

Chemistry

(Year 11)

(70 hrs, 2 hrs per week)

Table of contents	
1.	<p>Periodic law and periodic table. Phenomenon of periodic change of element features and their compounds based on the beliefs on electron atom structure. Electron and graphic electron formulas of atoms of s-, p-, d-elements. "Minimal energy" principle. Excited state of an atom. Valent states of elements. Possible degrees of oxidation of non-metal elements of the 2 and 3 periods.</p>
2	<p>Chemical bond and structure of substances Ion, covalent, metal, and hydrogen chemical bonds. Donor-acceptor mechanism of covalent bond (using the example of ammonium cation). Crystal and amorphous state of solid substances. Dependence of physical features of substances on their structure.</p>
3.	<p>Chemical reactions Non-reversible and reversible chemical processes. Chemical equilibrium. Le Chatelier-Braun principle. Salt hydrolysis. Concept of galvanic element as a chemical source of electric current.</p>
4.	<p>Non-organic substances and their features Non-metals. General characteristics of non-metals. Physical features. Allotropism. Allotropic modifications of non-metal elements. Concept of adsorption. Oxidizing and reducing properties of non-metals. Usage of non-metals. Compounds of non-metal elements with Hydrogen. Peculiarities of water solutions of these substances and their use. Oxides of non-metal elements, their content in air. Acids. Acid rains. Peculiarities of interaction of metals with nitrate and concentrated sulphate acids. General characteristics of metals. Physical properties of metals and features of their structure. Using metals and their alloys. Bases. Features and use of Sodium and Calcium hydroxide. Salts in nature. Neutral and acid salts. Concept of water hardness and methods of its elimination. Modern silicates. Mineral fertilizers. Concept of acid and alkaline soils. Quality reactions on certain ions. Biological value of metal and non-metal elements. Genetic bonds between the main classes of non-organic compounds.</p>
5.	<p>Chemistry and human progress Role of chemistry in creating new materials, development of new technology directions, and solving the food, raw material, energy, and ecology problems. "Green" chemistry: modern tasks of chemical science and chemical technology.</p>
Expected results	



Pupil:

- makes up electron and graphic electron formulas of atoms of s-, p-, d-elements (Ferrum) of 1–4 periods adhering to the “minimal energy” principle; atoms of non-metal elements of the 2 and 3 periods in the main and excited states; equations confirming the reducing properties of metals, specifically, aluminum and iron (reactions with non-metals, water, acids, and salts in solutions);
- forecasts physical features of substances based on their structure and substance structure based on their physical features; possibility of salt hydrolysis reaction; and pH of salt water solution media;
- makes up a plan of study and conducts an experiment to define the genetic bonds between the non-organic and organic substances;
- conducts an experiment on defining the pH of the salt water solution media using indicators;
- adheres to safety rules during chemical experiments;
- calculates the relative outcome of reaction product using chemical equation justifying the selected solution method;
- justifies the periodic change of element features and their simple components based on electron structure of their atoms;
- forecasts physical features of substances based on their structure and substance structure based on their physical features;
- argues about the use of periodic law to forecast the features of elements not yet discovered;
- assesses the role of chemistry in creating new materials, development of new technology directions, and solving food, raw material, energy, and ecology problems.