

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

**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 registrar'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. – Cengage, 2017.

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