

Chemistry Exam estimation principles

Different options are available on-line. All of them have the the same structure, meaning that tasks are identical in different options.

Chemistry exam consists of two parts.

Part 1 consist of 15 tasks: 8 of them are tasks with multiple choice, 7 are tasks to establish correspondence between a series of questions and answers. The answer should be given as a sequence of digits. Each digit should be written in a separate cell without spaces and other symbols. Sequence of digits in the answer to be aligned with the sequence of proposed answers.

Tasks of Part 1 are estimated from 1 to 4 scores. The maximum total score for Part 1 is 41.

Part 2 contains 5 tasks with expanded answer and is estimated from 2 to 5 scores depending on number of answer elements, the completeness and correctness of the answer. The maximum total score for Part 2 is 41.

Table

Answers Evaluation Criteria

Part 1

Verifiable Content Elements (Type of Activity)	Amount of answers	Maximum score
1. The structure of the electron shells of atoms of elements of the first four periods: s-, p- and d-elements. The electronic configuration of the atom. Ground and excited states of atoms. (Multiple choice)	2	2
2. Laws of the chemical properties of elements and their connections to periods and groups. General characteristics of metals IA – IIIA groups in connection with their position in the Periodic table and structural features of their atoms. (Multiple choice)	3	3
3. Covalent chemical bond, its varieties and formation mechanisms. Characteristics of covalent bonding (polarity and bonding energy). Ion bond. Metal bond. Hydrogen bond. Substances of molecular and non-molecular structure. Type of crystal lattice. The dependence of the properties of substances on their composition and structure (Multiple choice)	2	2

4. Classification of inorganic substances. Nomenclature of inorganic substances (trivial and international) (Establishing of correspondence)	3	3
5. Chemical properties of metals: alkaline, alkaline earth, magnesium, aluminum; transition metals: copper, zinc, chromium, iron. The characteristic chemical properties of simple non-metal substances: hydrogen, halogens, oxygen, sulfur, nitrogen, phosphorus, carbon, silicon. Characteristic chemical properties of basic, amphoteric, acid oxides (Multiple choice)	2	2
6. Chemical properties of metals (see above), non-metals (see above), oxides (see above), bases and amphoteric hydroxides; acids; medium, acid, base and complex salts (Establishing of correspondence)	4	4
7. Identified missing substances in the reaction equation of inorganic substances. (Multiple choice)	2	2
8 Classification of organic substances. Nomenclature of organic substances (trivial and international) (Establishing of correspondence)	3	3
9. The theory of the structure of organic compounds: homology and isomerism. The mutual influence of atoms in molecules. Types of bonds in the molecules of organic substances. Hybridization of carbon atomic orbitals. Radical. Functional group (Multiple choice)	2	2
10. Typical chemical properties of hydrocarbons: alkanes, cycloalkanes, alkenes, dienes, alkynes, aromatic hydrocarbons (benzene and homologues of benzene, styrene). The most important methods for producing hydrocarbons. (Multiple choice)	2	2
11. The characteristic chemical properties of alcohols, phenol, aldehydes, carboxylic acids, esters. The most important methods for producing oxygen-containing organic compounds (Multiple choice)	2	2

12. Interconversion of hydrocarbons, oxygen-containing and nitrogen-containing organic compounds (Establishing of correspondence)	2	2
13. Electrolysis of melts and solutions (salts, alkalis, acids) (Establishing of correspondence)	4	4
14. Hydrolysis of salts. The environment of aqueous solutions: acidic, neutral, alkaline (Establishing of correspondence)	4	4
15. Reversible and irreversible chemical reactions. Chemical equilibrium. Displacement of balance under the influence of various factors (Establishing of correspondence)	4	4
Total	Part 1	41

Part 2

No and topic of question	Expected answer	Maximum score
16. Calculations using the concept of "mass fraction of substances in solution"	Mass fraction is calculated	2
	Sub total	2
17. Calculations by thermochemical equations	Amount of heat is calculated	2
	Sub total	2
18. Redox reactions	Oxidizing agent is named	1
	Reducing agent is named	1
	Oxidation product is named	2
	The number of electrons is indicated	1
	Sub total	5
19. Calculations of the mass (volume, amount of substance) of the reaction products. Calculations of the mass fraction of the chemical compound in the mixture	Reaction product is named	1
	Mass of reaction product is calculated	2
	Mass of solution is calculated	1
	Mass fraction is calculated	1
	Sub total	5
20. Establishment of a molecular formula and the name of an organic substance, determination of the type of chemical reaction involving this substance	The molar ratio is indicated	3
	Organic substance is named	1
	Type of reaction is named	1
	Sub total	5

Total	Part 2	19
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The maximum score for the correct completion of all exam tasks – **60**.

The exam duration is 1 hour (60 minutes).

Part 1 is estimated by computer, Part 2 is checked by members of subject commission.

Chairman of the subject commission
in chemistry
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