



National Research Lobachevsky State University of Nizhny Novgorod
Admissions and Academic Coordination Office for International Students

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Topics and Questions for English + Chemistry admission test

CHEMISTRY

1. CHEMISTRY: GENERAL ISSUES

The subject of chemistry. Role and tasks of chemistry.

Basic concepts and laws of chemistry. Atomic-molecular doctrine. Symbolism of chemistry. Basic stoichiometric laws. Stoichiometric calculations. Ideal gases and their mixtures. Gas laws and calculations with their use.

Structure of the substance. Structure of atomic nuclei and electron shells of atoms.

D.I. Mendeleev's periodic law and periodic system of chemical elements. Basics of the theory of chemical bonding.

Solutions. Basics of the theory about solutions. Calculations using concentrations of solutions. The theory of electrolytic dissociation.

Regularities of chemical reactions. Classification of chemical reactions. Compiling equations of chemical reactions. Basics of thermochemistry. Thermochemical calculations. Chemical equilibrium. The theory about the rate of chemical reactions and catalysis. Chemical reactions in electrolyte solutions. Chemistry and electric current.

2. BASICS OF INORGANIC CHEMISTRY

Classification of inorganic substances. General overview of simple substances.

General methods for obtaining complex substances of different classes and their main chemical properties.

Chemistry of non-metals. Hydrogen, oxygen, elements of fluorine, sulphur, nitrogen and carbon subgroups. Obtaining, structure, properties and application of the most important simple and complex substances formed from these elements.

Chemistry of metals. Alkaline and alkali-earth metals. Aluminium. Some representatives of transition elements: chromium, manganese, iron, copper, zinc.

Obtaining, structure, properties and application of simple and complex substances formed from these elements.

3. BASICS OF ORGANIC CHEMISTRY

Theoretical foundations of organic chemistry. Theory of chemical structure.

Electronic structure of organic compounds. Intermediate particles in reactions involving organic compounds. Classification of reagents and reactions with participation of organic compounds. Classification of organic compounds.

Chemistry of hydrocarbons and their derivatives. Saturated hydrocarbons, ethylene, diene, acetylene and aromatic hydrocarbons. Halogen derivatives of hydrocarbons.

Alcohols and phenols. Aldehydes. Carboxylic acids and their derivatives. Nitrogen-containing compounds. Organic compounds with several functional groups.

Obtaining, structure, properties and application of organic substances of these classes.

General concepts of high-molecular compounds.

Main strategies of organic synthesis.

4. APPLIED SECTIONS OF CHEMISTRY

Basics of chemical technology. Production of the most important inorganic substances. General overview of metallurgical processes. Mineral fertilizers. Natural sources of organic compounds and their processing. Industrial synthesis of the most important organic substances.

Basics of qualitative analysis of substances.

Chemistry and the environment. Water hardness. Corrosion of metals.

ENGLISH

GRAMMAR:

- possess spelling skills within the lexico-grammatical minimum of the appropriate level
- use various communicative types of sentences: affirmative, interrogative, general, special, alternative, separating questions;
- use Present, Future, Past Simple; Present Perfect; Present Continuous, negative, inquisitive (in affirmative and negative forms);
- separate main information from secondary information;
- identify the most significant facts;

- identify facts/examples in accordance with the question/problem posed;
- use common and non-common simple sentences, including those with several circumstances,
- use sentences with the initial *It*;
- use sentences with the initial *There + to be*;
- use compound sentences with conjunctions *and, but, or*;
- use in speech compound subordinate sentences with conjunctions and allied words *what, when, why, which*
- words *what, when, why, which, that, who, if, because, that's why, than, so, for, since,*
- *during, so that, unless*;
- use conditional sentences of real (Conditional I) and unreal (Conditional II) character;
- use sentences with the construction *I wish*;
- use sentences with the construction *so/such*;
- use emphatic constructions like *It's him who... It's time you did smth*;
- use sentences with constructions *as ... as; not so ... as; either ... or; neither ... nor*;
- use constructions with verbs with *-ing: to love/hate doing something; stop talking etc.*;
- use constructions *It takes me ... to do something; to look/feel/be happy*;
- use indirect speech in affirmative and questioning sentences in the present and past tense;
- use verbs in the most common temporal forms of the active voice: Present Simple of the active voice: Present Simple, Future Simple and Past Simple, Present and Past Perfect, Present and Past Continuous, Present and Past Perfect;
- use verbs in the following forms of the active voice: Present Perfect Continuous and Past Perfect Continuous;
- use verbs in the following forms of the passive voice: Present Simple Passive, Future Simple Passive, Past Simple Passive, Present Perfect Passive;
- use various grammatical means to express the future tense: Simple Future, to be going to Simple Future, to be going to, Present Continuous;
- use Participle I and Participle II;
- use modal verbs and their equivalents in speech (*may, can/be able to, must/have to/should; need, shall, could, might, would*);
- harmonize tenses within a complex sentence in terms of present and past;
- use the names of nouns in the singular and in the plural formed by the plural, formed according to the rule, and exceptions;
- use the definite/indefinite/zero article;

- use personal, possessive, indicative, indefinite, relative, interrogative pronouns;
- use the names of adjectives in the positive, comparative and superlative degrees, formed according to the rule, and exceptions;
- use adverbs in the positive, comparative and superlative degrees, as well as adverbs expressing quantity (*many/much, few / a few, little / a little*);
- use quantitative and ordinal numerals;
- use prepositions in phrases expressing direction, time, place of action;
- use prepositions in phrases expressing direction, time, place of action;
- use various means of connection in a text to ensure its integrity (firstly, finally, at last, in the end, however, etc.).

CONTENT OF WRITING:

- daily life and everyday life, distribution of household duties in the family, shopping;
- life in the city and countryside, problems of the city and countryside;
- communication in the family and school, family traditions, interpersonal relations with friends and acquaintances;
- health and care, well-being, medical services, healthy lifestyle;
- the role of young people in modern society, their interests and hobbies
- leisure of young people: visiting circles, sports sections, hobby clubs, correspondence;
- native country and the country/countries of the language being studied, their geographical position,
- climate, population, towns and villages, places of interest;
- traveling around your home country and abroad, sightseeing;
- nature and environmental problems;
- cultural and historical peculiarities of their country and the countries of the target language;
- contribution of Russia and the countries of the target language to the development of science and world culture;
- modern world of professions, labor market;
- possibilities of continuing education in higher school;
- plans for the future, the problem of choosing a profession;
- the role of foreign language skills in the modern world;
- school education, subjects studied, attitude to them, vacations;
- scientific and technological progress, its prospects and consequences, new information technologies;
- holidays and significant dates in different countries of the world.