Federal state budgetary educational institute of the higher education

 "Orenburg state medical university" of Ministry of Health of the Russian Federation "

**INSTRUCTIONS**

**FOR THE INDEPENDENT WORK OF STUDENTS**

Chemistry

(name of subject)

majoring in (specialty)

31.05.01. Medical business (Faculty of Foreign Students) chemistry

(Code, name of training program (specialty)

It is part of the main professional educational program of higher education majoring in (specialty)

31.05.01. Medical business (Faculty of Foreign Students) chemistry

Minutes No. 8 dated March 25, 2016

Orenburg

1. **Explanatory note**

Independent work is a form of organization of the educational process that stimulates activity, independence, and the cognitive interest of students.

Independent work of students is an obligatory component of the educational process, since it ensures the consolidation of the acquired knowledge by acquiring the skills of comprehending and expanding their content, solving urgent problems of the formation of general cultural (universal), general professional and professional competencies, research activities, preparing for classes and passing the intermediate certification.

Independent work of students is a set of classroom and extracurricular activities and works that ensure the successful development of the educational program of higher education in accordance with the requirements of the Federal State Educational Standard. The form choice of organizing students' independent work is determined by the content of the discipline and the form of organization of training (lecture, seminar, practical lesson, etc.).

**2. Content of students' independent work.**

The content of tasks for independent work of students in discipline is presented in the fund of evaluation tools for current monitoring of progress and intermediate certification in the discipline, which is attached to the work program of the discipline, section 6 "Educational and methodological support for the discipline (module) ", in the information system University.

The list of educational, educational and methodological, scientific literature and information resources for independent work is presented in the work program of the discipline, section 8 "List of basic and additional educational literature necessary for mastering the discipline (module)".

**3. Methodical instructions for completing tasks for independent work in the discipline.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Self-theme** **work**  | **The form** **independent work1** | **Independent work control form** **(in accordance with section 4 of the RP)**  | **The form** **contact** **work at** **holding** **the current** **control** |
| o | 2 | 3 | 4 | 5 |
| ***Independent work*** ***Module 1 “General chemistry. The structure of matter. The doctrine of solutions "*** |
| o | Topic "Modern interpretation of the periodic law of D. I. Mendeleev on the basis of the electronic theory of the structure of the atom" | solving problems and exercises |  | classroom |
| 2 | Topic “Basic concepts and laws of chemistry. Basic concepts and laws of chemistry " | solving problems and exercises |  | classroom |
| 3 | Topic “Modern interpretation of the periodic law of D. I. Mendeleev on the basis of the electronic theory of the structure of the atom. Contemporary interpretation of the periodic law of DI Mendeleev on the basis of electronic theory of the atom. Theory of chemical bond. Structure of molecule " | solving problems and exercises |  | classroom |
| f | Topic “Structure of connections. Basic theoretical provisions on the structure of the atom. Chemical bond theory. Molecule structure. Modern interpretation of the periodic law of D. I. Mendeleev based on the electronic theory of the structure of the atom. The structure of compounds. Basic theoretical concepts about the structure of the atom. Contemporary interpretation of the periodic law of DI Mendeleev on the basis of electronic theory of the atom. Theory of chemical bond. Structure of molecule " | solving problems and exercises |  | classroom |
| . | Topic “Theory of chemical bonding. Molecule structure. The structure of compounds. Basic theoretical concepts about the structure of the atom " | execution of control work |  | classroom |
|  | Topic “Classes and nomenclature of inorganic compounds. Classes and the nomenclature of inorganic compounds " | execution of control work |  | classroom |
|  | The topic “The doctrine of solutions. Preparation of solutions with a given mass fraction. Colligative properties of solutions. Osmosis. The doctrine of the solutions. Preparation of solutions with a given mass fraction. Colligative properties of solutions. Osmoses " | solving problems and exercises |  | classroom |
|  | Topic “Buffer systems. The buffer system " | solving problems and exercises |  | classroom |
| ***Independent work*** ***Module 2 “Biologically important classes of organic compounds. Biopolymers and their structural components "*** |
|  | Topic "Carbohydrates, structure and chemical properties. Monosaccharides, structure and chemical properties. CARBOHYDRATES, STRUCTURE AND CHEMICAL PROPERTIES. MONOSACCHARIDES, STRUCTURE AND CHEMICAL PROPERTIES " | solving problems and exercisesexecution of control work |  | classroom |
|  | Topic "OLYGO-AND POLYSACCHARIDES, STRUCTURE AND CHEMICAL PROPERTIES. OLYGO- AND POLYSACCHARIDES, STRUCTURE AND CHEMICAL PROPERTIES" | solving problems and exercisesexecution of control work |  | classroom |
|  | Topic "HIGHER FATTY ACIDS. HIGHER FATTY ACIDS" | execution of control work |  | classroom |
|  | The theme “LIPIDS. PHOSPHOGLYCERIDES " | execution of control work |  | classroom |
|  | Topic "THE STRUCTURE AND CHEMICAL PROPERTIES OF α-AMINO ACIDS. The structure and chemical properties of alpha-amino acids (AMA)" | execution of control work |  |  |
|  | Topic "NUCLEIC ACIDS, COMPOSITION, STRUCTURE AND BIOLOGICAL SIGNIFICANCE / Nucleic acids, composition, structure and biological significance" | solving problems and exercisesexecution of control work |  | classroom |

**2. Methodical instructions for completing assignments for independent work in the discipline.**

 **METHODOLOGICAL INSTRUCTIONS FOR PERFORMANCE OF DESIGN TASKS**

*Module 1 “General chemistry. The structure of matter. The doctrine of solutions "*

*Module 2 “Biologically important classes of organic compounds. Biopolymers and their structural components "*

Design assignments are aimed at systematizing, consolidating and expanding theoretical and practical knowledge. As a result of performing design tasks, you will learn how to calculate various parameters of objects or processes.

The execution of design tasks includes several operations that must be interconnected in a certain way and applied in the established sequence in accordance with the emerging logic of the solution. It is this sequence that should lead to a positive result.

Algorithm for independent work on the implementation of design tasks:

1. Carefully read the training material on the topic under study (compendium). Use the reference material if necessary.
2. Write out the formulas from the synopsis (reference material) on the topic under study.
3. Note how these formulas were used when completing assignments in the lesson.
4. Write down your version of the assignment.
5. Analyze the conditions of the task and determine the algorithm for solving it.
6. Perform calculations.

Solve the proposed task using the formulas written out.

1. Make a decision.

If necessary, provide the solution with diagrams, pictures.

1. Analyze the result obtained (check the correctness of the substitution of numerical values ​​in the formulas, the correctness of calculations, the correctness of the derivation of the unknown value from the formula, etc.).

The criteria for evaluating independent work on the implementation of design assignments include:

* competent record of the conditions of the task and its solution;
* competent use of formulas;
* competent use of reference books;
* accuracy and correctness of calculations.

**INSTRUCTIONS** **ON DRAFTING ANSPECT**

A synopsis is a short record of the main content of a text using abstracts. When taking notes, the information selected and considered in the process of reading is recorded in a logical sequence.

There are two types of note-taking:

* taking notes of written texts (scientific, reference, normative literature, documentary sources);
* taking notes of oral messages (for example, lectures).

The abstract can be short or detailed. It should be noted that the verbatim recording of both written and spoken speech does not apply to note taking. The success of the outline depends on the ability to structure the material. It is important not only to learn how to highlight the basic concepts, but also to outline the connections between them. It is important to learn how to express the main idea of ​​the text in your own words, while maintaining the logic of the text by the author.

Types of abstracts:

*Outline plan*- this is a detailed detailed plan, in which sufficiently detailed records are given for those points of the plan that need clarification. A plan of the text is created, the points of the plan are accompanied by comments in the form of quotations or freely stated text.

*Textual synopsis*- This is a reproduction of the most important provisions and facts of the source (presentation of quotations).

*Free abstract*- these are clearly and concisely formulated (set out) the main provisions as a result of deep comprehension of the material. It may contain extracts, quotes, abstracts; part of the material can be represented by a plan.

*Thematic synopsis*- is compiled on the basis of studying a number of sources and gives a more or less exhaustive answer according to some scheme (question). Is a summary of the topic.

When taking notes, notes can be entered into pre-prepared tables. This is useful when preparing a single synopsis for several sources, especially when it is necessary to compare the data.

A kind of synopsis is a record made in the form of answers to pre-prepared questions.

Algorithm for independent work on drawing up a synopsis:

1. Determine the purpose of the outline.
2. Before starting to write your abstract, please indicate its sources.
3. Read the text carefully.
4. Specify incomprehensible words in reference books.
5. Highlight the main thing, make a plan.
6. Briefly formulate the main provisions of the text, note the author's argumentation.
7. Outline the material, clearly following the points of the plan. State the most essential provisions of the material under study sequentially and briefly in your own words or cite them in the form of quotations.

When preparing a synopsis, it is necessary to strive for the capacity of each sentence.

The records should be distributed in a specific sequence consistent with the logical structure of the source of information. Records should be kept clear, clear.

1. Write down your quotes correctly. When quoting, keep in mind the conciseness, the significance of the thought.
2. When writing a synopsis, reference the pages of the work outlined using a legend.
3. In conclusion, summarize the text of the synopsis, highlight the main content of the worked out material, give it an assessment.
4. Check the text carefully for errors and typos.
5. Make up your notes: highlight the most important places so that they are easy to see (underline, colored marker).
6. Formulate your questions and concerns that you would like to discuss in class.

The summary of the studied material can be made out in the form of a supporting summary.

Drawing up a basic outline - creating a brief information structure that summarizes and reflects the essence of the lecture material, the topic of the program. The supporting synopsis is designed to highlight the main objects of study, give them a brief description using symbols, reflect the connection with other elements. The main purpose of the keynote is to make it easier to remember. It uses various basic concepts, terms, signs (symbols) - reference signals.

A pivotal note is the best form of preparation for an answer, effectively used in the answer process (a detailed outline of your upcoming answer). The pivotal synopsis can be represented by a system of interconnected geometric figures containing blocks of concentrated information in the form of steps of a logical ladder; drawing with additional elements, etc.

Algorithm for independent work for compiling a reference outline:

1. Read the material of the topic under study in the text of the recommended sources.
2. Highlight the main thing in the studied material, make up the usual short notes.
3. Match the given text with reference signals in the form of separate words, definite signs, graphs, pictures.
4. Think over a schematic way of coding knowledge, using different fonts, frames, different arrangement of words (vertically, diagonally), etc.
5. Write a pivotal outline.

In terms of volume, the supporting synopsis should be approximately one full sheet.

All material should be arranged in small logical blocks, i.e. should contain several separate items, indicated by numbers or lowercase spaces.

When compiling a pivotal outline, you can use certain abbreviations and symbols that are often repeated in the course of the academic discipline or module.

Each small block (paragraph), along with a logical connection with the rest, should express a complete thought.

The supporting synopsis should be original in form, structure, graphic execution, due to which, it is better retained in memory. It should be visual and understandable not only for you, but also for the teacher and other students.

The criteria for evaluating independent work on the preparation of notes include:

* correspondence of the material of the abstract to the given topic;
* clear outline structure;
* correctness, conciseness and clarity of answers to questions on the outlined material;
* the correctness of the abstract.

**MODULE 1. Topic "Modern interpretation of the periodic law of D. I. Mendeleev on the**

**basis of the electronic theory of the structure of the atom"**

**Calculating the number of sub-atomic particles in an atom**

|  |  |  |  |
| --- | --- | --- | --- |
| Particle | Position | Relative Charge | Relative mass |
| Proton |  |  |  |
| Neutron |  |  |  |
| Electron |  |  | 9.1 \* 10-28 |

1. Complete the following table:

1. In the table above, why do we want to know the relative charge and relative mass, and not the real charges in С (coulomb) and real masses in kg? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Explain what mass number means. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Explain what atomic number means.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What are isotopes?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Complete the following table.

The first two rows have been done for you. You may need to look at your periodic table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Element | Symbol | Protons | Neutrons | Electrons |
| lithium | Li | 3 | 7-3 = 4 | 3 |
| carbon | FROM | 6 | 12-6 = 6 | 6 |
| sodium |  |  |  |  |
| aluminum |  |  |  |  |
|  | Pb |  |  |  |
|  | Ti |  |  |  |
|  | Zn |  |  |  |

**MODULE 1. Topic “Basic concepts and laws of chemistry. Basic concepts and laws of**

**chemistry "**

**Self-study questions**:

1. Application of the Mendeleev-Clapeyron equation of state for ideal gases to estimate the molecular weight of substances (molar weight - mass fraction of substances.).

2. Equivalent and equivalent weight of oxidizing agent and reducing agent.

**MODULE 1.** Topic “Modern interpretation of the periodic law of D. I. Mendeleev on the basis of the electronic theory of the structure of the atom. Contemporary interpretation of the periodic law of DI Mendeleev on the basis of electronic theory of the atom. Theory of chemical bond. Structure of molecule "

**Questions for self study:**

Natural and artificial radioactivity. Toxic effect of radionuclides, radiopharmaceutical drugs for treatment and diagnosis of diseases.

**MODULE 1. Theory of chemical bonding. Molecule structure. The structure of compounds. Basic theoretical concepts about the structure of the atom**

Bonding

A) Ionic bonding

 1) Which of the following compounds is formed by ionic bonding?

a) C2H6 b) NO2 c) Li2O d) O2

How were you able to tell this? Explain in terms of electronegativity difference:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 2) Which species will conduct electricity (is an electrolyte)?

a) NaCl (s) b) N2 (s) c) LiF (aq) d) CaI2 (s)

What gave it away? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3) Fill in the missing information:

When K and Cl atoms bond together:

K \_\_\_\_\_\_\_\_ \_\_\_\_ valence electron and becomes a \_\_\_\_\_\_ion, called a (n) \_\_\_\_\_\_\_\_ via \_\_\_\_\_\_\_\_\_

 Gains, loses # charge anion, cation oxidation, reduction

Cl \_\_\_\_\_\_\_\_ \_\_\_\_ valence electron and becomes a \_\_\_\_\_\_ion, called a (n) \_\_\_\_\_\_\_\_ via \_\_\_\_\_\_\_\_\_

 Gains, loses # charge anion, cation oxidation, reduction

four) Draw the dot diagram of the ionic compound KCl.

five) Draw the dot diagram of the ionic compound KCl.

6) Draw the dot diagram of the ionic compound CaF2.

B) Covalent Bonding

 1) Which of the molecules listed below has the most polar bond between the bonded atoms?

a) HF b) HCl c) HBr d) HI

How were you able to tell this? Explain in terms of electronegativity difference: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2) Which of the following compounds is formed by covalent bonding?

a) Na2S b) AlCl3 c) C6H12O6 d) LiH

How were you able to tell this? Explain in terms of types of elements: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3) Which of the following molecules contains a nonpolar covalent bond?

a) H2O b) HF c) F2 d) NH3

How were you able to tell this? Explain in terms of electronegativity difference: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4) Which of the following molecules contains a polar covalent bond?

a) H2 b) PH3 c) F2 d) NH3

How were you able to tell this? Explain in terms of electronegativity difference: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5) When an atom of H and an atom of F bond together:

The H will be partially \_\_\_\_\_\_\_\_\_, because it has \_\_\_\_\_\_\_\_\_\_\_electronegativity than F.

 charge higher, lower

The F will be partially \_\_\_\_\_\_\_\_\_, because it has \_\_\_\_\_\_\_\_\_\_\_electronegativity than N.

 charge higher, lower

6) Hydrogen and sulfur atoms combine to form a molecule of H2S, called hydrogen sulfide.

a) Show, using the chart below, how hydrogen and sulfur combine to form a molecule of hydrogen sulfide:

Dot diagram of Dot diagram of Dot diagram of Dot diagram of

Hydrogen atom Sulfur atom Hydrogen atom Hydrogen Sulfide

b) How can you tell this molecule is formed by covalent bonding and not ionic bonding? Explain in terms of electronegativity difference.

c) Are the bonds between hydrogen and sulfur polar or nonpolar? Explain, in terms of electronegativity difference.

7) Complete the following chart, drawing the dot diagram of each element in the molecule and then the dot diagram of the molecule. If the formula is H2O, make sure you have two atoms of H and one of O in your dot diagram of the molecule.

Formula Dot diagram for: Dot diagram for: Dot Diagram of Molecule

F2 F F

N2 N N

HBr H Br

H2O H O

NH3 N H

8) Identify the following bonds as being polar covalent or nonpolar covalent. For the polar covalent bonds, label the δ + and δ- ends.

Bond END Polar or Nonpolar? If polar, label the δ + and δ- ends

 H-H H - H

 HC HC

 H-Cl H-Сl

8) Regarding the nonmetallic element, oxygen:

Oxygen atoms have \_\_\_\_ unpaired valence electrons. This means that they can form \_\_\_\_\_ covalent bonds.

 # #

Two O atoms have\_\_\_\_\_unpaired electrons between them. When they form O2, they share \_\_\_\_\_ electrons.

 # #

Two O atoms form \_\_\_\_\_ bonds between them, also known as a \_\_\_\_\_\_\_\_\_\_\_\_ bond.

 # type

Each covalent bond is a \_\_\_\_\_ of shared unpaired valence that form \_\_\_\_\_ orbitals.

 # #

**MODULE 1. Classes and nomenclature of inorganic compounds. Classes and the nomenclature of inorganic compounds**

**The sample number 1**

1. Complete reaction eauation: Na2O + SiO2 → Ca (OH) 2 + Cl2O3 → Ba (H2PO4) 2 + Al2 (SO4) 3 →

2. Make the reactions by which to make such transformations of: Na → NaCl → NaOH → Na2CO3 → NaHCO3 → Na2CO3 → Na2SO4

3. Write the equation of dissociation of elektrolytes: H2SO4 →

BaCl2 →

Cr (OH) Br2 →

**MODULE 1. Topic “The doctrine of solutions. Preparation of solutions with a given mass fraction. Colligative properties of solutions. Osmosis. The doctrine of the solutions. Preparation of solutions with a given mass fraction. Colligative properties of solutions. Osmoses "**

**Self-study tasks:**

1. The calculation of the mass fraction of substances in solution.

**Task**... How many grams of boric acid and water is needed to prepare 250g of solution with mass fraction of 3% boric acid?

Solution: The formula for calculating the mass fraction:





2. Calculation of the molar concentration of a solution.

**Task.** How many grams of sodium chloride is necessary for the preparation of 1L solution with CM = 2 mol / l?

Solution: The formula for calculating the molar concentration:



3. Calculation of the molar concentration equivalent.

**Task**... How many grams of KMnO4 is required to prepare a 2l solution with CH = 0.5 mol / l if the analysis are performed in acidic environment?

Solution:



4. Calculation of molality concentration.

**Task.** Calculate the molality concentration of the solution prepared with 2g of KOH and 200g of water.

Solution: The formula for calculating molality concentration:



5. Calculation of titer.

**Task.** Calculate the titer of sulfuric acid, cw = 50% and ρ = 1.4 g / ml.

Solution: The formula for calculating the titer of the solution





6. Relationship of different ways of expressing concentration.

**Task.** Find the molar concentration equivalent of sulfuric acid solution with mass fraction of 10% (density 1.22, fekv. = 1/2).

Solution: The formula for the transition from the mass of the particle to a molar

concentration equivalent to:



**Task for the material:**

1. Calculate the mass of water that is needed to 50g of sodium chloride solution with mass fraction of NaCl 2% for solution with mass fraction of NaCl 0.9%.

2. Mass fraction of sulfuric acid in solution 3.2%. Calculate the molar concentration equivalent of sulfuric acid in the solution (ρ =1.02 g / ml).

3. For introducting in to the patient general anesthesia using sodium oxybutyrate that comes in 10 ml vials in a mass fraction of substance 20%, weight 60 kgpatient. The drug must enter at the rate of 70 mg / kg. How many ml must enter into the patient?

**Table regarding the expression of different methods of concentration**



**Part 2: COLLIGATIVE PROPERTIES OF SOLUTIONS. OSMOSE.**

**Task:**Calculate Posm. sodium chloride solution with mass fraction 5.85% at 0 ° C. The degree of dissociation of sodium chloride 0.96, and ρ =1.04 g / ml.

Solution: We translate the mass fraction in the molar concentration.



Let's calculate the isotonic coefficient:



Osmotic pressure is calculated using the formula for the electrolytes:



**Task for the material:**

1. How many moles of nonelectrolyte are placed in 1 literof solution at 0 ° C if Posm. = 1atm?

2. Is there an isotonic solution of urea and acetic acid by mass 0.6%, if the degree of dissociation of acetic acid is equal to 0.01, while the density of solutions - 1 g / ml.

3. Determine the molar concentration of sucrose solution which is isotonic relative to blood.

4. Calculate the isotonic coefficient of calcium chloride solution if the degree of dissociation of calcium chloride is equal to 68%.

**MODULE 1.THE BUFFER SYSTEM.**

*1. Calculating pH of buffer system.*

**Task.** Calculate the pH of buffer system which consists of 100 ml of dilute acetic acid, C = 0.1 mol / l and 200 ml of sodium acetate C = 0.2 mol / l, Kd (acid) = 1.75 10- five.



*2. Quantification of components for the preparation of buffer systems with a certain pH.*

**Task.** Calculate the volume of sodium acetate C = 0.1 mol / l and the amount of acetic acid with C = 0.1 mol / l which must be mixed to prepare 3l of acetate buffer рH = 5.24 (Кd (acid) = = 1.75 10-5).



Antilog of 0.48 is equal to 3. [V (salt)] / [V (acid)] = 3/1. So you need 3 parts of salt solution and one-part acid solution for the preparation of buffer systems with pH = 5.24. The volume of salt is: 3000 3/4 = 2250ml, and acid 3000 1/4 = 750ml.

**Test work No. 1**

1. Calculate the pH of buffer system which consists of 200 ml of dilute acetic acid, C = 0.2 mol / l and 300 ml of sodium acetate C = 0.1 mol / l, Kd (acid) = 1.75 · 10-5.

2. Calculate the volume of sodium acetate C = 0.1 mol / l and the amount of acetic acid with C = 0.1 mol / l which must be mixed to prepare 5 l of acetate buffer рH = 5.24 (Кd ( acid) = = 1.75 10-5).

**Test work No. 2**

1. Calculate the pH of buffer system which consists of 100 ml of dilute acetic acid, C = 0.2 mol / l and 400 ml of sodium acetate C = 0.5 mol / l, Kd (acid) = 1.75 · 10-5.

2. Calculate the volume of sodium acetate C = 0.1 mol / l and the amount of acetic acid with C = 0.1 mol / l which must be mixed to prepare 2 l of acetate buffer рH = 5.24 (Кd ( acid) = = 1.75 10-5).

**Test work No. 3**

1. Calculate the pH of buffer system which consists of 200 ml of dilute acetic acid, C = 0.5 mol / l and 300 ml of sodium acetate C = 0.7 mol / l, Kd (acid) = 1.75 · 10-5.

2. Calculate the volume of sodium acetate C = 0.2 mol / l and the amount of acetic acid with C = 0.2 mol / l which must be mixed to prepare 1 l of acetate buffer рH = 5.24 (Кd ( acid) = = 1.75 10-5).

**Test work No. 4**

1. Calculate the pH of buffer system which consists of 200 ml of dilute acetic acid, C = 0.1 mol / l and 400 ml of sodium acetate C = 0.2 mol / l, Kd (acid) = 1.75 · 10-5.

2. Calculate the volume of sodium acetate C = 0.5 mol / l and the amount of acetic acid with C = 0.1 mol / l which must be mixed to prepare 2 l of acetate buffer рH = 5.24 (Кd ( acid) = = 1.75 10-5).

**MODULE 2.1.CARBOHYDRATES, STRUCTURE AND CHEMICAL PROPERTIES. MONOSACCHARIDES, STRUCTURE AND CHEMICAL PROPERTIES**

**Examples of tasks:**

1. Write the hydrolysis scheme of О – methyl – β – D – glycopyranoside.



2. Write the formula of glucosamine.



one.



2. Name each compound.



\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Give reagents to show how to synthesize the compounds on the right from the compounds on the left.



4. Give reagents to carry out the transformations below.



**MODULE 2.2. OLYGO-AND POLYSACCHARIDES, STRUCTURE AND CHEMICAL PROPERTIES.OLIGO- AND POLYSACCHARIDES, STRUCTURE AND CHEMICAL PROPERTIES**

**The questions for individual learning:**

**Self-study questions**:

1. Starch hydrolysis, qualitative reaction for starch determination.

2. Heteropolysaccharides: hyaluronic acid, heparin, chondroitin sulfate, their composition and the structure of disaccharide fragment, biological meaning.

**MODULE 2.3. HIGHER FATTY ACIDS. HIGHER FATTY ACIDS.**

**The questions for individual learning:**

**Self-study questions**:

1. Non Saponification lipids (definition).

2. Structure of cholesterine, bile acids, biological role.

**Sample 1**

1. Write the formation reaction of 1-O-palmitoyl-2,3-di-O-stearoyl glycerol 2. Write the configuration of linoleic acid.

3. Design the chemical method to distinguish between saturated and unsaturated fatty acids.

**Sample 2**

1. Write the formation reaction of fat containing one residue of linoleic acid and two molecules of palmitic acid.

2. Write the reaction equation of oxidation of oleic acid by potassium permanganate.

3. Call the products of hydrolysis of oil.

**Sample 3**

1. Write the reaction equation of interaction between iodine and trioleoylglycerol.

2. Write the differences between fat, oil and waxes.

3. What are the bile acids? Design their general formula.

**Sample 4**

1. Write the formation reaction of oil.

2. Write the configuration of linolenic acid.

3. What is hydrogenation of fats? Write the scheme of the reaction.

**MODULE 2.4. LIPIDS. PHOSPHOGLYCERIDES.**

**The questions for individual learning:**

1. Non Saponification lipids (definition).

2. Structure of cholesterine, bile acids, biological role.

**Sample 1**

1. Write the structural formulas of aromatic amino acids.

2. Write the reaction equation between cysteine ​​and methanol.

3. Write the scheme of decarboxylation of valine.

**Sample 2**

1. Write the structural formulas of heterocyclic amino acids.

2. Write the reaction equation between arginine and ethanol.

3. Write the reaction equation between alanine and valine.

**Sample 3**

1. Write the structural formulas of monoamino-monocarboxylic acids.

2. Write the reaction equation between lysine and formaldehyde.

3. Write the reaction equation between valine and nitrous acids.

**Sample 4**

1. Write the structural formulas of oxy amino acids.

2. Write the reaction equation between glycine and ethanol.

3. Write the scheme of decarboxylation of leucine.

**MODULE 2.5.THE STRUCTURE AND CHEMICAL PROPERTIES OF α-AMINO ACIDS. Structure and chemical properties of alpha-amino acids (AMA).**

**The questions for individual learning:**

1.Classification of amino acids

**Sample 1**

1. Write the structural formulas of aromatic amino acids.

2. Write the reaction equation between cysteine ​​and methanol.

3. Write the scheme of decarboxylation of valine.

**Sample 2**

1. Write the structural formulas of heterocyclic amino acids.

2. Write the reaction equation between arginine and ethanol.

3. Write the reaction equation between alanine and valine.

**Sample 3**

1. Write the structural formulas of monoamino-monocarboxylic acids.

2. Write the reaction equation between lysine and formaldehyde.

3. Write the reaction equation between valine and nitrous acids.

**Sample 4**

1. Write the structural formulas of oxy amino acids.

2. Write the reaction equation between glycine and ethanol.

3. Write the scheme of decarboxylation of leucine.

**MODULE 2.6. NUCLEIC ACIDS, COMPOSITION, STRUCTURE AND BIOLOGICAL SIGNIFICANCE. Nucleic acids, properties, structure and biological role.**

**The questions for individual learning**:

1. Qualitative reaction on carbohydrate component and phosphoric acid.
2. Formation of N-glicosidic and ester bonds.
3. The action mechanism of coenzyme NAD +

**Give one word answer**

1. What is a nucleoside?

2. What are purine bases?

3. What is phosphodiates linkage?

4. Which is the direction of DNa double strands?

5. Give the keto enol form of adenine.

**Answer the followings**

1. Explain the structure of purine and pyrimidine bases.

2. Explain the primary structure of DNA.

3. List out the functions of DNa and RNA.

**Give one word answer**

1. What is a nucleoside?

2. What are purine bases?

3. What is phosphodiates linkage?

4. Which is the direction of DNa double strands?

5. Give the keto enol form of adenine.

**Answer the followings**

1. Explain the structure of purine and pyrimidine bases.

2. Explain the primary structure of DNA.

3. List out the functions of DNa and RNA.

**Give one word answer**

1. What is a nucleoside?

2. What are purine bases?

3. What is phosphodiates linkage?

4. Which is the direction of DNa double strands?

5. Give the keto enol form of adenine.

**Answer the followings**

1. Explain the structure of purine and pyrimidine bases.

2. Explain the primary structure of DNA.

3. List out the functions of DNa and RNA.

**Give one word answer**

1. What is a nucleoside?

2. What are purine bases?

3. What is phosphodiates linkage?

4. Which is the direction of DNa double strands?

5. Give the keto enol form of adenine.

**Answer the followings**

1. Explain the structure of purine and pyrimidine bases.

2. Explain the primary structure of DNA.

3. List out the functions of DNa and RNA.

**Var. 1**

1. Write the structure of lactim-lactam tautomerization of uracyl.

2. Write the hydrolysis of cytidine.

3. Write the structure of the dinucleotides RNA: guanine - cytosine.

**Var. 2**

1. Write the structure of lactim-lactam tautomerization of thymine.

2. Write the hydrolysis of uridine.

3. Write the structure of the dinucleotides RNA: guanine - cytosine.

**Var. 3**

1. Write the structure of lactim-lactam tautomerization of cytosine.

2. Write the hydrolysis of adenosine.

3. Write the structure of the dinucleotides RNA: guanine - cytosine.

**Var. four**

1. Write the structure of lactim-lactam tautomerization of guanine.

2. Write the hydrolysis of thymidine.

3. Write the structure of the dinucleotides RNA: guanine - cytosine.

**Methodical instructions for students**

**on the formation of skills in lecture material note-taking**

1. The basis for the qualitative assimilation of the lecture material is the synopsis, but the synopsis is not so much a device for fixing the lecture content as a tool for its assimilation in the future. Therefore, think about what your outline should be so that you can solve the following tasks faster and more successfully:

a) to finalize the records in the future (clarify, enter new information);

b) to work on the content of the records - compare individual parts, highlight the main ideas, draw conclusions;

c) to reduce the time for finding the necessary material in the synopsis;

d) to reduce the time required for repetition of the studied and passed material, and increase the speed and accuracy of memorization.

To complete points "c" and "d", during the work on the abstract, it is advisable to make notes also with pencil:

Example 1

Example 2

2. When taking notes, it is better to use large format notebooks - for convenience and freedom in the rational placement of notes on the sheet, as well as separate, lined sheets in a cage, which can be easily and quickly connected and disconnected.

3. Writing on one side of the sheet will allow, when working through the material, to lay out the necessary sheets on the table and, changing their order, bring together different parts of the course in time and space, which makes it easier to compare, establish connections, generalize the material.

4. With any method of taking notes, it is advisable to leave free space on the sheet for subsequent additions and notes. These are either wide margins or blank pages.

5. Lectures are recorded on the right page of each sheet in a spread, the left one remains blank. If you do not do this, then when preparing for the exams, additional, explanatory and other information will have to be entered between the lines, and the summary will turn into a text of little use for reading and assimilation.

6. When taking notes, the principle of distant note-taking operates, which allows separate blocks of information to be divided horizontally and vertically during recording: separate parts of the text are separated by distinct spaces - this is vertical division; horizontally, the material is divided into zones by fields: I - outlined text, II - own notes, questions, conventional signs, III - subsequent additions, information from other sources.

7. A great help in understanding the logic of the presented material is provided by rubrication, ie. numbering or designation of all its sections, subsections and smaller structures. At the same time, simultaneously with the note-taking, a text plan is drawn up. It is important that each new thought, aspect or part of the lecture is indicated by its own sign (number, letter) and separated from others.

8. The basic principle of note-taking is not to write everything, but in such a way as to preserve everything really important and the logic of the presentation of the material, which, if necessary, will allow to completely "expand" the note into the original text according to the formula "note + memory = original text".

9. In any text there are reference words, for example, helping to understand more important information (“in the end”, “as a result”, “in this way”, “summary”, “conclusion”, “summarizing all of the above”, etc. .) or signals of difference, i.e. words indicating the peculiarity, specificity of the object of consideration ("peculiarity", "characteristic feature", "specificity", "main difference", etc.). These words are usually followed by very important information. Pay attention to them.

10. If in the course of the lecture graphic modeling is proposed, then the reference scheme is written down large, freely, as crowding and small print make it difficult to understand.

11. Usually in a lecture there are several main ideas around which all the rest of the material is grouped. It is very important to highlight and clearly document these ideas.

12. In the lecture, the plan, sources, concepts, definitions, basic formulas, schemes, principles, methods, laws, hypotheses, estimates, conclusions are recorded in the most detail.

13. Each listener has his own cursive writing system, which is based on the following techniques: the words most frequently encountered in a given area are shortened the most; there are generally accepted abbreviations and abbreviations: "i.e", "etc.", "TE", etc .; mathematical signs are used: "+", "-", "=", ">". "<" and others; endings of adjective and participles are often omitted; words starting with a root are written without an ending ("soc.", "rev.", etc.) or without a middle ("q-ty")

14. The system of accentuation and designations helps to understand the material and quickly find the right one. During the lecture, there should be 2-3 colored pencils or felt-tip pens on the desk, with which arrows, wavy lines, frames, conventional icons on the auxiliary field circle, emphasize or indicate key aspects of the lectures.

For example, a straight line indicates an important thought, a wavy line indicates an incomprehensible thought, and a vertical line in the margin indicates a particularly important thought. The main point is underlined in red, the wording - in blue or black, green - the actual illustrative material.

15. The quality of the assimilation of the material depends on its active listening, therefore, externally show your attitude to one or another of its aspects: agreement, disagreement, bewilderment, question, etc. - this will allow the lecturer to better adapt the presented material to the audience.

16. An indicator of attention to educational information are questions to the lecturer. During the lecture, try to find and mark those aspects of the lecture that can become a "hook" for the question, and then in the next lectures, learn to formulate questions without being distracted from the perception of the content.

**Methodical instructions for students on preparation**

 **to practical training**

Practical training is a form of organization of the educational process, aimed at improving students' practical skills and abilities through group discussion of the topic, educational problem under the guidance of a teacher.

*When developing an oral response in a practical lesson, you can use the classic oratory scheme. This scheme is based on 5 stages:*

1. Selection of the necessary material for the content of the upcoming speech.

2. Drawing up a plan, dismembering the collected material in the necessary logical sequence.

3. "Verbal expression", literary processing of speech, saturation of its content.

4. Memorization, memorization of the text of the speech or its individual aspects (if necessary).

5. Making a speech with the appropriate intonation, facial expressions, gestures.

*Recommendations for building the composition of an oral response:*

1. The introduction should:

- to attract attention, arouse the interest of listeners to the problem, the subject of the answer;

- explain why your judgments about the subject (problem) are authoritative, meaningful;

- to establish contact with listeners by pointing to common views, previous experience.

2. The pre-notifications should:

- reveal the history of the problem (subject) of the speech;

- show its social, scientific or practical significance;

- to reveal previously known attempts to solve it.

3. In the process of argumentation it is necessary:

- to formulate the main point and give, if necessary for its clarification, additional information;

- to formulate an additional point, if necessary, accompanying it with additional information;

- to formulate a conclusion in general terms;

- to point out the disadvantages of alternative positions and the advantages of your position.

 4. In conclusion, it is advisable:

- summarize your position on the problem under discussion, your final conclusion and decision;

- justify what the consequences are if you abandon your approach to solving the problem.

*Recommendations for drawing up a detailed response plan*

*to theoretical questions of practical training*

1. When reading the studied material for the first time, divide it into the main semantic parts, highlight the main thoughts and conclusions.

2. When drawing up a detailed outline plan, formulate its points, subparagraphs, determine what exactly should be included in the outline for the disclosure of each of them.

3. The most essential aspects of the studied material (theses) consistently and briefly state in your own words or cite in the form of quotations.

4. In the synopsis include both key points and specific facts and examples, but not describe them in detail.

5. Write individual words and whole sentences in abbreviated form, write out only keywords, instead of citing, make only links to the pages of the cited work, use conventional symbols.

6. Arrange paragraphs in steps, use colored pencils, markers, felt-tip pens to highlight significant places.

**Methodical instructions for preparation for test work**

Preparation for the test. The test is assigned after studying a certain section (sections) of the discipline and is a set of detailed written answers of students to questions that they receive from the teacher in advance.

*Algorithm for preparing for the test:*

- study of lecture notes revealing material, knowledge of which is verified by test work;

- repetition of educational material received in preparation for seminars, practical classes and during their conduct;

- study of additional literature, which specifies the content of the tested knowledge;

- drawing up in mental form answers to the questions posed in the test;

- the formation of a psychological attitude for the successful completion of all tasks.

**Methodological instructions for the preparation of an oral report**

Report - a public announcement or document that contains information and reflects the essence of the issue or research in relation to a given situation.

Algorithm for the task:

1) to formulate the topic clearly;

2) to study and select the literature recommended on the topic, highlighting three sources of bibliographic information:

- primary (articles, dissertations, monographs, etc.);

- secondary (bibliography, abstract journals, signal information, plans, graph diagrams, subject indexes, etc.);

- tertiary (reviews, compilation works, reference books, etc.);

3) to write a plan that is fully consistent with the chosen topic and logically reveals it;

4) to write a report, observing the following requirements:

- to the structure of the report - it should include: a short introduction substantiating the urgency of the problem; main text; conclusion with brief conclusions on the problem under study; list of used literature;

- to the content of the report - general provisions should be supported and explained with specific examples; not to retell individual chapters of a textbook or study guide, but to state your own thoughts on the essence of the issues under consideration, to make your own suggestions;

5) to arrange the work in accordance with the requirements.

**Methodological instructions for the preparation of a written summary**

Synopsis (from Lat. Conspectus - overview, presentation) - 1) written text that systematically, concisely, logically and coherently conveys the content of the main source of information (articles, books, lectures, etc.); 2) synthesizing form of record, which may include a plan of the source of information, extracts from it and its theses.

In the process of performing independent work, you can use the following types of abstracts: (the teacher can immediately indicate the required type of abstracts, based on the goals and objectives of independent work)

- planned synopsis (plan-synopsis) - a synopsis based on the formed plan, consisting of a certain number of items (with headings) and sub-items corresponding to certain parts of the information source;

- textual synopsis - a detailed form of presentation based on extracts from the source text and its citation (with logical connections);

- an arbitrary summary - a summary that includes several ways of working on the material (extracts, citation, plan, etc.);

- schematic synopsis (context-diagram) - a synopsis based on a plan, composed of points in the form of questions that need to be answered;

- thematic synopsis - development and coverage in a concise form of a specific issue, topic;

- basic synopsis (introduced by V.F.Shatalov) - a synopsis in which the content of the information source is encoded using graphic symbols, pictures, numbers, keywords, etc .;

- summary synopsis - processing of several texts for the purpose of their comparison, comparison and reduction to a single structure;

- selective summary - selection of information from the text on a specific topic.

In the process of performing independent work, the student can use the following forms of note-taking: (the teacher can immediately indicate the required form of note-taking, based on the content of the task and the goals of independent work)

- plan (simple, complex) - a form of note-taking, which includes analysis of the structure of the text, generalization, highlighting the logic of the development of events and their essence;

- extracts - the simplest form of note-taking, reproducing the text almost verbatim;

- abstracts - a form of note-taking, which is the conclusions drawn from the read;

- citation - a verbatim extract that is used when it is impossible to convey the author's thought in your own words

**Algorithm for the task:**

1) to determine the purpose of the synopsis;

2) to write down the title of the text or part of it;

3) to write down the output data of the text (author, place and year of publication);

4) to highlight the main semantic parts of the text during the initial reading;

5) to highlight the main provisions of the text;

6) to highlight the concepts, terms that require clarification;

7) consistently and concisely state in your own words the essential provisions of the material being studied;

8) to include in the record conclusions on the main provisions, specific facts and examples (without a detailed description);

9) to use techniques of visual reflection of the content (paragraphs "steps", various ways of underlining, pens of different colors);

10) to follow the citation rules (the quote must be enclosed in quotation marks, a link to its source is given, the page is indicated).

**Guidelines for the implementation of the glossary**

Glossary - a dictionary of specialized terms and their definitions.

Glossary article - definition of a term. The purpose of the glossary is the collection and systematization of concepts or terms, united by a common specific topic, according to one or several sources.

**Algorithm for the task:**

1) to read the work carefully (educational / scientific text);

2) to define the most frequently used terms;

3) to make a list of terms united by a common theme;

4) to arrange the terms in alphabetical order;

5) to compose glossary articles:

- to give the exact wording of the term in the nominative case;

- to expand on the meaning of this term.

**Methodological instructions for completing a case task**

Case-task (English case - case, situation) is a teaching method based on the analysis of practical problem situations - cases related to a specific event or sequence of events.

***Algorithm for the task:***

1) to prepare the main text with questions for discussion:

- title page with a short memorable name of the case;

- introduction, which mentions the hero (s) of the case, tells about the history of the issue, indicates the start time of the action;

- the main part, which contains the main body of information, internal intrigue, problem;

- conclusion (in it, the solution to the problem considered in the case may sometimes not be completed);

2) to select applications with a selection of various information that conveys the general context of the case (documents, publications, photos, videos, etc.);

3) to suggest a possible solution to the problem.

**Methodological instructions for the implementation of a thematic portfolio**

Thematic portfolio of works - materials reflecting the goals, process and result of solving a specific problem within the framework of a particular topic of the discipline (module).

**The structure of the thematic portfolio of works:**

- accompanying text of the author of the portfolio with a description of the purpose, purpose and a brief description of the document;

- content or table of contents;

- organizer (diagrams, pictures, tables, graphs, diagrams, histograms);

- a list of observations of the processes that occurred during the work;

- written work;

- video clips, computer programs;

- a reflective journal (personal considerations and questions of the student, which make it possible to discover the connection between the knowledge received and received).

**Algorithm for the task:**

1) to justify the choice of a portfolio topic and give a title to your work;

2) to choose headings and give them names;

3) to find the relevant material and systematize it, presenting it in the form of a synopsis, diagram, cluster, mind map, table;

4) to compile a dictionary of terms and concepts based on reference literature;

5) to select the necessary sources of information (including Internet resources) on the topic and write abstracts;

6) to select statistical material by presenting it in graphic form; to conclude;

7) to select illustrative material (drawings, photos, videos);

8) to draw up a research plan;

9) to conduct research, process the results;

10) to check for links to sources of information.

**Methodological instructions for compiling summary (generalizing)**

**tables to text**

Pivot (summarizing) table - a concentrated representation of the relationship between the studied phenomena, expressed in the form of variables.

Rules for compiling the table:

1) the table should be expressive and compact, it is better to make several small, but visual tables that meet the research task;

2) the name of the table, the headings of the columns and lines should be formulated accurately and concisely;

3) the studied object and units of measurement must be indicated in the table;

4) in the absence of any data in the table, put an ellipsis or pi-jester "no information", if any phenomenon did not take place, then put a dash;

5) the values ​​of the same indicators are given in the table with the same degree of accuracy;

6) the table should have totals for groups, subgroups and in general;

7) if the summation of the data is impossible, then the multiplication sign is put in this column;

8) in large tables, a gap is made after every five lines for readability and analysis.

**Methodological instructions for the preparation and execution of the abstract**

Abstract - an independent research work of a student to reveal the essence of the problem under study, to present various points of view and their own views on it. The abstract in sequence should contain all its structural elements: title page, content, introduction, main part, conclusion, list of sources used.

1. The title page of the abstract should reflect the name of the university, the name of the faculty and the department where this work is performed, the title of the abstract, the surname and group of the person who performed it, the surname and academic degree of the examiner.

2. In the table of contents, the titles of the points of the abstract are sequentially stated, the pages from which each point begins are indicated.

3. In the introduction, the essence of the problem under study is formulated, the choice of the topic is substantiated, its significance and relevance are determined, the purpose and objectives of the abstract are indicated, and the characteristics of the literature used are given.

4. Main part: each section demonstratively reveals a separate problem or one of its sides, is logically a continuation of the previous one; in the main part can be presented tables, graphs, diagrams.

5. Conclusion: summarizes or gives a generalized conclusion on the topic of the abstract, offers recommendations.

The content of the abstract should be logical; the presentation of the material is problem-specific, and the text fully reflects the topic, meeting the following requirements:

- the relevance of the problem under consideration;

- the validity of the stated problems, questions, proposals;

- consistency, consistency and brevity of presentation;

- reflection of the opinion on the problem of the referee.

References in the text of the abstract to the sources used must be made in square brackets, indicating the source number according to the list of references given at the end of the work (for example: [2]). The literal cited sentences of the author or pages of his texts (for example: [2. pp. 24-25]) are indicated through a dot after the number. The proper names of the authors in the text of the abstract and sources in a foreign language are given in the original language. The volume of the abstract as an integral part of teaching practice should be from 15 to 20 typewritten A4 pages. Font size "Times New Roman" 14 pt, line spacing, margins: right - 10 mm; top, left and bottom - 20 mm. Page numbering should be continuous, starting from the title page (no number is put on the title page).

**Methodological instructions for preparing a computer presentation**

Computer presentation: demonstration in a visual form of the main provisions of the report, the degree of mastering the content of the problem.

Algorithm for preparing a computer presentation:

1) preparation and agreement with the scientific supervisor of the text of the report;

2) development of the presentation structure;

3) creating a Power Point presentation;

4) rehearsal of the report using the presentation.

***Requirements for the design of a computer presentation:***

- The presentation must fully comply with the text of your report. First of all, you need to compose the text of the report itself, and secondly, to create a presentation.

- The title slide should contain the topic of the report and the surname, name and patronymic of the speaker.

- The order of the slides should clearly correspond to the structure of your presentation. Do not plan to return to previous slides or turn them forward during the presentation, this will complicate the process and can disrupt your reasoning.

- Do not try to reflect the entire text of the report in the presentation! The slides should only show the main points of your talk.

- Slides should not be overloaded with graphic and text information, various animation effects.

- The text on the slides should not be too small (size 24-28).

- Sentences should be short, maximum 7 words. Each separate information should be in a separate sentence or on a separate slide.

- The theses of the report must be generally understandable.

- Spelling errors in the text of the presentation are not allowed!

- Illustrations (figures, graphs, tables) must have a clear, concise and expressive title.

- In the design of the presentation, adhere to the principle of "less is more"

- You shouldn't use more than 3 different colors on one slide.

- Beware of light colors, they are difficult to see from a distance.

- The combination of background and text colors should be such that the text is easy to read. Best combination: white background, black text. It is recommended to use black or dark blue as the main font.

- It is better to use the same color scheme throughout the presentation, rather than different styles for each slide.

- Use only one type of font. Better to use a plain typeface instead of exotic and flowery fonts.

- On the final slide, as a rule, they thank you for your attention, provide information for contacts.

*Requirements for the text of the presentation:*

- do not write long;

- break text information into slides;

- use headings and subheadings;

- to improve readability, use: formatting, lists, font selection.

*Presentation background requirements:*

Recommended use: blue on white, black on yellow, green on white, black on white, white on blue, green on red, red on yellow, red on white, orange on black, black on red, orange on white, red on green.

*Requirements for presentation illustrations:*

- The more abstract the material, the more effective the illustration.

- What can be portrayed, it is better not to describe in words.

- To portray what is difficult or impossible to describe in words.

- Use animation as one of the most effective means of attracting and controlling the user's attention.

- Use video information that allows you to dynamically demonstrate information in real time, which is not available with traditional teaching.

- Remember that video information requires a lot of computing resources and significant costs for the delivery and reproduction of images.