Evaluation tools for certification
in the discipline " General 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

Intermediate certification in the discipline of General Pharmaceutical Chemistry is carried out following the results of mastering the discipline "exam" in the VI semester.

Assessment tools for current certification of the discipline.

Current certification includes the following types of tasks: testing, solving situational tasks, interviewing on control questions.

Examples of multiple-choice tests:

Verifiable indicators of competence achievement: UC-8.1.1., UC-8.1.2., GPC-1.1.1., PC-4.1.1., PC-10.1.1., PC-11.1.1.

1. ASSESSMENT AND DOCUMENTATION OF CONFORMITY OF PRODUCTION PROCESS AND PRODUCT QUALITY IS
   a) standardization
   b) validation
   c) certification
2. A WRITTEN CERTIFICATION (WARRANTY) THAT THE QUALITY OF A MEDICINE (EFFICACY, SAFETY) MEETS THE ESTABLISHED REQUIREMENTS IS
   a) certification
   b) instructions for use
   c) technical documentation for medicinal products
   d) test reports
3. STATE CONTROL OVER THE PRODUCTION OF DRUGS IN THE RUSSIAN FEDERATION IS EXERCISED BY
   a) federal bodies
   b) territorial bodies
   c) regional bodies
   d) federal and territorial bodies

4. THE CONTROL AND AUTHORIZATION SYSTEM DOES NOT COVER THE STAGES OF HANDLING AND QUALITY CONTROL
    a) preclinical studies
    b) clinical trials
    c) research of imported medicinal products
    d) development of regulatory documentation for transportation of medicinal products
5. THE ENTERPRISE STANDARD SHALL BE ADOPTED
    a) by a federal agency
    b) by a state management body within its competence.
    c) by the enterprise
    d) all together
6. WHAT TYPES OF VALIDATION ARE MANDATORY IN PHARMACEUTICAL MANUFACTURING
    a) prospective validation
    b) concomitant validation
    c) re-validation (revalidation)
    d) transportation validation
7. PROXIMITY OF THE RESULTS OBTAINED USING THIS METHODOLOGY TO THE TRUE VALUE IS
    a) correctness
    b) accuracy
    c) convergence
    d) reproducibility
8. THE DEGREE OF CONSISTENCY BETWEEN INDIVIDUAL TEST RESULTS. IT IS MEASURED BY THE DEVIATION OF INDIVIDUAL RESULTS FROM THE MEAN VALUE - THIS IS
    a) correctness
    b) accuracy
    c) convergence
    d) reproducibility
9. IT IS THE ACCURACY OF A METHODOLOGY WHEN PERFORMED BY THE SAME ANALYST UNDER THE SAME CONDITIONS - IT IS
    a) correctness

b) accuracy

c) convergence

d) reproducibility

10. ACCURACY OF THE METHODOLOGY CONDUCTED UNDER DIFFERENT CONDITIONS ON IDENTICAL SAMPLES FROM THE SAME SERIES OF MATERIAL IS

a) correctness

b) accuracy

c) convergence

d) reproducibility

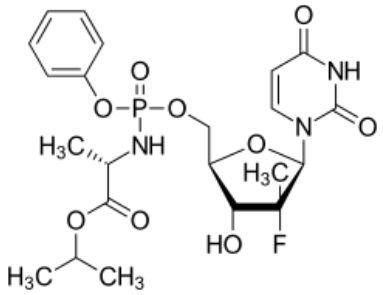
Examples of situational tasks:

Verifiable indicators of competence achievement: UC-8.2.1.UC-8.3.1., GPC-1.2.1, GPC-1.2.2.GPC-1.3.1., PC-4.2.1, PC-4.2.2.PC-4.3.1, PC-4.3.2., PC-10.2.1. PC-10.3.1., PC-11.2.1, PC-11.2.2., PC-11.3.1, PC-11.3.2., PC-11.3.1, PC-11.3.2.

1. Provisor-analyst of a pharmaceutical company received a substance of a drug, which was delivered for the production of tablets of the drug nicotinic acid. To quantify this substance, the Provisor Analyst applied acid-base titration.
   - Give the chemistry of this determination.
   - Give a general characterization of acid-base titration in aqueous and non-aqueous media and a classification of these methods.
   - Suggest a method of fixing the equivalence point.
   - Working solutions of the acid-base titration method and standard substances of this method.
2. Substance of a drug substance for the manufacture of levomycetin eye drops was delivered to the QC of a pharmaceutical company

   For quantitative evaluation, the analytical supervisor took an accurate suspension of the substance with a solution of concentrated hydrochloric acid and added zinc dust in several portions. After the zinc dust was completely dissolved and cooled, the reaction mixture was titrated with the working solution under the conditions of the methodology.
   - Was the choice of quantification method correct?
   - Characterization of the nitrite titration method. Methods of titration
   - Working solution, standardization.
   - Advantages and disadvantages of the nitritometry method.

3. Provisor analyst of a pharmaceutical company has been delivered a substance of a medicinal product, which was received for preparation of tablets of a medicinal product of structural formula:



- It is necessary to cite the names of the drug.
- What functional groups are in the structure of this drug.
- What structural elements of this compound can be detected after acid hydrolysis.
- Suggest reactions for detection of fluoride ions after mineralization.

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-11.1.1.1.PC-11.2.1, PC-11.2.2, PC-11.3.1, PC-11.3.2.

Identification of inorganic drugs - detection of cations.

1. Identification of inorganic drugs - detection of anions.
2. Identification of organic drugs - diazotization and azo-combination.
3. Identification of organic drugs - detection of aromatic nitro group.
4. Identification of organic drugs - detection of single and multi-atomic alcohols.

Evaluation tools for intermediate certification of 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., 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-11.1.1.1., PC-11.2.1, PC-11.2.2., PC-11.3.1, PC-11.3.2.

1. Provisor-analyst of a pharmaceutical company has received a substance of a drug, which was delivered for preparation of zinc sulphate powder of a medicinal product. To quantify this substance, the Provisor Analyst used a complexometric titration.
   - Give the chemistry of this determination for the analysis of two-charged cations.
   - Give a general characterization of the complexometric titration. Standard solution of Trilon B.
   - Suggest a method of fixing the equivalence point.

2. A pharmaceutical company's Provisor Analyst has received NaCl and KBr substances for the preparation of medical solutions.

   To quantify both drugs, the Provisor Analyst suggested the use of the Argentometric method.
   - Characterize all argentometric titration methods
   - Write the chemistry of these methods.
   - Suggest possible ways of fixing the equivalence point.

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

   For quantitative evaluation, the analytical supervisor took an accurate suspension of the substance with a solution of concentrated hydrochloric acid and added zinc dust in several portions. After the zinc dust was completely dissolved and cooled, the reaction mixture was titrated with the working solution under the conditions of the methodology.
   - Was the choice of quantification method correct?
   - Characterization of the nitrite titration method. Methods of titration
   - Working solution, standardization.
   - Advantages and disadvantages of the nitritometry method.

List of interview questions

№	Questions for intermediate certification	Verifiable indicators of competence achievement
1.	State pharmacopoeia. National and regional pharmacopoeias. International Pharmacopoeia. Main documents regulating the quality of manufactured medicinal products.	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.
2.	Aspects of pharmacy operations are governed by the legal and regulatory framework. Duties of pharmacists.	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.
3.	Classification of drugs, its necessity. Types of classification. Pharmacological and pharmacotherapeutic classification. Chemical classification.	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.
4.	Obtaining medicinal substances from plant raw materials. Obtaining of medicinal substances from animal raw materials and microorganisms. Organic synthesis of medicinal 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.
5.	Prerequisites for the development of a new drug. Stages of development of a new drug.	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.
6.	The system of standardization in healthcare. Main directions of standardization of medicinal products. Objectives.	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.
7.	Validation. Validation process. Types of validation process. Partial cases of validation.	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.
8.	The main stages of validation. Validation parameters.	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.
9.	Metrology. Major sections. Aims and objectives. Metrology in pharmacy.	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.

10.	Requirements for the quality and safety of medicines. Requirements for medicinal products.	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.
11.	Sources and causes of substandard drugs. Acquired impurities. Technological impurities.	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.
12.	Quality control of medicines. Types of in-pharmacy control.	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.
13.	Control and analytical laboratory and its functions. The activity of a pharmacist-analyst. Professional and job duties. Requirements for the pharmacy pharmacist-analyst.	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.
14.	Pharmaceutical examination of prescriptions. Definition of adulterated medicinal product. Causes contributing to the spread of falsified drugs.	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.
15.	Incompatibility of drugs, its types. Causes of incompatible combinations of drugs. Classification of pharmaceutical incompatibility of drugs.	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.
16.	Stability as a factor of quality of medicines. Influence of conditions of receipt and degree of purity on the stability of drugs.	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.
17.	Identification of drug substances. Criteria for chemical 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.
18.	Identification of inorganic LVs - detection of cations and anions.	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.
19.	Identification of organic drugs - detection of organic drugs - aromatic nitro group, single and multi-atomic alcohols, phenolic hydroxyl, detection of aldehyde and	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.

	keto groups, carboxyl and ester groups.	
20.	Acid-base titration in aqueous and non-aqueous media.	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.
21.	Precipitation titration. Argentometry. Mohr's method. Folgard's method. Fayans method. Mercurimetric titration. Characteristics of the method, working solutions, indicators. Advantages and disadvantages of the mercurimetry method.	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.
22.	Essence and methods of oxidimetry. Permanganatometry. Characteristics, working solution, standardization. Determination of oxidizing and reducing agents. Advantages and disadvantages of the method.	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.
23.	General characterization of the iodometric titration method. Fixing the equivalence point. Standard solutions in iodometry. Preparation, standardization.	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.
24.	Application of iodometry in pharmaceutical analysis - determination of ascorbic acid, sodium metamizole and caffeine. Advantages and disadvantages of iodometry.	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.
25.	Redox titration - bichromatometry, cerimetry. Characteristics, methods of titration, working 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.
26.	Nitritometry. Essence of the method. Working solutions. Indicators of the method of nitritometry. Advantages and disadvantages of the nitritometry method.	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.
27.	Complexometric titration. Complexones. Chemistry. Methods of fixing the end point of titration. Analysis of two- and three-charged	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.

	cations. Chemistry. Examples.	
28.	Virus, definition, characterization. Structure of the viral particle. Classification of viruses according to Baltimore.	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.
29.	Influenza virion structure, life cycle. Antiviral drug for influenza - rimantadine. Characterization, synthesis.	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.
30.	Structure of the HIV-1 virion. Life cycle of HIV-1. Nucleoside reverse transcriptase inhibitors (NRTIs) of HIV-1. Classification. Azidothymidine, Nicavir.	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.
31.	Non-nucleoside inhibitors from (NNRTIs) of HIV -1. The binding domain of NNRTIs to the viral enzyme. Etravirine, rilpavirine - structure, characterization.	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.
32.	Viral enzyme - integrase, its functions, structure. Integrase inhibitors: Reltegravir - characterization, structure.	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.
33.	HIV-1 protease inhibitors - peptidomimetics. Darunavir - structure, characterization.	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.
34.	Stages of entry of the HIV-1 virion into the cell. Receptors.	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.
35.	Inhibitors of virus attachment to the cell. Cyclotriaza-sulfonamides, Temsavir - structures, characterization.	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.
36.	Inhibitors of virus binding to SSR5 and CXCR4 co-receptors (scheme). Maraviroc - characterization, structure.	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.
37.	The fusion inhibitor is an inhibitor of the gp41 protein. Interaction of Enfuvirtide with the virus. Part of the Enfuvirtide peptide chain.	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.
38.	Hepatitis B virus (HBV). Structure, life cycle. Nucleoside drugs for HBV treatment - lamivudine, adefovir - structure, characterization.	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.
39.	General characterization of hepatitis C virus. Structure of HCV virion. Life cycle.	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.
40.	General pharmaceutical analysis of agents for the treatment of hepatitis C virus: nucleoside inhibitors of RNA-dependent RNA polymerase (RdRp) - 4'-Azidocytidine (R1479) and its prodrug form balopyravir - structure, characterization.	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.
41.	Viruses of the family Herpesviridae. Structure, life cycle.	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.
42.	Anti-herpes drugs in clinical practice : acyclovir, valacyclovir - structure, characterization. Biotransformation of famciclovir to penciclovir.	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.
43.	Characteristics of the family Coronaviridae. Structure of the coronavirus virion. Life cycle of RSV.	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.
44.	Therapy for coronavirus infections: dexamethasone, favipiravir.	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.
45.	General pharmaceutical analysis of antiviral agents for various purposes. Inhibitors of late viral protein synthesis - thiosemicarbazone derivatives: methisazone - preparation, pharmanalysis.	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.
46.	Inhibitors of virus self-assembly: rifampicin.	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.

47.	General pharmaceutical analysis of antiviral agents for various purposes. Virucidal agents of local action: tetraoxotetrahydronaphthalene (oxolin), tebrofen - obtaining, characterization.	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.

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

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

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

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

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

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=8030#section-5

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

Head of the Department  Ozerov A.