

Development of novel and simple technique for electroanalytical determination of lidocaine in pharmaceutical analysis

N. Rahbar^{1,*}, Z. Ramezani¹, A. Babapoor²

¹Nanotechnology Research Center, Pharmacy School, Ahvaz Jundishapur University, Ahvaz, Iran

²Medicinal Chemistry Department, Pharmacy School, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

Background and Aims: Pharmaceutical analysis is one of the most important fields in analytical chemistry. The discovery of new drugs and the on-going update of international regulations for the safety and efficacy of pharmaceutical formulations demand the continuous development of new analytical methods. In the present work a novel and simple voltammetric method based on carbon paste electrode without modification, has been introduced for the determination of lidocaine in pharmaceutical formulations. Lidocaine is a local anesthetic drug with a pronounced antiarrhythmic and anticonvulsant effect.

Methods: All voltammetric measurements were carried out on an Autolab electrochemical device and a three-electrode arrangement was used throughout. The current responses in cyclic and square wave voltammetric experiments were investigated and an oxidation peak was observed at + 0.8 V vs. Ag/AgCl for lidocaine. The peak current for oxidation of lidocaine increased with increasing the concentration of this analyte and was monitored for its determination.

Results: Several instrumental and chemical parameters were investigated to evaluate the performance of carbon paste electrode. The best analytical responses were obtained employing graphite and paraffin (70:30 w/w) as electrode material, scan rate of 0.25 Vs⁻¹, accumulation time of 120 s and 0.2 M KNO₃ (pH 12) as supporting electrolyte. The analytical curve was linear for lidocaine concentrations of 6×10⁻⁶ to 8×10⁻⁴ M (r = 0.9989). The relative standard deviation for a solution containing 4×10⁻⁵ M was 3.3 % and the detection limit was 2.7×10⁻⁶ M.

Conclusions: The developed methodology of this study was simple, fast, time saving and economical, compared with all of the previously reported methods specially, if more sophisticated techniques such as chromatography are not available. The proposed method was used successfully to determine lidocaine in several pharmaceutical formulations and commercial products.

Keywords: Lidocaine; Square wave voltammetry; Carbon paste electrode