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IMPROVING THE TEACHING METHODS OF THE CHAPTER OF QUANTITATIVE ANALYSIS BASED ON THE DIFFERENTIAL APPROACH

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ANNOTATION

This article is devoted to the teaching methodology of the quantitative analysis section based on the differential approach, which highlights data on increasing students' interest in gravimetric and titrimetric methods.

Keywords: differential approach, teaching methodology, titrimetric analysis, method, titrant; acid-base titration, non-standard test tasks.

INTRODUCTION

Today, analytical chemistry plays an important role in scientific research, industry, health, environmental protection, and food safety. Rapidly developing technologies and methods of analytical chemistry allow working with smaller samples, conducting sensitive and selective analyses, processing data faster and giving accurate calculated results.

Analytical chemistry is taught to chemistry and biology students of higher education institutions. Analytical chemistry is a science that studies the methods of determining the composition of these substances. Analytical chemistry deals with solving general problems of analysis, creating methods for specific fields, developing and improving metrology of analytical methods.

Analytical chemistry is divided into qualitative and quantitative analysis. Qualitative analysis studies information about the composition of a substance or mixture of substances, its structure, functional groups, etc., and quantitative analysis studies information about the amount of a substance and the amount of its components. Gravimetric analysis and titration methods are based on maintaining a correct proportional relationship between the amount of substance and its weight or volume [1].

The quantitative analysis section of analytical chemistry consists of a set of methods that quantitatively studies the composition of the substance under investigation. With the help of these methods, it is possible to determine the amount of elements in certain compounds or compounds in mixtures, alloys and solutions. The results of the test are usually expressed in percentages.

General information is obtained on each topic of quantitative analysis. The method of gravimetric analysis refers to determining the amount of a component (element or ion) based on the mass of the substance obtained as a result of the analysis. In the methods of this group, the determined part of the substance under analysis is isolated and measured in its pure form or in the form of a compound with a known composition.

For example, to determine the amount of barium in its compounds, the Ba2+ ion is precipitated using dilute sulfuric acid:

$$BaCl_2 + H_2SO_4 \rightarrow BaSO_4\downarrow + 2HCl$$

$BaSO_4$ the precipitate is filtered, washed, heated and accurately weighed. $BaSO_4$ knowing the mass of the precipitate and its formula, it is calculated how much barium is in it. The gravimetric analysis method gives high-precision results, but it requires a lot of time and labor. Titrimetric analysis method refers to a method based on accurate measurement of the amount of reactant that reacts with the component being determined. The reagent is a titrated solution obtained in the form of a solution of specific concentration. The time when an equivalent amount of reactant is added to the amount of the component being determined, i.e., the reaction completion time, is determined by various methods. During the titration, a reagent is poured in an amount equivalent to the amount of the substance being determined. Knowing the volume and exact concentration of the solution that reacts with the substance to be determined, the amount of the substance to be determined is calculated [2].

The titrimetric analysis method gives less accurate results than the gravimetric analysis method, but the analysis is performed very quickly. Depending on the type of reactions during titration, the method of titrimetric analysis is divided into the following methods: acid-base titration method, oxidation-reduction titration method, precipitation and complex formation method.

The acid-base titration method refers to the method of analysis based on the neutralization reaction. The acid-base titration method is used for the quantitative determination of acids and bases.

Oxidation-reduction titration method refers to the method of analysis based on oxidation-reduction reaction. The oxidation-reduction titration method is divided into a number of methods: permanganatemetry, iodometry, iodochlorometry, bromatometry, dichromatometry, serimetry, nitritometry methods.

The precipitation method combines titrimetric determinations in which the ion to be determined completely precipitates as a result of the reaction between the substance to be determined and the working solution. There are many types of them, argentometry, thiocyanitometry and hakozo. Depending on the type of sink, this method is divided into four: Mor, Folgard, Fayance, Khodakov methods.

The method of complex formation, i.e., determinations based on reactions to form complex ions, is very close to the precipitation method. In recent years, organic reagents that form complexes with most cations have been widely used. These reagents are called chelators, chelators are divided into 4 types, the most important of which are EDTA (disodium salt of ethylenediaminetetraacetic acid) or trilon-B.

The use of a differential approach in the process of teaching the department of quantitative analysis in higher education institutions has a good effect on the effectiveness of teaching. The differential approach is a teaching process based on the ability of students to acquire knowledge. It can be used in different parts of the lesson. It can be used in the course of repetition of the lesson, in the process of explaining a new topic, and in the reinforcement parts of the lesson. Control tasks can be used in the process of checking how well students have mastered this section [3].

Task 1. **Write an explanation based on the given chemical reactions and analyze the process?**

$$H_2C_2O_4 + 2NaOH \rightarrow Na_2C_2O_4 + 2H_2O$$

$$N_{NaOH} = \frac{N \cdot VH_2C_2O_4}{V_{NaOH}} \quad \frac{g\text{-}ekv}{litr}$$

The answer. Equivalent point in titrimetric analysis is determined by various methods, most often by changing the color of the indicator solution. For example, it is possible to determine the concentration of alkali in the presence of a phenolphthalein indicator with a specific concentration of oxalic acid.

3- assignment. Match the number of terms with their definition

№	Terms	№	Description
1	Valumometry	A	Chemical methods, in turn, are divided into two: a method based on measuring the mass of the product of a chemical reaction
2	Gravimetria	B	weighing the increase in electrode mass as a result of electrolysis
3	Chemigravimetry	C	a method based on measuring the amount of reagent used for the reaction with the substance to be determined
4	Electrogravimetry	D	accurately weigh the mass of the product of a chemical reaction

In the differential approach, depending on the level of knowledge, the group can be divided into several groups. To strengthen the topic, test options are given to the groups depending on their level of knowledge. In this, they learn the basic concepts of the subject in the least amount [4].

Test assignments

1. What is the analytical effect?

A) formation of a new substance as a result of a reaction;

B) sequential course of the reaction;

C) heat release during the reaction;

D) precipitation, gas release, change in solution color.

2. What is the method based on measuring the mass of the product of a chemical reaction called?

A) Electrogravimetry; B) Argentometry

C) Gravimetry; D) Volumemetry

3. What is the titer of the solution?

A) amount of substance in 1 liter of solution;

B) amount of substance in 1 cm2 solution;

C) gram amount of the substance in 1 ml of solution;

D) amount of substance in 0.1 ml solution.

4. What does the titer of HCl with respect to NaOH mean 0.0040 g/ml?

A) 10 ml of HCl is completely neutralized with 0.0040 g of NaOH;

B) 0.1 ml of HCl is completely neutralized with 0.0040 g of NaOH;

C) 100 ml of HCl is completely neutralized with 0.0040 g of NaOH;

D) I ml of HCl is completely neutralized with 0.0040 g of NaOH.

5. What indicators are used in acid-base titration?
A) methyl orange, methyl red, phenolphthalein; B) thymol blue, phenolphthalein, ferrocene;
C) phenolphthalein, murexide, thymolphthalein; D) methyl red, black eriochrome, litmus.
6. 0.49 g was dissolved in 50 ml of water, what is the titer of the solution?
A) 0.98 g/ml; C) 0.125 g/ml; B) 0.049 g/ml; D) 0.0098 g/ml.
7. What indicator is used in permanometric titration?
A) phenolphthalein; C) without an indicator; B) methyl orange; D) without ink.
8. In what units is water hardness measured?
A) % da; B) mol/1 da; C) mg-ekv Ca^{2+} va Mg^{2+} 1 liter in water; D) g/1 da.
9. How many types of complexes are there? A) 2; C) 5; B) 4; D) 3.
10. What indicators are used in complex ionometric titration?
A) black eriochrome-T, murexide; B) nitrochromase, ferroin;
C) alizarin, ninhydrin; D) black eriochrome and methyl orange
The methodological basis of the differential approach, which serves to ensure the effectiveness of lessons, is of great importance. To teach students to think freely, independently and logically, to work as a team, to search, to gather ideas and form a theoretical and practical understanding from them, to be able to influence the team with their opinion, to approve it, as well as to understand the basic concepts of the subject. teaching to apply the acquired knowledge in interpretation is a requirement of the present time [5].
In conclusion, on the basis of a differential approach, the development of students' attitudes to chemistry is carried out, taking into account their interests, opportunities and levels of knowledge acquisition.

REFERENCES

1.Азизходжаева А. Педагогик технология ва педагогик маҳорат. Т.: «Ўқитувчи», 2007
2.Fayzullayev O. Analitik kimyo, Toshkent: Yangi asr avlodi, 2006
3. Ibodulloyeva M.I., Sobirova N.A.,Alimurodov M.S. The importance of quantitative analysis in the study of the topic of solutions Eurasian Medical Research Periodical Volume 5/ February 2022, Page 5-10.
4.Ibodulloyeva M. I., Sobirova N., Sapayeva G. Analitik kimyo fanini o‘rganishda test topshiriqlaridan foydalanish, “Tabiiy fanlarning zamonaviy yutuqlari va o‘qitishda innovatsiyalar” Respublika ilmiy-amaliy anjumani, T.: 2021, 174-bet
5.Movlonova S.A., Alimova F.A. Differensial yondashuv asosida oqsillar mavzusini o‘qitish metodikasini takomillashtirish, “XXI asrda ilm-fan taraqqiyotining rivojlanish istiqbollari va ularda innovatsiyalarning o‘rni” mavzusidagi konferensiya materiallari, T.: 2019, 231-232.
6. Bobonazarovna, F. S., & Abduhamidovich, N. A. (2021). Development of Mathematical Literacy in Chemistry Lessons. European Scholar Journal, 2(3), 97-99.