

VOLTAMMETRIC DETERMINATION OF ATENOLOL ENANTIOMERS USING POLYELECTROLYTE COMPLEXES OF CHITOSAN AND CHITOSAN SUCCINAMIDE WITH CYCLODEXTRINS

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Nowadays, the number of people with cardiovascular diseases is dramatically increasing. Especially popular are tachycardia, arterial hypertension, etc. Pharmaceuticals based on atenolol have antiarrhythmic, antianginal, hypotensive effects. Atenolol, designated chemically as 4-(2-hydroxy-3-isopropylaminopropoxy)-phenylacetamide, is a cardio selective β -adrenoblocker. In connection with the important role of atenolol, different methods of its recognition and determination have been used, such as gas chromatography coupled with mass spectrometry, spectrophotometry and flow injection analysis, etc. The use of these methods requires expensive tools and equipment, long preparation and thorough cleaning of samples. An alternative to the methods listed above is the electrochemical methods of analysis, in particular the voltammetry. Voltammetric sensors based on glassy carbon electrodes (GCE) modified by composites of polyelectrolyte complexes of chitosan and chitosan succinamide with cyclodextrins for enantioselective analysis and determination of atenolol enantiomers were studied using cyclic voltammetry (CV), and differential pulse voltammetry (DPV).

Atenolol enantiomer solutions were prepared by dissolving an accurately weighed quantity in 100 ml of borate buffer solution (pH 9.18). Solutions of lower concentrations were prepared by serial dilution of the stock solutions. A 20 ml test solution was placed in an electrochemical cell. CV were measured by the potential range of 0.8 to 1.6 V with a potential sweep rate of 100 mVs^{-1} after the electrolyte solution for 30 s with vigorous mixing and $E = 0$. The DPV experiments were carried out a potential range of 0.8 to 1.2 V with an amplitude of 50 mV, an interval time of 0.25 s, a modulation time of 0.025 s, and a potential sweep rate of 20 mVs^{-1} . One parallel measurement included recording five voltammograms. Each voltammogram included from 80 (DVP) to 160 (CV) instantaneous currents (in increments of 5 mV) at different potentials. The proposed sensors exhibited selectivity towards the atenolol enantiomers and had cross-sensitivity, so they can be used to create a multi-sensor system.

Thus, the system of these sensors based on glassy carbon electrodes modified by composites of polyelectrolyte complexes of chitosan and chitosan succinamide with cyclodextrins can be successfully applied for the recognition of atenolol enantiomers through a multi-sensory system.

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