Electrochemical Characterization of Pefloxacin and Rapid Determination of the Drug in Pharmaceuticals and Serum at Borondoped Diamond and Glassy Carbon Electrodes

Bengi Uslu, Burcu Dogan Topal, Sibel A. Ozkan
Ankara University, Faculty of Pharmacy, Department of Analytical Chemistry, 06100, Tandogan-Ankara-Turkey
huslu@pharmacy.ankara.edu.tr

Pefloxacin is a medication belonging to the antibiotic group known as fluoroquinolones. The fluoroquinolones are a family of broad-spectrum antibiotics. Pefloxacin is the member of 2nd generation of the quinolone group antibiotics. They are bactericidal drugs, actively killing bacteria or preventing their growth. Pefloxacin is given by mouth or by intravenous infusion in the treatment of susceptible infections. It has a long plasma half-life. It is well absorbed by the oral route. About 20-30% of Pefloxacin is bound to plasma proteins. Pefloxacin is available as the mesylate salt [1, 2].

Scheme. The chemical structure of pefloxacin

The anodic behavior and determination of pefloxacin on boron-doped diamond and glassy carbon electrodes were investigated using cyclic, linear sweep, differential pulse(DP) and square wave voltammetric (SWV) techniques in cyclic voltammetry, pefloxacin shows one main irreversible oxidation peak and additional one irreversible ill-defined wave depending on pH values for both electrodes. The results indicate that the process of pefloxacin is irreversible and diffusion controlled on boron-doped diamond electrode and irreversible but adsorption controlled on glassy carbon electrode. The peak current is found to be linear over the range of concentration 2x10⁻⁵ to 2x10⁻¹ M in 0.5 M H₂SO₄ at about +1.20 V (vs Ag/AgCl) for differential pulse and square wave voltammetric technique using boron-doped diamond electrode. The detection limit of the standard solution is estimated to be 4.12x10⁻⁷ M for DPV, 1.54x10⁻⁷ M for SWV. The repeatability, reproducibility, precision and accuracy of the methods in all media were investigated. The repeatability of the methods was found as 0.49 and 0.37 RSD % for peak currents for DPV and SWV, respectively. Selectivity, precision and accuracy of the developed methods were also checked by recovery studies. The procedures were successfully applied to the determination of the drug in pharmaceutical dosage forms and human serum samples with good recovery results. No electroactive interferences from the excipients and endogenous substances were found in the pharmaceutical dosage forms and biological samples, respectively.

References: