bare glassy carbon electrode, C2 and C3 modified electrodes. The corresponding differential pulse voltammetry (DPV) current signals appeared as two well resolved oxidation peaks, with peak potential differences of 0.31 V (PR and 4-AR). For simultaneous detection, linear responses for PR and 4-AR were obtained under optimal conditions in the following concentration ranges: 5 to 30 μmol·L^{-1}, with detection limits of 1.86 and 2.08 μmol·L^{-1}, respectively. These results demonstrated that C1 modified glassy carbon electrode can be a promising electrochemical sensor for electrocatalytic applications, which was proved to be applicable for simultaneous detection of PR and 4-AR in paracetamol tablets.

Keywords: Schiff base cobalt complexes; modified electrode; simultaneous detection; acetaminophen; 4-aminophenol

FULL TEXT