Evaluation tools for certification
in the discipline "Special pharmaceutical chemistry"
for students of the educational program
specialist degree
in the specialty of training 33.05.01 Pharmacy
direction (profile) Pharmacy,
form of study full-time (face to face)
for the 2023-2024 academic year

Evaluation tools for current certification of the discipline.

Current certification includes the following types of assignments: testing, solving situational problems, preparation and defense of essays, assessment of mastering practical skills (abilities), control work, interview on control questions, preparation and defense of term papers.

Examples of multiple-choice tests

Verifiable indicators of competence achievement: UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1.,PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.

1. The quantification of Drotaverine hydrochloride is determined:
   a) Nitritometrically
   b) Argentometrically
   c) Neutralization method
   d) Cerimetrically
2. When papaverine hydrochloride interacts with Frede's reagent, it appears:
   a) Red staining
   b) Green staining
   c) Blue staining
   d) Yellow-orange staining
3. The hydrolysis products of aprofen are:
   a) Diphenylacetic acid, 2-diethylaminoethanol
   b) 2,2-Diphenylpropionic acid, 2-diethylaminoethanol
   c) 2,2-Diphenylpropionic acid, 2-(di-n-propylamino)ethyl mercaptan
   d) Diphenylacetic acid, 2-(diethylamino)ethylmercaptan
4. The Sobolev reaction is used to identify:
   a) Quinine hydrochloride
   b) Aprofen
   c) Dibazol
   d) Papaverine hydrochloride
5. The taleioquine test is based on the sequential action of the quinine salt on:
   a) Ammonia solution, bromine water

b) Bromine water, ammonia solution
c) Sulfuric acid, sodium hydroxide
d) Potassium bichromate, sodium nitroprusside

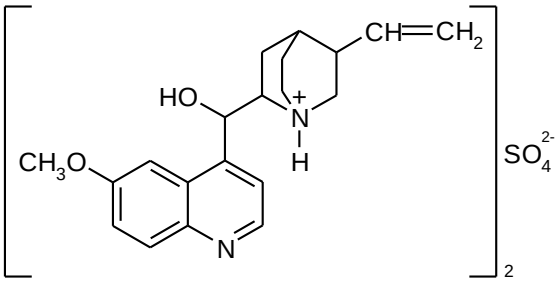
6. The pharmacopoeial method for determining the authenticity of Drotaverine hydrochloride is:
   a) Interaction with concentrated sulfuric acid and formaldehyde
   b) Interaction with concentrated sulfuric acid in the presence of iron (III) chloride
   c) Interaction with Frede's reagent
   d) Interaction with iodine solution
7. When papaverine hydrochloride interacts with concentrated sulfuric acid, it appears:
   a) White precipitate
   b) Violet coloring
   c) Unchanging orange coloring
   d) Yellow coloration changing to orange coloration
8. The pharmacopoeial method for quantitative determination of Drotaverine hydrochloride is:
   a) Argentometric
   b) Method of neutralization in aqueous-alcoholic medium
   c) Method of non-aqueous titration
   d) Gravimetric method
9. The indicator in the mercurimetric method for the determination of dibazol is:
   a) Crystal violet
   b) Phenolphthalein
   c) Methyl orange
   d) Diphenylcarbazone
10. The specific impurity in bendazole hydrochloride is:
   a) Diphenylamine
   b) o-Phenylenediamine
   c) Diphenylacetic acid
   d) Veratrol
11. In the case of the inverse Argentometric titration of dibazole, the indicator is:
   a) Ammonium rhodanide
   b) Phenolphthalein
   c) Iron-ammonium alum
   d) Potassium chromate

Examples of situational tasks

Verifiable indicators of competence achievement: UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1.,

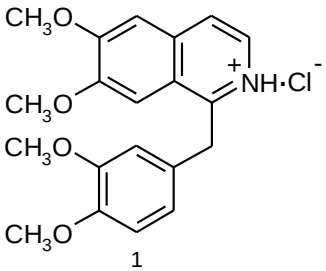
PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.

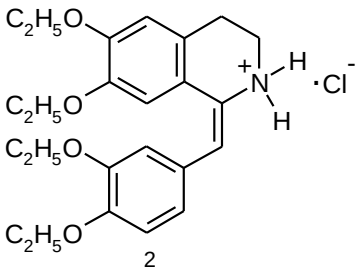
1. Under conditions of industrial production, suppositories containing a medicinal substance with the following chemical structure are obtained:



- ✓ When assessing the quality of this medicinal substance in samples of one series, the indicator "Content of other alkaloids of cinchona bark" did not meet the requirements of the regulatory documentation. Specify and explain the methodology for determining the impurity and suggest other tests characterizing its quality.
- ✓ Give the Russian, Latin and rational name of the drug. Characterize the physical and chemical properties (appearance, solubility, spectral and optical characteristics) and their use for quality assessment.
- ✓ According to the chemical properties, propose identification reactions and methods of quantification. Write the equations of reactions.

2. The analytical laboratory of the quality control department of the chemical-pharmaceutical enterprise received for analysis the substances of medicinal substances with the following chemical structure:





- ✓ When assessing the quality of substance "1" in samples of one series, the pH value of the solution did not meet the requirements of the State Pharmacopoeia - it was less than 3.0. Give a justification of the reasons for the change of its quality by this indicator in accordance with the properties. Suggest other tests characterizing its quality.
- ✓ Give the Russian, Latin and rational name of the medicinal product. Characterize physico-chemical properties (appearance, solubility, spectral and optical characteristics) and their use for quality assessment.

- ✓ According to the chemical properties, suggest identification reactions and quantification methods. Write the equations of the reactions. Suggest general and differentiating reactions for their detection. Write the equations of the reactions.
- ✓ Suggest methods of quantitative determination, give formulas for calculating the content of drug substances. What environmental factors affect the stability of drugs? Suggest rational storage conditions and methods of stabilization in dosage forms.

3. The pharmacy analytical supervisor analyzed the obtained substances quinine sulfate and quinine hydrochloride. He noted that both substances were slightly soluble in water, the pH of their aqueous extracts being 5.5. For authentication, he used the taleioquin test, which resulted in green coloration of the solution. Both drugs were quantified by alkalimetry.

- ✓ Do the obtained substances meet the requirements of the regulatory documentation in terms of water solubility and pH values? If not, explain the possible reasons for the changes in the values.
- ✓ Give a justification for the choice of reaction to establish authenticity and give the conditions for its conduct, write the reaction scheme. What additional reactions and physicochemical tests can you suggest?
- ✓ Is the method of quantification correct? If yes, explain why and characterize the conditions of its carrying out. What other methods can be used for this purpose?

Examples of tasks to evaluate the mastery of practical skills.

Verifiable indicators of competence achievement: UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.

Objective of the work:

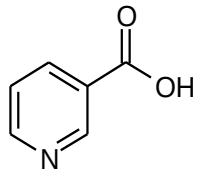
To determine the authenticity of pharmaceuticals - pyridine derivatives. To master the methods of chemical quality control established by the State Pharmacopoeia XIV.

Objects under test

Nicotinic acid

(acidum nicotinicum)

(pyridinecarboxylic-3 acid)



- ✓ As a β - pyridine carboxylic acid, nicotinic acid is readily decarboxylated when heated with anhydrous sodium carbonate and smells like pyridine.

Technique:

0.1 g of the preparation is heated with 0.1 g of anhydrous sodium carbonate; a pyridine odor develops.

- ✓ With copper sulfate CuSO4, nicotinic acid enters into a complexation reaction forming an insoluble blue-colored copper salt.

Technique:

To 3 ml of warm solution of the drug (1:100), 1 ml of copper sulfate solution is added; a blue precipitate precipitates.

- ✓ Nicotinic acid forms a soluble green complex with CuSO4 solution in the presence of ammonium rhodanide.

Technique:

To 10 ml of the same solution add 0.5 ml of copper sulfate solution and 2 ml of ammonium rhodanide solution; green coloration appears.

Example of a control work option

Verifiable indicators of competence achievement: UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.

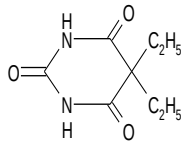
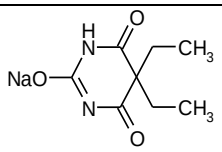
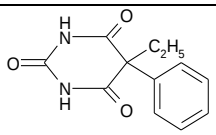
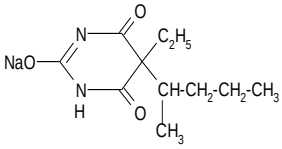
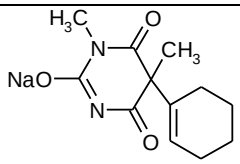
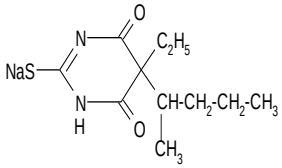
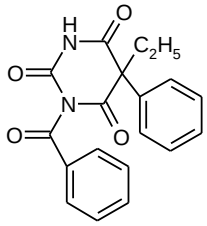
Chemical dictation
on the structures of drug compounds
BARBITURATES.

The teacher names the drug in any order and the student writes the name, structure, uses:

Drug substance

1	Barbital	5	Hexenal
2	Barbital sodium	6	Thiopental sodium
3	Phenobarbital	7	Benzonal
4	Etaminal sodium		

The answer:

№	Drug substance	Structure	Medical use
1	Barbital		Sleeping pill, sedative.
2	Barbital sodium		Sleeping pill, sedative (fast-acting).
3	Phenobarbital		Antisudorant, antiepileptic, sedative in small doses.
4	Etaminal sodium		Sleeping pills, in high doses has a narcotic effect
5	Hexenal		Sleeping pills, narcotic
6	Thiopental sodium		Sleeping pills. Used for anesthesia in surgical operations.
7	Benzonal		Antisudorant, antiepileptic.

Examples of essay topics

Verifiable indicators of competence achievement: UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.

1. Vitamins. History of discovery. Finding in nature. Classification.
2. Alkaloids. Classification. Phenanthrenisoquinoline derivatives. Social significance.

3. Steroid compounds, their classification. Modification of steroidal compounds for obtaining drugs.

Examples of control questions for the interview:

Verifiable indicators of competence achievement: UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.

Benzodiazepine Derivatives

1. Suggest the synthesis of oxazepam .
2. Write the authenticity reactions of nitrosepam.
3. What methods of quantification of fenozepam do you know.
4. Write the structural formulas of:
   - oxodoline;
   - aminazine;
   - etacizine.

Benzodiazepine Derivatives

1. Synthesis of chlordiazeproxide.
2. Authenticity of fenozepam.
3. Quantification of diazepam.
4. Write the structural formulas of:
   - dichlothiazide;
   - ethmosine;
   - furosemide.

Examples of coursework topics

Verifiable indicators of competence achievement: UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.

Analysis of a two-component drug mixture

№ tasks	**Composition of the medicinal mixture**	**№ tasks**	**Composition of the medicinal mixture**
1	Riboflavin solution 0,02 % - 10, Potassium iodide 0.3	6	Salicylate sodium Sodium benzoate 2.0 each Purified water 100.0
	Riboflavin solution 0,02 % - 10,		Cobalt chloride 0.1

2	Potassium iodide 0.3	7	Nicotinamide 0.15
3	Potassium iodide Iodine 6.0 each Ethyl alcohol 95%-500	8	Levomycetin solution 0,25% - 10,0 Sodium chloride 0.09
4	Sodium bromide Ammonium bromide 2.0.0 each Purified water 200,0	9	Quinine hydrochloride solution 0.05% - 10.0 Sodium chloride 0.09
5	Potassium iodide 5.0 Sodium hydrogen carbonate 2.0 Purified water 200.0	10	Calcium chloride solution 5% - 100.0 Ascorbic acid 1.0

Evaluation tools for intermediate certification in the discipline

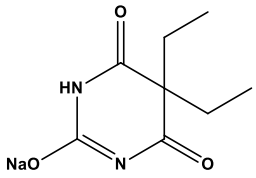
Intermediate certification is held in the form of an exam.

Intermediate certification includes the following types of tasks: solving situational tasks, interview.

Examples of situational tasks

Verifiable indicators of competence achievement: UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.

1. A trainee quality control analyst at a pharmaceutical company has received a substance of the following structure:

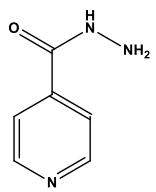


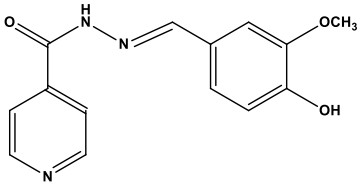
When assessing the quality of the preparation, the indicators "Solubility", "Transparency and color", "Free alkali content" did not meet the requirements of the regulatory documentation. The solution of the preparation opalesced immediately and the quantitative content of "free alkali" is significantly higher than specified in the regulatory documentation. The trainee needs to:

- Give a justification of the reasons for the change in its quality by this indicator according to its storage conditions and properties.
- Cite other tests characterizing its quality.
- Give the Russian and Latin names of this medicinal substance.
- Characterize its physical and chemical properties.

- According to the chemical properties, propose identification reactions and methods of quantification.

2. Provisor analyst of the pharmaceutical company delivered substances of drugs, received for the production of tablets of medicinal substances of several series of the following structure:





When determining the impurity of isonicotinic acid hydrazide in sample No. 2 according to the method State Pharmacopoeia, no stable blue staining on iodo-starch paper with sodium nitrite solution was observed. The Provisor Analyst should:

- Make a conclusion on the compliance of the impurity content with the requirements of the State Pharmacopoeia. Suggest other tests to characterize the quality of these drugs.
- Give the Russian, Latin and rational names of the drug. Characterize its physical and chemical properties.
- According to the chemical properties, propose identification reactions and methods of quantification. Write equations of reactions.

List of interview questions

№	Questions for intermediate certification	Verifiable indicators of competence achievement
1.	Subject and objectives of pharmaceutical chemistry. Basic terminology (biologically active substance, pharmacological agent, medicinal substance, drug, medicinal product, dosage form). Interrelation with chemical and biomedical disciplines.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
2.	The main sources and methods of obtaining medicinal substances. Natural substances, chemical and biological synthesis. Microbiological methods and genetic engineering.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-

		11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
3.	Tasks of pharmaceutical chemistry for the creation of new drugs, development of methods of research and evaluation of drug quality. The main trends in the creation of new drugs, taking into account the increasing requirements for their efficacy and safety.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
4.	Environmental control of pharmaceutical manufacturing facilities. Sources of toxicants. Classification and mechanism of action of toxicants. Waste-free and low-waste technologies as a basis for rational environmental management.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
5.	General methods of pharmaceutical analysis. Description of the appearance and solubility of the drug substance. Transparency and color of solutions.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
6.	General methods for the quantitative determination of organic drug substances. Method of titration in non-aqueous media. Method of argentometry.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
7.	General methods of quantitative determination of organic drug substances. Bromatometry, nitritometry, complexometry as methods of quantitative analysis in pharmaceutical chemistry.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
8.	Classification of inorganic drugs in the course of pharmaceutical chemistry. The main drug substances of elements of I-II	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-

	groups of the periodic system.	4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
9.	Classification of inorganic drugs in the course of pharmaceutical chemistry. The main drug substances of elements of groups III-IV of the periodic system.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
10.	Classification of inorganic drugs in the course of pharmaceutical chemistry. The main drug substances of elements of group V of the periodic system.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
11.	Classification of inorganic drugs in the course of pharmaceutical chemistry. The main drug substances of elements of group VI of the periodic system.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
12.	Classification of inorganic drugs in the course of pharmaceutical chemistry. The main drug substances of elements of group VII of the periodic system.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
13.	Chemical and pharmacological classification of organic drug substances in the course of pharmaceutical chemistry. Methods of finding new drug substances.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
14.	Halogen derivatives of hydrocarbons.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1.,

	Chloroethyl, chloroform, iodoform, fluorotane.	GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
15.	Alcohols. Ethyl alcohol, glycerin. Iodoform test for authentication of ethyl alcohol and its derivatives.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
16.	Simple and complex esters. Medical ether, dimedrol, amyl nitrite, nitroglycerin. Formation of peroxides in the oxidation of medical ether and their detection.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
17.	Aldehydes and their derivatives. Formalin, chloral hydrate, hexamethylenetetramine. Peculiarities of storage and stability of formaldehyde. Use of Nessler's reagent in pharmaceutical analysis of aldehydes.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
18.	Carboxylic acids and their salts. Potassium acetate, calcium lactate, sodium citrate, calcium gluconate, sodium oxybutyrate.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
19.	Carbonic acid derivatives: urethanes and ureides. Carbacholine, meprotan, carbromal, bromisoval.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.

20.	Medicinal substances of phenol group. General method of synthesis of phenolic compounds on the basis of aromatic sulfonic acids. Phenol, thymol, resorcinol, phenolphthalein. Indophenol reaction of phenols. Reaction of phenols with iron (III) chloride.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
21.	Amino acids and their derivatives. Glutamic acid, aminalon, methionine, phenibut, piracetam, phenotropil.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
22.	Aromatic acids and their derivatives. Benzoic acid, salicylic acid and its derivatives. Acetylsalicylic acid. Application of the Markey reaction in pharmaceutical analysis.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
23.	Amino acids of the aromatic series and their derivatives. Anesthesin, novocaine, dicaine. Sodium para-aminosalicylate.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
24.	Amino derivatives of the aromatic series. Phenacetin, paracetamol. Acetanilide derivatives. Lidocaine, trimecaine.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
25.	General methods for the preparation of sulfonamides. General authenticity reactions and methods of quantitative determination of sulfonamides.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-

		12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
26.	Sulfonamides: streptocide, soluble streptocide, sodium sulfacil, sulgin, ethazol. Sulfonamide preparations of prolonged action: sulfalen, sulfadimethoxine.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
27.	Barbituric acid derivatives. Relationship between the chemical structure of barbiturates and their pharmacological activity. General methods of preparation of barbiturates and thiobarbiturates.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
28.	Vitamins. History of discovery and medical use of vitamins. Classification of vitamins.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
29.	Alkaloids. Classification of alkaloids. Methods of isolation of alkaloids from plant raw materials. Purification and separation of alkaloids. General (group) reactions of alkaloids.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
30.	Alkaloids are derivatives of phenanthrenisoquinoline. Morphine group: morphine hydrochloride, codeine, apomorphine hydrochloride. Synthetic analogs of opiates: promedol.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
31.	Glycosides. Classification of glycosides. Glycosides of cardiac action. The concept of cardenolides and bufadienolides. General reactions of	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-

	cyclopentaneperhydrophenanthrene glycosides.	10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
32.	Glycosides of the foxglove group: digitoxin. Glycosides of the strophanthus group: strophanthin K.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
33.	Adrenal medullary hormones. Adrenaline hydrotartrate, noradrenaline hydrotartrate. Synthetic analogs: mesaton.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
34.	Adrenal cortical hormones. Corticosteroids. Deoxycorticosterone acetate, cortisone acetate. Synthetic analogs of corticosteroids: hydrocortisone, prednisone, prednisolone, dexamethasone.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
35.	Male sex hormones and anabolics; methyltestosterone, testosterone propionate, methandrostenolone. Estran derivatives with anabolic action: phenobolin	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
36.	Female sex hormones. Estrogens: estradiol, ethinylestradiol. Synthetic analogs of estrogens: synestrol, diethylstilbestrol and their derivatives. Gestagens: progesterone.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
37.	Antibiotics. Basic concepts and classification. Methods of obtaining	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1.,

	antibiotics: chemical synthesis, microbiological synthesis. Features of standardization of antibiotics. Biological, physicochemical and chemical methods of quality assessment of antibiotics.	PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
38.	Penicillin antibiotics. Natural antibiotics: salts of benzylpenicillin, phenoxymethylpenicillin.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
39.	Penicillin antibiotics. Semisynthetic penicillins. Synthesis strategy. Ampicillin, methicillin, oxacillin.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
40.	Antibiotics of the aromatic series. Levomycetin (chloramphenicol). Chemical synthesis of levomycetin. Syntomycin. Levomycetin esters: stearate and succinate.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
41.	Tetracyclines. Tetracycline, oxytetracycline and their semi-synthetic derivatives: metacycline, doxycycline.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
42.	Antibiotics are aminoglycosides. Streptomycin sulfate. Maltol reaction of streptomycin. Gentamicin sulfate.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.

43.	Antitumor antibiotics. Anthracyclines: rubomycin and its analogs.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
44.	Standardization of medicines, regulatory documentation: state pharmacopoeia, general pharmacopoeial articles, pharmacopoeial articles of the enterprise. WHO International Pharmacopoeia.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
45.	Analytical quality assurance of medicines in accordance with the requirements of international standards. Rules of laboratory (GLP), clinical (GCP) and manufacturing (GMP) practice. Basic principles and requirements.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
46.	Quality assurance in the production, distribution, storage and consumption of medicines. State system of quality control of medicines and its main functional links.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
47.	Prediction of biological activity of chemical compounds using mathematical methods. Methods of chemical modification of drugs, providing their directed transport and release of active components in target organs.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
48.	Current state and ways to improve the standardization of medicines.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-

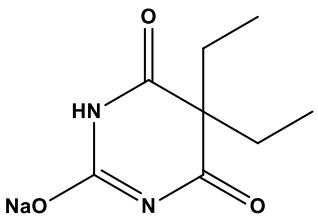
		12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.
49.	Subject and objectives of pharmaceutical chemistry. Basic terminology (biologically active substance, pharmacological agent, medicinal substance, drug, medicinal product, dosage form). Interrelation with chemical and biomedical disciplines.	UC-8.1.1., UC-8.1.2., UC-8.2.1., UC-8.3.1., GPC-1.1.1., GPC-1.2.1., GPC-1.2.2., GPC-1.3.1., PC-4. 1.1., PC-4.2.1., PC-4.2.2., PC-4.3.1., PC-4.3.2., PC-10.1.1., PC-10.2.1., PC-10.3.1., PC-11.1.1., PC-11.2.1., PC-11.2.2., PC-11.3.1., PC-11.3.2., PC-12.1.1., PC-12.2.1., PC-12.3.1., PC-12.3.1.

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 of Pharmaceutical and Toxicological Chemistry

EXAMINATION CARD № 1
in the discipline " Special pharmaceutical chemistry "
for students of the educational program
specialist degree
in the specialty of training 33.05.01 Pharmacy
direction (profile) Pharmacy,
form of study full-time (face to face)
for the 2023-2024 academic year

1. Subject and objectives of pharmaceutical chemistry. Basic terminology (biologically active substance, pharmacological agent, drug substance, drug product, drug form). Interrelation with chemical and biomedical disciplines.
2. Antitumor antibiotics. Anthracyclines: rubomycin and its analogs.
3. Situational task. A trainee pharmacist-analyst of quality control of a pharmaceutical company received a substance of the following structure:



When assessing the quality of the preparation, the indicators "Solubility", "Transparency and color", "Free alkali content" did not meet the requirements of the regulatory documentation. The solution of the preparation opalesced immediately and the quantitative content of "free

alkali" is significantly higher than specified in the regulatory documentation. The trainee needs to:

- Give a justification of the reasons for the change in its quality by this indicator according to its storage conditions and properties.
- Cite other tests characterizing its quality.
- Give the Russian and Latin names of this medicinal substance.
- Characterize its physical and chemical properties.
- According to its chemical properties, propose identification reactions and methods of quantification.

Seal place Head of department

The full fund of assessment tools for discipline / practice is available in the EIES of VolgSMU at the link:

https://elearning.volgmed.ru/course/view.php?id=8012

Considered at the meeting of the department of Pharmaceutical and Toxicological Chemistry "27" may 2023, protocol No9

Head of the Department  Ozerov A.