Assessment tools for conducting attestation
in discipline « General Pharmaceutical Chemistry »
for students of 2024, 2023 year of admission
under the educational programme
33.05.01. Pharmacy,
specialisation (profile) Pharmacy
(Specialist's degree),
form of study full-time
for the 2025-2026 academic year

1. Assessment tools for conducting current discipline assessment

1.1. Evaluation tools for conducting certification in seminar-type classes

Certification in seminar-type classes includes the following types of tasks: testing, situational task solving, control work, interview on control issues, assessment of the development of practical skills.

1.1.1. Examples of test tasks:

Verifiable indicators of competence achievement: UC-8.1.1, GPC-1.1.1, PC-4.1.1, PC-10.1.1, PC-11.1.1.

1. Assessment and documentation of the conformity of the production process and product quality is...
a) standardization
b) validation
c) certification

2. A written confirmation (guarantee) of the compliance of the quality of a medicinal product (efficacy, safety) with the established requirements is…
a) certification
b) instructions for use
c) technical documentation for medicines
d) test reports

3. State control over the production of medicines in the Russian Federation is carried out by…
a) federal agencies
b) territorial bodies
c) regional bodies
d) federal and territorial authorities

4. The quality control and authorization system does not cover…
a) preclinical studies
b) clinical trials
c) research of imported medicines
d) development of regulatory documentation for the transportation of medicines

5. The enterprise standard is approved…
a) a federal agency
b) a public administration body within its competence

c) an enterprise
d) all together

6. What types of validation are required for pharmaceutical production...
a) prospective validation
b) accompanying validation
c) re-verification (revalidation)
d) confirmation of the correctness of transportation

7. The proximity of the results obtained using this technique to the true value is…
a) correctness
b) accuracy
c) convergence
d) reproducibility

8. The degree of consistency between individual test results. The value determined by the deviation of individual results from the average value is…
a) correctness
b) accuracy
c) convergence
d) reproducibility

9. The accuracy of the methodology used by the same analyst under the same conditions is…
a) correctness
b) accuracy
c) convergence
d) reproducibility

10. The accuracy of the technique, implemented under different conditions on identical samples from the same series of materials, is…
a) correctness
b) accuracy
c) convergence
d) reproducibility

1.1.2. Examples of situational tasks:

Verifiable indicators of competence achievement: UC-8.2.1, UC-8.3.1, GPC-1.2.1, GPC-1.3.1, PC-4.2.1, PC-4.3.1, PC-10.2.1, PC-11.2.1, PC-11.3.1

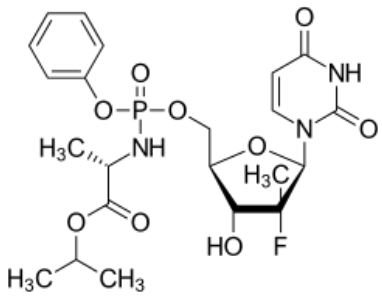
1. The pharmacist-analyst of the pharmaceutical company received the substance of the medicinal product, which was received for the preparation of tablets of the medicinal product nicotinic acid. To quantify this substance, the pharmacist-analyst applied acid-base titration..
- Give the chemistry of this definition.
- Give a general description of acid-base titration in aqueous and non-aqueous media and a classification of these methods.
- Suggest a way to determine the equivalence point.
- What working solutions are used in this titration method?

2. The substance of the drug used for the production of levomycetin eye drops was delivered to the quality control department of a pharmaceutical company.

To quantify, the analyst carefully dissolved the substance in a solution of concentrated hydrochloric acid and added zinc dust in several portions. After the zinc dust was completely dissolved and cooled, the reaction mixture was titrated with a working solution in accordance with the conditions of the procedure.

- Was the quantification method chosen correctly?
- Characteristics of the nitrite titration method. Titration methods.
- Working solution, standardization.
- Advantages and disadvantages of the nitritometry method.

3. The pharmacist-analyst of the pharmaceutical company was delivered the substance of the drug, which was received for the preparation of tablets of the drug with a structural formula:



- Please provide the name of the medicinal product.
- What functional groups are included in the composition of this medicinal product?
- What structural elements of this compound can be detected after acid hydrolysis?
- Suggest reactions for the determination of fluorine ions after mineralization.

1.1.3. Examples of test options:

Verifiable indicators of competence achievement: UC-8.1.1, UC-8.2.1, UC-8.3.1, GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1

Option 1

1. Factors affecting the presence of impurities in medicines.
2. Water in pharmaceutical practice. Characteristic.
3. Acid-base titration in an aqueous medium.

Option 2

1. Methods of expressing the concentration of titrated solutions.
2. Mercurimetric titration. Method characteristics, working solutions, indicators.
3. Features of the complexation reaction. Preparation of a standard trilon B solution.

1.1.4. Examples of security questions for an interview:

Verifiable indicators of competence achievement: UC-8.1.1, UC-8.2.1, UC-8.3.1, GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1

1. Criteria of chemical analysis – selectivity.
2. Classification of errors in performing quantitative determination.
3. Classification of impurities.
4. Methods of expressing the concentration of titrated solutions.
5. General requirements for purity testing and permissible limits of impurities.

1.1.5. Examples of tasks for assessing the development of practical skills

Verifiable indicators of competence achievement: GPC-1.2.1, GPC-1.3.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-11.2.1, PC-11.3.1

1. Determination of chloride impurities in medicinal substances.
2. Determination of heavy metal impurities in medicinal substances.
3. Determination of calcium impurities in medicinal substances.
4. Performing physical control of a custom-made medicinal product.
5. Assessment of the quality of purified water.

1.2. Assessment tools for students' independent work

The assessment of independent work includes testing.

1.2.1. Examples of test tasks with a single answer

Verifiable indicators of competence achievement: GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.2.1, PC-10.3.1, PC-11.2.1, PC-11.3.1

1. Choose one of the four answers. Chloride ions detect…
a) an aqueous solution of silver nitrate
b) silver nitrate solution in the presence of ammonia
c) silver nitrate solution in the presence of nitric acid
d) silver nitrate solution in the presence of sulfuric acid

2. Choose one of the four answers. Blue staining of the solution in the presence of ammonia gives…
a) silver ion
b) zinc ion
c) iron ion
d) copper ion

3. Choose one of the four answers. The pink color of potassium permanganate disappears…
a) in the presence of nitric acid
b) in the presence of sulfuric acid
c) in the presence of sodium sulfate and sulfuric acid
d) in the presence of sodium nitrite and sulfuric acid

4. Choose one of the four answers. Acidic reaction of the medium, has a solution of...
a) sodium bicarbonate
b) calcium chloride
c) silver nitrate
d) magnesium sulfate

5. Choose one of the four answers. The lithium ion is proved by reaction with...
a) sulfate ion
b) phosphate ion in an acidic environment
c) phosphate ion in an alkaline environment
d) phosphate ion in a neutral medium

6. Choose one of the four answers. A common reaction to sodium bicarbonate and lithium carbonate is a reaction with...

a) hydrochloric acid
b) sodium hydroxide solution
c) ammonia solution
d) the reaction of flame coloring in yellow

7. Choose one of the four answers. The characteristic color of the flame is given by…

a) calcium chloride
b) sodium bicarbonate
c) lithium carbonate
d) magnesium sulfate

8. Choose one of the four answers. Precipitation of hydroxides with ammonia gives...

a) magnesium sulfate
b) calcium chloride
c) lithium carbonate
d) barium sulfate

9. Choose one of the four answers. Ammonium ion can be detected by...

a) barium chloride solution
b) Nessler's reagent
c) potassium iodide solution
d) a solution of potassium permanganate

10. Choose one of the four answers. The lithium ion is proved by reaction with...

a) sulfate ion
b) phosphate ion in an acidic environment
c) phosphate ion in an alkaline environment
d) phosphate ion in a neutral medium

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

Verifiable indicators of competence achievement: GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.2.1, PC-10.3.1, PC-11.2.1, PC-11.3.1

1. Choose three answers out of four. The acidic reaction of the aqueous solution medium is...

a) sodium tetraborate
b) hydrochloric acid
c) silver nitrate
d) boric acid

2. Choose two of the four answers. In calcium preparations, the cation (Ca^{2+}) can be proved by…

a) flame staining
b) reactions with ammonia
c) reactions with ammonium oxalate
d) reactions with hydrochloric acid

3. Choose two of the four answers. If stored improperly, they change their

appearance.…

a) sodium tetraborate
b) potassium bromide
c) potassium chloride
d) magnesium sulfate

4. Choose two of the four answers. An alcohol solution burns with a flame with a green border ...

a) calcium chloride
b) boric acid
c) sodium tetraborate
d) lithium carbonate

5. Choose two out of five answers. Pharmacopoeial authenticity reactions to phosphates are reactions with:

a) ammonium molybdate
b) barium diphenylamine
c) chloride
d) silver nitrate
e) sodium hydroxide

6. Establish a correspondence between the analyzed ion and the reagent used by the GF for its detection by matching the corresponding position from the second column to each position given in the first column:

1. Calcium	a) barium chloride
2. Magnesium	b) tartaric acid
3. Sodium	c) sodium hydrophosphate
4. Sulfate	d) ammonium oxalate
5. Potassium	e) zinc uranyl acetate
6. Bismuth	f) potassium hexacyanoferrate (II)
7. Zinc	g) ammonium sulfide
8. Bromide	h) chloramine B
9. Nitrous iron	i) potassium iodide
	j) sodium hexanitrocobaltate (W)
	k) Sodium sulfide chloride

7. Establish a correspondence between the total impurity and the reagent used to detect it by matching the corresponding position from the second column to each position given in the first column:

1. Ammonia	a) barium chloride
2. Zinc	b) potassium hexacyanoferrate (II)
3. Calcium	c) sodium sulfide
4. Iron	d) sulfosalicylic acid
5. Sulfates	e) sodium hydroxide
	f) Nessler reagent
	g) ammonium oxalate

8. Establish a correspondence between the silver salt precipitate and its properties by selecting the corresponding position from the second column for each position given in the first column:

1. Silver chloride	a) yellow, insoluble in dilute nitric acid, soluble in ammonia solution
2. Silver bromide	b) yellowish curdled, insoluble in dilute nitric acid and hardly soluble in ammonia solution
3. Silver iodide	c) white curdled, insoluble in dilute nitric acid and soluble in ammonia solution
4. Silver phosphate	d) yellow, soluble in dilute nitric acid and ammonia solution
	e) yellow curdled, insoluble in dilute nitric acid and ammonia solution

9. Establish a correspondence between the reagent and the effect of the reaction of its interaction with potassium iodide by selecting the corresponding position from the second column for each position given in the first column:

1. Silver Nitrate	a) staining of the chloroform layer in yellow-brown color
2. Iron (III) chloride	b) staining of the chloroform layer in purple color
3. Tartaric acid	c) bleaching of the reagent
4. Sodium nitrite	d) formation of yellow sediment e) formation of white sediment

10. Arrange the stages of the analysis of the drug sample by thin-layer chromatography in the order in which they are carried out. Write down the appropriate sequence of numbers:

1. detection
2. applying the sample to the chromatographic plate
3. preparation of the mobile phase and saturation of the chromatographic chamber with its vapors
4. elution

1.2.3. Examples of open-ended tasks (a question with an open answer)

Verifiable indicators of competence achievement: GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.2.1, PC-10.3.1, PC-11.2.1, PC-11.3.1

1. Choose one correct answer. The solubility of medicinal substances in GF is expressed in conditional terms that indicate:

1) the mass of the solvent (g) required to dissolve 1 g of the substance
2) the mass of the substance (g) capable of dissolving in 100 ml of solvent
3) the volume of solvent (ml) required to dissolve 1 g of the substance
4) the mass of the substance (g) capable of dissolving in 1 ml of solvent

2. Choose one correct answer. In pharmacopoeial analysis, the determination of the melting point allows you to obtain information about:

1) the degree of purity and authenticity of the test substance
2) the quantitative content of the test substance
3) humidity of the test substance
4) solubility of the test substance

3. Choose one correct answer. To confirm the authenticity of medicinal substances containing a tertiary amino group (tertiary nitrogen atom) in the chemical structure, a reaction with a reagent is used.:

1) Felinga

2) Nessler
3) Van-Urka
4) Bouchard

4. Choose one correct answer. To identify the secondary aromatic amino group in the chemical structure, a solution can be used as a reagent.:
1) sodium bicarbonate
2) sodium nitrite
3) sodium edeteate
4) sodium benzoate

5. Choose one correct answer. The Dragendorf reagent is a solution:
1) Bismuth iodide in potassium iodide
2) Ammonium vanadate in concentrated sulfuric acid
3) formaldehyde in concentrated sulfuric acid
4) Ammonium molybdate in concentrated sulfuric acid

2. Assessment tools for conducting intermediate certification in the discipline

The intermediate certification is conducted in the form of an exam.

The list of questions for preparation for intermediate certification:

№	Questions for preparation for the interim assessment	Verifiable indicators of competence achievement
1.	The State Pharmacopoeia. National and regional pharmacopoeias. International Pharmacopoeia. The main documents regulating the quality of manufactured medicines.	GPC-1.1.1, PC-4.1.1
2.	Aspects of pharmacies' activities are regulated by the regulatory framework. Duties of pharmacists.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1
3.	Classification of medicines, its necessity. Types of classification. Pharmacological and Pharmacotherapeutic classification. Chemical classification.	GPC-1.1.1, PC-4.1.1
4.	Obtaining medicinal substances from plant raw materials. Obtaining medicinal substances from animal raw materials and microorganisms. Organic synthesis of medicinal substances.	UC-8.1.1, UC-8.2.1, UC-8.3.1, GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
5.	Prerequisites for the creation of a new medicinal substance. Stages of development of a new medicinal substance.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
6.	The system of standardization in healthcare. The main directions of standardization of medicines. Tasks.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1
7.	Validation. The validation process. Types of validation process. Special cases of validation.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1
8.	The main stages of validation. Validation parameters.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1
9.	Metrology. The main sections. Goals and objectives. Metrology in pharmacy.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1

10.	Requirements for the quality and safety of medicines. Requirements for medicines.	UC-8.1.1, UC-8.2.1, UC-8.3.1, GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC -11.1.1
11.	Sources and causes of poor quality of medicinal substances. Acquired impurities. Technological impurities.	UC-8.1.1, UC-8.2.1, UC-8.3.1, GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC -11.1.1
12.	Quality control of medicines. Types of intra-apical control.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
13.	The control and analytical laboratory and its functions. The activity of a pharmacist analyst. Professional and job responsibilities. Requirements for a pharmacy's pharmacist analyst.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
14.	Pharmaceutical examination of prescriptions. Definition of a falsified medicinal product. The reasons contributing to the spread of counterfeit medicines.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1
15.	Incompatibility of medicines, its types. The reasons for the appearance of incompatible combinations of medicinal substances. Classification of pharmaceutical incompatibilities of medicinal products.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1
16.	Stability as a factor of drug quality. Influence of production conditions and degree of purity on stability of medicinal products.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1
17.	Identification of medicinal substances. Criteria of chemical analysis.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
18.	Authentication of inorganic medicinal substances – detection of cations and anions.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
19.	Authentication of organic medicinal substances – detection authentication of organic medicinal substances –aromatic nitro groups, monatomic and polyatomic alcohols, phenolic hydroxyl, detection of aldehyde and keto groups, carboxylic and ester.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
20.	Acid-base titration in aqueous and non-aqueous media.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
21.	Precipitation titration. Argentometry. The Pestilence method. The Folgard method. The Faience method. Mercurimetric titration. Method characteristics, working solutions, indicators. Advantages and disadvantages of the mercurimetry method.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
22.	The essence and methods of oxidimetry. Permanganometry. Characteristics, working solution, standardization. Determination of oxidizing and	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-

	reducing agents. Advantages and disadvantages of the method.	11.2.1, PC-11.3.1
23.	General characteristics of the iodometric titration method. Fixing the equivalence point. Standard solutions in iodometry. Preparation, standardization.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
24.	The use of iodometry in pharmaceutical analysis is the determination of ascorbic acid, sodium metamizole and caffeine. Advantages and disadvantages of iodometry.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
25.	Redox titration – bichromometry, cerimetry. Characteristics, titration methods, working solutions.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
26.	Nitritometry. The essence of the method. Working solutions. Indicators of the nitritometry method. Advantages and disadvantages of the nitritometry method.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
27.	Complexometric titration. Complexes. Chemism. Methods of fixing the end point of titration. Analysis of two- and three-charged cations. Chemism. Examples.	GPC-1.1.1, GPC-1.2.1, GPC-1.3.1, PC-4.1.1, PC-4.2.1, PC-4.3.1, PC-10.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
28.	Virus, definition, characteristics. The structure of the virus particle. Classification of viruses by Baltimore.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
29.	The structure of the influenza virion and its life cycle. The antiviral drug for influenza is rimantadine. Characterization, synthesis.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
30.	The structure of the HIV-1 virion. The life cycle of HIV-1. Nucleoside reverse transcriptase inhibitors (NNRTIs) HIV-1. Classification. Azidothymidine, nicavir.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
31.	Non-nucleoside OT inhibitors (NNRTIs) HIV-1. The region of binding of NNRTIs to the viral enzyme. Etravirine, rilpavirine – structure, characteristics.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
32.	The viral enzyme integrase, its functions, structure. Integrase inhibitors: reltegravir – characteristics, structure.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
33.	HIV-1 protease inhibitors are peptidomimetics. Darunavir – structure, characteristics.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
34.	The stages of entry of the HIV-1 virion into the cell. Receptors.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
35.	Inhibitors of virus attachment to the cell. Cyclotriase-sulfonamides, Temsavir – structures, characteristics.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
36.	Inhibitors of virus binding to CCR5 and CXCR4 co-receptors (scheme). Maravirok – characteristics, structure.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
37.	The fusion inhibitor is a gp41 protein inhibitor. The interaction of Enfuvirtide with the virus. Part of the	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-

	Enfuvertide peptide chain.	11.2.1, PC-11.3.1
38.	Hepatitis B virus (HBV). Structure, life cycle. Nucleoside drug for the treatment of HBV – lamivudine, adefovir – structure, characteristics.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
39.	General characteristics of the hepatitis C virus. The structure of the HCV virion. Life cycle.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
40.	General pharmaceutical analysis of agents for the treatment of hepatitis C virus: nucleoside inhibitors of RNA-dependent RNA polymerase (RdRp) – 4'-Azidocytidine (R1479) and its prodrug form balopiravir – structure, characteristics.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
41.	Viruses of the herpesviride family. Structure, life cycle.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
42.	Antiherpes drugs in clinical practice: acyclovir, valacyclovir – structure, characteristics. Biotransformation of famciclovir to penciclovir.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
43.	Characteristics of the Coronaviridae family. The structure of the coronavirus virion. RSV Life cycle.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
44.	Therapy of coronavirus infections: dexamethasone, favipiravir.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
45.	General pharmaceutical analysis of antiviral drugs for various purposes. Inhibitors of the synthesis of late viral proteins — thiosemicarbazone derivatives: metisazone preparation, pharmacanalysis.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
46.	Inhibitors of virus self-assembly: rifampicin.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1
47.	General pharmaceutical analysis of antiviral drugs for various purposes. Topical virucidal agents: tetraoxotetrahydronaphthalene (oxoline), tebrofen preparation, characterization.	GPC-1.1.1, GPC-1.2.1, PC-4.1.1, PC-10.2.1, PC-10.3.1, PC-11.1.1, PC-11.2.1, PC-11.3.1

The intermediate attestation includes the following types of tasks: interviewing questions and solving situational tasks.

2.1. Examples of situational tasks:

Verifiable indicators of competence achievement: UC-8.2.1, UC-8.3.1, GPC-1.2.1, GPC-1.3.1, PC-4.2.1, PC-4.3.1, PC-10.2.1, PC-11.2.1, PC-11.3.1.

1. The pharmacist-analyst of the pharmaceutical company received the substance of the drug, which was used to produce zinc sulfate powder. The pharmacist-analyst used complexometric titration to quantify this substance..

- Give the chemistry of this definition for the analysis of double-charged cations.
- Give a general description of complexometric titration. The standard solution of Trilon B.
- Suggest a method for determining the equivalence point.

2. The pharmacist-analyst of the pharmaceutical company received the substances NaCl and KBr for the preparation of medical solutions.

The pharmacist-analyst suggested using the argentometric method to quantify both substances.

- Describe all argentometric titration methods.
- Describe the chemistry of these methods.
- Suggest possible ways to determine the equivalence point.

3. The pharmaceutical company's quality control department received a substance for the production of levomycetin eye drops.

For quantitative assessment, the head of the analytical service carefully dissolved the substance in a solution of concentrated hydrochloric acid and added zinc dust in several portions. After the zinc dust was completely dissolved and cooled, the reaction mixture was titrated with a working solution in accordance with the conditions of the procedure..

- Was the quantification method chosen correctly?
- Characteristics of the nitrite titration method. Titration methods.
- Working solution, standardization.
- Advantages and disadvantages of the nitritometry method.

Example of an exam card:

Federal State Budgetary Educational Institution of Higher Education
"Volgograd State Medical University"
Ministry of Health of the Russian Federation

Department: **Pharmaceutical, toxicological chemistry, pharmacognosy and botany.**
Discipline: **General Pharmaceutical Chemistry**
Speciality at the speciality **33.05.01 Pharmacy**
Academic year: **2025 - 2026**

EXAMINATION CARD № 1

1. State pharmacopoeia. National and regional pharmacopoeias. International pharmacopoeia. The main documents regulating the quality of produced medicines.

2. A substance of a pharmaceutical company was delivered to the pharmacist for the preparation of the drug powder CHI3.

   To quantify the substance, the pharmacist has heated a suspension of the substance with an excess of silver nitrate titrated solution in the presence of nitric acid diluted for 30 minutes in a water bath with reflux condenser.

   - Give the Latin and rational names of the drug.
   - Evaluate the preliminary steps taken by the analytical pharmacist to quantify the drug.
   - Name the method of quantification.
   - What precipitation titration "argentometry" methods do you know?
   - Give the chemistry.

3. Virus, definition, characterisation. Structure of the viral particle. Classification of viruses according to Baltimore.

Stamp place Head of department A.A. Ozerov

The full fund of assessment tools for the discipline/practice is available in the VolgSMU Electronic Information and Educational System at the link(s): https://elearning.volgmed.ru/course/view.php?id=11207

Considered at the department meeting Pharmaceutical, Toxicological Chemistry, Pharmacognosy and Botany, protocol of «30» ___may___ 2025 г. № _10_.

Head of the Department  A. Ozerov