

BASIC CONCEPTS AND LAWS OF CHEMISTRY

1. General chemistry. Theoretical basis of the course.

1.1. Introduction.

Physical and chemical phenomena.

1.2. Atomic-molecular theory.

Basic concepts and laws of chemistry.

Atoms. Molecules. Chemical elements.

Relative atomic mass of matter.

Relative molecular mass.

Mole. Molar mass.

The law of conservation of mass of matter. Equations of chemical reactions.

Gas laws. Avogadro's law.

Molar volume of gas. Volume fraction.

1.3. The structure of the atom. Periodic system of elements.

Electronic structure of atoms.

Pauli principle.

Periodic Law of D.I. Mendeleev.

1.4. Chemical bond

Main types of chemical bond.

Covalent bond.

Ionic bond.

1.5. Intermolecular linkage. The structure of the substance.

Power of intermolecular linkage.

Aggregate states of substance.

1.6. Basic classes of inorganic compounds

Oxides, their chemical nature.

Fundamentals. Nomenclature of bases. Alkali and water-insoluble bases.

Acids, their classification by composition. The main chemical powers of acids.

Amphoteric hydroxides. The main chemical properties of amphoteric hydroxides.

Salt. Classification by chemical properties and composition.

1.7. Patterns of chemical reactions.

Classification of chemical reactions.

1.7.1. Energy of chemical processes.

Exo- and endothermic reactions. The thermal effect of the reaction. Hess's law.

1.7.2. Chemical kinetics and equilibrium.

Rate of chemical reactions.

Effect of temperature on reaction rate. Catalysis.

1.8. Solutions.

1.8.1. General characteristics of solutions

Representation of solutions. Solubility.. Mass fraction of solute; molar concentration.

1.8.2. Electrolyte solutions.

Theory of electrolytic dissociation. Strong and weak electrolytes. Electrolytic dissociation constant. Electrolytic dissociation of water. Hydrogen pH. Indicators. Ionic processes. Hydrolysis of salts.

1.9. Redox processes.

Oxidation and reduction processes. Oxidizers and reducing agents.

1.10. Electrochemical processes.

Representation of electrode potentials. Electrochemical series. Galvanic elements.

Faraday's laws of electrolysis.

2. Inorganic chemistry. Properties of chemical elements and their compounds.

2.1. General properties of metals.

Physical and chemical properties of metals. Alloys. Corrosion of metals.

2.2. s-elements

2.2.1. Elements of I A group

Position in the periodic system of elements, the structure of their atoms. Sodium, its properties. Compounds of Sodium.

Potassium, its properties, compounds.

2.2.2. Elements of II A group

Position in the periodic system of elements, the structure of their atoms.

Calcium, physical and chemical properties. Calcium compounds and their applications.

2.3. p-elements

2.3.1. Elements of III A group

Position in the periodic system of elements, the structure of their atoms.

Aluminum. Natural aluminum compounds. Properties of aluminum.

2.4. d-elements

Elements of VI B group.

The position in the periodic system of elements, the structure of their atoms. Chrome. Physical and chemical properties. Redox properties of chromium compounds.

2.4.2. Elements of VII B group.

The position in the periodic system of elements, the structure of their atoms.

Manganese. Chemical properties of manganese oxides.

2.4.3. Elements of VII B group.

The position in the periodic system of elements, the structure of their atoms.

Iron. Application of iron, its alloys and compounds.

2.5. General properties of non-metals. Hydrogen.

General characteristic of non-metals. Position of non-metals in the periodic table of elements. Structure of the atoms of non-metals.

Hydrogen. The structure of the atom. Physical and chemical properties of hydrogen.

2.6. p-elements

2.6.1. Elements of IV A group

The position in the periodic system of elements, the structure of their atoms. Carbon (Carbon). Carbon oxides (IV).

Environmental protection from combustion products.

3. Organic Chemistry

3.1. The main provisions of organic chemistry.

Theory of the structure of organic compounds. Electronic structure of carbohydrate connections.

Classification of organic compounds. Functional groups.

3.2. Hydrocarbons.

Classification of hydrocarbons. Saturated hydrocarbons (alkanes).

Methane, tetraedric structure of methane. Physical and chemical properties, obtaining.

Unsaturated hydrocarbons. Structure of molecules. Alkenes and alkynes, nomenclature. Physical and chemical properties.

Aromatic hydrocarbons. Benzene, electronic structure of benzene. Physical and chemical properties.

3.3. Oxygen-containing organic compounds

Alcohols. Homologous series of saturated monohydric alcohols. Methanol and ethanol. Electronic structure.

Physical and chemical properties. Polyhydric alcohols - ethylene glycol and glycerol. Aromatic alcohols and phenol.

Structure, properties, application. Carboxylic acids: formic and acetic, their structure and properties.

Alkynes. Carbohydrates. Monosaccharides.

Glucose, sucrose. Structure, properties and applications. Polysaccharides. Starch, cellulose.

3.4. Nitrogen-containing organic compounds. Nitrocompounds. General formula. Structure. Amines. Structure, isomerism, classification. Amino acids. Classification and nomenclature.

Proteins. Classification. The structure of proteins, their meaning. Nucleic acids.