

Chemistry

Year 10

High school chemistry course is aimed at such educational, developmental and upbringing tasks as:

- deepening the knowledge on the chemical component of the natural science picture of the world: the most important chemical concepts, laws and rules, theories and processes; and modern chemical nomenclature;
- developing the skills of independent acquisition of knowledge on chemistry from different information sources and within experimental research; treat them critically; use the obtained knowledge to explain the features of substances and various chemical phenomena;
- develop a notion of a positive role of chemistry as a science facilitating the progress of the society, understanding the need of well-thought approach to one's health and the environment.

Course structure (52 hrs, 1.5 hrs per week)

Content of educational material	Expected results
Repeating the initial knowledge on organic substances	
Components, features, using of separate carbohydrates (methane, ethane, ethene, ethine), oxygen-containing (methanol, ethanol, glycerol, ethane acid), and nitrogen-containing organic substances (aminoethane acid).	Pupil makes up the molecular, structural and semistructural formulas of methane and nine of its homologs ($C_2H_6 - C_{10}H_{22}$), ethene, ethine, methanol, ethanol, glycerol, ethanoic acid and aminoethane acids.
Topic 1. Theory of composition of organic compounds	
Dependence of the features of substances on the composition and chemical content of molecules. Concept of isomerism and isomers. Covalent carbon-carbon bonds in the molecules of organic substances: simple, double, and triple. Classification of organic substances.	Pupil: <ul style="list-style-type: none"> • Distinguishes between the organic substances in terms of components: hydrocarbons, oxygen-containing and nitrogen-containing organic substances; simple, double, and triple carbon-carbon bonds; • characterizes the essence of the composition of organic substances; • solves tasks on the molecular formula of substances using mass fractions of elements with a preferred method.
Topic 2. Hydrocarbons	
Hydrocarbons classifications. Alkanes.	Pupil:

<p>Alkenes and alkynes. Chemical properties of ethene and ethine. Arenes. Using hydrocarbons.</p>	<ul style="list-style-type: none"> • Classifies hydrocarbons of different homological rows, compares their composition and features; • characterizes the chemical features of alkanes, ethene and ethine, benzene, and methods of obtaining them; • sets connections between the composition, ingredients, features, storing, transporting and use of hydrocarbons, and their impact on the environment; relations between the homological rows of hydrocarbons; • adheres to the rules of safe conduct with hydrocarbons and their derivatives in household; • solves problems on the molecular formula of substance using the general homological row formula, density and relative density; mass, volume or number of reagents or products of reaction, justifying the selected means of solving.
<p>Topic 3. Oxygen-containing organic substances</p>	
<p>Alcohols Phenol Aldehydes Carbon acids Ethers Hydrocarbons</p>	<p>Pupil:</p> <ul style="list-style-type: none"> • names the general formulas and characteristic (functional) groups of alcohols, aldehydes, carbon acids, and ethers; in terms of systematic nomenclature, the alcohols, aldehydes, saturated monocarboxylic acids, and ethers; • explains the impact of characteristic (functional) group on the physical and chemical features of oxygen-containing organic compounds; hydrogen bond on physical features of oxygen-containing organic substances; • provides examples of alcohols, aldehydes, saturated monocarboxylic acids, ethers, fats, carbohydrates, and their trivial names; spreading of oxygen-containing organic substances in nature and food products.
<p>Topic 4. Nitrogen-containing organic substances</p>	
<p>Saturated and aromatic amines Aminoacids</p>	<p>Pupil:</p> <ul style="list-style-type: none"> • names the general formulas and characteristic (functional) group of amines and aminoacids; • explains the structural formulas of amines and aminoacids; amphoteric behavior of aminoacids; understands the notions of characteristic (functional) aminogroup, peptide group, polypeptide; • provides examples of amines, aminoacids, and proteins.
<p>Topic 5. Synthetic high-molecular substances and polymer materials based on them</p>	
<p>Synthetic high-molecular substances. Polymers. Impact of polymer materials on human health and environment.</p>	<p>Pupil:</p> <ul style="list-style-type: none"> • distinguishes between polymerization and polycondensation reactions, plastics, rubbers, and synthetic fibers;



<p>Problems of disposal of polymers and plastics in the context of sustainable society development. Synthetic fibers: physical features and use.</p>	<ul style="list-style-type: none"> ● describes the features of polymer materials; ● compares natural, artificial and synthetic fibers, and plastics; ● sets cause and effect bonds between the composition, structure, features and use of polymers; ● adheres to rules of safe conduct with synthetic materials.
<p>Topic 6. Multitude and bonds between the classes of organic substances</p>	
<p>Bonds between the classes of organic substances. General concepts of biologically active substances (vitamins and enzymes). Role of organic chemistry in solving the raw material, power, and food problems, and creation of new materials.</p>	<p>Pupil:</p> <ul style="list-style-type: none"> ● distinguishes between organic substances from the point of view of affiliation to the relevant homological rows; ● makes up the equations of reactions on genetic bonds between the organic substances; ● reveals the presence of organic substances in food products using indicators; ● sets the bonds between the classes of organic substances; ● uses knowledge on the organic substances to explain their diversity; ● adheres to the rules of safe conduct with organic substances.