

ABSTRACT

The presented diploma thesis is devoted to study of determination of 4-nitrobiphenyl (4-NBP) in model river water by DC voltammetry (DCV) and differential pulse voltammetry (DPV) at m-AgSAE (diploma thesis relates to bachelor thesis, in it DCV and DPV methods for determination of 4-NBP in deionized water were developed). Limit of determination (*LOD*) is $2 \cdot 10^{-7} \text{ mol} \cdot \text{l}^{-1}$ by DCV and $4 \cdot 10^{-7} \text{ mol} \cdot \text{l}^{-1}$ by DPV. The adsorptive stripping DPV (AdSDPV) technique was tested to archive lower *LOD* the AdSDPV, optimal conditions were not found.

Electrochemical behavior of 2-nitrobiphenyl (2-NBP) at m-AgSAE was studied. Optimal conditions for its determination by both techniques DCV and DPV were found in methanol-0,01 $\text{mol} \cdot \text{l}^{-1}$ LiOH (1:9) and in this medium peak current dependence in $1 \cdot 10^{-7} \text{ mol} \cdot \text{l}^{-1}$ to $1 \cdot 10^{-4} \text{ mol} \cdot \text{l}^{-1}$ 2-NBP (*LOD* $\approx 2 \cdot 10^{-7} \text{ mol} \cdot \text{l}^{-1}$ by DCV and $1 \cdot 10^{-7} \text{ mol} \cdot \text{l}^{-1}$ by DPV) concentration range was measured. Developed methods were successfully tested for determination of 2-NBP in drinking and river water samples. For both mediums obtained *LODs* were $2 \cdot 10^{-7} \text{ mol} \cdot \text{l}^{-1}$ by DCV and $1 \cdot 10^{-7} \text{ mol} \cdot \text{l}^{-1}$ by DPV. AdSDPV technique was unsuccessfully tested to achieve lower *LOD*.

Optimal conditions for simultaneous determination of 4-NBP and 2-NBP by DPV technique at m-AgSAE were found: methanol-0,25 $\text{mol} \cdot \text{l}^{-1}$ acetate buffer (pH = 6,0) 3:7. The dependence of the peak current of 4-NBP on concentration of 2-NBP and dependence of peak current of 2-NBP on concentration of 4-NBP was studied for 10^{-6} and $10^{-7} \text{ mol} \cdot \text{l}^{-1}$ concentration range.

Using cyclic voltammetric (CV) technique at HMDE and m-AgSAE in medium methanol-Britton-Robinson buffer (pH 2,1; 7,0 and 13,1) 3:7 it was found that the dependence of peak current of 4-NBP and 2-NBP on square root of scan rate is linear for 5–500 $\text{mV} \cdot \text{s}^{-1}$ scan rate range. This fact confirms that reduction processes at electrode surface is controlled by diffusion for this scan rate range.

In medium ethanol-0,25 $\text{mol} \cdot \text{l}^{-1}$ phosphate buffer (pH 7,0) (1:1) and (1:9) the effect of double-stranded DNA (*dsDNA*) presence ($c_{\text{DNA}} = 2\text{--}2500 \mu\text{g} \cdot \text{ml}^{-1}$) in solution on electrochemical behavior of 4-NBP, 2-NBP, 3-nitrobiphenyl, nitrobenzene and 4-nitrophenol was studied at HMDE by DPV technique. It was found that the electrochemical behavior of studied compounds is influenced by ethanol content. Possibility of using different interaction of studied compounds with *dsDNA* for separation of its signals was studied.