

ABSTRACT

This thesis is focused on the application of two working electrodes of graphite suitable for determination of oxidizable tumour biomarkers. It deals with the study of electrochemical behavior of urinary indican. For the determination the technique of differential pulse voltammetry (DPV) was used on carbon paste electrode and film composite paste electrode in Britton-Robinson (BR) buffer.

In the first step optimal conditions were determined to find the lowest limit of determination (LQ) of this substance. BR buffer of pH 3 was chosen as the optimum medium for determination on a carbon paste electrode and BR buffer of pH 2 was used as the optimum medium for the determination using a film composite electrode. Performance for both electrodes was observed in a concentration range of from $1 \cdot 10^{-6}$ to $5 \cdot 10^{-5} \text{ mol} \cdot \text{l}^{-1}$. The limit of determination for measurements on a carbon paste electrode was $0.7 \text{ } \mu\text{mol} \cdot \text{l}^{-1}$ and the film composite electrode was $1.7 \text{ } \mu\text{mol} \cdot \text{l}^{-1}$.

Possibility of the accumulation of indican was examined in order to increase sensitivity and decrease of limit of quantification. However, after 5 minute sorption, no increase in response was observed and the accumulation step was not inserted. Developed method was tested on the determination of urinary indican in human urine matrix after solid phase extraction with methanol as a elution reagent, but the extraction step was not efficient enough. Good repeatability and good agreement with measured results was demonstrated using carbon paste electrode. Carbon film composite electrode provided lower concentration values and lower repeatability.