


**MINISTRY OF HEALTH OF THE REPUBLIC OF BELARUS
EDUCATIONAL INSTITUTION
BELARUSIAN STATE MEDICAL UNIVERSITY**

**Контрольный
экземпляр**

APPROVED
by First Vice-Rector, Professor
I.N.Moroz
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CHEMISTRY

**Curriculum of higher educational institution
in the educational discipline for international students
of the Faculty of the Career Guidance and Pre-University Training**

Minsk, BSMU 2019

Curriculum is based on the program for entrance examination in the discipline «Chemistry» for applicants with secondary education aiming at receiving 1st-degree higher education or secondary specialized education, 2019.

COMPILERS:

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RECOMMENDED FOR APPROVAL:

by the Department of General Chemistry of the Educational Institution «Belarusian State Medical University»

(protocol # 10 of 23.05.2019);

by the Methodological Commission of medical and biological disciplines of the Educational Institution «Belarusian State Medical University»

(protocol # 9 of 12.06.2019)

EXPLANATORY NOTE

«Chemistry» is an educational discipline containing systematized scientific knowledge and techniques in the field of general chemistry, inorganic chemistry, organic chemistry studying the main concepts on the structure of substances and chemical reactions between them.

The curriculum of the discipline «Chemistry» includes the latest scientific data about electron configurations of atoms, shapes of inorganic and organic compounds, their physical and chemical properties, their usage in medicine, pharmacy and industry.

The aim of teaching and learning the discipline «Chemistry» is to prepare foreign attendees for the entrance exam and for the understanding of such disciplines as «General Chemistry» and «Bioorganic Chemistry» that they will study in the first year. The aim is to provide the students with the scientific knowledge about the main theories and concepts of Chemistry.

The tasks of studying the discipline are to develop the students' academic competences, based on the ability to self-search educational and information resources, as well as acquire and understand the knowledge of:

- the basic concepts and principles of chemistry;
- the main types of inorganic and organic compounds and reactions between them;
- the structure of the periodic table of elements and knowledge on the main trends existing inside it;
- the knowledge of properties of chemical elements and their compounds;
- skills of application of theoretical concepts in chemistry for solving typical tasks for calculation and writing equations of chemical reactions.

The tasks of teaching the discipline include the formation of students' social, personal and professional competences, based on the knowledge and application of:

- main laws of chemistry, contributing to the formation of clinical thinking according to medical ethics and deontology rules;
- the writing of chemical reactions;
- the methods of carrying out stoichiometric calculations;
- the indices that are used to express the content of a solution.

As a result of studying the discipline «Chemistry» the student should know:

- the basic concepts (principles) of chemistry;
- chemical properties of main types of inorganic and organic compounds;
- the structure of the Periodic Table of chemical elements;
- main concepts of chemical kinetics;
- theory of electrolytic dissociation

be able to:

- write and balance chemical reactions;
- perform stoichiometric calculations;
- describe chemical properties of inorganic and organic compounds;

master:

- the methods of balancing chemical reactions;
- the skills of solving chemical problems;
- the writing of electron configurations of elements;
- the drawing of structures of inorganic and organic compounds.

The structure of the curriculum in the educational discipline «Chemistry» includes 8 sections: main concepts and laws of chemistry; the periodic table and the structure of the atom; chemical bonds and structure of matter; chemical kinetics and catalysis; main types of inorganic compounds; solutions, electrolytic dissociation; inorganic chemistry; organic chemistry.

Total number of hours for the study of the discipline is 150 academic hours. Classroom hours according to the types of studies: practical classes - 150 hours.

Current assessment is carried out according to the syllabus of the specialty in the form of examination (2nd semester).

Form of education – full-time.

ALLOCATION OF ACADEMIC TIME ACCORDING TO SEMESTERS OF STUDY

Code, name of the specialty	semester	Number of academic hours					Form of current assessment
		total	in-class	including		out-of-class self-studies	
				lectures	laboratory studies (practical classes and seminars)		
International students of the Faculty of the Career Guidance and Pre-University Training	1	42	42	-	42	-	examination
	2	108	108	-	108	-	
Total hours		150	150	-	150	0	

THEMATIC PLAN

Section (topic) name	Number of class hours (practical)
1. Main concepts and laws of chemistry	18
1.1. Physical and chemical properties of substances. Atoms and molecules. Symbols of chemical elements	3
1.2. Atomic mass and molecular mass. The mole and molar mass	3
1.3. Valence. Chemical equations and their balancing	3
1.4. Calculations using chemical equations	3
1.5. Molar volume of gases. Relative densities of gases	6
2. The Periodic table and the structure of atom	6
2.1. The Periodic table of elements	3
2.2. Quantum numbers and electron configurations of elements	3
3. Chemical bonds and structure of matter	12
3.1. Types of chemical bonds. Electronegativity	3
3.2. Oxidation state	3
3.3. Classification of chemical reactions	3
3.4. Balancing reduction-oxidation reactions	3
4. Chemical kinetics and catalysis	9
4.1. Chemical equilibrium. The law of mass action	3
4.2. The rate of a chemical reaction. Temperature coefficient of a chemical reaction	6
5. Main types of inorganic chemical compounds	18
5.1. Oxides: classification, physical and chemical properties	3
5.2. Bases: classification, physical and chemical properties	3
5.3. Acids: classification, physical and chemical properties	3
5.4. Salts: classification, physical and chemical properties	3
5.5. Chains of chemical reactions	6
6. Solutions, electrolytic dissociation	18
6.1. Qualitative description of solutions. Solubility of chemical compounds in water	3
6.2. Quantitative description of solutions. Mass percentage, molarity	3
6.3. Electrolytic dissociation. Weak and strong electrolytes	3
6.4. Ionic equations of chemical reactions	3
6.5. Hydrolysis of inorganic salts	6
7. Inorganic chemistry	33
7.1. Chemistry of hydrogen and its compounds	3
7.2. Chemistry of halogens and their compounds	3

Section (topic) name	Number of class hours (practical)
7.3. Chemistry of oxygen and its compounds	3
7.4. Chemistry of sulfur and its compounds	3
7.5. Chemistry of nitrogen and its compounds	3
7.6. Chemistry of phosphorus and its compounds	3
7.7. Chemistry of carbon and its compounds	3
7.8. Chemistry of silicon and its compounds	3
7.9. Chemistry of alkali and alkaline-earth metals and their compounds	3
7.10. Chemistry of aluminum and iron, and their compounds	6
8. Organic chemistry	36
8.1. Alkanes: nomenclature, physical and chemical properties	3
8.2. Nomenclature and structure of unsaturated hydrocarbons	3
8.3. Physical and chemical properties of unsaturated hydrocarbons	3
8.4. Polymerization of unsaturated hydrocarbons	3
8.5. Arenes: nomenclature, physical and chemical properties	3
8.6. Alcohols and phenols: nomenclature, physical and chemical properties	3
8.7. Aldehydes and ketones: nomenclature, physical and chemical properties	3
8.8. Carboxylic acids: nomenclature, physical and chemical properties	3
8.9. Esters and fats: nomenclature, physical and chemical properties	3
8.10. Carbohydrates: nomenclature, physical and chemical properties	3
8.11. Amines, amino acids and proteins: nomenclature, physical and chemical properties	6
Total hours	150

CONTENT OF THE EDUCATIONAL MATERIAL

1. Main concepts and laws of chemistry

1.1. Physical and chemical properties of substances. Atoms and molecules.

Symbols of chemical elements

The subject and aims of chemistry. Physical and chemical processes. Atoms and molecules. Mixtures and compounds. Signs of chemical processes. Chemical element, pure chemical element, compound. Chemical symbols and formulas.

1.2. Atomic mass and molecular mass. The mole and molar mass

Relative atomic and molecular mass. Mole as an amount of quantity of matter. Avogadro's number. Molar mass. Conversion from mass to the number of moles.

1.3. Valence. Chemical equations and their balancing

Valence. Simplest, molecular and structural formulas. Mass percentage of the given element in the compound. Chemical equations.

1.4. Calculations using chemical equations

Stoichiometry. The law of the conservation of mass. Mass from mass and mass from mole calculations. Cases with limiting reactant. The yield of the reaction.

1.5. Molar volume of gases. Relative densities of gases

Avogadro's law. Molar volume of gases. Relative density of gases. Average molecular mass of dry air. Volume from volume and volume from mass calculations.

2. The Periodic table and the structure of atom

2.1. The Periodic table of elements

The Periodic table of chemical elements created by D. I. Mendeleev. Structure of the Periodic table: periods, groups, subgroups, blocks, families. Dependence of certain properties of chemical elements on their position in the Periodic table.

2.2. Quantum numbers and electron configurations of elements

Structure of atomic nuclei and electron configurations for atoms from the first four periods of the Periodic table. Isotopes. Periodic table as the way to describe the distribution of electrons between their orbitals in chemical elements.

3. Chemical bonds and structure of matter

3.1. Types of chemical bonds. Electronegativity

Types of chemical bonds: covalent (nonpolar and polar), ionic, metallic and hydrogen and. Examples of compounds with different types of bonds. Electronegativity and its usage.

3.2. Oxidation state

The difference between valence and oxidation state. Elements that show constant oxidation state in all compounds. Calculation of oxidation state for elements that show different oxidation states in different compounds.

3.3. Classification of chemical reactions

Classification of chemical reactions: combination, decomposition, single and double substitution reactions.

3.4. Balancing reduction-oxidation reactions

Reduction-oxidation reactions and their balancing with the help of the electron-atom method. Reduction and oxidation, reducers and oxidizers.

4. Chemical kinetics and catalysis

4.1. Chemical equilibrium. The law of mass action

Chemical equilibrium. Le Chatelier's principle. Thermal effects of chemical reactions. Prediction of the direction of the shift of chemical equilibrium because of different stresses. The law of mass action. The constant of chemical equilibrium.

4.2. The rate of a chemical reaction. Temperature coefficient of a chemical reaction

The rate of a chemical reaction. Dependence of the rate of a chemical reaction on the nature of reactants and their concentration, on the pressure, on the volume of a gas container, on temperature. Kinetic equations of chemical reactions according to the law of mass actions. Temperature coefficient of chemical reaction.

5. Main types of inorganic chemical compounds

5.1. Oxides: classification, physical and chemical properties

Oxides, their classification and nomenclature, physical and chemical properties. Production of oxides. Acidic oxides, basic oxides, amphoteric oxides, neutral oxides.

5.2. Bases: classification, physical and chemical properties

Bases, their classification and nomenclature, physical and chemical properties. Strong and weak bases. Alkalis. Production of bases.

5.3. Acids: classification, physical and chemical properties

Acids, their classification and nomenclature, physical and chemical properties. Strong and weak acids. Strong oxidizing acids. Production of acids.

5.4. Salts: classification, physical and chemical properties

Salts, their classification and nomenclature, physical and chemical properties. Neutral salts, acidic salts, basic salts, double salts, complex salts. Production of salts.

5.5. Chains of chemical reactions

Chains of chemical reactions between main types of chemical compounds. Classic and modern chains of chemical reactions.

6. Solutions, electrolytic dissociation

6.1. Qualitative description of solutions. Solubility of chemical compounds in water

Solutions. Solubility of substances. Dependence of solubility on the nature of substance, temperature and pressure. Thermal effects of solution formation.

6.2. Quantitative description of solutions. Mass percentage, molarity

Quantitative description of the content of a solution. Molarity. Mass percentage of solute in a solution. Hydrates of salts. Formation of solutions of a needed content.

6.3. Electrolytic dissociation. Weak and strong electrolytes

Electrolytic dissociation. Dissociation degree. Strong and weak electrolytes. Electrolytic dissociation of acids, bases and salts.

6.4. Ionic equations of chemical reactions

Complete and short ionic equations of chemical reactions taking place in water solutions. The rules of writing ionic equations. The sense of short ionic equations.

6.5. Hydrolysis of inorganic salts

Complete and reversible hydrolysis of salts. Hydrolysis of salts composed by a cation of a strong base and an anion of a weak acid. Hydrolysis of salts composed by

a cation of a weak base and an anion of a strong acid. Hydrolysis of salts composed by a cation of a weak base and an anion of a weak acid.

7. Inorganic chemistry

7.1. Chemistry of hydrogen and its compounds

Hydrogen, its physical and chemical properties, production and applications. Water. The structure of water molecule. Physical and chemical properties of water.

7.2. Chemistry of halogens and their compounds

Properties of halogens. Unique chemical properties of fluorine. Chlorine, its physical and chemical properties. Hydrogen chloride. Hydrochloric acid and its salts. Characteristic reaction for chloride anion.

7.3. Chemistry of oxygen and its compounds

Properties of elements from VIA group. Oxygen, its physical and chemical properties. Allotropy. Production of oxygen. The role of oxygen in nature.

7.4. Chemistry of sulfur and its compounds

Sulfur, its physical and chemical properties. Hydrogen sulfide. Oxides of sulfur. Sulfuric acid, its properties and production. Differences in chemical properties of concentrated and dilute sulfuric acid. Characteristic reaction for sulfate anion.

7.5. Chemistry of nitrogen and its compounds

Properties of elements from VA group. Nitrogen, its physical and chemical properties. Ammonia and ammonium salts. Nitrogen oxides. Nitric acid, its oxidizing properties. Nitrates.

7.6. Chemistry of phosphorus and its compounds

Phosphorus, its allotropic modifications, physical and chemical properties. Phosphorus (V) oxide, phosphoric acid and its salts.

7.7. Chemistry of carbon and its compounds

Properties of elements from IVA group. Carbon and its compounds. Carbon dioxide, carbon monoxide. Carbonic acid and its salts. Carbonates and bicarbonates. Characteristic reactions for carbonate anion.

7.8. Chemistry of silicon and its compounds

Silicon. Silicon (IV) oxide. Silicides, silane. Silicic acid. Silicates.

7.9. Chemistry of alkali and alkaline-earth metals and their compounds

Metals, their position in the Periodic table, physical and chemical properties. Electrochemical series of metals. Alkali metals and their properties. Compounds of sodium and potassium widespread in nature, their applications. Properties of elements from group IIA. Calcium, application of its compounds in medicine.

7.10. Chemistry of aluminum and iron, and their compounds

Aluminum. Amphoteric properties of its oxide and hydroxide. Iron, its oxides and hydroxides, dependence of their properties on the oxidation state of iron.

8. Organic chemistry

8.1 Alkanes: nomenclature, physical and chemical properties

Theory of organic compounds structure created by A. M. Butlerov. Dependence between structure and chemical properties. Isomers. Classification of organic compounds.

Alkanes – saturated hydrocarbons, sp^3 -hybridization of their carbon atoms, nomenclature, physical and chemical properties, production and applications. Substitution reactions.

8.2 Nomenclature and structure of unsaturated hydrocarbons

Alkenes, sp^2 -hybridization of their carbon atoms, sigma and pi bonds, nomenclature. Ethylene. Dienes. Alkynes, sp -hybridization of their carbon atoms, nomenclature. Acetylene.

8.3 Physical and chemical properties of unsaturated hydrocarbons

Physical and chemical properties of alkenes, dienes and alkynes, production and applications. Addition reactions.

8.4 Polymerization of unsaturated hydrocarbons

Polymerization reactions. The difference between polymerization and polycondensation. Polymerization of ethylene, 1,3-butadiene, isoprene.

8.5 Arenes: nomenclature, physical and chemical properties

Aromatic hydrocarbons. Arenes. Benzene, its electron structure, chemical properties. Benzene homologs. Toluene. Production of benzene and its homologs. Electrophilic substitution reactions.

8.6 Alcohols and phenols: nomenclature, physical and chemical properties

Alcohols. Classification and nomenclature. Physical and chemical properties. Methanol and ethanol, their applications. Ethylene glycol and glycerol, their applications. The difference between aromatic alcohols and phenols. Chemical properties of phenol in comparison with those of aliphatic alcohols. Applications of phenol.

8.7 Aldehydes and ketones: nomenclature, physical and chemical properties

Aldehydes, their structure and chemical properties. Production and application of methanal and ethanal. Structure, chemical properties and production of ketones. Acetone.

8.8 Carboxylic acids: nomenclature, physical and chemical properties

Carboxylic acids, the structure of carboxylic group. Physical and chemical properties of carboxylic acids. Formic, acetic, stearic, palmitic and oleic acids.

8.9 Esters and fats: nomenclature, physical and chemical properties

Esters, their structure, production and chemical properties. Fats, their chemical and physical properties. Saponification reaction.

8.10 Carbohydrates: nomenclature, physical and chemical properties

Carbohydrates. Their classification. Glucose, its structure and chemical properties, production and applications. Fructose, ribose and deoxyribose. Disaccharides. Sucrose, its structure, physical and chemical properties. Sucrose hydrolysis. Polysaccharides. Starch and cellulose, their structure, chemical properties, role in Nature and applications.

8.11 Amines, amino acids and proteins: nomenclature, physical and chemical properties

Aliphatic and aromatic amines. Their physical and chemical properties. Production of aniline from nitrobenzene. Amino acids, their structure, chemical properties, production and applications. Proteins. Their structure and biological roles.

EDUCATIONAL DISCIPLINE CURRICULAR CHART

Section, topic #	Section (topic) name	number of hours	Equipment	Form of control
		Practical lessons		
1 semesters				
1.	1.1. Physical and chemical properties of substances. Atoms and molecules. Symbols of chemical elements	3	Calculators; Periodic table	interview; test; written classroom practical exercises
2.	1.2. Atomic mass and molecular mass. The mole and molar mass	3	Calculators; Periodic table	interview; written home practical exercises; written classroom practical exercises
3.	1.3. Valence. Chemical equations and their balancing	3	Calculators; Periodic table	interview; test; situational tasks and tests; written home practical exercises; written classroom practical exercises
4.	1.4. Calculations using chemical equations	3	Calculators; Periodic table	interview; written home practical exercises
5.	1.5. Molar volume of gases. Relative densities of gases	3	Calculators; Periodic table	interview; written home practical exercises; written classroom practical exercises
6.	Final lesson on the main concepts and laws of chemistry	3	Calculators; Periodic table	Colloquium
7.	2.1. The Periodic table of elements	3	Calculators; Periodic table	interview; test; situational tasks and tests;

8.	2.2. Quantum numbers and electron configurations of elements	3	Calculators; Periodic table	written home practical exercises interview; test; written home practical exercises; written classroom practical exercises
9.	3.1. Types of chemical bonds. Electronegativity	3	Calculators; Periodic table	interview; test; situational tasks and tests; written home practical exercises; written classroom practical exercises
10.	3.2. Oxidation state	3	Calculators; Periodic table	interview; test; written home practical exercises; written classroom practical exercises.
11.	3.3. Classification of chemical reactions	3	Calculators; Periodic table	interview; situational tasks and tests; written home practical exercises; written classroom practical exercises.
12.	3.4. Balancing reduction-oxidation reactions	3	Calculators; Periodic table	interview; written home practical exercises; written classroom practical exercises.
13.	4.1. Chemical equilibrium. The law of mass action	3	Calculators; Periodic table	interview; written home practical exercises; written classroom practical exercises.
14.	4.2. The rate of a chemical reaction. Temperature coefficient of a chemical reaction	3	Calculators; Periodic table	interview; test; written home practical exercises; written classroom practical exercises.
2 semesters				
15.	Final lesson on the periodic table and the structure of the atom, on chemical bonds and structure of matter, chemical kinetics and catalysis	3	Calculators; Periodic table	Colloquium
16.	5.1. Oxides: classification, physical and chemical properties	3	Calculators; Periodic table	interview; written home practical exercises; written classroom practical exercises.

17.	5.2. Bases: classification, physical and chemical properties	3	Calculators; Periodic table	interview; written home practical exercises; written classroom practical exercises.
18.	5.3. Acids: classification, physical and chemical properties	3	Calculators; Periodic table	interview; written home practical exercises; written classroom practical exercises.
19.	5.4. Salts: classification, physical and chemical properties	3	Calculators; Periodic table	interview; test; written home practical exercises; written classroom practical exercises.
20.	5.5. Chains of chemical reactions	3	Calculators; Periodic table	interview; written home practical exercises; written classroom practical exercises.
21.	Final lesson on the main types of inorganic chemical compounds	3	Calculators; Periodic table	Colloquium
22.	6.1. Qualitative description of solutions. Solubility of chemical compounds in water	3	Calculators; Periodic table	interview; test; situational tasks and tests; written home practical exercises; written classroom practical exercises.
23.	6.2. Quantitative description of solutions. Mass percentage, molarity	3	Calculators; Periodic table	interview; written home practical exercises; written classroom practical exercises.
24.	6.3. Electrolytic dissociation. Weak and strong electrolytes	3	Calculators; Periodic table	interview; written home practical exercises; written classroom practical exercises.
25.	6.4. Ionic equations of chemical reactions	3	Calculators; Periodic table	interview; written home practical exercises; written classroom practical exercises.
26.	6.5. Hydrolysis of inorganic salts	3	Calculators; Periodic table	interview; test; written home practical exercises; written classroom practical exercises.
27.	Final lesson on solutions and electrolytic dissociation	3	Calculators;	Colloquium

			Periodic table	
28.	7.1. Chemistry of hydrogen and its compounds	3	Calculators; Periodic table; Set of reactants	visual laboratory-based studies; interview; written home practical exercises; written classroom practical exercises.
29.	7.2. Chemistry of halogens and their compounds	3	Calculators; Periodic table; Set of reactants	visual laboratory-based studies; interview; test; written home practical exercises; written classroom practical exercises.
30.	7.3. Chemistry of oxygen and its compounds	3	Calculators; Periodic table; Set of reactants	visual laboratory-based studies; interview; written home practical exercises; written classroom practical exercises.
31.	7.4. Chemistry of sulfur and its compounds	3	Calculators; Periodic table; Set of reactants	visual laboratory-based studies; interview; test; written home practical exercises; written classroom practical exercises.
32.	7.5. Chemistry of nitrogen and its compounds	3	Calculators; Periodic table; Set of reactants	visual laboratory-based studies; interview; written home practical exercises; written classroom practical exercises.
33.	7.6. Chemistry of phosphorus and its compounds	3	Calculators; Periodic table; Set of reactants	visual laboratory-based studies; interview; test; written home practical exercises; written classroom practical exercises.
34.	7.7. Chemistry of carbon and its compounds	3	Calculators; Periodic table; Set of reactants	visual laboratory-based studies; interview; written home practical exercises; written classroom practical exercises.
35.	7.8. Chemistry of silicon and its compounds	3	Calculators; Periodic table;	visual laboratory-based studies; interview; test;

			Set of reactants	written home practical exercises; written classroom practical exercises.
36.	7.9. Chemistry of alkali and alkaline-earth metals and their compounds	3	Calculators; Periodic table; Set of reactants	written home practical exercises; visual laboratory-based studies; interview; written home practical exercises; written classroom practical exercises.
37.	7.10. Chemistry of aluminum and iron, and their compounds	3	Calculators; Periodic table; Set of reactants	visual laboratory-based studies; interview; test; written home practical exercises; written classroom practical exercises.
38.	Final lesson on inorganic chemistry	3	Calculators; Periodic table	Colloquium
39.	8.1. Alkanes: nomenclature, physical and chemical properties.	3	Calculators; Periodic table	interview; test; written home practical exercises; written classroom practical exercises.
40.	8.2. Nomenclature and structure of unsaturated hydrocarbons.	3	Calculators; Periodic table	interview; written home practical exercises; written classroom practical exercises.
41.	8.3. Physical and chemical properties of unsaturated hydrocarbons.	3	Calculators; Periodic table	interview; written home practical exercises; written classroom practical exercises.
42.	8.4. Polymerization of unsaturated hydrocarbons.	3	Calculators; Periodic table	interview; written home practical exercises; written classroom practical exercises.
43.	8.5. Arenes: nomenclature, physical and chemical properties.	3	Calculators; Periodic table	interview; test; written home practical exercises; written classroom practical exercises.
44.	8.6. Alcohols and phenols: nomenclature, physical and chemical properties.	3	Calculators; Periodic table	interview; written home practical exercises; written classroom practical exercises.
45.	8.7. Aldehydes and ketones: nomenclature, physical and	3	Calculators;	interview;

	chemical properties.		Periodic table	written home practical exercises; written classroom practical exercises.
46.	8.8. Carboxylic acids: nomenclature, physical and chemical properties.	3	Calculators; Periodic table	interview; written home practical exercises; written classroom practical exercises.
47.	8.9. Esters and fats: nomenclature, physical and chemical properties.	3	Calculators; Periodic table	interview; test; written home practical exercises; written classroom practical exercises.
48.	8.10. Carbohydrates: nomenclature, physical and chemical properties.	3	Calculators; Periodic table	interview; written home practical exercises; written classroom practical exercises.
49.	8.11. Amines, amino acids and proteins: nomenclature, physical and chemical properties.	3	Calculators; Periodic table	interview; test written home practical exercises; written classroom practical exercises.
50.	Final lesson on organic chemistry	3	Calculators; Periodic table	Colloquium Examination

INFORMATION AND INSTRUCTIONAL UNIT

LITERATURE

Basic (relevant):

1. Введение в общую химию = Introduction to the general chemistry : практикум / В.В.Хрусталёв, Т.В.Латушко, Т.А.Хрусталёва. – 2-е изд., испр. – Минск : БГМУ, 2018. – 144 с.
2. Введение в неорганическую химию = Introduction to the inorganic chemistry : практикум / В.В.Хрусталёв, Т.В.Латушко, Т.А.Хрусталёва. – 2-е изд. – Минск : БГМУ, 2019. – 96 с.
3. Введение в органическую химию = Introduction to the organic chemistry : практикум / В.В.Хрусталёв, Т.В.Латушко, Т.А.Хрусталёва. – 2-е изд. – Минск : БГМУ, 2019. – 112 с.

Additional:

1. Ball, D.W. Introductory Chemistry, v. 1.0. / D.W.Ball. Washington : Flat World Education, Inc., 2014. – 352 p.
2. Wilson, D. Kaplan AP Chemistry 2014–2015 / D.Wilson. New York : Kaplan Publishing, 2014. – 396 p.

LIST OF AVAILABLE DIAGNOSTIC TOOLS

The following forms are used for competences assessment:

1. Oral form:
 - interview;
 - situational tasks and tests.
2. Written form:
 - test;
 - classroom practical exercises;
 - home practical exercises.
3. Oral-written form:
 - Colloquium.
4. Technical form:
 - visual laboratory-based studies.

LIST OF PRACTICAL SKILLS

1. Writing and balancing chemical equations.
2. Writing electron configurations.
3. Balancing redox reactions with the help of the electron-atom method.
4. Writing short ionic equations.
5. Solving stoichiometric problems.
6. Solving problems on the formation of solutions.
7. Writing kinetic equations.
8. Writing the constant of equilibrium equations.
9. Predicting the direction of a shift in chemical equilibrium.

10. Writing structural formulas of organic and inorganic compounds.

LIST OF PRACTICAL LESSONS

Semester 1

1. Physical and chemical properties of substances. Atoms and molecules. Symbols of chemical elements.
2. Atomic mass and molecular mass. The mole and molar mass.
3. Valence. Chemical equations and their balancing.
4. Calculations using chemical equations.
5. Molar volume of gases. Relative densities of gases.
6. Final lesson on the main concepts and laws of chemistry.
7. The Periodic table of elements
8. Quantum numbers and electron configurations of elements
9. Chemical bonds and structure of matter. Types of chemical bonds. Electronegativity.
10. Oxidation state.
11. Classification of chemical reactions.
12. Balancing reduction-oxidation reactions.
13. Chemical equilibrium. The law of mass action.
14. The rate of a chemical reaction. Temperature coefficient of a chemical reaction.

Semester 2

1. Final lesson on the periodic table and the structure of atom, on chemical bonds and structure of matter, chemical kinetics and catalysis.
2. Oxides: classification, physical and chemical properties
3. Bases: classification, physical and chemical properties
4. Acids: classification, physical and chemical properties
5. Salts: classification, physical and chemical properties
6. Chains of chemical reactions
7. Final lesson on main types of inorganic chemical compounds
8. Qualitative description of solutions. Solubility of chemical compounds in water.
9. Quantitative description of solutions. Mass percentage, molarity.
10. Electrolytic dissociation. Weak and strong electrolytes.
11. Ionic equations of chemical reactions.
12. Hydrolysis of inorganic salts.
13. Final lesson on solutions and electrolytic dissociation.
14. Chemistry of hydrogen and its compounds.
15. Chemistry of halogens and their compounds.
16. Chemistry of oxygen and its compounds.
17. Chemistry of sulfur and its compounds.
18. Chemistry of nitrogen and its compounds.
19. Chemistry of phosphorus and its compounds.
20. Chemistry of carbon and its compounds.

21. Chemistry of silicon and its compounds.
22. Chemistry of alkali and alkaline-earth metals and their compounds.
23. Chemistry of aluminum and iron, and their compounds.
24. Final lesson on inorganic chemistry
25. Alkanes: nomenclature, physical and chemical properties.
26. Nomenclature and structure of unsaturated hydrocarbons.
27. Physical and chemical properties of unsaturated hydrocarbons.
28. Polymerization of unsaturated hydrocarbons.
29. Arenes: nomenclature, physical and chemical properties.
30. Alcohols and phenols: nomenclature, physical and chemical properties.
31. Aldehydes and ketones: nomenclature, physical and chemical properties.
32. Carboxylic acids: nomenclature, physical and chemical properties.
33. Esters and fats: nomenclature, physical and chemical properties.
34. Carbohydrates: nomenclature, physical and chemical properties.
35. Amines, amino acids and proteins: nomenclature, physical and chemical properties.
36. Final lesson on organic chemistry.

COMPILERS/AUTHORS:

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signature

Khrustalev V.V.

Associate Professor of the Department of general Chemistry of the Educational Institution «Belarusian State Medical University», PhD, Associate Professor



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Latushko T.V.

Assistant Professor of the Department of General Chemistry of the Educational Institution «Belarusian State Medical University», MD



signature

Poboinev V.V.

Curriculum content, composition and accompanying documents comply with the established requirements.

Dean of the Faculty of Career Guidance and Pre-University Training

21. 06. 2019



A.R. Avetisov

Methodologist of the Educational Institution «Belarusian State Medical University»

21. 06. 2019



S.V. Zaturanova

Head of the Foreign Languages Department



M.N. Petrova

Information about the authors (compilers) of the curriculum

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23.05.2019

заседания кафедры общей химии
Председатель: доц. Хрусталёв В.В.
Секретарь: асс. Монахова Е.М.

ПРИСУТСТВОВАЛИ: заведующий кафедрой, доцент Хрусталев В.В., профессор Блохин А.В., доц. Ткачев С.В., доц. Латушко Т.В., доц. Ачинович О.В., доц. Петрушенко Л.Г., доц. Сперанская Е.Ч., доц. Прохорова Т.В., ст. преподаватели: Атрахимович Г.Э., Козел А.Р., Юзефович О.Н., Казюлевич С.Р., ассистенты: Сароко С.С., Барченко С.В., Монахова Е.М., Клышко И.А., Реуцкая Ж.И., Бондарец О.А., Хаминец С.Г., Семашко И.В., Рыбак Е.Н., Кохановская Е.Ю., Побойнев В.В., лаборанты: Бубенько Т.А., Шестакова Н.А., Смирнова О.И., Ковгареня Е.П., Комель В.В., Лабун Л.М., Никитина Т.В., Сеницкая Н.А.

ПОВЕСТКА ДНЯ

Текущие дела.

СЛУШАЛИ: Информацию доц. Хрусталёва В.В. Для слушателей подготовительного отделения иностранных учащихся, изучающих предмет «Химия» на английском языке, подготовлена новая рабочая учебная программа. Авторы: доц. Хрусталёв В.В., доц. Латушко Т.В., асс. Побойнев В.В. Программа составлена согласно учебным планам, оформлена по последним требованиям, содержание её соответствует русскоязычной версии аналогичной программы.

ВЫСТУПИЛИ: доцент Латушко Т.В.

ЗАКЛЮЧЕНИЕ: Рекомендовать программу по предмету «Химия» для рассмотрения на заседании методической комиссии по медико-биологическим дисциплинам.

Председатель, доцент



Хрусталёв В.В.

Секретарь, ассистент



Монахова Е.М.

Міністэрства аховы здароўя
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ВЫПСКА З ПРАТАКОЛА

12.06.2019 № 9

г. Мінск

засядання методічнай камісіі
медыко-біялагічных дысцыплін

Прэсідатэль камісіі – доцэнт, к.м.н. А.В.Чантурыя
Секрэтарь – доцэнт, к.м.н. Т.Г.Северіна

Присутствовали: доц. А.В.Чантурия, доц. С.В.Ткачев, доц. Т.Г.Северина, проф. А.Д.Таганович, проф. Р.Г.Заяц, доц. В.Г.Лещенко, доц. Т.И.Островская, доц. О.Н.Ринейская, доц. Н.В.Синельникова, проф. В.А.Чучко, доц. С.А.Гузов, доц. О.В.Лопухов, доц. Л.Д.Чайка, доц. Л.М.Сычик

Повестка дня:

○ О рекомендации учебной программы «Химия» для иностранных слушателей подготовительного отделения БГМУ, обучающихся на английском языке, к утверждению. Авторы: доц. Хрусталева В.В., доц. Латушко Т.В., асс. Побойнев В.В.

Информация доцента кафедры общей химии учреждения образования «Белорусский государственный медицинский университет» Ткачева С.В.

СЛУШАЛИ:

Ткачева С.В., который представил на рассмотрение разработанную на кафедре учебную программу по дисциплине «Химия» для иностранных слушателей подготовительного отделения БГМУ, обучающихся на английском языке. Учебная программа включает: учебный план изучения дисциплины «Химия» с учетом практических занятий, выполнения контрольных работ, тематический план учебных занятий, содержание дисциплины. В программе приведен перечень требований к усвоению учебного материала, перечислены формы контроля усвоения знаний. Учебную программу завершает список основной и дополнительной литературы, рекомендованной для изучения дисциплины, и перечень наглядных пособий.

РЕШИЛИ:

Рекомендовать учебную программу «Химия» для иностранных слушателей подготовительного отделения БГМУ, обучающихся на английском языке, (авторы Хрусталева В.В., Латушко Т.В., Побойнев В.В.), к утверждению проректором БГМУ.

Прэсідатэль методічнай камісіі
медыко-біялагічных дысцыплін, доцэнт

Секрэтарь, доцэнт

Міністэрства здравоахранення
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ВЫПСКА ИЗ ПРОТОКОЛА

12.06.2019 № 9

г. Минск



А.В. Чантурия

Т.Г. Северина

**AMENDMENTS AND CHANGES TO THE CURRICULUM IN THE EDUCATIONAL DISCIPLINE
“Chemistry”**

**for the attendees of the pre-university training courses
2020/2021 academic year**

#	Amendments and changes	Basis/Reason
	There are no amendments and changes	Educational Plan for 2020/2021 academic year

The curriculum is revised and approved at the department meeting
General Chemistry (protocol # 12 of 17.06.2020)

Head of the department of General Chemistry

PhD, Associate Professor

V.V.Khrustalev

APPROVED

Dean of the faculty of career guidance and pre-university training

PhD, Associate Professor

A.R.Avetisov