

**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**  
**MRKAH 4306 Methods of Separation and Concentration in Analytical**  
**Chemistry**

Educational program:  
5B060600 “Chemistry”

**Almaty 2021**

Final exam program the discipline is compiled by Madi Abilev, PhD, senior lecturer 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

« 16 » November 2021, Protocol №5

Head of the department

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(signature)

A.K. Galeyeva

## **Introduction**

**Exam formats:** asynchronous format.

**Exam form** – Written exam, case-task.

**Exam platform:** Moodle LMS.

**Exam type** — online

**Exam control** – plagiarism check.

**The exam lasts:** 3 hours.

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

This is a problematic task in which the trainee is asked to comprehend a real professionally oriented situation necessary to solve a problem.

### **Topics for which test tasks will be drawn up**

1. Classification of the methods of separation and concentration
2. Masking techniques
3. Determination of copper and zinc by the method of titration
4. Precipitation and co-precipitation
5. Determination of iron using the method of gravimetry
6. The use of precipitation methods in modern research
7. Volatilization and Distillation
8. Oxidation-Reduction Processes
9. Methods of Sorption
10. Separation of the binary mixture of isopropanol-water by simple distillation
11. The use of distillation methods in modern research
12. Periodic rectification of binary mixture of liquids
13. Adsorption of acetic acid by coal
14. The use of sorption methods in modern research
15. Solvent Extraction
16. Concentration of trace amounts of aluminum and iron from natural waters by extraction with 8-hydroxyquinoline followed by photometric determination
17. Solid phase microextraction
18. Separation of a mixture of cations Cu (II), Zn (II), Mg (II), Mn (II), Al (III)
19. Role of extraction methods in modern analytical chemistry

20. Electrodeposition
21. Extraction of iodine from an aqueous solution with organic solvents
22. Chromatography
23. Separation and detection of cations by 1D paper chromatography
24. Role of chromatographic methods in modern analytical chemistry
25. Separation of a mixture of amino acids
26. Other methods of separation and concentration
27. Optimization of the methods of separation and concentration

### **Rules for conducting the exam form**

1. Lecturer of a discipline must necessarily prepare a document "Final control of the discipline" in PDF-format, which sets out:

- rules for conducting the exam;
- format for presentation of responses;
- assessment policy;
- themes of case tasks: individual;
- schedule (deadlines for assignments).

Inform students about the prerequisite - the faces of all group members should be visible on the video, so that the teacher can assess the activity of each participant when discussing the assignment and consider this during certification.

2. According to the dates established in the disposal (order) on loading examination tasks timings, upload prepared PDF-file to the Moodle LMS for the zero week - it is located at the very beginning of the course - until the first week.

3. Lecturer indicates the deadlines and the number of attached files in Moodle LMS.

After the time expires, the student will not be able to send files.

4. Inform the students in the general chat where the exam rules and topics of projects or creative assignments are loaded for them.

After the deadline lecturer:

1. Checks the final work and reports of students.

2. Checks reports for plagiarism in the Antiplagiat.ru system (required). The teacher, based on the Antiplagiat system report, evaluates the main parts of the report (introductory and main parts, conclusion and literature). Individual project assignments, the student's report is assessed for plagiarism in full.

3. Based on the results of the check, lecturer certifies the participants of the exam:

- assigns points in the LMS Moodle system;
  - transfers the points in the system to the Univer IS attestation paper.
4. Time for scoring in the attestation paper for an exam - up to 72 hours.

### **Student instruction**

1. At the time set by the teacher, they log in to the Moodle LMS and get access to the task "Final exam on the discipline".
2. Look through the lecturer's assignment.
3. The work is individual, video recording is not required.
4. Carry out the teacher's task
5. Based on the results achieved, they draw up a final report on the work done.

6. According to the schedule of exams (the beginning of the exam is the time of the exam on the schedule, the end is the time of the exam on the schedule + the time set by the teacher to download the answer, 3 hours), students upload the result of the assignment into the LMS Moodle, for this:

- 6.1 students are authorized in the LMS Moodle accounts;
- 6.2 open the element "Final exam on the discipline";
- 6.3 select the item "Add answer to the task";
- 6.4 upload their works in the file upload field;
- 6.5 click "Save", ("Submit for verification"),
- 6.6 if necessary, checks the work for borrowings using the Antiplagiat system. The student will be given 1 attempt to check the written report for originality.

The postponement of the uploading of finished works in the Moodle LMS is not allowed!

As a result of the exam, the lecturer receives from the students:

1) a completed answer to a case task, drawn up in the form of a report and additional files-attachments to the report in \*.docx format (if necessary, depending on the assignment) from each student.

Example of student report content:

1. Introductory part
  - full name of the author;
  - short description of the case task - exactly the task at hand, you do not need to copy the entire teacher's document.
2. Main part:
  - description of the achieved results of the case (directly solving the task in the form of a report, images, links to videos, diagrams, graphs, etc., depending on the task);
  - description of the progress of the case assignment;
  - description of the deviations and difficulties encountered in the course of the case-task, as well as the ways used to overcome them.
4. Conclusion. Conclusions on the work done.
5. References.
  - list of used literature;
  - a description of the methods and technologies used in the case for solving the assigned tasks (programs, tools, links to key regulatory documents, methods).

Each student in his report must write the introductory and main parts, conclusion, literature (all the same, in the case of a group project).

It is allowed to upload final reports only in \*.docx formats. Additional files, if available - images, graphics, listings, etc. depending on the task, can be loaded in the appropriate formats (for this, set the ability to load data files in formats other than docx when creating the "Assignment" element).

The size of uploaded files should not exceed 30 MB. If it is necessary to send large files, students upload files to cloud storage and publish links to them in the text of the report.

### **Evaluation policy**

Each part of the report will be assessed as follows:

1. Introductory part – 5 points
  2. Main part – 50 points, including:
    - description of the achieved results of the case – 20 points;
    - description of the progress of the case assignment – 10 points;
    - description of the deviations and difficulties encountered in the course of the case-task, as well as the ways used to overcome them – 20 points.
  3. Conclusion – 30 points.
  4. Results of plagiarism checking – 15 points.
- Total for the exam – 100 points.

### ***Recommended Literature Sources for Exam Preparation***

1. Separation Methods in Microanalytical Systems. 1st Edition / Jorg P. Kutter (Ed.). - CRC Press, 2005. – 604 p.
2. Sample Preparation Techniques in Analytical Chemistry. 1st Edition / Somenath Mitra (Ed.). – Wiley Interscience, 2003. - 487 p.
3. Chemical Separations: Principles, Techniques and Experiments (Techniques in Analytical Chemistry). 1st Edition / Clifton E. Meloan (Ed.). - Wiley-Interscience, 1999. - 768 p.
4. Kramer R. Chemometric Techniques for Quantitative Analysis // CRC Press, 2021. – 119 p.
5. Satinder A. Chromatography and Separation Science // Academic Press, 2003. - 262 p.
6. Pawliszyn J. Comprehensive Sampling and Sample Preparation: Analytical Techniques for Scientists // Academic press, 2012. – 3200 p.