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

BANK OF ASSESSMENT TOOLS FOR DISCIPLINE

MODERN METHODS OF PHARMACEUTICAL ANALYSIS

Training program (specialty): 33.05.01 PHARMACY

Department: Pharmaceutical Chemistry and Pharmacognosy

Mode of study: full-time

Nizhniy Novgorod
2023

1. Bank of assessment tools for the current monitoring of academic performance, mid-term assessment of students in the discipline "Pharmaceutical Chemistry"

This Bank of Assessment Tools (BAT) for the discipline **"Modern methods of pharmaceutical Analysis"** is an integral appendix to the working program of the discipline **"Modern methods of Pharmaceutical Analysis"** All the details of the approval submitted in the WPD for this discipline apply to this BAT.

(Banks of assessment tools allow us to evaluate the achievement of the planned results stated in the educational program.
Assessment tools are a bank of control tasks, as well as a description of forms and procedures designed to determine the quality of mastering study material by students.)

2. List of assessment tools

The following assessment tools are used to determine the quality of mastering the academic material by students in the discipline **"Modern methods of pharmaceutical analysis"**:

No.	Assessment tool	Brief description of the assessment tool	Presentation of the assessment tool in the BAT
1	Test	A system of standardized tasks that allows you to automate the procedure of measuring the level of knowledge and skills of a student	Bank of test tasks
2	Individual survey	A control tool that allows you to assess the degree of comprehension of the material	List of questions
3	Situational tasks	A method of control that allows you to assess the criticality of thinking and the degree of the material comprehension, the ability to apply theoretical knowledge in practice.	List of tasks

3. A list of competencies indicating the stages of their formation in the process of mastering the educational program and the types of evaluation tools

Code and formulation of competence	Stage of competence formation	Controlled sections of the discipline	Assessment tools
UK-1. An ability to carry out critical analysis of problem situations based on a systematic approach and developing an action strategy.	Input, Current, Intermediate	Section 1. Optical methods for the analysis of medicinal substances. Section 2. Elemental analysis of medicinal substances. Section 3. Chromatographic methods of drug analysis.	Tests, situational tasks, individual survey
UK-2. An ability to manage a project at all stages of its life cycle.	Input, Current, Intermediate	Section 1. Optical methods for the analysis of medicinal substances. Section 2. Elemental analysis of medicinal substances. Section 3. Chromatographic	Tests, situational tasks, individual survey

		methods of drug analysis.	
PK-4. ability to participate in monitoring the quality, effectiveness and safety of medicinal products and medicinal plant raw	Input, Current, Intermediate	Section 1. Optical methods for the analysis of medicinal substances. Section 2. Elemental analysis of medicinal substances. Section 3. Chromatographic methods of drug analysis.	Tests, situational tasks, individual survey
PK-7 implementation of operations related to the technological process in the production of medicines, and their control	Input, Current, Intermediate	Section 1. Optical methods for the analysis of medicinal substances. Section 2. Elemental analysis of medicinal substances. Section 3. Chromatographic methods of drug analysis.	Tests, situational tasks, individual survey

4. The content of the assessment tools of entry, current control

Input / current control is carried out by the teacher of the discipline when conducting classes in the form of: tests, control questions, situational tasks, individual survey, abstract.

4.1. Tests and situational tasks (UK-1, UK-2, PK-4, PK-7) are presented on the PRMU Educational Portal:

https://sdo.pimunn.net/course/view.php?id=3870

4.2. Questions for individual survey (UK-1, UK-2, PK-4, PK-7) are presented on the PRMU Educational Portal:

https://sdo.pimunn.net/course/view.php?id=3870

4.3. Tasks (assessment tools) submitted for credit (UK-1, UK-2, PK-4, PK-7) are presented on the PRMU Educational Portal:

https://sdo.pimunn.net/course/view.php?id=3870

5. The content of the assessment tools of mid-term assessment

Mid-term assessment is carried out in the form of a differentiated exam.

The fund of assessment tools for conducting current monitoring and intermediate certification of students in this discipline is presented on the PRMU Educational portal:

https://sdo.pimunn.net/course/view.php?id=3870

5.1 The list of control tasks and other materials necessary for the assessment of knowledge, skills and work experience.

5.1.1. Questions for the discipline "Modern methods of pharmaceutical analysis" credit:

1.   What is called optical density? What does the optical density mean? What is the maximum absorption rate? What is called the absorption spectrum? Give the concept of electron spectra.
2.   What is called the molar absorption index? What is called the specific absorption rate? What are structural elements? What are the main numerical characteristics of the spectra?
3.   What is measured in the method of spectrophotometry in the UV region? Define the basic law of light absorption.
4.   What definitions are based on measuring the absorption of electromagnetic radiation? What methods are based on selective absorption of electromagnetic radiation?
5.   Formulate the basic law of light absorption. What causes deviations from the Bouguer-Lamberat-Behr law? How can the content be calculated for quantitative determination of medicinal substances by UV spectrophotometry?
6.   What are the methods of absorption spectrophotometry (spectroscopic methods of analysis) based on? What is called the specific absorption rate? What is called the molar absorption index?

7.	How are the specific and molar indicators of light absorption related to each other? What factors determine the specific and molar parameters of light absorption?

8.	What are the methods of absorption spectrophotometry (spectroscopic methods of analysis) based on? What is the calibration graph?

9.	What are the main constants that characterize the absorption spectrum? What is the absorption spectrum? What is the dependence of optical density on wavelength?

10.	Which groups are classified as auxochromic? What structural elements are called chromophores? What concentration of the solution is used to determine the molar index of light absorption?

11.	What explains the appearance of absorption spectra in the UV and visible regions? What wavelength range is meant by the UV region? What happens if the electrons in some orbitals absorb light quanta and move to higher energy levels?

12.	For what analytical purposes is the spectrophotometry method used? What method is used to determine light-absorbing impurities in pharmaceutical substances? Is it possible to use the ratio of optical densities at certain wavelengths when determining light-absorbing impurities in a medicinal substance?

13.	How is the authenticity (identification) of medicinal substances confirmed by UV spectrophotometry? What values are plotted on the abscissa and ordinate axes when plotting UV spectra?

14.	What methods of calculating the active substance content exist? How to calculate the active substance content according to the calibration schedule? How do I calculate the active substance content based on the specific or molar absorption index?

15.	How to calculate the active substance content based on the optical density of a standard sample solution? What are the advantages and disadvantages of each of these calculation methods? What is the most accurate method for calculating the active substance content?

16.	What are the methods of absorption spectrophotometry (spectroscopic methods of analysis) based on? What does the ability of a substance to absorb the energy of IR radiation depend on? For what purpose is the transmission value measured as a function of the wavenumber?

17.	What wavelength range of electromagnetic radiation is meant by the near-infrared region of the spectrum? What causes IR spectra? Which region of the IR spectrum is most suitable for pharmaceutical analysis?

18.	What region of the IR spectrum is currently called the "fingerprint" region? What values are plotted on the abscissa and ordinate axes when plotting IR spectra? Give a definition of the concept of transmission?

19.	What part of the spectrum is called the absorption band? What kind of oscillation is called a valence oscillation? What kind of vibration is called a deformation one?

20.	What are characteristic frequencies? What vibrations are called mixed valence-strain vibrations? What causes infrared (IR) spectra?

21.	What is measured to confirm the authenticity of medicinal substances by IR spectrophotometry? What happens when electromagnetic energy is absorbed during vibrations of atomic nuclei in molecules?

22.	What stages does IR spectroscopy study of a substance involve? Give a description of the method of suspensions with potassium bromide? Describe the method of rubbing the sample with indifferent liquids.

23.	What are the common elements of IR spectrophotometers? How do I perform identification in accordance with the requirements of the Tax Code?

24.	What are the main methods of studying substances by IR spectroscopy? Please provide a method for identifying medicinal products using standard samples? Please describe the method of drug identification using reference spectra.

25.	What is chromatography? Name its types. What process underlies chromatographic separation of substances?

26.	What are the main parameters of the chromatographic peak?

27.	What is laboratory analysis of substances?

Question	Code of competence (according to the RAA)
1	UK-1, UK-2, PK-4, PK-7
2	UK-1, UK-2, PK-4, PK-7
3	UK-1, UK-2, PK-4, PK-7
4	UK-1, UK-2, PK-4, PC-7
5	UK-1, UK-2, PK-4, PK-7
6	UK-1, UK-2, PK-4, PK-7
7	UK-1, UK-2, PK-4, PK-7
8	UK-1, UK-2, PK-4, PK-7

9	UK-1, UK-2, PK-4, PC-7
10	UK-1, UK-2, PK-4, PK-7
11	UK-1, UK-2, PK-4, PK-7
12	UK-1, UK-2, PK-4, PK-7
13	UK-1, UK-2, PK-4, PK-7
14	UK-1, UK-2, PK-4, PC-7
15	UK-1, UK-2, PK-4, PK-7
16	UK-1, UK-2, PK-4, PK-7
17	UK-1, UK-2, PK-4, PK-7
18	UK-1, UK-2, PK-4, PK-7
19	UK-1, UK-2, PK-4, PC-7
20	UK-1, UK-2, PK-4, PK-7
21	UK-1, UK-2, PK-4, PK-7
22	UK-1, UK-2, PK-4, PK-7
23	UK-1, UK-2, PK-4, PK-7
24	UK-1, UK-2, PK-4, PK-7
25	UK-1, UK-2, PK-4, PK-7
26	UK-1, UK-2, PK-4, PC-7
27	UK-1, UK-2, PK-4, PK-7

6. Criteria for evaluating learning outcomes

Learning outcomes	Evaluation criteria	
	Not passed	Passed
Completeness of knowledge	The level of knowledge is below the minimum requirements. There were bad mistakes.	The level of knowledge in the volume corresponding to the training program. Minor mistakes may be made
Availability of skills	Basic skills are not demonstrated when solving standard tasks. There were bad mistakes.	Basic skills are demonstrated. Typical tasks have been solved, all tasks have been completed. Minor mistakes may be made.
Availability of skills (possession of experience)	Basic skills are not demonstrated when solving standard tasks. There were bad mistakes.	Basic skills in solving standard tasks are demonstrated. Minor mistakes may be made.
Motivation (personal attitude)	Educational activity and motivation are poorly expressed, there is no willingness to solve the tasks qualitatively	Educational activity and motivation are manifested, readiness to perform assigned tasks is demonstrated.
Characteristics of competence formation*	The competence is not fully formed. The available knowledge and skills are not enough to solve practical (professional) tasks. Repeated training is required	The competence developed meets the requirements. The available knowledge, skills and motivation are generally sufficient to solve practical (professional) tasks.
The level of competence formation*	Low	Medium/High

For testing:

Mark "5" (Excellent) - points (100-90%)
Mark"4" (Good) - points (89-80%)
Mark "3" (Satisfactory) - points (79-70%)

Less than 70% – Unsatisfactory – Mark "2"

Developer:

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