

ANALYSIS OF DOSAGE FORMS CONTAINING VITAMIN B6 BY IONOMETRIC METHOD

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Introduction. Pyridoxine hydrochloride - is a watersoluble vitamin of the B group. Its application improves the absorption of polyunsaturated fatty acids, delays the congestion of cholesterol, lipids and calcium on the walls of blood vessels, which prevents the development of atherosclerosis. In the human body, vitamin B6 is phosphorylated and forms of pyridoxal phosphate, pyridoxamine and pyridoxal usually in an amount of 2-3% per day of the total pyridoxine. This leads to a lack of pyridoxine in the body, as well as appearance of hypovitaminosis and deficiency disease, which are manifested in the form of dermatitis, epileptic seizures, and bone marrow hypofunction. In this regard there is actual development of simple and rapid techniques of pyridoxine hydrochloride analysis.

The literature describes methods of analysis of pyridoxine hydrochloride using as a titrant silver nitrate solution with a visual and a potentiometric indication of equivalence point. However, the proposed methods are not specific because do not allow to analysis of pyridoxine hydrochloride by biologically active moiety of the molecule. Now this approach is low acceptable.

Materials and methods. Based on this, the most perspective is the method of direct potentiometry (ionometry). The literature describes the pyridoxine-selective electrode based on ion associate of pyridoxine hydrochloride and sodium tetraphenylborate. However, this electrode has low electrode characteristics, making it difficult to use in the assay. Therefore, for the development of simple and rapid methods potentiometric analysis of pyridoxine hydrochloride in dosage forms, the task of developing and research pyridoxine-selective electrode based on ion associates with of pyridoxine heteropolyanions Keggin structure ($XMe_{12}O_{10}$, где $X(P, Si); Me(Mo(VI); W(VI))$) has been put.

Preliminary studies have shown that as the electrode-active substance is necessary to use of pyridoxine ion associate with phosphorus tungstic acid. The composition of the solidstate membrane pyridoxine-selective electrode is (w%): polyvinyl chloride 26 ± 4 , dibutyl phthalate 50 ± 5 , ionic associate of pyridoxine with phosphotungstic acid 17 ± 3 , activated carbon 4%.

Results and discussion. As a result of studies, it was found that the electrode function of the made pyridoxine-selective electrode is linear in the range of

concentrations of $(6,0 \pm 0,2) \cdot 10^{-5}$ - $(1,0 \pm 0,1) 10^{-2}$ M with a slope of 56 ± 2 mV, which corresponds to the characteristics of the ion-selective electrode (ISE) for the singly charged ion. Electrode response time is 20-30 seconds and potential drift of the week does not exceed 3-5 mV. Working resource of the electrodes is not less than 6 months. Consequently, pyridoxine-selective electrode may be used for potentiometric analysis of pyridoxine hydrochloride in solid and liquid dosage forms. Potentiometric analysis of pyridoxine hydrochloride in the following dosage forms: injectable solutions with a concentration of 1% of pyridoxine hydrochloride, 2.5% and 5%, and tablets containing of pyridoxine hydrochloride and 0.01 g 0,002g has been carried out by using the developed pyridoxine-selective electrode. For analysis electrochemical circuit with salt bridge was used consisting of two electrodes: pyridoxine-selective electrode and reference electrode. As the reference electrode – the silver-chloride electrode was used EVL-1 MZ. Measurements of electromotive force carried out on the ionomer I-130. Analysis was performed by tightinterval testing of two-point calibration curve. For this purpose, we set the concentration range in which the dispersion of the points of dispersion with respect to So^2 straight line does not exceed 0.5 mV. To do this, we calculated the parameters a and b, and the value of So^2 for the equation $E = a + b \cdot \lg$ by ordinary least squares. It was found that this concentration range is 10^{-2} - 10^{-3} M.

To perform the measurements two standard solution of pyridoxine hydrochloride was prepared. The concentration of the first standard solution (C_1) is equal to 10^{-2} M of pyridoxine. The second standard solution was prepared by ten-fold dilution of the first, the concentration (C_2) is 10^{-3} M of pyridoxine. The sample solution was prepared so that the concentration of pyridoxine hydrochloride fell into within a range of concentrations of the tightinterval calibration curve: 10^{-2} - 10^{-3} M. Next electromotive force of circuit in standard (E_1 and E_2) and the sample solution (E_x) was measured. The concentration of pyridoxine hydrochloride (C_x) is calculated by formula:

$$C_x = C_1 - \text{antilg}(E_x - E_1) / (E_1 - E_2)$$

Conclusions. The results of ionometric analysis of pyridoxine hydrochloride in the dosage forms are characterized by sufficient precision and reproducibility. Proposed method analysis is simple and rapid and does not require the use of expensive reactants and reagents. The relative uncertainty of the analysis does not exceed 2%, which corresponds to the requirements of technical documentation of the dosage forms.