

Abstract:

This Thesis deals with the construction of an electrochemical cell with two types of integrated composite electrodes based on carbon films. Using these electrodes, the voltammetric behavior of environmental pollutant triclosan (5-chlor-2-(2,4-dichlorophenoxy)phenol) was studied.

For the construction of composite electrodes, graphite and glassy carbon were used as conductive microparticles. Several types of polymers served as the nonconductive binder. For the measurements, combinations of graphite with polystyrene and graphite with polycarbonate were selected as optimum materials.

From the dependence of peak heights on solution composition, a mixture of a buffer of pH 7 and methanol (1:9, V/V) was selected as the optimum medium. In this medium, concentration dependences were measured; calculated triclosan detection limit were $0,49 \mu\text{mol dm}^{-3}$ for carbon polystyrene composite electrode and $0,25 \mu\text{mol dm}^{-3}$ for carbon polycarbonate composite electrode, respectively. The possibility of further increasing the sensitivity of the determination by the accumulation step was studied. Accumulation of triclosan on carbon polystyrene composite electrode was observed, but the increase in response was connected with the loss of repeatability. Accumulation of triclosan on carbon polycarbonate composite electrode was not observed even after thirty minutes.

The developed method for the determination of triclosan was verified by its determination in the real matrices of river water and in the real sample of toothpaste.

The obtained limit of detection in sample of the river water corresponds with the limits obtained from concentration dependences.

Extraction of triclosan from the real sample of toothpaste was carried out. Concentration of the analyte was determined by standard addition method. In the case of carbon polystyrene composite electrode, very good repeatability of the measurements and agreement of the determined and declared content of triclosan in the toothpaste was found. In the case of carbon polycarbonate composite electrode, about few percent lower amount of triclosan was found and also a worse repeatability was observed.