

MINISTRY OF HEALTH OF UKRAINE
ODESA NATIONAL MEDICAL UNIVERSITY



PROGRAM
OF THE ENTRANCE EXAMINATION FOR
THE COMPONENT "CHEMISTRY"
FOR FOREIGN APPLICANTS
IN A REMOTE FORMATE

Odesa
2026

Explanatory note

The main purpose of the test is an objective and impartial assessment of the level of academic achievement of persons who graduated from high school and expressed a desire to enter the Odesa National Medical University.

The task of assessment in chemistry is to assess the knowledge and skills of participants: students' knowledge of the most important laws and theories of chemistry; knowledge of chemical language, the ability to use the names and symbols of chemical elements, the names of simple and complex substances; ability to compose chemical formulas and equations of chemical reactions, to solve computational and experimental problems; understanding the relationship between the composition, structure, physical and chemical properties of substances, methods of their extraction, areas of application; knowledge of the most important natural and artificial substances, their structure, methods of extraction and areas of application; understanding the scientific basis of certain chemical industries; awareness of some environmental issues related to chemistry; understanding the role of chemistry in solving global problems of mankind.

The program is based on the program for the preparatory department ONMedU in chemistry.

An individual oral interview in chemistry takes place remotely in oral form using the Microsoft Teams platform. Total number of questions - 5.

The program was discussed and approved at the sitting of the admission board of Odesa National Medical University (Record No. 5 of May 01 , 2026).

The program was approved by the order of Acting Rector of ONMedU № 292-o of May 04 , 2026

EVALUATION CRITERIA

The interview consists of 5 questions, which are evaluated in 40 points.

The maximum number of points that an entrant can receive in an individual oral interview in the Ukrainian language is 200 points.

The minimum number of points to be scored is 100.

CRITERIA FOR EVALUATION OF CHEMICAL TASKS

For each correct answer, the person who passes the interview receives 40 points. Each question is answered in no more than 3 minutes.

Problems in chemistry are evaluated by criteria, as set out in the table.

The correct answer is received.	
The basic concepts and formulations are substantiated and competently analyzed. Examples are given.	40
The correct answer is received, full wording, but no examples are given.	30
Incomplete answer received, correct wording, no examples.	20
The answer is incomplete, the wording is incorrect, no examples are given.	10
The entrant did not start the answer or his answer does not meet the above criteria.	0

CHEMISTRY INTRODUCTORY TEST PROGRAM

n / a	Name topics	Content of educational material
1. GENERAL CHEMISTRY		
1.1	Basic concepts	Atoms. Molecules. Relative atomic and relative molecular mass. The law of conservation of mass of matter. Molar mass. Mole - a measure of the amount of substance.
1.2	Chemical element. Chemical formula. Avogadro's law. Relative density of gases	Chemical element. Signs of chemical elements. Chemical formula. The law of constancy of composition. Mass hour of the element. Avogadro's law and its consequences. Relative density of gases. Molar volume.
1.3	The structure of the atom	Modern model of atomic structure. Isotopes. Structure of electronic shells of atoms.

1.4	Periodic law of DI Mendeleev. PSE	Opening of the periodic law. Its formulation by D.I. Mendeleev and modern, based on the structure of the atom. Periodic system of elements. The meaning of the periodic law. Periods, groups, insert decades, blocks. Dependence of properties of chemical elements on their presence in PSE.
1.5	Chemical bond	Quantum-mechanical theory of communication. Types of chemical bonds and parameters. Electronegativity of atoms, polarity and polarization of chemical bonds, the mechanism of its formation.
1.6	Classification of chemical reactions	Classification of chemical reactions on various grounds. Reactions of coupling, decomposition, exchange, substitution.
1.7	Rate of chemical reactions. Chemical equilibrium. Catalysis	The concept of the rate of chemical reactions. Dimensionality and definition of the concentration of components. Dependence of reaction rate on concentration. Kinetic equation of reaction. Influence of temperature and pressure on the rate of reactions. Vant-Hoff's rule. Catalysis and catalysts. Catalytic reactions. Reversible reactions. Displacement of equilibrium according to the Le Chatelier principle.
1.8	Solutions. General characteristics. Electrolyte solutions	The concept of solutions. Classification of solutions. Means of expressing the concentration of solutions. The concept of electrolytes. Strong and weak electrolytes. Degree and constant of dissociation. Ionic equations.
1.9	Redox reactions	The degree of oxidation of the elements. Redox reactions. Intermolecular, intramolecular, disproportionation. Compilation of equations by electronic balance. The most important oxidants and reducing agents.

2. INORGANIC CHEMISTRY

2.1	Oxides. Hydroxides	Classification of oxides. Means of production and properties of acid, basic and amphoteric oxides. Soluble and insoluble hydroxides, their production and properties.
2.2	Acids	Classification of acids. Obtaining oxygen-free and oxygen-containing acids. Chemical properties and applications of acids.
2.3	Salt. Genetic connection between	Composition, types, nomenclature of salts. Chemical properties and means of obtaining salts. Hydrolysis

	the main classes of inorganic compounds.	of salts.
2.4	Hydrogen. Oxygen. Water	The position of hydrogen in PSE. Physical and chemical properties. Obtaining in the laboratory and industry. Allotropy. Physical and chemical properties of oxygen and ozone. Receiving. The structure of the water molecule. Physical and chemical properties. Biological role of water.
2.5	Halogens and their compounds	Provisions in the PSE. The structure of atoms. Physical and chemical properties. Obtaining in the laboratory and industry. Participation in redox reactions.
2.6	Sulfur and its compounds	The structure of the sulfur atom. Physical and chemical properties. Hydrogen sulfide. Oxides of sulfur (IV) and (VI). Obtaining properties. Sulfuric acid, properties, chemical bases of production of contact methods. Participation in redox reactions.
2.7	Elements of the main subgroup of the PSE group. Nitrogen and its compounds. Phosphorus and its compounds	General characteristics of the elements of the nitrogen subgroup. Nitrogen. Physical and chemical properties. Ammonia. Industrial production, properties. Ammonium salts. Nitric acid. Features of chemical properties of nitric acid, its production. Participation in redox reactions. Allotropic forms of phosphorus. Physical and chemical properties of phosphorus. Phosphorus oxide (V). Orthophosphate acid and its salts.
2.8	Elements of the carbon subgroup. Carbon and its compounds. Silicon	Carbon, its allotropic forms. Physical and chemical properties. Oxides of carbon (II) and (IV), carboxylic acid and its salts. Silicon, physical and chemical properties. Silica (IV) oxide, silicate acid. Silicon compounds in nature, its use in technology.
2.9	Alkali and alkaline earth metals	General characteristics of elements of subgroups of lithium and beryllium. Alkali and alkaline earth metals and their properties. Receiving. Compounds of sodium, potassium, calcium in nature.
2.10	Aluminum and its compounds	Position of aluminum in PSE. Forms of its compounds. Aluminum oxide and hydroxide, their amphotericity. Aluminum compounds in nature, application in engineering
2.11	Iron. Iron alloys	Characteristics of iron by position in PSE. The degree of oxidation of iron and the form of its compounds. Oxides and hydroxides of iron (II) and (III).

2.12	General characteristics of metals	Position of metal elements in PSE. Electronic structure. Methods of obtaining. A number of activities of metals. Corrosion.
3. ORGANIC CHEMISTRY		
3.1	Theory of chemical structure. Nomenclature and classification of organic compounds	The subject of organic chemistry. A.M. Butlerov's theory of chemical structure of organic compounds. Types of bonds in molecules of organic compounds. Mechanisms of their formation and ways of rupture. Classification of organic compounds. Nomenclature. The concept of isomerism.
3.2	Saturated hydrocarbons	Homologous series of alkanes. The concept of hybridization. Spatial and electronic structure of saturated hydrocarbons. Their chemical and physical properties. Receipt and use.
3.3	Unsaturated hydrocarbons	Homologous series of alkenes, alkynes. The concept of hybridization. Spatial and electronic structure of unsaturated hydrocarbons. Their chemical and physical properties. Receipt and use.
3.4	Aromatic carbohydrates. Benzene and its homologues	Electronic structure and chemical properties of benzene. Industrial methods of obtaining benzene. The mutual influence of atoms on the example of toluene. Orientation rules in the benzene nucleus.
3.5	Hydro compounds. Monoatomic and polyhydric alcohols. Phenols	General formula, nomenclature, isomerism of saturated monohydric alcohols, their properties and methods of production. Polyhydric alcohols. Chemical properties of ethylene glycol and glycerol. The structure of the phenol molecule. Electronic effects and interaction of atoms in the phenol molecule. Chemical properties of phenol in comparison with the properties of alcohols.
3.6	Aldehydes	General formula of aldehydes. Electronic structure of aldehyde group. Nomenclature and isomerism of aldehydes. Chemical properties.
3.7	Carboxylic acids	Nomenclature and isomerism of carboxylic acids. The structure of the carboxyl group. Physical and chemical properties of monobasic carboxylic acids, methods of their production.
3.8	Esters, fats	Ester communication. Nomenclature of esters. Esterification reaction and conditions of its course. Esters of low molecular weight monobasic carboxylic acids and low molecular weight monobasic alcohols. General formula of fats. Fats as a source of glycerol, Fatty acids, salts of Fatty acids-

		soap. Synthetic and natural fats. Chemical properties of fats.
3.9	Carbohydrates	General characteristics of carbohydrates and their classification. Monoses, bioses, polyoses. Carbohydrates as poly functional compounds. Carbohydrate isomerism. D- and L-genetic series
3.10	Nitrogen-containing organic compounds. Amines	Nomenclature. Isomerism of amines. Chemical properties of fatty amines. Structure of amines. Comparison of the main properties of aniline as an aromatic amine with fatty amines. Industrial and laboratory methods of obtaining amines.
3.11	Amino acids. Proteins	Isomerism and nomenclature of amino acids. Chemical properties of amino acids. Alpha amino acids as structural units of proteins. Formation of peptic bond. Levels of protein structure. Types of chemical bonds in protein molecules.
3.12	Genetic connection between the main classes of organic compounds	Chains of transformation of the basic classes of connections among themselves.

LITERATURE

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