Abstract:

The aim of this Thesis was to clarify electrochemical properties of two new psychoactive substances. These substances are an alternative to classical drugs because they are not controlled by current legislation. It is important to determine the metabolites of these substances to be able to detect them in organism. Their electrochemical properties could explain the process of the first phase of biotransformation in human organism. Two synthetic stimulants were studied – 3-fluorophenmetrazine and 4-methylpentedrone, used as substitutes for cocaine or ecstasy. The purity of substances was controlled by HPLC with UV/Vis diode array detector and the stability was verified by UV/Vis spectrophotometry. Electrochemical properties were studied in phosphate buffer using cyclic voltammetry. For both substances was calculated theoretical HOMO and LUMO spatial distribution. This information was important to estimate parts of molecules, that can be reduced or oxidised. The analytical method was developed on glassy carbon electrode using differential pulse voltammetry. Substance 3-fluorophenmetrazine was determined in phosphate buffer pH 9,0 with limit of detection of 5,1 μmol l^{-1}. The linear range of calibration curve is from 7,0 to 107,0 μmol/l, R = 0,9988. 4-methylpentedrone was determined in phosphate buffer pH 7,2 with limit of detection 5,0 μmol l^{-1} and linear range from13,7 to 73, 5 μmol l^{-1}, R = 0,9951. An interference study was performed.

Key words: cyclic voltammetry, differential pulse voltammetry, glassy carbon electrode, 3-fluorophenmetrazine, 4-methylpentedrone