AL-FARABI KAZAKH NATIONAL UNIVERSITY
Faculty of chemistry and chemical technology
Department of Analytical, colloid chemistry and technology of rareelements

Final exam program for the discipline
36699
Instrumental methods of analysis

Educational program:
"6B07102 – Chemical Engineering"

Almaty 2023

Final exam program the discipline is compiled by Madi Abilev, PhD, associate professor of the department of analytical, colloid chemistry and technology of rare elements

Reviewed and recommended at the meeting of the department of analytical, colloid chemistry and technology of rare elements
« 07 » September 2023, Protocol №2

Head of the department _____ A.M. Argimbayeva
(signature)

Introduction

Exam format: synchronous.
Exam form – Oral exam.
Exam platform: Univer IS.
Exam type — offline
Exam control – examination committee consisting of at least 3 lecturers.
The exam lasts: 15 minutes for 3 questions, 1 attempt.

On the exam in this discipline, the following types of questions are encountered

Knowledge application questions, composite questions.

Topics for which test tasks will be drawn up

1. Classification of instrumental methods of analysis
2. Spectroscopic methods. Atomic spectroscopy
3. The phenomenon of interference in atomic spectroscopy
4. Atomic fluorescence spectroscopy
5. X-ray spectroscopy.
6. Electronic spectroscopy
7. Molecular spectroscopy. Molecular absorption spectroscopy in the ultraviolet and visible regions
8. Infrared and Raman spectroscopy
9. Nephelometry and turbidimetry
10. Radioscopic methods of analysis
11. Chromatographic methods of analysis
12. Sensors
13. Mass spectrometry
14. Electrochemical methods. Potentiometry
15. Ammetry, voltammetry
16. Coulometry
17. Conductometry
18. Miniaturization and automation of chemical analysis
19. Hybrid methods of analysis
20. Modern trends in the development of instrumental analysis

Rules for conducting the exam form

The exam will be held according to the exam schedule. The teacher uploads the prepared exam questions to the Univer system (univer.kaznu.kz).

Teacher:

1. In the Univer system, on the tab "Program of final control by subject", places the document "Final control of the discipline" in PDF format, in which the following should be indicated:

- examination rules;
- assessment policy;
- schedule;

- place of examination.

2. After the date of the exam is set in the schedule, the teacher must inform the students where the rules of the exam are located.

3. Gives time to prepare the answer during the exam.

4. The student is warned about the prohibition of using photocopiers, telephones, and other devices.

5. Monitors the course of training the student, introducing warnings, if necessary, or canceling the student's answer (preparing an act of violation in case of a gross violation of the rules of conduct for the exam). Students are allowed to use the sheet to compose a summary of the answer.

6. After completing the scheduled exam, students' points are sent to the registrator's office.

Student instruction

1. Upon entering the examination room, the student is required to show the examiner an identity card and sign the attendance sheet.

2. No more than 5 examinees can be in the auditorium where the oral exam is held at the same time. The remaining examinees of the current group are waiting for an individual invitation outside the exam room without leaving the faculty building.

3. Before the exam, students should check whether there is a sheet of paper, a pen and other necessary items.

4. It is forbidden to stand up and/or change places, leave the audience before completing your answer to the ticket during the exam.

5. During the oral examination, the exam ticket is chosen by the examiner himself.

6. In preparation for the answer, the student is given sheets for compiling a summary of the answer. The time for preparing an oral answer for students is 10 minutes. To defend the answer, the student speaks to the examiner for no more than 5 minutes.

7. After the announcement of his last name, the student begins his answer on the ticket. Each question is evaluated based on the maximum possible points indicated in the questionnaire.

Evaluation policy

As a result of the exam, the student gets 100 points. 50 points for the first question, 50 points for the second question. Within 48 hours, the students' points will be entered in the certification sheet.

Recommended Literature Sources for Exam Preparation

1. Petrozzi S. Practical Instrumental Analysis: Methods, Quality Assurance and Laboratory Management. - Wiley-VCH, 2012. - 467 p.

2. Skoog D.A., Holler F.J., Crouch S.R. Principles of Instrumental Analysis. - Cengage Learning, 2018. — 985 p.

3. Robinson J.W., Skelly Frame E.M., Frame II G.M. Undergraduate

Instrumental Analysis. 7th ed. — CRC Press, 2014. — 1264 p.

4. S. S. Mahajan. Instrumental Methods of Analysis. - Popular Prakashan Limited, 2010 – 458 p.

5. D. Muralidhara Rao, A. V. N. Swamy, D. Dharaneeswara Reddy. Instrumental Methods of Analysis. - CBS Publishers & Distributors, 2020. – 384 p.

6. D. A. Skoog, F.J. Holler, S.R. Crouch. Principles of Instrumental Analysis. – Cencage, 2017.

7. F. Rouessac, A. Rouessac. Chemical Analysis: Modern Instrumentation Methods and Techniques. – Wiley, 2013.

RUBRICTOR FOR CRITERIAL ASSESSMENT OF FINAL CONTROL
(for standard oral/written forms)

Discipline: 36699 Instrumental Methods of Analysis. **Form:** standard oral**. Platform:** offline

№	Score / Criteria	DESCRIPTORS				
		«Excellent»	**«Good»**	**«Satisfactory»**	**«Unsatisfactory»**	
		90-100 % (27-30 points)	**70-89 % (21-26 points)**	**50-69 % (15-20 points)**	**25-49 % (8-14 points)**	**0-24 % (0-7 points)**
Question 1 30 points	Describing the basics of the selected instrumental method	To give a detailed information about the instrumental method, its position in the classification of the methods of analysis, to describe the principles and parameters of the method.	Some information is missing, but the principles are described correctly.	Basic principles are described, but most of the details are missing (classification, analytical signal, principles of operation, etc.)	The method is classified, instrument is named, but the principles of operation are not mentioned.	The method is classified, no information about instruments
	Giving the examples of the application of instrumental method	To give a precise example of application; describe the procedure of analysis	Example is good, but no procedure described	Example is given without detailed information	Application of the method/instrument is mentioned only for a group of compounds without specific examples	No example
		90-100 % (32-35 points)	**70-89 % (25-31 points)**	**50-69 % (18-24 points)**	**25-49 % (9-17 points)**	**0-24 % (0-8 points)**
Question 2 35 points	Describing the principles of the operation of instrument	Full information about the components of the instruments is mentioned, including the purpose of each component, types, principles.	The scheme is described correctly, but the components are not fully described.	The scheme is described correctly, but the components are named wrong	Description of the scheme is partially correct, components are named wrong or missing	The instrument is not identified, components are not named
	Theoretical background for the method/instrument	Detailed information on the scheme and application of the instrument is given	Some information is missing	Some information is missing and application is not given	Most of the theoretical background is missing, no application examples are given	Basic principles are not mentioned, some examples are given
Question 3 35 points	Application of selected methodology and calculations to real practical tasks	Completing the study assignment in full, giving a detailed, reasoned answer to the question, and then solving the practical problems. Completing calculations, formulas in them completely and correctly.	Completion of the educational task in part, not completely, giving a reasoned answer to the question posed without fully solving the practical problems; illiterate use of scientific language norms. In calculations, quoting formulas	The answer is fragmented, breaking the logical sequence, factual and semantic inaccuracies are allowed, the theoretical knowledge is used superficially.	An irrational method of solving the task or an insufficiently thought-out response plan; inability to solve tasks, perform tasks in general; the presence of errors and shortcomings exceeding the norm.	Inability to use knowledge and algorithms to solve tasks; inability to draw conclusions. Violation of the rules of final control. Practical problem is not solved.

			is incorrect or incomplete.			

Formula for calculating the final grade:
Final grade **(FI) = (%1+%2+%3+%4+%5+%6, etc.) / K**, where % is the level of task completion by criterion, K is the total number of criteria.

Exam tickets consist of 3 questions. The maximum points for correctly completed tasks are 100, including 30 points for the first question and 35 points for the second and the third questions.