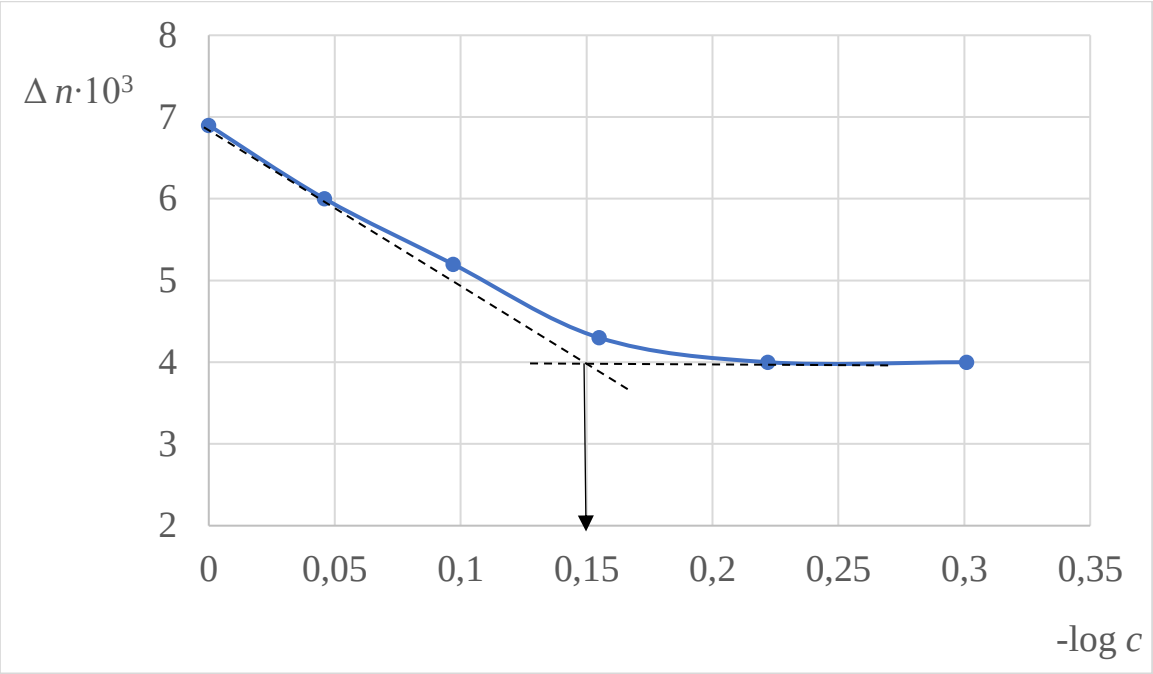

Fig. 1. Refractometric determination of the CMC of the "Garnier" Micellar water

The procedure is based on measuring the refraction indexes of the Micellar water various concentrations and comparing them to refraction index of distilled water (medium of the solution under study) illustrated in Fig. 1.

As it is seen from the graph, a sharp change of the physical property is observed under the concentration - log c = 0.15, which means that the CMC=70.8 %.

Conclusion. The proposed procedure in easy and quick in performance and can be applied in the teaching complex of Physical and Colloid Chemistry discipline studying for the Technologies of Perfumery and Cosmetics speciality students mainly and others. The data obtained can be used as a reference while preparing a Micellar water of different composition.

USE OF ENZYMES IN ANALYTICAL CHEMISTRY

Berbega A. S.
Scientific supervisors: prof. Blazheyevskiy M. Ye.,
assoc. prof. Koval'ska O. V.
National University of Pharmacy, Kharkiv, Ukraine
lena05021985@ukr.net

Introduction. Enzymes - biological catalysts - enable the many complex chemical reactions, upon which depends the very existence of life. Because enzymes work in complex living systems, one of their outstanding properties is specificity - ability to catalyzing a particular reaction of a particular substrate, even though other isomers of that substrate or similar substrates may be present.

Aim. Specificity and ability to catalyze reactions of substrates at low concentrations, makes it possible to widely used enzymes in chemical analysis. Enzyme – catalyzed reactions may be used for analytical purpose for determination of substrates and inhibitors, and also of enzymes themselves. Nowadays numerous enzymes are available in purified form, with high specific activity, at reasonable price.

Materials and methods. The concentrations of material participating in an enzyme reaction can be calculated in one two ways: by measuring the total change the occurs by chemical, physical or enzymatic analysis of the product or unreacted stating material; or (second method) by the rate of enzyme reaction. The total changes method can be used only for substrate analysis (S). For enzyme (E) and activator (A) and inhibitor (I) analysis may be used kinetic method, because are catalytic in nature and affect only the rate.

Results and discussion. In the kinetic method, the initial rate of reaction, V_0 is measured in one of many conventional ways, by following either the production of product or the disappearance of the substrate, enzyme, inhibitor and activator. It should be emphasized the rate method is faster, because the rate can be measured initially without having to wait for the reaction to go to completion.

Enzyme method can be used for determination substrate. The most important advantages of enzymatic assay of substrate are specificity and the great sensitivity. Glucose, for example, is oxidized at the rate of a new present per minute, regardless of concentration. Thus, a 10^{-7} M solution can be analyzed as easily as 10^{-4} M solution.A complete review of enzymatic methods for the assay of carbohydrates, amino acid, organic acid, hydroxyl compounds, esters, aldehydes, quaternary ammonium compounds, organophosphates, carbamates and inorganic substance has been prepared by Guilbault and Bergmeyer. Common techniques such as spectrophotometry, measurements of change in pH and manometric measurements have been described for the assay of almost all enzymes. With the advent of new techniques, electrochemical, fluorimetric and chemiluminometric as well as the successful immobilization of several enzymes, many of the difficulties have now been resolved. Because of their simplicity and susceptibility to automation, photometric methods have been used extensively to follow enzyme activity. For determination of activators: the initial rate of the enzyme reaction used because it is proportional to the activator concentrations. Determination of inhibitors: it is a compound that causes a decreased in the rate of enzyme reaction, either by reacting with the enzyme to form an enzyme – inhibitor complex or by reacting with the enzyme – substrate intermediate to form a complex:

$$E + I \rightarrow EI$$
$$E + S \leftrightarrow ES \leftrightarrow P + E$$
$$\uparrow\downarrow I$$
$$E - S - I.$$

In general, the initial rate of an enzymes reaction will decrease with increasing inhibitor concentration, linearly at low inhibitor concentrations, and the will increasing inhibitor concentration, linearly at low inhibitor concentrations, and then will gradually approach zero. Analytical working curves for inhibitor assay are generally constructed by plotting percent – age inhibitor against concentration of inhibitor. The percentage inhibition is calculated as follows:

$$Inhibition\ (\%) = (Rate_{\ No\ ingibitor} - Rate_{\ ingibitor}) / Rate_{\ No\ inhibitor} \times 100.$$

Generally, a graph of percentage inhibition against concentration is a typical exponential type of curve with a linear range extending from 0 to 60 or 70% inhibitor that causes a 50% inhibition of enzymic activity is termed the I_{50}, and is a measure of the strength of an inhibitor.Organophosphate and carbamate pesticides, insecticides, toxic metal ions, quaternary ammonium compounds, have been studied using enzymatic methods. A CL system based on three simultaneous coupled enzymatic reactions involving Acetylcholinesterase, Cholinoxidase and Horseradish peroxidase with Luminol as the CL substrate has been employed to assess the potency of Acetylcholinesterase inhibitors. The analytical procedures, based on the measurement of the kinetics of the CL emission, was very rapid and suitable for the high-throughput screening of Acetylcholinesterase inhibitors.

Conclusions. Enzymes have potential utility in analytical chemistry, and may be successfully applied in the pharmaceutical analysis. The specificity of enzyme is very highly, can solve the problem of analysis of one substance in the presence of many similar compounds in complex medicines and the problem of trace amounts analysis of preservatives.

DEVELOPMENT OF VORTIOXETINE DETECTION METHOD USING TLC AND CHROMOGENIC REACTIONS FOR CHEMICAL-TOXICOLOGICAL ANALYSIS

Bohoutdinova V. T., Karpushyna S. A.
Scientific supervisor: assoc. prof. Baiurka S. V.
National University of Pharmacy, Kharkiv, Ukraine
viktoria_tagirovna@ukr.net

Introduction. Vortioxetine (1-[2-(2,4-Dimethylphenylsulphanyl)-phenyl]-piperazine hydrobromide) is an antidepressant agent of a new generation. Information about detection and identification methods of Vortioxetine developed for toxicological studies has not been found in the available literature.