Comparison of Electrochemical Determination of Purines and Pyrimidines by means of Carbon, Graphite and Gold Paste Electrodes

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Comparison of electrochemical detection with the use of thick-film sensors with working electrodes made of graphite, carbon and gold pastes for individual determination of four nucleobases – adenine, guanine, cytosine and thymine is presented. The best results and oxidation peaks for the four nucleobases were obtained for gold paste electrodes. For purines limits of detection (LOD) and sensitivities obtained with the use of the developed gold paste electrodes were as follows: for adenine – $7.4 \cdot 10^{-7}$ M with mean sensitivity of 26 nA/ μ M, for guanine for two oxidation peaks – $1.3 \cdot 10^{-6}$ M and $2.6 \cdot 10^{-6}$ M with mean sensitivities 3 nA/ μ M and 1.6 nA/ μ M, respectively. Whereas, for pyrimidines, LOD and sensitivities obtained with the use of the same type of electrodes were as follows: for cytosine – $6.3 \cdot 10^{-7}$ M with sensitivity of 39.8 nA/ μ M, for thymine for two oxidation peaks – $1.3 \cdot 10^{-6}$ M and $6.4 \cdot 10^{-7}$ M with mean sensitivities 11.5 nA/ μ M and 34.1 nA/ μ M, respectively. Therefore, the highest sensitivities were obtained for adenine and cytosine, while the lowest values of LOD were for cytosine and thymine determination.

Keywords: electrochemical detection; nucleobases determination; differential pulse voltammetry (DPV); thick-film electrodes.

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