

**al – Farabi Kazakh national University**  
**Faculty of chemistry and chemical technology**  
**Department of physical chemistry, catalysis and petrochemistry**

**Program of final exam on discipline**

**MS 3219 «Metrology and standardization»**  
**6B05301 – Chemistry (NIS)**

**Almaty 2022 y.**

The program of final exam is composed by senior lecturer of the department of physical chemistry, catalysis and petrochemistry Supiyeva Zh.A.

Reviewed and recommended at the meeting of the department of physical chemistry, catalysis and petrochemistry

«28» September 2022 y., protocol № 3

Head of department \_\_\_\_\_ Ye.A.Aubakirov

## **Introduction**

**The form of the exam:** standard, written

**Exam platform:** UC “Univer”

**Type of exam** - offline

**Exam control** - video cameras in the classroom and a teacher

**Duration:** 3 hours to answer the questions.

## **Topics for which assignments will be compiled**

1. Introduction. Brief history and current state of metrology system development in the Republic of Kazakhstan.
2. Basic concepts and definitions of metrology. Metrology as a science. Measuring tools used in the workplace. Metrological maintenance of production. The metrological characteristics of measuring tools. Regulatory documents for measuring tools.
3. Metrology and provision of metrological measurement units.
4. Measurement methods and types.
5. Uniformity of measuring instruments and testing of measuring instruments.
6. Conduct metrological certification of state metrological supervision, control and measuring instruments.
7. Estimation of distribution parameters. Confidence Interval and Confidence Probability. Student method.
8. Three purposes of error theory.
9. A general description of standardization. Scientific and methodological bases of standardization. Purposes, principles and functions of standardization. Regulation of standardization subjects. General concept of standardization methods.
10. General characteristic of standards of different categories and types. The stages of the standards development. Structural elements and the examination of standards.
11. Standardization organizations, activities.
12. Classification and coding of state information, procedure for use. Product data sheets. Product barcoding. Examination of the product data sheets.
13. Service standardization.
14. International standardization. The forms and objects of state control; the composition of the Commission, making state control; the inspection order; the assessment of the correctness of the MI metrological control.
15. Status of certification development and main directions of development, principles of accreditation. The history of the certification development; Documenting of the conformity attestation procedures; Basic guidelines on conformity assessment; Declaration of conformity; Certification and regulatory

principles in the field of conformity assessment; Authorized agency in the field of conformity assessment.

### **Rules of Exam**

The student needs to come to the classroom 20 minutes before the start of the exam and prepare, to sign the attendance sheet and sit in the seat indicated on the attendance sheet. You must have an identity card or ID card, a pen, a pencil with you.

### **During the exam forbidden:**

1. Take and open a ticket without the teacher's permission.
2. To carry unauthorized aids during the exam (cheat sheets, cell phones (turned on or off), smart watches, headphones, other electronic devices, etc.).
3. Make noise, talk, get up and leave the room.
4. Seek help from third parties.
5. Unauthorized use of books, drawings, calculators without the permission of the teacher.

### **Instruction for the student**

#### **Important!**

1. A student who has committed a violation of any of the above requirements, which was recorded by the act, is graded “F” (“unsatisfactory”) in the discipline.
2. Opening unauthorized educational materials, electronic means of communication with the student during the exam, as well as violation of these Rules is the basis for a decision to cancel the assessment results and give an “unsatisfactory” grade, regardless of whether they were used in the exam or not.

#### **Important!**

#### **Assessment policy:**

The case – tasks consist of 3 steps and they evaluate by toughly level.

First question – 30 points	Second question – 40 points
Third question – 30 points	

### **Recommended literature sources for exam preparation**

#### **Educational literature: basic:**

1. Elisabeth Mansfield, Debra L. Kaiser, Daisuke Fujita, Marcel Van de Voorde. Wiley-VCH Metrology and Standardization for Nanotechnology: Protocols and Industrial Innovations (Applications of Nanotechnology) / 1st edition (April 10, 2017). - 626 p.

2. R.K. Rajput Measurements & Metrology /S.K. Kataria & Sons. - 310 p.
  3. Bureau International des Poids et Mesures (BIPM). International vocabulary of metrology—basic and general concepts and associated terms (VIM). 3rd ed. 2008 version with minor corrections; 2008. Available at <https://www.bipm.org/en/publications/guides/>.
  4. Сыздыкова Л.И. Метрология, стандартизация и сертификация: Программа, тестовые вопросы, задачи: Учебное пособие. - Алматы: Қазак университеті, 2008. – 120 с.
- Internet resources:
1. <http://elibrary.kaznu.kz/ru>
  2. <https://metro.ru/html/literatura.html>