

SOLID-STATE POTENTIOMETRIC SENSORS FOR DETERMINATION OF VITAMINS B₁ AND B₁₂

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Potentiometric sensors are a valuable analytical tool for both researchers and practitioners in the field of chemistry. Creating new sensitive elements, improving the theory of their functioning, expanding areas of use and implementation of the new methodological solutions are the result of continuous development of research in the field of the sensors. The advantages of potentiometric sensors are low cost, small sizes, the ability to selectively determine of the different substances in the special conditions in laboratory and non-laboratory use, there is a possibility of remote analysis. That is why sensors are widely used in various fields of the industry, medicine, agriculture, ecological monitoring, quality control of the pharmaceuticals and food and other areas of human activity. The solid-contact potentiometric sensors are an interesting solution due to their portability, absence of internal solution and the stable metrological characteristics.

The EAS for the solid-contact potentiometric sensors in the form of insoluble associatives of molybdophosphoric acid (MPA) with vitamin B₁ (thiamine hydrochloride) and vitamin B₁₂ (cyanocobalamin) had been obtained. The main electrode-analytical and exploitative characteristics of constructed solid-contact sensors which are selective for the vitamins B₁ and B₁₂ are given in a Table 1.

Electrode-analytical characteristics of the solid-contact potentiometric sensors which are selective for the vitamins B₁ and B₁₂

Composition of EAS	S, mV/pC	Working range, mol/L	C _{min} , mol/L	Reponse time, min	Time of life, month
B ₁ - MPA	29	10 ⁻⁵ - 10 ⁻²	2,0·10 ⁻⁶	2	7
B ₁₂ - MPA	57	10 ⁻⁶ - 10 ⁻⁴	7,9·10 ⁻⁸	2	8

The developed potentiometric technique of vitamin B₁₂ determination was tested on the real objects: a solution for injections "Cyanocobalamin" (0,54 ± 0,11) mg/ml; tablet form of vitamin B₁₂ «Sundown Naturals» (1,47 ± 0,33) mg; tablet mixture of vitamins B₁-B₆-B₁₂ «Neurobex-Forte» (0,34 ± 0,07) mg, chicken egg yolk (4,24 ± 0,96) µg /100 g of product, salmon meat (4,24 ± 0,96) µg /100 g of product. The results of vitamin B₁ potentiometric determination are as follows: a solution for injection "Thiamine hydrochloride" (51,20 ± 0,11) mg/ml; tablet form of vitamin B₁ "21st Century" (98,4 ± 0,28) mg; pine nut (29,62 ± 1,5) mg/100 g of product, sesame seeds (1,12 ± 0,08) mg /100 g of product, walnut leaves (12,71 ± 0,41) mg /100 g of product . The relative standard deviation does not exceed 7 %.