MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION
Federal State Autonomous Educational Institution of Higher Education
"Far Eastern Federal University"
(FEFU)
INSTITUTE OF LIFE SCIENCES AND BIOMEDICINE (SCHOOL)

APPRAISAL FUND

in the discipline "Pharmaceutical Chemistry"

Vladivostok
2023

The list of forms of assessment used at various stages of the formation of competencies in the course of mastering the discipline "Pharmaceutical Chemistry"

No p/n	Supervised sections/topics of the discipline	Code and the name of the indicator accomplishments	Learning Outcomes	Evaluation tools *	
				Current control	Intermediate certification
1	Section I. Pharmaceutical Analysis	PC-4.1	knows, knows how, owns Skills	UO-1 UO-2	_
		PC-4.2	knows, knows how, owns Skills	PP-12 UO-2	-
		PC-4.3	knows, knows how, owns Skills	PP-1 UO-2	-
		PC-8.1	knows, knows how, owns Skills	PP-1 UO-2	-
		PC-8.2	knows, knows how, owns Skills	PP-1 UO-2	-
		PC-8.3	knows, knows how, owns skills	PP-2 UO-2	-
2	Section II. Pharmaceutical Analysis of Inorganic Medicinal Substances	PC-4.1	knows, knows how, owns Skills	UO-2 PP-1	_
		PC-4.2	knows, knows how, owns Skills	UO-2	_
		PC-4.3	knows, knows how, owns Skills	UO-2 PP-1	-
		PC-8.1	knows, knows how, owns Skills	UO-2 PP-7	_
		PC-8.5	knows, knows	UO-2	-

			how, owns Skills		
	Section III. Intra-pharmacy quality control of medicines	PC-4.1	knows, knows how, owns Skills	UO-1 UO-2	-
		PC-4.2	knows, knows how, owns Skills	UO-1 PP-1	-
		PC-8.5	knows, knows how, owns Skills	PP-11	-
	Section IV. Fundamentals of functional analysis of organic medicines.	PC-4.1	knows, knows how, owns Skills	UO-1 UO-2	-
		PC-4.2	knows, knows how, owns Skills	UO-2 PP-7	-
	Section V. Analysis of drugs of aliphatic nature	PC-4.1	knows, knows how, owns Skills	UO-1 PP-1	-
		PC-4.2	knows, knows how, owns Skills	UO-1 UO-2	-
		PC-8.1	knows, knows how, owns Skills	UO-2 PP-2	-
		PC-8.5	knows, knows how, owns Skills	UO-1 PP-7	-
	Section VI. Analysis of aromatic drugs.	PC-4.1	knows, knows how, owns Skills	UO-1 UO-2	-
		PC-4.2	knows, knows how,	PP-1	-

			owns Skills		
		PC-8.1	knows, knows how, owns Skills	UO-1 PP-2	-
		PC-8.5	knows, knows how, owns Skills	UO-2 PP-1	-
	Section VII. Analysis of drugs derived from heterocycles	PC-4.1	knows, knows how, owns Skills	UO-1 UO-2	-
		PC-4.2	knows, knows how, owns Skills	UO-2	-
		PC-8.1	knows, knows how, owns Skills	UO-1 PP-2	-
		PC-8.5	knows, knows how, owns Skills	UO-1 UO-2	-
	Section VIII. Fundamentals of pharmaceutical analysis of drugs. Physical and chemical methods.	PC-4.1	knows, knows how, owns Skills	UO-2 PP-1	-
		PC-4.2	knows, knows how, owns Skills	UO-1 PP-7	-
		PC-4.3	knows, knows how, owns Skills	UO-2 UO-3	-
		PC-8.1	knows, knows how, owns Skills	UO-2 PP-2	-
		PC-8.5	knows, knows how,	PP-1	-

			owns Skills		
	Section IX. Analysis of drugs of the group of cardiac glycosides, vitamins, antibiotics, hormones	PC-4.1	knows, knows how, owns Skills	UO-1 UO-2	-
		PC-4.2	knows, knows how, owns Skills	UO-2 PP-7	-
		PC-8.1	knows, knows how, owns Skills	UO-1 PP-2	-
		PC-8.5	knows, knows how, owns Skills	UO-2 PP-1	-
	Test/Exam	PC-4.1	knows, knows how, owns Skills	-	UO-1 PP-1
		PC-4.2	knows, knows how, owns Skills	-	UO-1 PP-1
		PC-4.3	knows, knows how, owns Skills	-	UO-1 PP-1
		PC-8.1	knows, knows how, owns Skills	-	UO-1 PP-1
		PC-8.2	knows, knows how, owns Skills	-	UO-1 PP-1
		PC-8.3	knows, knows how, owns Skills	-	UO-1 PP-1
		PC-8.5	knows, knows how, owns	-	UO-1 PP-1

			Skills		

Scale for assessing the level of achievement of learning outcomes for current and intermediate certification *in the discipline "Pharmaceutical Chemistry"*

Points (rating score)	Levels of achievement Training		*Requirements for formed competencies*
	Current and intermediate certification	*Intermediate certification*	
100 – 90	*Increased*	"credited" / "Excellent"	Freely and confidently finds reliable sources of information, operates with the information provided, has excellent skills in analyzing and synthesizing information, knows all the basic methods of solving problems provided by the curriculum, knows typical mistakes and possible difficulties in solving a particular problem and is able to choose and effectively apply an adequate method for solving a specific problem. trouble
89-80	*Base*	"credited" / "Good"	In most cases, he is able to identify reliable sources of information, process, analyze and synthesize the proposed information, choose a method for solving the problem and solve it. Makes single serious mistakes in solving problems, experiences difficulties in rare or complex cases of problem solving, does not know typical mistakes and possible difficulties in solving one or another trouble
79-70	*Threshold*	"credited" / "Satisfyingly "	Makes mistakes in determining the reliability of sources of information, is able to correctly solve only typical, most common problems in a specific area (process information, choose a method for solving a problem and solve it)
69-0	*Level Not reached*	"not credited" / "Dissatisfied"	He does not know a significant part of the program material, makes significant mistakes, hesitantly, with great difficulty, performs practical work.

Current certification in the discipline (module) "Pharmaceutical Chemistry"

The current certification of students in the discipline "Pharmaceutical Chemistry" is carried out in accordance with the local regulations of FEFU and is mandatory.

The current certification of the discipline is carried out in the form of control measures (defense of the test, report, testing, interview, colloquium, solving case problems, filling out a workbook and taking notes - indicate what is used in the table above) to assess the actual learning outcomes of students and is carried out by the leading teacher.

Assessment tools for ongoing control

1. Interview Questions

1) Titration. The principle of the method
2) Concepts of titration by direct, reverse, substitution methods. Pipetting/separate hitching technique.
3) Utensils used in titrimetric analysis. (Pay attention to the volumetric flask, Erlenmeyer flask, Mohr pipette, graduated pipette, measuring cylinder)
4) Acid-base titration. Variety. (Alkali-, acidimetry; titration in aqueous and non-aqueous media)
5) Precipitation titration. Characteristics of methods. (Mercury, Mercury, Argentometry, Various modifications of Argentometric titration)
6) Complexometric titration.
7) Redox titration. Basic principles. Characteristics of redox titration methods.
8) Identification of medicinal substances under the general article of the GF XIII "General reactions to authenticity".
9) Environmental factors affecting appearance and solubility.
10) The value of the indicators "description" and "solubility" for assessing the qualitative and quantitative changes in medicinal substances during the performance of individual stages of pharmaceutical analysis.
11) Storage conditions for medicines requiring protection against
12) the impact of environmental factors.
13) General structural formulas of nitrogen-containing functional groups.
14) Qualitative reactions to the primary aromatic amino group
15) Qualitative reactions to the aromatic nitro group.
16) Reagents for proving the tertiary nitrogen atom, names and composition.
17) Amides, imides, lactams - reactions to prove authenticity
18) Classification of heterocyclic compounds.
19) Methods of production and physicochemical properties of medicines,

derivatives of furan, benzofuran.

20) Quality requirements and methods of analysis of medicines, derivatives of furan, benzofuran.

21) Define the concept of "alkaloids".

22) Features of alkaloid extraction.

23) Classification of alkaloids.

24) What heterocycles are included in the structure of alkaloids?

25) What are the general alkaloid reagents used in alkaloid analysis?

26) Are special and precipitating reagents specific, is it possible to use them to establish the authenticity of an alkaloid without using additional reactions?

27) Methods of quantitative analysis of alkaloid preparations.

28) Characterization of the method of non-aqueous titration in a protogenic solvent medium.

29) Gravimetry as a method of quantitative determination.

30) How are pyridine-derived drugs classified? Give structural formulas, give them a chemical name.

31) What reactions determine the authenticity of nicotinic acid?

32) What reactions determine the authenticity of nicotinamide?

33) What are the reactions that determine the authenticity of Nicotinic acid diethylamide (Nicotamide)?

34) Refractometry in the quantitative analysis of cordiamine.

35) What methods can be used to quantify nicotinic acid in substances and dosage forms?

36) What reactions determine the authenticity of isoniazid?

37) What methods can be used to quantify ethionamide and protionamide?

38) What qualitative reactions establish the authenticity of 8-hydroxyquinoline derivatives?

39) Can quinohol, nitroxoline form azo dye?

40) What diseases are 8-hydroxyquinoline preparations used for?

41) How to distinguish quinine pharmacopoeial preparations from each other based on their solubility in water?

42) Can thalleioquinia be considered specific to the quinine preparation?

43) What are the chemical properties of quinine drugs that cause the thaleioquine reaction?

44) What volumetric methods can be used to quantify quinine and 8-hydroxyquinoline preparations?

45) What are the properties of quinine salts based on physicochemical methods of analysis?

2. Questions for the colloquium

1. Oxygen. Purified water and water for injection. Chemical properties, features of quality control, storage, possible changes during storage, medical use.
2. Hydrogen peroxide and its compounds. Chemical properties, features of quality control, storage, possible changes during storage, medical use.
3. Sodium thiosulfate and sodium fluoride. Chemical properties, features of quality control, storage, possible changes during storage, medical use.
4. Hydrochloric acid Chemical properties, features of quality control, storage, possible changes during storage, medical use.
5. Alkali metal chlorides: sodium chloride, potassium chloride. Chemical properties, features of quality control, storage, possible changes during storage, medical use.
6. Alkali metal bromides: sodium bromide, potassium bromide. Chemical properties, features of quality control, storage, possible changes during storage, medical use.
7. Iodine and its compounds (sodium and potassium iodides). Chemical properties, features of quality control, storage, possible changes during storage, medical use.
8. Sodium bicarbonate and lithium carbonate. Chemical properties, features of quality control, storage, possible changes during storage, medical use.
9. Barium compounds: barium sulfate for fluoroscopy. Chemical properties, features of quality control, storage, possible changes during storage, medical use.
10. Calcium compounds: calcium chloride, calcium sulfate. Chemical properties, features of quality control, storage, possible changes during storage, medical use.
11. Magnesium compounds: magnesium oxide, magnesium sulfate. Chemical properties, features of quality control, storage, possible changes during storage, medical use.
12. Boron compounds: boric acid, sodium tetraborate. Chemical properties, features of quality control, storage, possible changes during storage, medical use.
13. Aluminum compounds: aluminum hydroxide, aluminum phosphate. Chemical properties, features of quality control, storage, possible changes during storage, medical use.
14. Nitrogen and bismuth compounds: nitrous oxide, bismuth nitrate basic. Chemical properties, features of quality control, storage, possible changes during storage, medical use.
15. Zinc compounds: zinc oxide, zinc sulfate. Chemical properties, features of quality control, storage, possible changes during storage, medical use.

16. Silver compounds: silver nitrate, collargol, protargol. Chemical properties, features of quality control, storage, possible changes during storage, medical use.

17. Iron compounds: iron (II) sulfate, iron gluconate, iron fumarate. Chemical properties, features of quality control, storage, possible changes during storage, medical use.

18. Platinum compounds: cisplatin, etc. Chemical properties, features of quality control, storage, possible changes during storage, medical use.

19. Determination of the benignity of drugs.

20. The method of alkalimetry in the analysis of drugs

21. Acidimetry method in drug analysis

22. Methods of argentometry in the analysis of halogen derivatives.

23. Quantitative assessment of drugs by complexonometry.

24. Redox methods of quantitative determination in the analysis of drugs of inorganic nature.

25. Medicines are derivatives of nitrofuran. Quality requirements. General methods of analysis.

26. Drugs derivatives of pyrazole. General and particular methods of analysis. Quality requirements. Storage conditions and use.

27. General characteristics, classification, methods of obtaining and analyzing alkaloids. Methods of qualitative and quantitative analysis of alkaloids.

28. Alkaloids as a class of drugs. Methods of obtaining. Classification. General and particular methods for the analysis of alkaloids.

29. Drugs are imidazole derivatives. Quality requirements. General methods of analysis.

30. Drugs derivatives of benzimidazole. Quality requirements. General and particular methods of analysis. Application.

31. Medicines: derivatives of indole (including ergoalkaloids). Classification. General methods of analysis. Quality requirements. Storage conditions and use.

32. Pyridine derivatives. Classification. General methods of analysis.

33. Medicines: derivatives of pyridine-3-carboxylic acid. Quality requirements. General and particular methods of analysis.

34. Medicines: derivatives of pyridine-4-carboxylic acid. Quality requirements. General and particular methods of analysis.

35. Drugs derivatives of piperidine, piperidine cycloheptane. Quality requirements. General and particular methods of analysis. Application

36. Drugs derivatives of quinoline. Classification. General methods of analysis.

37. Medicines are derivatives of 4-substituted quinoline and their salts, 4-

aminoquinoline. Quality requirements. General methods of analysis.

38. Drugs derivatives-8-hydroxyquinoline. Quality requirements. General methods of analysis.

39. Medicines are derivatives of pyridine methanol. Quality requirements. General and particular methods of analysis. Application

40. Fluoroquinolone derivatives. Features of the chemical structure. Methods of analysis, structure-action relationship. Features of use, storage conditions.

3. A set of typical tasks for the test

Section 1.

Option 1

1. Calculate the minimum sample of sodium chloride if:

To 2 ml of sodium salt solution (7 - 10 mg of sodium ion) add 2 ml of potassium carbonate solution of 15% and heat to a boil; No sediment is formed. 4 ml of potassium pyroantimonate solution is added to the solution and heated to a boil. Cool in ice water and, if necessary, rub the inner walls of the tube with a glass stick; A dense white precipitate is formed.

2. Give pharmacopoeial reactions to determine the authenticity of magnesium sulfate, potassium iodide, ferric chloride (111).

3. Calculate the sample for the preparation of 250 ml of the reference solution of chlorine ion. 0.002 mg of chlorine ion in 1 ml of solution gives a well-marked opalescence by reaction with the reagent. M.m. salt 58.44. A.m. chlorine 35.45.

4. How many ml of potassium permanganate solution (0.1 mol/l) with K 1.0000 will be used to titrate 1 ml of a 3% hydrogen peroxide solution? M.m. hydrogen peroxide 34.01.

Option 2

1. 1. Calculate the minimum sample of sodium chloride to confirm the authenticity of the chloride ion.

To 2 ml of chloride solution (2 - 10 mg of chloride ion) add 0.5 ml of nitric acid diluted 16% and 0.5 ml of silver nitrate solution 2%; A white cheesy precipitate is formed, insoluble in nitric acid diluted with 16% and soluble in ammonia solution 10%. For salts of organic bases, the solubility test of the sediment is carried out after filtering and washing the precipitate with water.

2. Give pharmacopoeial reactions to determine the authenticity of bismuth nitrate, aluminum chloride, lithium carbonate.

3. Calculate the sample for the preparation of 500 ml of titrated sodium hydroxide solution (0.1 mol / l). What sample of potassium hydrophthalate for installation K should be taken so that 20.00 ml of titrant is used for titration? M.m. sodium hydroxide 40.00. M.m. potassium hydrophthalate 204.23.

4. Rp: Zinc sulfate solution 0.25%-10.0ml
Boric acid 0.2

How much solution of Trilon B (0.01 mol/L) with K 1.0000 will be spent on titration of 2 ml of the drug? M.m. zinc sulfate 287.54. M.m. boric acid 61.83.

Option 3

1. Calculate the limits of potassium iodide weights to determine the authenticity of the potassium ion.

To 2 ml of a solution of potassium salt (5 - 10 mg of potassium ion), previously calcined to remove ammonium salts, add 0.5 ml of acetic acid diluted with 30% and 0.5 ml of a 10% solution of sodium cobaltinitrite; A yellow crystalline precipitate is formed.

2. Give pharmacopoeial reactions to determine the authenticity of zinc sulfate, sodium citrate, arsenite ions

3. 2 liters of a titrated solution of hydrochloric acid (0.1 mol/l) with K 0.9625 was prepared. How to fix the solution? The titrated solution was prepared from a 37% solution of hydrochloric acid (density 1.17). M.m. hydrogen chloride 36.46.

4. Recipe: Solutionis Cupri sulfatis 1% - 100 ml
D. S.:

What sample of the dosage form was taken for analysis, if 1.76 ml of 0.05 mol / l solution of Trilon B was spent on titration, the content of copper sulfate in the preparation is 0.9857 g

Option 4

1. Calculate the maximum sample of potassium bromide to confirm the authenticity of the potassium ion for determination by the method:

To 2 ml of a solution of potassium salt (5 - 10 mg of potassium ion), previously calcined to remove ammonium salts, add 0.5 ml of acetic acid diluted with 30% and 0.5 ml of a 10% solution of sodium cobaltinitrite; A yellow crystalline precipitate is formed.

2. Give pharmacopoeial reactions to determine the authenticity of tartrate ion, calcium chloride, magnesium sulfate.

3. When standardizing 0.1 M ammonium thiocyanate solution for titration of 20.00 ml of 0.1 M silver nitrate solution K = 1, the following volumes of ammonium thiocyanate 20.05 ml, 20.15 ml, 20.10 ml were used. calculate the correction factor, if necessary, make calculations for strengthening / diluting the solution.

Titrant sample 7.612 g

4. Recipe: Solutionis Natrii chloridi 0,9% - 200 ml

D. S.:

What sample of the medicinal form should be taken for analysis so that 0.79 ml of 0.1 mol / l of silver nitrate solution is spent.

Molar mass of sodium chloride 58.44

4. Sample topics of reports

1. Visible mechanical inclusions in LF for parenteral use and in ocular LF
2. Invisible mechanical inclusions in LF for parenteral use
3. Weight/volume of the contents of the package
4. Homogeneity of mass of dosed LF
5. Uniformity of dosing
6. Disintegration of suppositories and vaginal tablets
7. Disintegration of tablets and capsules
8. Dissolution for solid dosed LF
9. Dissolution for lipophilic-based suppositories.
10. Crushing strength of tablets
11. Abrasion of tablets
12. The degree of flowability of powders
13. Dissolution for transdermal patches
14. Dissolution for gum chewable medicinal
15. Atomic adsorption spectrometry. Features of the method, application in pharmaceutical analysis
16. Infrared spectroscopy and its practical application in pharmaceutical analysis
17. Fundamentals of refractometric analysis.
18. Potentiometry is a method of electrochemical analysis.
19. Polarimetry in drug analysis
20. Mass spectroscopy. Basics of the method. Application of mass spectrometry in the development and analysis of medicines.
21. Nuclear magnetic resonance spectroscopy. Possibilities of application in pharmaceutical chemistry.
22. Application of the electrophoresis method in the analysis of drugs
23. Colorimetry (FEC, SPS) in drug analysis
24. Application of the HPLC method in drug analysis.
25. GLC. Application in pharmaceutical analysis
26. Fluorimetry. Application in pharmaceutical analysis
27. Raman spectroscopy. Basics of the method. Application of Raman spectroscopy in drug analysis.

Purpose(s)

To give students experience in working with literary sources, to teach them to

critically analyze the collected material, to compare information, to think independently and to reasonably and competently express their understanding, their interpretation of the issue under study in writing.

5. Workbook

LESSON No. 1

1. RULES OF WORK AND SAFETY IN THE CHEMICAL LABORATORY

1. List the rules for working in a chemical laboratory

_____
_____
_____
_____
_____
_____
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_____

2. List the general safety rules when working in a chemical laboratory:

_____
_____
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_____
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_____

3. List the general rules of first aid _____

PHARMACEUTICAL CHEMISTRY science _____

TASKS OF PHARMACEUTICAL CHEMISTRY

1._____

2._____

3._____

RUSSIAN REGULATORY DOCUMENTS REGULATING THE QUALITY OF MEDICINES

In the Russian Federation, the creation, conduct of preclinical and clinical trials, as well as the production of a medicinal product are regulated by several main regulatory documents.

1. It is based on Federal Law No. 61-FZ of April 12, 2010 "On the Circulation of Medicines".

The Federal Law regulates relations arising in connection with the circulation - development, preclinical studies, clinical trials, expertise, state registration, standardization and quality control, production, manufacture, storage, transportation, import into the Russian Federation, export from the Russian Federation, advertising, release, sale, transfer, use, destruction of medicines.

CONCEPTS

Medicines	
Pharmaceutical substance	
excipients	
Medicines	
Dosage form	
International nonproprietary name of the medicinal product	
General Pharmacopoeia Monograph	

Pharmacopoeia Monograph	
Reference materials	
The quality of the medicinal product	
Safety of the medicinal product	
The effectiveness of the drug	
falsified medicinal product	
poor-quality drug	
Counterfeit medicine	

2. STATE PHARMACOPOEIA OF THE RUSSIAN FEDERATION

The basis of the regulatory framework for the standardization of medicines, ensuring the quality, efficacy and safety of drugs in accordance with modern requirements, is the State Pharmacopoeia.

The State Pharmacopoeia has a _____ character. The basis of the State Pharmacopoeia is _____

OFS_____.

FS_____

_____

_____.

DESCRIBE THE STRUCTURE OF THE PHARMACOPOEIA MONOGRAPH FOR THE PHARMACEUTICAL SUBSTANCE (in accordance with GPM.1.1.0006.15 PHARMACEUTICAL SUBSTANCES)

_____

_____

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RULES FOR THE USE OF PHARMACOPOEIA MONOGRAPHS CFM 1.1.0001.18

This General Pharmacopoeia Monograph defines the rules for the application of the following terms and concepts used in the General Pharmacopoeia Monographs, Pharmacopoeia Monographs and Appendices.

Procedure for Using the Texts of General Pharmacopoeia Monographs and Pharmacopoeia Monographs of the State Pharmacopoeia of the Russian Federation

When using the materials of the State Pharmacopoeia of the Russian Federation presented in General Pharmacopoeia Monographs, Pharmacopoeia Monographs and Appendices, references to these articles and appendices should be given. In the case of using methods and techniques, lists of quality indicators and their regulatory requirements that differ from those given in the General Pharmacopoeia Monographs, Pharmacopoeia Monographs of the State Pharmacopoeia of the Russian Federation in assessing the quality of medicines, this difference must be justified accordingly.

Vacuum. The term "vacuum" means that the pressure does not exceed _____ mmHg. (_____ kPa), unless otherwise indicated. For drying in a vacuum, use _____, a vacuum gun or other similar devices.

It's time. The concepts "_____", "_____", "_____" mean a period of time of no more than 30 seconds.

The term "freshly prepared solution" means a solution prepared no more than __ hours before its application, unless otherwise indicated.

_____. Characteristics of _____ pharmaceutical substances of various origins and medicines, incl. aqueous extracts from herbal preparations, is given, if necessary, and is for informational purposes only.

Smell. If the smell is not characterized, then its _____ is implied in the analyzed drug.

_____ of the drug should be characterized by the names: white, blue, green, yellow, orange, red, etc. With tint colors, the color that

_____ is indicated in the first place, and then with a hyphen - _____ color (for example, red-brown).

Weakly colored specimens have a shade of color, the name of which is characterized by the suffix "-ovat" (for example, "yellowish") or add the prefix "light-" (for example, "light yellow").

The color of solids should be determined on a _____ background (white thick or filter paper) with _____ light under conditions of minimal shadow. A small amount of the substance (_____) is placed on white paper and without pressure _____ distributed over the surface of the paper (carefully leveled with a spatula or other device) so that the surface remains _____.

Hygroscopicity. The characteristics of the hygroscopicity of the pharmaceutical substance and the drug, if necessary, are given in the "Description" section and are _____.

Dark place. If it is indicated that the test is carried out "in a dark place", then this means that measures should be taken to avoid hitting _____, any other _____, as well as _____, for example, by using dishes made of special glass, working in a darkened room, etc.

Drop. The term "droplet" means a volume from ___ to ____ μl, depending on the solvent (see Annex); For aqueous solutions, the volume of the droplet, measured with a standard dropletter, is equal to _____ μl (1 ml contains _____ drops).

Control experience. A control experiment means a determination carried out with the same _____ and in the same _____, but without _____ _____, unless otherwise indicated in the Pharmacopoeia Monograph.

_____. Solid substances can be coarse-crystalline, crystalline, fine-crystalline or amorphous.

Solids can be:

Characteristics of powder particles	**Particle fraction content, %**	**The size of the regulated fraction, mm**
Coarse-crystalline		
Crystalline		
Fine crystalline		
Amorphous		

Some solid substances are characterized by the phenomenon of polymorphism - the ability to exist in different _____ with the

same _____ (General Pharmacopoeia Monograph "Polymorphism").

The crystallinity, polymorphism, and hygroscopicity characteristics in the description are given for information and testing _____. If it is necessary to normalize the size of the particles in the regulatory documentation, a special section is given.

Test methods. As a rule, several methods of analysis are described in the General Pharmacopoeia Monograph (GPM) for control methods. If in the Pharmacopoeia Monograph or Normative Documentation _____, which of the methods is used, then the _____ method described in the General Pharmacopoeia Monograph is used.

Molecular weight. The molecular weight of the compounds described in the pharmacopoeia is understood as the relative molecular weight, which is calculated according to the table of relative atomic masses of 1997, adopted by the International Union of Pure and Applied Chemistry (IUPAC) and based on the carbon-12 scale.

Constant mass. The mass should be considered constant if the difference in the results of the two subsequent weighings does not exceed _____ mg for 1.0 g of the substance taken. The term "_____" means that the mass does not exceed 0.5 mg.

Content limits. The limits indicated are based on the results obtained in the framework of analytical practice; They already take into account the usual analytical errors, the permissible variation in production and preparation, as well as the deterioration of quality during storage within the limits that are considered acceptable. If _____ is not specified in the section "Quantification" for individual substances, it should be assumed that the latter is _____% of the substance to be determined.

In cases where the content of a substance in a preparation is expressed in terms of a dry or anhydrous substance, it should be understood that the weight loss during drying or the water content is determined by the method described in the relevant Pharmacopoeia Monograph or Normative Document.

Solubility is an indicator of the approximate solubility of pharmaceutical substances and excipients, characterizing their ability to dissolve in solvents of different polarity at a fixed temperature.

Solvents. If a solvent is not specified for solutions, then _____ solutions are implied. Under the name "_____", as a solvent, if there are no special indications, it should be understood as water that meets the requirements of the Pharmacopoeia Monograph "_____".

The term "_____" refers to "purified water"

obtained by distillation.

The quality indicator of the medicinal product "Water" should be understood as the determination of the content in the medicinal product _____ using the Fisher method (semi-micromethod and micromethod) or the distillation method in accordance with the General Pharmacopoeia Monograph "Determination of water".

Under the name "alcohol", if there are no special instructions, it should be understood _____ %, "_____" − absolute ethyl alcohol; under the name "ether" –_____.

When determining alcohol in medicines, the percentage means the volume percentage.

If it is indicated that in the preparation of a mixture of solvents they are taken in the ratio a: b, then the ratio of volumes is meant. For example, a hexane-benzene ratio of 1:3 means that 1 volume of hexane is mixed with 3 volumes of benzene.

Solutions. Under the accepted method of designating the concentration of solutions of solids in various solvents 1:10, 1:2, etc. should mean the content of the mass fraction of the substance in the specified volume of the solution, i.e. when preparing a solution of 1:10, you should take ___ g of substance and solvent _____ ml of solution; When preparing a 1: 2 solution, 1 g of substance and solvent should be taken until 2 ml of solution is obtained, etc.

The designation "____" means mass parts.

The designation "____" (parts per million) implies a mass ratio.

The percentage concentration of the solution can have one of three values:

Designation of the percentage concentration of the solution

Name	Designation	Decoding
Mass Percentage		
Mass-volume percentage		
Volume Percentage		

If "%" is used without the designation (m/m, m/o or o/o), then the mass percentage for mixtures of solids, the mass-volume percentage for solutions or suspensions of solids in liquids, the volume percentage for solutions of liquids in liquids and the mass-volume percentage for solutions of gases in liquids are implied. For example, a 1% solution is prepared by dissolving 1 g of solid or 1 ml of liquid in a solvent, followed by 100 ml of solution.

Solutions used in the quality assessment of medicines carried out in accordance with the requirements of the Pharmacopoeia Monographs and/or regulatory documents must comply with the expiration dates established for them.

Reagents. In the event that the qualification of the reagents is not indicated, the qualification "clean for analysis" is implied.

Dry place. The term "dry place" refers to the humidity of _____ 50%.

Temperature. In addition to the specific indication of temperature, the following terms are also used:

Temperature regimes

Mode name	Temperature, 0C

"_____" refers to a boiling water bath if the Pharmacopoeia Monograph does not specify the heating temperature. Tests should be carried out at _____ temperature, unless otherwise indicated.

If the temperature range is not specified in the "Weight loss during drying" test, then it is assumed that it is equal to ± 2 ºC from the specified value.

Measurement accuracy. When describing the weights and volumes, the amount of substance or its solution required for the test in the Pharmacopoeia Monographs is indicated with varying accuracy depending on the specific test.

If the values of the mass of the samples or volumes are not used for further calculations, then the accuracy of their taking (weighing, measuring) must coincide with the last specified sign.

The term "about" means the permissible deviation from the set value within _____%.

"_____" means weighing on an analytical balance, as well as recording the obtained value for further consideration in the calculations.

When determining the mass in grams with an accuracy of more than 4 decimal

places, you should use scales with metrological or technical characteristics that provide the required weighing accuracy.

Volumes are measured as follows. If the decimal point is followed by "0" or a number ending in zero (for example, 10.0 ml or 0.50 ml), the required volume is measured using _____, _____ or _____. In other cases, a graduated measuring cylinder or a graduated pipette can be used.

_____ measured with a micropipette or microsyringe.

Filtration. If the brand of the filter is not indicated, then any filter is meant.

Storage. The term "_____" means storage at room temperature.

6. Case Study

For analysis, a dosage form of the composition was received from the assistant's office to the pharmacist-analyst's office:

Rp: Sol. Novokaini 0.5% - 10 ml

D.S.

Suggest possible methods of qualitative and quantitative analysis.

Analyze the proposed dosage form

Intermediate certification in the discipline "Pharmaceutical Chemistry"

Intermediate certification of students. Intermediate certification of students in the discipline "Pharmaceutical Chemistry" is carried out in accordance with the local regulations of FEFU and is mandatory.

Evaluation tools for intermediate control (zacht)

1. The sodium salt introduced into the flame stains it in

1. Carmine red color
2. Yellow*
3. Purple
4. Vert
5. Brick red color

2. Specify the analytical effect of ion iodide reaction with sulfuric acid (conclusion)

1. White sediment
2. Yellow precipitate
3. Staining the chloroform layer yellow

4. Dyeing the chloroform layer purple

5. Emission of purple vapors *

3. A common reagent for the detection of Br^-, Cl^-, J^- is a reagent

1. Silver nitrate*

2. Iron oxide chloride

3. Barium sulfate

4. Zincuranyl acetate

5. Potassium hexahydroxotybate

4. The correction factor (k) of the titrated solution is calculated as

A) the ratio of the actually obtained concentration of the titrated solution to the theoretically specified one. *

B) the product of the molecular weight of the substance to be determined by the equivalence factor

C) the mass of the substance that is titrated with 1 ml of titrant

D) the product of the actually obtained concentration of the titrated solution by the volume of the titrant

Detectable ion	**Detection reagent**
	1. Iron thiocyanate
5.Fluoride (1)	2.Chloramine B
	3.Copper sulfate and sulfuric acid (end.)
6.Iodide (2)	4. Sodium eosinate
	5.Mercury(II) chloride

7. The titrated solution should be diluted or strengthened if the K ratio is within

A) below 0.98 and above 1.02 *

B) from 0.98 to 1.02

C) differs by more than ± 5%

D) not equal to 1

8. The titrant titer for the substance to be determined is

1. expressed in moles, the amount of solute contained in 1 liter of solution.

2. the mass of the solute expressed in milligrams,
contained in 1 ml of solution.

3. expressed in milligrams, the mass of the substance to be determined, equivalent to 1 ml of this titrant. *

4. the number of gram equivalents of the substance in 1 liter of solution.

9. Achromatism or lack of coloration means:

1. The absence of the test solution of absorption in the visible region of the spectrum.*

2. The test solution does not have absorption in the infrared region of the spectrum

3. The test solution does not have absorption in the ultraviolet region of the spectrum

4. The absence of the test solution of dissociation in the visible region of the spectrum.

10. For the preparation of initial solutions according to GF XIII, the following substances shall be used for testing in terms of "Chromaticity":

1. Cobalt chloride, copper sulfate, iron(III) chloride*
2. Cobalt chloride, copper sulfate, iron ammonium alum
3. Cobalt chloride, potassium dichromate, copper sulfate
4. Potassium dichromate, copper sulfate, iron(III) chloride
5. Potassium dichromate, cobalt chloride, iron(III) chloride

11. To test the degree of turbidity of a liquid in the GF, _*4*___ of the reference solution standard is proposed

12. To determine the color of liquids according to GF XIII, standards of the corresponding shades are used

1. burgundy, salad, turquoise, orange, turquoise green, brown
2. orange, blue, lilac, red, brown, blue-greenish
3. brown, brownish-yellowish, yellow, greenish-yellow, red*
4. Brown, yellow, pink, green
5. Green, blue, black, beige.

13. The standard for determining the degree of turbidity according to GF XI is a suspension of two substances

1. Talc and Hexamethylenetetramine
2. Hexamethylenetetramine and hydrazine sulfate*
3. Hydrazine sulfate and white clay
4. White clay and talcum powder
5. Talc and barium sulfate

14. When determining the solubility of low-soluble medicines in a volume of 100-1000 ml of solvent, the mass (in grams) is dissolved:

1. 0,0001
2. 0,001
3. 0,01
4. 0,1
5. 1,0 *

15. Phenolic acids include a medicinal substance

1. benzoic acid
2. salicylic acid *
3. thymol
4. phenol
5. resorcinol.

16. Nitrogen-containing functional groups include:

A) Enol hydroxyl

b) aldehyde

C) ester

D) lactam *

17. For the quantitative determination of preparations containing a primary aromatic amino group, the method shall be used

(A) Gravimetry

B) Argentometry according to the Mohr method

C) nitritetry *

D) Argentometry according to the Faience method

18.Menthol is obtained from natural raw materials

1.Mint leaves*

2.Mint flowers

3.Mint grass

4.Mint tubers

19. One of the components of validol in terms of chemical structure is

1.Hydrozine

2.Ether *

3.Aminoalcohol

4.Lactone

20. In the nitritometric titration of aromatic amines, indicators are used

1. iodine starch paper, tropeolin 00, neutral red *
2. methyl orange, phenolphthalein, methyl red
3. neutral red, diphenylamine, diphenylcartizone
4. bromophenol blue, potassium chromate, iron ammonium alum
5. pyrocatechin violet, methylene blue.

21. Quantitative determination of aluminum hydroxide basic shall be carried out by the method

1. Alkalimetry
2. Argentometry according to the Mohr method

3. Argentometry according to the Faience method
4. Permanganatometry
5. Complexometry*

22. To detect a tertiary nitrogen atom, use

A) sodium bicarbonate
B) magnesium sulfate
C) zincuranyl acetate
D) tannin*

23. Covalently bonded bromine in bromocamphor after mineralization prove

1.With chloramine B*
2.On the coloring of the burner flame
3.With dinitrophenylhydrazine
4.With furfural

24. The equivalence factor of boric acid during titration in glycerol medium is

1. 1*
2. ½
3. ¼
4. 2
5. 1/8

25. Quantitative determination of bismuth nitrate basic shall be carried out by the method

1. Alkalimetry
2. Argentometry according to the Mohr method
3. Argentometry according to the Faience method
4. Permanganatometry
5. Complexometry*

26. Qualitative reaction to boric acid:

1. Turmeric paper*
2. Aluminum hydroxide
3. Magnesia mixture
4. Silver nitrate

27. When interacting with sodium hydroxide, nitrofural forms

1. Aurin dye
2. azo dye
3. sodium hydroxamate
4. Aci Salt *

5. indophenol dye

28. Covalently bound iodine in its structure contains:

1. Furacilin
2. 4.Amiodarone furadonin*
3. Griseofulvin 5. Furazolidone

29. The equivalence factor of analgin in iodometric determination is equal to:

1. ¼* 2. 1/3 3. 1 4. 1/2 5. 2

30. Butadione, when oxidized under harsh conditions, forms a colored product:

1. Azo dye 4. Formadon
2. Aurin dye5. Murexide
3.Azobenzene*

31. If improperly stored, metamizole sodium is susceptible to

1) oxidation*
2) recovery
3) weathering of crystallization water
4) moisture absorption

32. A positive reaction to sodium ion is given by a medicinal substance:

1. Amidopyrine 4. Butadione
2. Furacilin 5. Analgin*
3.Antipyrine

33. Name of cardiac glycosides containing a five-membered lactone ring_____.

34. To confirm the ester group in the structure of cortisone acetate, a reagent (ND) shall be used:

1. Concentrated sulfuric acid
2. Hydroxylamine alkaline solution + iron(III) chloride*
3. Felinga
4. Phenylhydrazine
5. Triphenyltetrazolium chloride

35. To determine the steroid cycle in cardiac glycosides, the reaction is used:

1. Balleta
2. Raymond
3. Keller-Kiliani
4. Reichievein*

5. Pezetsa

36. To determine the five-membered lactone ring in the structure of the cardiac glycoside, the reaction shall be used

1. Keller-Kiliani
2. Pezetsa
3. Raymond*
4. Rosenheim
5. Liebermann-Burchardt

37. To determine the 2-deoxysaccharide in the structure of the cardiac glycoside, the reaction shall be used:

1. Raymond
2. Ballier
3. Liebermann-Burchardt
4. Vitali-Morena
5. Keller-Kiliani*

38. 2.6 deoxysaccharides include sugar:

1. D-glucose
2. L-glucose
3. D-rhamnose
4. D-digitoxosa*
5. L-rhamnose

39. Cardiac glycosides of the strophanthus group in position C_{10} shall contain a functional group:

1. methyl
2. ethyl
3. aldehyde*
4. ethyl
5. phenyl radical

40. For separate quantitative determination of ascorbic acid and calcium gluconate in the drug mixture, the following method is used:

1. Acidimetry and alkalimetry
2. Alkalimetry and iodometry
3. Iodometry and argentometry
4. Argentometry and alkalimetry
5. Alkalimetry and complexometry*

41. For separate quantitative determination of thiamine bromide and ascorbic acid in the medicinal mixture, the following method is used:

1. Alkalimetry and acidimetry
2. Acidimetry and iodometry

3. Iodometry and argentometry*
4. Argentometry and alkalimetry
5. Acidimetry and complexometry

42. For separate quantitative determination of thiamine bromide and nicotinic acid in the medicinal mixture, the following method is used:

1. Acidimetry and alkalimetry
2. Alkalimetry and iodometry
3. Iodometry and argentometry*
4. Argentometry and alkalimetry
5. Alkalimetry and complexometry

43. In the iodometric method for determining ascorbic acid in medicinal mixtures, the equivalence factor is equal to:

1. 1
2. ½*
3. 1/3
4. 1/5
5. 2

44. In the alkalimetric method for determining ascorbic acid in medicinal mixtures, the equivalence factor is equal to:

1. 1*
2. 1/2
3. 1/3
4. 1/5
5. 2

45. For quantitative determination, the following method is used in the rapid analysis of vikasol:

1. Nitritometry
2. Acidimetry
3. Bromatometry
4. Alkalimetry
5. Iodometry*

46. The derivatives of the structure of naphthylmethimidazoline include the medicinal substance:

1. Clonidine g/h
2. Bendazole g/h
3. Naphazoline nitrate*
4. Metronidazole
5. Clotrimazole

47. A natural analogue of bendazole g / x in terms of pharmacological

action is a medicinal substance:

1. caffeine
2. morphine g/h
3. atropine sulfate
4. Papaverine g/c*
5. pilocarpine g/h

48. To test the authenticity of metronidazole, the reaction is used:

1. Complexation
2. Alkaline hydrolysis
3. acid hydrolysis
4. azo combination (after hydrogenation)*
5. Electrophilic substitution

49**. When corticosteroids interact with hydroxylamine in an acidic environment, a product is formed:**

1. Pyrazolone
2. Hydrazide
3. Hydroxamic acid
4. Oxime
5. Hydrazone

50. The group of semi-synthetic antibiotics-lactamides includes a medicinal substanceβ

1. Phenoxymethypenicillin
2. Streptomycin

@3. Ampicillin

4. Gentamicin
5. Benzylpenicillin sodium salt

51. The reaction of streptomycin sulfate with Felling's reagent causes a fragment in the structure:

@ 1. aldehyde group
2.Phenolic hydroxyl
3.Guanidine
4.Aromatic ring
5.Methylene group

52. To determine the amount of natural penicillins, the following method shall be used:

1.Nitritometry
2.FEC
3.Gravimetry
@ 4. Iodometry

4.Bromatometry

53. For the quantitative determination of steroid hormones, a general method shall be used:

1.Iodometry

2.Alkalimetry

3.Nitritometry

@ 4. spectrophotometry

5. Acidimetry

54. The yellow color of tetracycline is caused by a fragment in its structure:

1.Nitrogen heteroate

@ 2. Conjugate double bonds

3.Alcohol hydroxyl

4.Methoxygroup

5.Dimethylamine group

55. To distinguish tetracycline preparations from oxytetracycline, a reagent shall be used:

1.Picric acid

@ 2. sulfuric acid concentrated;

3. Hydrochloric acid concentrated

4.Reagent Grades

5. Sodium hydroxide

56. The basis of synthetic analogues of estrogenic hormones is a hydrocarbon:

1.Pregnin

2.Pregnan

3.Estran

4.androstan

@ 5. Diphenylethane

Assessment tools for intermediate control (Exam)

1. The subject and content of pharmaceutical chemistry. Tasks. The place of pharmaceutical chemistry in the complex of pharmaceutical sciences and the system of higher pharmaceutical education. Integration of pharmaceutical chemistry with major disciplines.

2. Pharmaceutical analysis, its classification. Features of pharmaceutical analysis. Requirements for qualitative and quantitative analysis. ND regulating analytical activities.

3. Features of express analysis, methodological techniques. Order of the Ministry of Health of the Russian Federation No. 751n on the assessment of the quality of dosage forms of pharmacy production.

4. The comprehensive nature of the assessment of the quality of drugs. The value of the indicators "Description", "Solubility", "Transparency" and "Color" for assessing the qualitative changes in drugs. Methodology for assessing the quality of these indicators. Examples of drugs from different groups.

5. Methods of identification (determination of authenticity) of medicines. GF article "General reactions to authenticity". Examples.

6. General Pharmacopoeial Requirements for Purity Testing (Permissible Impurity Limits). Reference solutions. Preparation, purpose of using reference solutions. Methods for establishing limits of permissible/unacceptable impurities.

7. The use of acid-base titration (including in non-aqueous solvents) in the quantitative analysis of drugs. (Argue the answer with examples of drugs from different groups)

8. The use of precipitation methods in the quantitative analysis of drugs. Argentometry. Forward and reverse titration. (Argue the answer with examples of drugs from different groups)

9. The use of redox methods (permanganatometry) in the quantitative analysis of drugs. (Argue the answer with examples of drugs from different groups)

10. The use of redox methods (iodometry) in the quantitative analysis of drugs. (Argue the answer with examples of drugs from different groups)

11. The use of complexometry in the quantitative analysis of drugs. Conditions for the analysis. Characteristics of indicators. (Argue the answer with examples of drugs from different groups)

12. The use of nitritetry in the quantitative analysis of drugs. Features of nitritometric titration of organic drugs. (Argue the answer with examples of drugs from different groups)

13. The use of the Kjeldahl method in the quantitative analysis of drugs. (Argue the answer with examples of drugs from different groups)

14. The use of refractometry in the analysis of drugs. Characteristics of the method. Calculation formulas for finding the concentration of the analyzed sample. (Argue the answer with examples)

15. Determination of melting point, distillation temperature limits, density, viscosity. The value of the given physical constants in assessing the quality of drugs. Argue the answer (the question will be divided into several - separately different constants)

16. Titrated solutions. Preparation of titrated solutions. The use of the setting substance in the process of titrant standardization. Determination of the correction factor. Examples.

17. Alkali metal halides as drugs: sodium and potassium chlorides, bromides, iodides. Quality requirements. Standardization (qualitative and

quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

18. Hydrogen peroxide and its compounds as medicines: hydrogen peroxide solution, magnesium peroxide, hydroperite. Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

19. Boron and carbon compounds as medicines: boric acid, sodium tetraborate, sodium bicarbonate, lithium carbonate. Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

20. Calcium and magnesium compounds as medicines: calcium chloride, calcium sulfate, magnesium oxide, magnesium sulfate. Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

21. Zinc compounds as medicines: zinc oxide, zinc sulfate. Barium sulfate for fluoroscopy. Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

22. Compounds of silver and iron as medicines: silver nitrate, iron sulfate. Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

23. Iron and copper compounds as medicines: iron (II) sulfate, complex compounds of iron and platinum, copper sulfate. Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

24. Iodine and its 5 and 10% alcohol solutions according to GF. Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

25. Purified water and water for injection, water for hemodialysis. Quality requirements, justification of norms and methods included in the FS. Analysis of purified water and water for injection in accordance with the requirements of the order of the Ministry of Health of the Russian Federation No. 751n.

26. Nitrogen compounds as medicines: sodium nitrite. Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

27. Functional analysis of drugs by oxygen-containing functional groups. Examples of drugs from different groups.

28. Functional analysis of drugs by nitrogen-containing functional groups.

29. Mineralization methods used in pharmaceutical analysis. Proof of halides after mineralization. Examples of drugs from different groups

30. Alcohols as drugs: ethyl alcohol, glycerin (glycerol). Quality requirements. Standardization (qualitative and quantitative analysis). Definition of benignity. Features of storage, in connection with the stability of drugs, application in medical practice.

31. Aldehydes as drugs: formaldehyde solution, hexamethylenetetramine (methenamine), chloral hydrate, glucose. Quality requirements. Standardization (qualitative and quantitative analysis). Definition of benignity. Features of storage, in connection with the stability of drugs, application in medical practice.

32. Ethers and esters of inorganic acids as medicines: diethyl ether (medical ether and ether for anesthesia), diphenhydramine, nitroglycerin. Quality requirements. Standardization (qualitative and quantitative analysis). Definition of benignity. Features of storage, in connection with the stability of drugs, application in medical practice.

33. Salts of carboxylic acids as drugs: potassium acetate, calcium lactate, sodium citrate, calcium gluconate. Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

34. Aliphatic amino acids and their derivatives as medicines: glutamic acid, gamma-aminocaproic acid, aminalon (gamma-aminobutyric acid), cysteine, methionine, calcium tetacin-calcium (sodium calcium edetate, calcium disodium salt of ethylenedia-mintetraacetic acids), penicylamine. Quality requirements. Standardization (qualitative and quantitative analysis). Definition of benignity. Features of storage, in connection with the stability of drugs, application in medical practice.

35. Monocyclic terpenes as drugs: menthol, validol, terpinhydrate. Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

36. Bicyclic terpenes as drugs: camphor, bromocamphor, sulfocamphoric acid, sulfocamphocaine. Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

37. Phenols as medicines: phenol, thymol, resorcinol, tamoxifen. Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

38. Aromatic acids and their salts: salicylic acid, sodium salicylate, benzoic acid, sodium benzoate. Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs,

application in medical practice.

39. Derivatives of o-aminobenzoic acid (anthranilic) as medicines: mefenamic acid and its sodium salt; Phenylacetic acid derivatives: diclofenac sodium (voltaren, ortofen). Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

40. Esters of p-aminobenzoic acid as drugs: benzocaine (Anesthesin), procaine g / hl (Novocaine), tetracaine g / hl (Dikain). Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

41. Derivatives of amide steam - aminobenzoic acid: procainamide g / hl (novocainamide), metoclopramide g / hl. Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

42. Similar to the structure of local anesthetics : bupivacaine, articaine g / hl (ultracaine).derivatives of acetanilide as LS : lidocaine g / hl (xicaine), trimecaine g / hl. Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

43. Aromatic acid esters as drugs: acetylsalicylic acid. Medicines derived from p-aminosalicylic acid: sodium p-aminosalicylated acid. Quality requirements. Standardization (qualitative and quantitative analysis). Definition of benignity. Features of storage, in connection with the stability of drugs, application in medical practice.

44. Benzenesulfonamides substituted for the sulfa group, derivatives of the aliphatic and heterocyclic series as drugs: sulfacetamide-sodium (Sulfacil-sodium), sulfadimethoxine, sulfalene, sulfamethoxazole + trimethoprim. Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

45. Benzenesulfonamides substituted for the aromatic amino group and sulfa group as drugs: phthalylsulfametizol (Ftalazole), salazopyridazine. Quality requirements. Standardization (qualitative and quantitative analysis). Definition of benignity. Features of storage, in connection with the stability of drugs, application in medical practice.

46. Substituted sulfonylureas as drugs: carbutamide (bucarban), glibenclamide, glipizid (Minidiab), gliquidon (Glurenorm), gliclazide (Predian). Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

47. Benzenesulfochloramide derivatives as drugs: chloramine B, galazone (Pantocid). chlorobenzenesulfonic acid amide: furosemide, hydrochlorothiazide (Dichlorothiazide, Hypothiazide), bumetanide (Bufenox). Quality requirements. Standardization (qualitative and quantitative analysis). Features of storage, in connection with the stability of drugs, application in medical practice.

48. Medicines of the nitrofuran series: furacilin, furadonin, furazolidone, furagin. Benzofuran derivatives: amiodarone, griseofulvin.. Quality requirements. General and particular methods of analysis.

49. Pyrazole derivatives: phenazone, propyphenazone, analgin, butadione. General characteristics of physical and chemical properties. Quality requirements. Methods of analysis

50. Alkaloids as a class of drugs. General characteristics. Methods for obtaining alkaloids. Classification. General and particular methods for the analysis of alkaloids.

51. Ergoline derivatives: ergometrine maleate, methylergometrine maleate, nicergoline, ergotamine tartrate, dihydroergotamine mesylate, bromocreptin mesylate, dihydroergocristine mesylate. General characteristics. Methods of analysis.

52. Indolylalkylamine derivatives: tryptophan, indomethacin, serotonin adipate, sumatriptan, tropisetron, arbidol. Characteristics of the chemical structure. Methods of quality assessment.

53. Imidazole derivatives: xylometazoline hydrochloride, metronidazole, clonidine, naphthyzine, clotrimazole, ketoconazole. General characteristics. Quality requirements. Methods of analysis.

54. Benzimidazole and pyrrolizidine derivatives: dibazole, omeprazole, motilium, platyfillin. General characteristics. Quality requirements. Methods of analysis.

55. Derivatives of pyridine - 3 - carboxylic acid: nicotinic acid, niketamide, nicotinamide, picamilon. Physical and chemical properties. Methods of analysis. Quality requirements.

56. Isonicotinic acid and its derivatives: isoniazid, ftivazide, nialamide. Derivatives of isonicotinic acid thioamide: ethionamide, protionamide. Characteristics of the structure. Physical and chemical properties, quality requirements.

57. Alkaloids, quinoline derivatives: quinine dihydrochloride, quinine hydrochloride, quinine sulfate, hingamine, plaquenil. General chemical structure. Methods of quality assessment.

58. Alkaloids, derivatives of 8-hydroxyquinoline: quinozol, nitroxoline, chloroquinaldol. Preparations of the fluoroquinolone group: lomefloxacin

hydrochloride, ciprofloxacin hydrochloride, ofloxacin. The direction of pharmacological action depending on the chemical structure. Methods of analysis. Quality requirements

59. Phenanthrenisoquinoline derivatives: morphine hydrochloride, codeine, codeine phosphate, ethylmorphine hydrochloride, naltrexone hydrochloride. General chemical structure. Methods of quality assessment.

60. Synthetic derivatives of piperidine and cyclohexane: promedol, fentanyl, loperamide hydrochloride, cyclodol, tramal. General properties, quality requirements.

61. Alkaloids derivatives of benzylisoquinoline: papaverine hydrochloride and its synthetic analogue - drotaverine g / chloride (but - spa). Quality requirements, general and specific methods of analysis

62. Barbituric acid derivatives: barbital, phenobarbital, benzonal, hexobarbital sodium, thiopental sodium. The relationship between structure and action. General and particular methods of analysis. Quality requirements

63. Drugs derivatives pyrimidine - 2,4 - dione (uracil): methyluracil, fluorouracil. Nucleosides: tegafur (fluorafur), zidovudine (azidothymidine), stavudine. General characteristics. Quality requirements.

64. Benzodiazepine derivatives as directed drugs: oxazepam, phenazepam, nitrazepam, diazepam, medazepam, chlordiazepoxide, diltiazem. The relationship between structure and activity. General methods of analysis.

65. Alkylamino- and acyl derivatives of phenothiazine, as drugs: promazine hydrochloride, promethazine hydrochloride, chlorpromazine hydrochloride, levomepromazine, trifluoperazine hydrochloride, etmosin, etacizine. Structure-activity relationship. Chemical and physico-chemical properties. Characteristics of methods of analysis.

66. Alkaloids, purine derivatives and synthetic analogues: caffeine, theophylline, theobromine, diprofillin, pentoxifylline. General properties. Methods of analysis, quality requirements.

67. Double salts of purine alkaloids: caffeine - sodium benzoate, aminophylline (aminophylline), xanthinol nicotinate. General characteristics. Methods of analysis. Quality requirements.

68. Purine derivatives: mercaptopurine, azathioprine, inosine. Guanine derivatives, pyrazolopirimidine: acyclovir, ganciclovir, allopurinol. Characterization of structure and chemical properties. Methods of analysis.

69. Alkaloids are derivatives of tropane and their synthetic analogues, such as esters of amino alcohols and substituted carboxylic acids (atropine sulfate, scopolamine hydrobromide, homatropin hydrobromide, diphenyltropin hydrochloride, tropodifene hydrochloride). Physical and chemical properties.

Methods of analysis. Quality requirements.

70. Alkaloids, derivatives of phenylalkylamines: ephedrine hydrochloride, defedrin. Physical and chemical properties. Quality requirements.

71. Hydroxypropanolamine derivatives: anaprilin, atenolol, timolol maleate, fluoxetine hydrochloride. Quality requirements, storage, application. Aminodibromophenylalkylamine derivatives: bromhexine hydrochloride, ambroxol hydrochloride. Quality requirements

72. Chemical structure of glycosides. Cardiac glycosides: methods of standardization, determination of authenticity, quantitative determination, application, storage.

73. Ascorbic acid as a drug. Characteristics of physicochemical properties. Methods of analysis. Quality requirements.

74. Vitamins derivatives of cyclohexane. Retinols and calciferols. General characteristics of the structure. Sources of receipt. Methods of analysis.

75. Pyrimidine thiazole vitamins: thiamine bromide, thiamine chloride, phosphotiamine, benfotiamine, cocarboxylase hydrochloride. Modification of the structure in order to obtain coenzymes. Quality requirements.

76. Benzopyran derivatives. Phenylchromane compounds: flavonoids (vitamins of group P: rutin, quercetin, dihydroquercetin). General chemical structure. Methods of quality assessment.

77. Vitamins and antivitamins, benzopyran derivatives: ethylbiscumacetate (Neodikumarin), fepromarone, acenocoumarol (Sinkumar). Chemical structure. Methods of qualitative and quantitative analysis. Application, storage conditions

78. Oxymethylpyridine vitamins and their derivatives: pyridoxine hydrochloride, pyridoxal phosphate. General characteristics. Methods of analysis.

79. Pyrrole derivatives (vitamins of group B12): cyanocobalamin, hydroxocobalamin (oxycobalamin), cobamamide. Features of the structure, quality requirements. Methods of analysis

80. Vitamins derivatives of isoalloxazine: riboflavin, riboflavin mononucleotide. Characteristics of the structure. General and particular methods of analysis. Quality requirements.

81. Vitamins, pteridine derivatives: folic acid, methotrexate. Characteristics of the physicochemical properties of vitamins, pteridine derivatives. Quality Assessment Methods

82. Thyroid hormones and their derivatives: liothyronine, levothyroxine sodium, thyroidin. Sources of receipt. Methods of identification and quantification of drugs.

83. Oxyphenylaliphatic amino acids (lswodopa, methyldopa), derivatives of kneaded aryloxypropanolamines (anaprilin). General and particular methods of

analysis. Physico-chemical methods of analysis.

84. Pharmaceutical analysis of drugs - synthetic analogues of catecholamines: isoprenaline hydrochloride (isadrine), salbutamol, verapamil hydrochloride, berotec. Characteristics of physicochemical properties and quality requirements.

85. Hormones of the adrenal medulla, their metabolites and synthetic analogues: adrenaline, norepinephrine and their salts, isadrine, inderal. The relationship between structure and action. General and specific methods of quality assessment.

86. Corticosteroid hormones and their semisynthetic analogues: deoxycortisone acetate, cortisone acetate, prednisolone hydrocortisone acetate. General chemical structure. Methods of quality assessment.

87. Androgen hormones as medicines. General chemical structure. Methods of quality assessment.

88. Synthetic anabolic agents, acetoxy derivatives of androstane: phenobolin, retabolil, androkur, ardouan. General characteristics. Methods of analysis. Quality requirements.

89. Estrogenic hormones and their semi-synthetic analogues: ethinyl estradiol, mestranol, estradiol dipropionate. Quality requirements. Methods of analysis.

90. Synthetic analogues of estrogens of non-steroidal structure: synestrol, diethylstilbestrol. Antiestrogenic agents: tamoxifen citrate. General chemical structure. Methods of quality assessment.

91. Progestin hormones and their synthetic analogues: progesterone, norethisterone (Norkolut), medroxyprogesterone acetate (Depo-Provera). Structure is action. Quality requirements. Methods of analysis.

92. Natural penicillins. General chemical structure. The relationship between structure and action. Methods of quality assessment.

93. Semi-synthetic penicillins. General chemical structure. Physical and chemical properties. Methods of quality assessment.

94. Cephalosporin antibiotics. Characteristics of the structure. Chemical properties. Quality requirements. Features of use, storage

95. Antibiotics - aminoglycosides: kanamycin, amikacin, gentamicin. Antibiotics: glycosides - streptomycin sulfate. Characteristics of the structure. Chemical properties. Quality requirements.

96. Antibiotics derivatives of nitrophenylalkylamines: chloramphenicol, chloramphenicol stearate, chloramphenicol sodium succinate. Quality requirements, storage, application. Characteristics of physicochemical properties and quality requirements.

97. Tetracycline antibiotics as medicines. Tetracycline, metacycline, doxycycline, oxytetracycline hydrochloride. Physical and chemical properties. Standardization. Quality requirements.