The definition low concentrations of $\text{H}_2\text{O}_2$ and $\text{C}_2\text{H}_5\text{OH}$ in water solution with use of biomimetic sensor catalase and peroxidase types

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Advances in the field of imitation catalysis allow us to synthesize biomimetic analogs of the corresponding enzymes [1] and use them as substitutes for bioselectors in sensors.

In this connection, the aim of the present investigation is the elaboration and research of more active, stable modified iron tetraphenylporphyrinous biomimetic electrodes of catalase and peroxidase types for definition the low concentrations of $\text{H}_2\text{O}_2$ and $\text{C}_2\text{H}_5\text{OH}$ in the water solutions. In [2] there has been elaborated the electrochemical biomimetic model of the catalase and peroxidase sensors, which is consists of the electrode of comparison $\text{(Ag/AgCl)}$ and the irontetraphenylporphyrincontaining $(\text{TPhPFe}^{3+}\text{OH})$ electrode. The elaboration of the Biomimetic electrode on the base of the oxidized aluminum plates has been carried out by means of adsorption. The oxide coating $(\text{Al}_2\text{O}_3)$ of the aluminum electrode was prepared by electrochemical and chemical methods [3].

While investigating the catalase activity, the electrochemical cell was filled with a reactional medium in which the concentration of $\text{H}_2\text{O}_2$ in the water solution varied from $10^{-6}$ to 1.0 wt. %. While investigating the peroxidase activity, the reactional medium was a mixture of $\text{C}_2\text{H}_5\text{OH}$ and 1.0% of $\text{H}_2\text{O}_2$ in the water solution, where the concentration of ethyl spirit varied from $10^{-1}$ to 1.0 wt. %. The investigation of electrode potentials $(\Delta E)$ of the catalase and peroxidase reactions dependent on the time has been carried out by the potentiometric method.

The designed biomimetic sensors proved stable, due to which they could be reused many times.

References


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