Assessment tools for conducting attestation in discipline « Analytical chemistry » for students of 2024 year of admission under the educational programme cipher 33.05.01 Pharmacy, specialisation (profile) Pharmacy (Specialist's), form of study full-time /correspondence for the 2025-2026 academic year

1. Assessment tools for conducting current attestation in discipline

1.1. Assessment Tools for Conducting Certification in Seminar-Type Classes

Assessment in seminar-type classes includes the following types of assignments: testing and written examination.

1.1.1. Examples of tests

Assessed indicators of competence achievement: УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.

1. Type of analytical chemical reaction

$[Ag(NH_3)_2]Cl + 2\ HNO_3 \rightarrow AgCl + 2\ NH_4NO_3$

1) ion exchange
2) complex formation
3) deposition
4) oxidation-reduction
5) catalytic

2. Type of analytical chemical reaction

$CuSO_4 + 4\ NH_4OH \rightarrow [Cu(NH_3)_4]SO_4 + 4\ H_2O$

1) ion exchange
2) complex formation
3) deposition
4) oxidation-reduction
5) catalytic
6) combined

3. Type of analytical chemical reaction

$PbS + 4\ H_2O_2 \rightarrow PbSO_4 + 2\ H_2O$

1) ion exchange
2) complex formation
3) deposition
4) oxidation-reduction
5) combined

4. The determination of alkali and carbonates in the joint presence is carried out by the method:

1) acid–base titration;

2) redox titration;
3) sedimentary titration;
4) complexometric titration
5) by pipetting
5. Complexon III is:

1) nitrilotriacetic acid;
2) ethylenediaminetetraacetic acid;
3) disodium salt of ethylenediaminetetraacetic acid;
4) diamincyclohexanthetraacetic acid.
5) Trilon B

6. Chloride ions are determined by Folgard: by direct titration;

1) indirect titration;
2) reverse titration;
3) it is impossible to determine
4) reverse titration with iodometric termination

1.1.2. Examples of of situational tasks

Testable Indicators of Competency Achievement: ПК УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.

1. 100 ml of 0.1n iodine solution was added to the 1.5g of technical Na_2SO_3 after dissolution. 40 ml of solution was used for titration of excess iodine, 200 ml of which contains 2.482 $Na_2S_2O_3$. Determine the percentage of Na_2CO_3

2. 27.5 ml of $KMnO_4$ solution was consumed for titration of 2.5 ml of 0.1N oxalic acid solution. Calculate the titer of the $KMnO_4$ solution.

1.1.3 Examples of security questions for the interview

Testable Indicators of Competency Achievement: ПК УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.

1. Qualitative chemical analysis. Classification of methods (fractional, systematic analysis). Basic concepts in qualitative analysis. Analytical effects. Analytical classification of cations (sulfide, ammonia-phosphate, acid-base).

2. Protolytic equilibrium in buffer solutions. Types of buffer systems, examples, and recording forms. The pH value in buffer solutions. The Henderson-Hasselbach equation.

1.1.4 Examples of control work options:

Testable Indicators of Competency Achievement: ПК УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.

Option №. 1.

1. 0.45 liters contain 4.5 g of sodium nitrite. Calculate the pH, the hydrolysis constant, and the degree of salt hydrolysis. $KHNO_2 = 4*10^{-4}$.

2. Determine the potential of the $BrO_3^-, H^+|$ Br- pair if the concentrations of $C(BrO_3^-) = C(H^+) = C(Br^-) = 0.01$mol/L, and the standard potential of this pair at room temperature is $E_0 = 1.45$ V. The half-reaction can be represented as:

$BrO_3^- + 6H^+ + 6e = Br^- + H_2O$

3. Calculate the concentration of the Hg^{2+} ion in 0.05M solution of $K_2[HgI_4]$ in 1 liter of which 0.6 g of potassium iodide is additionally dissolved. Kn = 5·10-31

4. $KMnO_4+H_2SO_4+FeSO_4\rightarrow$

5. Characterization of cations of the V analytical group. Qualitative reactions.

6. Equilibria in solutions of complex compounds.

Option 2.

1. Which type of borax should be used to prepare 0.5 liters of 0.1 M solution.

2. To determine the mass fraction of free fatty acids in linseed oil, a sample of 0.5000 g was dissolved in 20 ml of an alcohol-ether mixture and titrated with 0.05 M KOH solutions. At the same time, 2.45 billion rubles were spent. Determine the mass fraction of fatty acids if the molar mass of linseed oil acids is 274 g/mol.

3. A sample of sodium carbonate weighing 0.1054 g was treated with 25.00 ml of 0.2 M HCl solution. The excess acid was titrated with 25.40 ml of 0.12 M NaOH solution. Calculate the mass fraction of Na_2CO_3 in the sample.

4. Acid-base titration curves: titration of strong acid, strong base.

5. Requirements for reactions in titrimetric analysis.

1.5. Assessment tools for students' independent work

The evaluation of independent work includes testing.

1.5.1. Examples of test tasks with a single answer

Testable Indicators of Competency Achievement: ПК УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.

1. Choose one of the five answers. Non-K+ is not used to detect

a. tartaric acid;

b. Ammonium perchlorate;

c. sodium hexanitrocobaltate (III)

d. Dioxouranyl acetate

e. Flame coloring

2. Choose one of the five answers. An analytical chemical reaction is a reaction accompanied

By

a) a change in the color of a solution

b) a certain analytical effect due to the formation of a reaction product with specific properties

c) a change in the pH of the solution

d) dissolution of the sediment

e) formation of sediment

3. Choose one of the five answers. The microcrystalloscopic reaction is accompanied by the formation of

a) crystals of a characteristic shape

b) colored pearls

c) fine crystalline sediment

d) colored crystals

e) amorphous sediment

4. Choose one of the four answers. Reagent for the cation kaline

a) ammonium oxalate

b) oxalic acid

c) sodium hydrophosphate

d) sodium hexstitrocobaltate (III)

5. Choose one of the four answers. The sodium cation colors the sludge in

a) yellow color

b) purple color

c) brick red color

d) green color

6. Choose one of the four answers. The salt effect is

a) the effect on the solubility of a poorly soluble electrolyte of a salt containing the ion of the same name and reducing the solubility of a poorly soluble electrolyte

b) the effect on the solubility of a difficult-to-dissolve electrolyte of a salt that does not have the same ion and reduces the solubility of a poorly soluble electrolyte

c) the effect on the solubility of a poorly soluble electrolyte of a salt containing the ion of the same name and increasing the solubility of a poorly soluble electrolyte

d) the effect on the solubility of a difficult-to-dissolve electrolyte of a salt that does not have an ion of the same name and increases the solubility of a poorly soluble electrolyte

e) the effect on the solubility of a difficult-to-dissolve electrolyte of any ion in the direction of decreasing solubility

7. Choose one of the four answers. Physical methods of quantitative determination include:

a) permanganometry

b) iodometry

c) refractometry

d) bromometry

8. Choose one of the four answers. The nermanganometry method is performed at pH:

a) pH = 7

b) pH > 7

c) pH < 7

9. Choose one of the four answers. By the redox method of ivlnetsi:

a) the Mohr method

b) mercurimetry

c) iodometry

d) trilometry

10. Choose one of the four answers. Precipitation methods include:

a) trilometry

b) alkalimetry

c) argentometry

d) nitrometry

1.5.2. Examples of multiple choice test tasks and/or matching and/or sequencing

Testable Indicators of Competency Achievement: ПК УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.

1. Choose three out of six answers. The methods of redox titration include:

a) dichromometry

b) permanganometry

c) cerimetry

d) argentometry

e) acidimetry

e) alkalimetry

2. Choose three out of six answers. Precipitation titration methods include:

a) The Mohr method

b) Faience method

c) Folgard method

d) Reductometry

e) Complexometry

f) Ring separation method

3. Choose three out of six answers. Electrochemical methods of analysis include:

a) Potentiometry

b) Polarography

c) Conductometry

d) Photocolorimetry

e) Spectrophotometry

f) Chromatography

4. Set the analytical effect and cation by matching each position given in the first column to the corresponding position from the second column:

Analytical effect	The cation
1. Turns the flame purple	A. Na^+
2. Turns the flame yellow	B. Ca^{2+}
3. Turns the flame red	C. Ba^{2+}
4. Turns the flame green	D. K^+

5. Match the measured parameter and the method given in the first column to the corresponding position in the second column:

The measured parameter	Method
1. Electrode potential	A. Spectrophotometry
2. Optical density	B. Potentiometry
3. Electrical conductivity	C. Conductometry
4. Light transmission coefficient	
5. pH	
6. resistance of the solution	

6. Match the indicator and the quantitative analysis method given in the first column to the corresponding position in the second column.:

The indicator	Method of quantitative analysis
1. Methyl Orange	A. Mohr's method
2. Potassium chromate	B. Acidimetry
3. Starch	C. Complexometry
4. Murexide	D. Iodometry
5. Eosin	E.Nitritometry
6. Tropeolin 00	F. Faience method

7. Set the sequence of operations in the Gravimetry method. Write down the appropriate sequence of numbers:

1. Filtering

2. weighing the suspension

3. calculation of the suspension and volume of the precipitator

4. Calculation of results and analysis errors

5. Obtaining the deposited form

6. dissolution of the suspension

7. Obtaining and weighing gravimetric mold.

8. Set the sequence of titrimetric analysis steps. Write down the appropriate sequence of numbers.

1. selection of aliquots

2. Titration

3. preparation of the analyzed solution

4. Visual definition of CT

5. Adding an indicator

9. Set the sequence of the Spectrophotometric determination steps. Write down the appropriate sequence of numbers.

1. Measurement of the optical density of standard solutions

2. construction of a calibration graph

3. measurement of the optical density of the analyzed solution

4. Preparation of a series of standard solutions

5. calculations of the analysis results

10. Set the sequence of Chromatography steps. Write down the appropriate sequence of numbers.

1. Prepare the chromatographic plate

2. Place the solvent in the chromatography column

3. Place the chromatographic plate in the column

4. Apply samples of the analyzed substances to the chromatographic plate

5. Dry the chromatographic plate after chromatography

1.5.3. Examples of open-ended tasks (open-ended question)

Testable Indicators of Competency Achievement: ОПК-1.1.1.

1. Calculate the volume of hydrochloric acid with a density of 1,170 g/ ml required to prepare 200 ml of a solution with an HCl concentration of 0.05 mol/L.

2. 0.02g of $H_2C_2O_4$ $2H_2O$ was taken to standardize the KOH solution. 15 ml of KOH solution was used for titration. What is the concentration of the titrant?

3. Calculate the molar concentration and titer of the HCl solution if 17.5 ml of this acid were consumed for titration of 0.4217 g of borax.

4. To determine the molar concentration of the H_2SO_4 equivalent, an excess of $BaCl_2$ was added to 10.0 ml of it. The mass of the resulting BaSO4 precipitate after filtration, calcination and weighing was 0.2762g. Calculate the molar concentration of the equivalent of the H_2SO_4 solution and titer.

5. A sample of $H_2X_2O_4$ $2H_2O$ weighing 0.6000 g was dissolved in a measuring flask with a capacity of 100.0 ml. 18.34 ml of NaOH was used for titration of 20.00 ml of the resulting solution. Determine the molar concentration of NaOH solution and its titer by $H_2X_2O_4$

2. Assessment tools for conducting intermediate attestation in a discipline

Intermediate attestation is carried out in the form of an exam.

List of questions to prepare for the intermediate attestation: ...

№	Questions for the student's intermediate certification	Indicators of competence achievement
1	Analytical chemistry and chemical analysis. Tasks of analytical chemistry in biology and medicine. The main sections of analytical chemistry. Classification. Basic concepts of chemical analysis. Application of analytical	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.

	chemistry methods in pharmacy	
2	Analytical features of substances and analytical reactions. Classification and characterization of analytical reactions. Sensitivity, specificity and selectivity.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
3	Methods of increasing sensitivity and lowering the limit of detection of substances. Methods for detecting substances. Interfering effect of ions	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
4	Qualitative chemical analysis. Classification of methods (fractional, systematic analysis). Basic concepts in qualitative analysis. Analytical effects. Analytical classification of cations (sulfide, ammonium phosphate, acid-base)	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
5	Acid-basic classification of cations. Principles of classification, related with the periodic table of D.I. Mendeleev. Advantages and disadvantages of classification.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
6	Analytical classification of anions. Basic analytical reactions of anions of various groups	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
7	The concept of a sample. Types of samples. Sampling of the average sample of liquid, solid and gaseous mass of the sample. Sample preparation for analysis	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
8	Strong and weak electrolytes. The concentration of ions in the solution. Activity of electrolytes and ions. Ionic strength of electrolyte solutions	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
9	The law of the acting mass. Application of the law of acting mass in analytical chemistry. The main types of equilibrium used in the analysis.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
10	Equilibrium constants for different types of reactions. Forms for recording equilibrium constants of all types of analytical processes. True thermodynamic equilibrium constants.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
11	Protolytic equilibrium. Protolytic theory of acids and bases. pH of aqueous solutions. Constants of acidity and basicity	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
12	Protolytic equilibrium in buffer solutions. Types of buffer systems, examples and forms of recording. pH value in buffer solutions. The Henderson-Hasselbach equation.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
13	Buffer capacity, buffer action. The use of buffer systems in pharmaceutical analysis. Examples of buffer solutions and their use.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
14	Protolytic equilibrium in aqueous solutions of salts. Degree and constant of hydrolysis. Calculation of pH in solutions of hydrolysis salts.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
15	Types of hydrolysis depending on the nature of the salt. Ionic equations of hydrolysis salts. The use of hydrolysis	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-

	in analytical practice	5.1.1; ПК-5.2.1; ПК-5.3.1.
16	Protolytic equilibrium in non-aqueous solutions. Classification of solvents. The constant of autoprotolysis. The strength of acids and bases in non-aqueous solutions. Application of non-aqueous solvents in analysis	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
17	Red-ox systems. Types of red-ox processes and methods of their balance.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
18	Potential of the reaction. The Nernst-Peters equation. (Reaction EMF). The direction of the red-ox reactions. The influence of various factors on the direction of the red-ox reactions.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
19	Methods of calculation of the equilibrium constant of the Red-ox reaction. The use of red-ox reactions in analytical chemistry	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
20	Heterogeneous equilibrium systems. Solubility and the solubility product, the relationship between them. Conditions of precipitation formation. Fractional precipitation	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
21	The influence of various factors on the solubility of precipitation (temperature, the nature of the solvent, salt effect, pH, the presence of complexing agents, oxidants and reducing agents). The use of heterogeneous equilibrium systems in analytical chemistry	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
22	Precipitation, its properties. The dependence of their structure on various factors: solubility, concentration, pH of the medium, temperature, rate of precipitation.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
23	General characteristics of complex systems. Equilibrium of solutions of coordination compounds. The stability and nonstability constants	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
24	The ability of metals and ligands to complex formation.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
25	The most important organic complexing reagents used in the analysis (ditizon, 8- hydroxyquinoline, dimethylglyoxime, diphenylcarbazide and others.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
26	Intracomplex compounds. Examples of metal complexonates and their use in analytical chemistry . Bonding in complex compounds	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
27	Complexes of metals with organic ligands. Stability of chelates.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
28	Bonding in complex compounds.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
29	Methods of separation and concentration of substances. Classification and description of these methods	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-

	(evaporation, ashing, precipitation, precipitation, crystallization, extraction, adsorption, chromatography)	5.1.1; ПК-5.2.1; ПК-5.3.1.
30	Extraction methods. Selected key terms of liquid extraction. Extraction equilibrium. Nernst's distribution law. The distribution constant. The distribution coefficient.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
31	Classification of extraction systems. Use of extraction in analytical chemistry	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
32	Chromatography. The essence of the method. Classification of chromatographic methods. Adsorption and precipitation chromatography, application in pharmacy.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
33	Planar chromatography. The essence of thin-layer and paper chromatography. Materials and solvents, requirements for them. Application of chromatography in pharmacy.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
34	Ion exchange chromatography. The essence of the method. Ionites. Ion exchange equilibrium.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
35	Gas and gas-liquid chromatography. The essence of the method. Classification. The concept of the method. Retention parameters and separation parameters. The effect of temperature on separation.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
36	Methods of quantitative processing of chromatograms (absolute calibration, internal standard). The concept of liquid chromatography. The essence of the method.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
37	A number of theoretical plates . HETP.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
38	High-performance liquid chromatography. Application of chromatography in pharmacy.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
39	Application of chemical, physical and physico-chemical methods for the identification of substances in qualitative analysis.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
40	I and II analytical group of cations. Group reagents. Analytical reactions of ions: Na^+ , K^+ . NH_4^+ ,Ag^+ ,Hg_2^{2+}, Pb^{2+} .	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
41	III and IV analytical group of cations. Group reagents. Analytical reactions of ions: Ca^{2+}, Ba^{2+} , Al^{3+} , Zn^{2+} , Sn(II), Sn(IV)	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
42	Analysis of mixtures of cations of I – III analytical groups. The essence and scheme of the analysis. Qualitative reactions and conditions for their implementation	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
43	V and VI analytical group of cations. Group reagents. Analytical reactions of ions: Mg^{2+}, Mn^{2+}, Fe^{2+} , Fe^{3+}, Bi^{3+}, Co^{2+},Ni^{2+}, Cu^{2+}, Mg^{2+} .	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-

		5.1.1; ПК-5.2.1; ПК-5.3.1.
44	Analysis of mixtures of cations of IV-VI analytical groups. The essence and scheme of the analysis. Qualitative reactions and conditions for their implementation.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
45	Quantitative analysis. Classification of methods. Requirements for reactions in quantitative analysis. The role and application of quantitative analysis in pharmacy	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
46	Sources of analysis errors. Correctness and reproducibility of quantitative analysis results. Classification of error.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
47	Systematic error, random error. Assessment of the correctness of the analysis results. (Use of standard samples)	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
48	Selected terms of mathematical statistics (random variable, general population, sample, Student distribution)	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
49	Statistical processing and reporting of quantitative analysis results (the average value of the determined value, random deviations, variance, confidence interval of the average.)	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
50	The essence of the titrimetric method of analysis. Classification of methods, examples.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
51	Requirements for reactions in titrimetric methods. Methods and techniques of titration. The method of individual weights and pipetting method. Calculations.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
52	Primary standard substances and primary standard solutions. Requirements for them. Preparation and standardization of solutions. Titrants. Examples of primary standards and titrants of titration methods	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
53	Types of titration methods: direct, back, indirect. The essence, schemes and examples of titration methods and conditions.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
54	Acid-base titration. The essence of the method. The reactions of the method. Requirements for the reactions.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
55	Indicators of acid-base titration. The equivalent point of the titration, its fixation.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
56	Indicator errors. Theories of acid-base indicators. Indicator transition range	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
57	Acid-base titration curves, their calculation and plotting.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.

58	Three types of curves: titration of a strong acid with a strong base. The equivalent point, optimal indicators.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
59	Three types of curves: titration of weak acid with a strong base, equivalent point, selection of indicators, optimal indicators.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
60	Types of acid-base curves: titration of a weak base with a strong acid. The equivalent point. Indicators	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
61	Varieties of the neutralization method. Acidimetry and alkalimetry in biology, medicine and pharmacy	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
62	Red-ox titration. Essence, classification, examples. Basic requirements for reactions	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
63	Indicators of red-ox titration. Classification of indicators. Range of indicators. The mechanism of their action.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
64	Curves of red-ox titration. Calculation and plotting red-ox titration curves. Determination of the equivalent point and equivalent titrant volume	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
65	The effect of pH, temperature and catalysts on the jump during redox titration. Errors.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
66	Permanganometry. The essence of the method. Preparation and standardization of titrants. Permanganate reactions in various media (pH).	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
67	The iodometry. The essence of the method, titrants, indicators	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
68	Iodimetry, iodatometry. Titrants, titration methods, titration indicators. The use of methods in pharmacy.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
69	Permanganatometry and iodometry as pharmacopoeial methods of analysis. The use of permanganate and iodometry in biology, medicine and pharmacy.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
70	Chloriodimetry. The essence of the method, titrants, indicators, application in pharmacy.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
71	Bromo- and bromatometry. The essence of the methods. Titrants, indicators, conditions of methods	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
72	Application of bromo- and bromatometry in pharmaceutical analysis.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-

		5.1.1; ПК-5.2.1; ПК-5.3.1.
73	Nitritometry. The essence of the methods. Titrants, indicators. Application.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
74	Determination of Sulfonamide preparations and other medicinal products by nitritometry.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
75	Dichromatometry. The essence of the methods. Titrants, indicators. Application.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
76	Calculations of samples, concentrations and titer of solutions in titrimetric methods of analysis	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
77	Methods of expressing concentrations in titrimetric analysis (molar, molar equivalent concentration, titer, titer for the substance being determined, correction factor, mass fraction)	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
78	Titrimetric analysis. Basic concepts (aliquot, titrant, equivalent point, indicator, titration curve, degree of titration). Requirements for reactions and reagents in titrimetry	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
79	Preparation of standard solutions. Standardization of titrants by the method of individual weigts; pipetting method	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
80	Gravimetric analysis. Basic concept of the method. Main stages of gravimetric analysis in the precipitation method	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
81	Calculation of analyzed sample weight mass and precipitant volume (mass). Formulas for calculating the mass, volume of reagents and percentage of errors	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
82	Gravimetric analysis. Advantages and disadvantages. Application of the method in pharmacy.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
83	The concept of precipitation titration. Essence, titrants. Requirements for reactions. Classification of deposition methods.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
84	Indicators of precipitation titration. Classification of indicators and mechanism of their action.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
85	Argentometric titration. Essence of the method. Titrants, their preparation and standardization. Storage conditions of titrants	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
86	The Mohr method, the essence, conditions,indicators, the use of pharmacy.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-

		5.1.1; ПК-5.2.1; ПК-5.3.1.
87	Precipitation titration. Method Volhard's method. Essence, titrants, performance conditions, indicators, application in pharmacy	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
88	Precipitation titration. The method of Fajans — Fisher— Kchodakov. Essence, titrants, indicators, application.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
89	Thiocyanatometry.Essence, titrants, indicators.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
90	Mercurimetry and mercurometry. Essence, titrants, indicators, application. Advantages and disadvantages of the method.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
91	The concept of the complexometric titration method. Essence, requirements for reactions.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
92	Complexons, structure, properties, mechanism of their action. Complexonates.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
93	Types of complexometric titration (direct, back, substitution titration).	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
94	Preparation of titrants in complexonometry. Application of this method in biology, medicine and pharmacy.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
95	Types of indicators in complexometric titration.Mechanism of their action.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
96	Complexometric titration curves. Factors influencing the titration jump. Selection of indicators	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
97	Precipitation titration curves. Calculation and construction of titration curves. Selection of indicators.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
98	Titration in non-aqueous media. Titrants, indicators, application	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
99	The use of non-aqueous titration in medicine and pharmacy.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
100	Instrumental methods of analysis. Classification, advantages compare to titrimetric methods of analysis.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.

101	Optical methods. Classification of optical methods. Basic concept. The Bouguer— Lambert—Beer- Bernard light absorption Law	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
102	Colorimetry and photocolorimetry. The essence of the methods. Advantages and disadvantages.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
103	Application of photoelectrocolorimetry in pharmaceutical analysis.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
104	Quantitative photometric analysis. The essence of the method. Application.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
105	Conditions of photometric analysis (selection of photometric reaction, wavelength, solution concentration, cells length).	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
106	Photometric titration. The essence of the method, its advantages. Conditions of the event. Application of the method in pharmacy.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
107	Luminescent analysis. The essence of the method. Classification of luminescent analysis, application in analytical chemistry	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
108	Photometric determination of the concentration of the analyzed substance: Calibration curves method, Single standard method, Standard addition method	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
109	Photometric methods for determining the concentrations of several substances in their combined presence.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
110	Electrochemical methods of analysis. Classification of methods, their advantages and disadvantages.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
111	Potentiometric analysis. The essence of the method. Direct potentiometry. Application of the method in analytical practice.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
112	Determination of the concentration of the analyzed substance in direct potentiometry (calibration graph method, standard additive method).	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
113	The essence of potentiometric titration. Types of potentiometric titration. The electrodes.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
114	Calculations and plotting of potentiometric titration curves. Integral and differential Curves.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
115	Application of potentiometry and potentiometric titration in analytics and pharmacy	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-

		5.1.1; ПК-5.2.1; ПК-5.3.1.
116	Conductometric analysis. The essence of the method. Direct conductometry. The equivalent electrical conductivity of electrolytes. Application in pharmacy.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
117	Types of conductometric titration. Analysis of electrodes for conducting conductometric titration.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
118	Conductometric titration. The essence of the method. Types of conductometric titration curves, their analysis.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
119	Application of conductometric titration in medicine and pharmacy.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
120	Coulometric analysis. The principle of the method. Its advantages and use.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
121	Direct coulometry. Methods for determining the amount of electricity passed through the solution. Application of the method.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
122	Coulometric titration. The essence of the method. Indication of the method, determination of equivalent point, application of the method.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
123	Polarographic analysis. General concepts. The essence of the method.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
124	Polarographic curves. Half-wave potential. The connection of the diffusion current with the concentration.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
125	Quantitative polarographic analysis: determination of the concentration of the analyzed substance by the calibration curves method.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
126	Quantitative polarographic analysis: determination of the concentration of the analyzed substance by the method of additives, by the method of standard solutions. Application of polarography	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
127	Ion exchange chromatography methods. Application in pharmacy	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
128	Ion-exchange equilibrium. Anionites and cationites, their use.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
129	The scheme and the principle of operation of the gas-liquid chromatograph. The main nodes and their purpose	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.

130	Types of detectors, classification And their use. Catarometer. Device, principle of operation	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
131	Calculation in gas-liquid chromatography: calibration graph method, internal standard method, normalization method.	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.
132	Combination of ion exchange chromatography methods with other analytical methods of analysis	УК-1.1.1; УК-1.2.1; УК-1.3.1; ОПК-1.1.1; ОПК-1.2.1 ;ОПК-1.3.1; ПК-5.1.1; ПК-5.2.1; ПК-5.3.1.

The intermediate attestation includes the following types of tasks interview on control questions

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Considered at the department meeting chemistry protocol of «30»_May 2025 г. № 10.

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