Abstract

The aim of presented Diploma Thesis was to study an electrochemical behavior of nitroimidazole drugs metronidazole and ornidazole and to find optimal conditions for their voltammetric determination at a mercury meniscus modified silver solid amalgam electrode using DC voltammetry (DCV) and differential pulse voltammetry (DPV). Voltammetric behavior of selected drugs was investigated in dependence on the pH of the medium used (realized using a Britton-Robinson buffer (BR buffer)) and a mechanism of the reduction of both drugs was investigated using cyclic voltammetry (CV).

The optimum medium for voltammetric determination of studied nitroimidazole drugs at the m-AgSAE in a region of cathodic potentials was found to be the BR buffer of pH 8.0. Then, the concentration dependences were measured in this optimum medium in the concentration range from $2 \cdot 10^{-7}$ mol/L to $1 \cdot 10^{-4}$ mol/L. The limits of quantification (L_Qs) for both metronidazole and ornidazole were found in the concentration order of 10^{-7} mol/L by using DCV and DPV at the m-AgSAE.

The applicability of the newly developed voltammetric methods of the determination of nitroimidazole drugs was verified on the model samples of drinking and river water, with $L_Q \approx 2 \cdot 10^{-7}$ mol/L for both DC voltammetry and differential pulse voltammetry at the m-AgSAE.

The newly developed voltammetric methods were also used for the determination of the metronidazole content in selected drugs: Efloran – infusion 500 mg/100 mL (KRKA, Slovenia), Entizol 500 mg – vaginal tablets (Polpharma, Poland), Entizol 250 mg – tablets (Polpharma, Poland).

For a comparison of the developed voltammetric methods with supplemental analytical method, the concentration range $2 \cdot 10^{-7}$-$1 \cdot 10^{-4}$ mol/L of selected drugs was measured using UV-VIS absorption spectrophotometry in deionized water, with reached $L_Q \approx 2 \cdot 10^{-7}$ mol/L for metronidazole and $L_Q \approx 3 \cdot 10^{-7}$ mol/L for ornidazole. Hence it follows that the L_Qs for selected drugs reached using DCV at m-AgSAE, DPV at m-AgSAE, and UV-VIS absorption spectrophotometry are comparable under given conditions.