

VOLTAMMETRIC SENSOR FOR TOTAL CHOLESTEROL DETERMINATION IN BLOOD SERUM

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Cholesterol is an essential compound in a human body. Nevertheless, cholesterol blood level is strongly connected with a risk of cardiovascular diseases (CVDs) in clinical practice. The suddenness of mortality is the key moment in CVDs diagnosis and therapy. According to the World Health organization statistics 21% of CVDs patients are dying at pre-state period [1]. Therefore, point-of-care testing plays a vital role in the successful treatment of CVDs. Electrochemistry is one of the best solutions for such systems due to its simplicity and low-costs [2].

We report on a novel electrochemical sensor for total cholesterol determination. It is based on modified working electrode. 2,6-diacetyl-2,4,6,8-tetraazobicyclo[3.3.0]octane-3,7-dion-diphosphonic acid was chose as a modifier. The modifier is structurally similar to flavin adenine dinucleotide.

The three-electrode cell was used for the performing of experiments. Silver chloride electrodes were used as a reference and auxiliary electrodes. Such approach provides an opportunity to the increasing of potential stabilization and the decreasing of signal-to-noise ratio. Standard phosphate buffer (pH 6.9) was used as a supporting electrolyte.

The cholesterol oxidation peak was obtained at +0.9 V by means of cyclic voltammetry. Besides, the Taffel plot was drawn. The charge transfer coefficient was 0,5. Mass diffusivity by Cottrell was $6 \cdot 10^{-6}$ cm²/s. The electrochemical process was quasi-reversible. The differential pulse voltammetry usage helped to decrease the potential of oxidation peak to 0,6 V. Calibration curve was linear from 0,5 mmol/L to 10,5 mmol/L.

Therefore, obtained sensor is very promising for clinical practice.

References:

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