THE SIGNIFICANCE OF STUDYING THE TOPIC "CHEMICAL BOND" ON THE BASIS OF INTERDISCIPLINARY INTEGRATION

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Abstract. *The importance of studying the topic "Chemical bond" by the method of interdisciplinary integration based on the integration of chemistry with physical science is emphasized. The connection between physical concepts is carefully covered: the energy of a chemical bond, the bond length, the angle between bonds (valence angle) and the nature of a chemical bond and the reactivity of substances.*
Keywords: *chemical education, chemical bond, interdisciplinary integration, chemical bond formation, chemical bond nature.*

INTRODUCTION. Currently, the goal of all the work being carried out in the field of education in our country at the initiative of the President is to bring the process of education to the level of modern requirements for the future generation of our country, to enable them to think independently, to acquire knowledge, to learn from the rich scientific and spiritual heritage of our ancestors. is to teach to appreciate the educational heritage. This, in turn, requires teachers to further improve their experience, modernize the chemistry education system, and fully equip the educational process with new educational methodological complexes and new advanced pedagogical technologies. [1-3].

Relevance of the topic: The use of modern and information technologies in the educational system, the formation and development of independent thinking and knowledge acquisition skills of our children is one of the urgent tasks facing the representatives of the education sector. As well as all educational subjects, integrative methods are of great importance in the thorough and effective mastering of chemistry. Pupils' understanding of the content of the given topics, assimilation of chemical concepts, laws, and evidential data on the example of some substances is carried out with the help of teaching methods. In order for all of this to be at the required level, the use of integrative methods in chemistry education today has a good effect, because the lessons conducted with these methods help the student to think independently, develop his speech, communicate with each other and even teaches to draw conclusions.

The purpose of this research work is to develop recommendations on the use of inter-disciplinary integrative methods in the acquisition of effective knowledge and skills of chemistry by high school students, especially in the teaching of chemical bonding topics, and to determine their effectiveness in the course of the lesson.

MAIN PART

The doctrine of chemical bonding is one of the main doctrines of modern chemistry. Because without knowing this doctrine, it is impossible to explain the reasons for the diversity of chemical compounds, the nature of their properties, such as the mechanism of their formation, their structure, and their ability to react.

A chemical substance consists of crystals, molecules, and ions formed by atoms and their interconnections, and the sum of forces holding atoms in compounds is recognized as a chemical bond.

It is known that in the formation of a chemical bond, the electrons in the outer and outer energy levels of the element atoms participate and are redistributed. Electrons involved in chemical bonding are called valence electrons. Main group elements can participate in chemical bonding with outer shell electrons, and side group elements with outer and outer second shell electrons. Their maximum number can be known from the position of the element in the periodic system, that is, from the group number (with the exception of some elements). Atoms of elements tend to complete outer energy levels. For this, the same atom can take electrons from other atoms or pair valence electrons together or give electrons to another atom.[4-6].

How bonds are formed between the atoms of an element depends on the element's need for electrons. When explaining the nature of chemical bonds, there is a need to integrate pure chemical knowledge with physical science. For example, to quantitatively express the need of atoms for electrons, the concept of electronegativity was first introduced.

Electronegativity is the ability of an atom of the same element to withdraw electrons from an atom of another element.

Chemical bond physical properties include chemical bond energy, bond length, angle between bonds (valence angle) and nature of bond.

Bond energy is measured by the minimum energy required to break a bond between atoms. Binding energy is equal to the amount of energy required to break the bonds of molecules in one mole of substance, and it is denoted by E and measured in kJ/mol and kcal/mol. The greater the binding energy, the stronger the bond, and the smaller it is, the opposite. The value of bond energy depends on the nature of interacting atoms, bond length, bond type and nature. Bond energy increases horizontally from alkali metals to halogens. in groups, from top to bottom, the number of elements decreases with increasing number. For example:

E (H–O) = 460, 5 kJ/mol in H_2O molecule;

E (H–S) = 229.4 kJ/mol in H_2S molecule;

E (H–Se) = 174.8 kJ/mol in H_2Se molecule;

E (H–Te) = 140, 5 kJ/mol in H_2Te molecule.

The length of a bond is the distance between two nuclei. It is measured in nanometers (nm). In most cases, as this distance increases, it becomes easier to break the bond. That is, it allows us to conclude that the reactivity of the substance is higher. The reason for this is explained by the fact that the length of the bond is related to the radius of the atoms that make up the molecule, among which is there is some degree of proportionality.

For example, in hydrogen compounds of halogens, as the period number of halogens increases, the length of the bond also increases. The longer the string, the easier it is to break. At this point, it is possible to explain why hydrochloric acid is stronger than hydrofluoric acid, bromic acid is stronger than hydrochloric acid, and iodic acid is stronger than bromic acid. Because according to the theory of dissociation, the more hydrogen cations are formed from substances, the greater the acidity. In the above acids, due to the increased length of the bond, it becomes difficult for the halogen to hold the hydrogen atom. As a result, hydrogen is released as ions in aqueous solution.

The length of the garden decreases from Fr to F. So the reason for this lies in the radius of the atoms. [7].

Valent angle. The angle between chemical bonds is called valence angle. If we take a water molecule, the H–O bond is located at an angle of 104.5 to each other, and the molecule has an angular structure.

Chemical bonds and their formation should be considered from the point of view of electronic structure and physical essence of atoms. Because the main means involved in the formation of chemical bonds are electrons and electron clouds.

According to Cassel's theory, created in 1916, when molecules are formed from atoms, each atom tries to bring its surface layer to eight electrons (hydrogen has 2 electrons). Often, atoms with one, two or three electrons in their outer electron shells (metal atoms) easily donate their electrons to other atoms. If the number of electrons in the surface layer of an atom is about eight (5, 6, 7), that is, non-metal atoms tend to take the missing electrons from other atoms to form a strong electron layer. Based on the formation of a stable electronic layer in different ways, chemical bonds can be divided into several types:

1) Covalent bond;
2) Coordination bond (donor-acceptor bond);
3) Ionic bond.
4) Metal connection;
5) Hydrogen bond.

The minimum amount of energy required to completely remove one electron from an atom in a normal state in the gaseous phase is called ionization energy. The amount of energy released when an atom of an element attaches an electron is called the electron affinity of the same element.

So, the reason for the formation of molecules from atoms is explained by the emergence of energy advantage and stability in the system. [8-9].

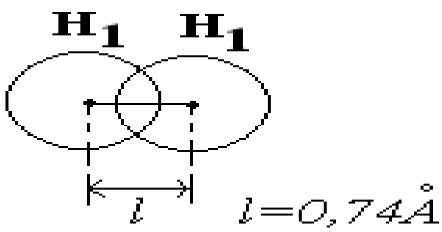
A chemical bond is the formation of forces that hold the same or different atoms together as a result of their interaction.

The main reason for the formation of chemical bonds is that when atoms or ions are combined with each other, their total energy reserve is less than when they are individually, and therefore such a system occupies a relatively stable state. Chemical bonding is mainly characterized by the following quantities:

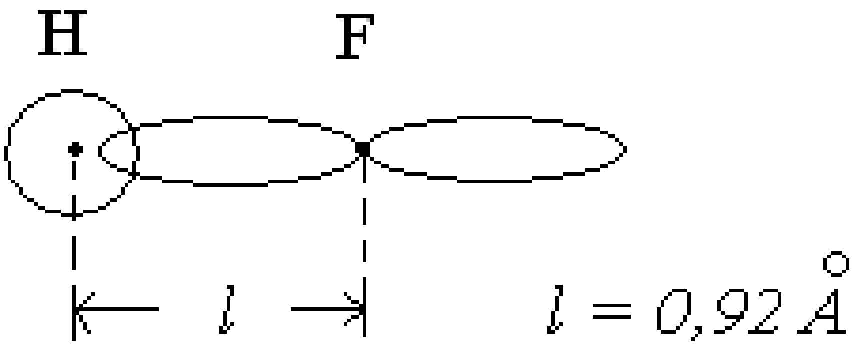
A) Chemical bond energy (kcal/mol)
B) Chemical garden length (A° = 10^{-10}m)
C) The angle between the bonds.

Atoms of chemical elements interact to form molecules, ions or free radicals. The distance between the centers of the atoms that make up the molecule is measured in angstroms (Ao):

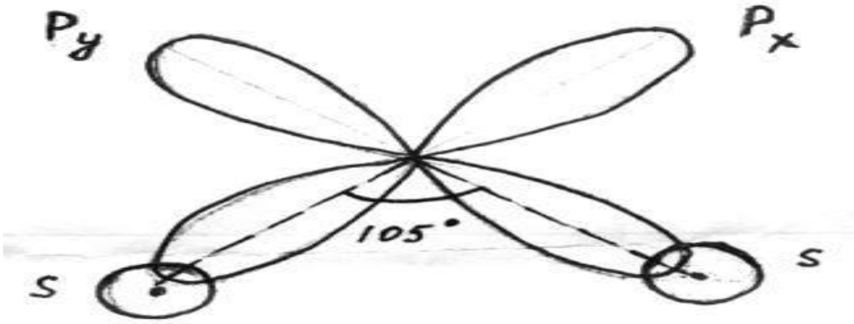
hydrogen molecule – H_2



hydrofluoric acid molecule – HF



The angle between the chemical bonds of the atoms that make up the molecule depends on the type of electrons of the atoms involved in the formation of these bonds (s, p, d, f). For example, hydrogen atoms (s) interact with oxygen (p) to form water. So, 1s1 electrons of hydrogen and 2p electrons of oxygen interact to form a water molecule of the following form:



CONCLUSION:

In this way, the creation of a chemical garden and the implementation and maintenance of the mutual integration of chemistry and physics in explaining its nature to pupils and students will closely support the deep understanding of the essence of chemistry and increase the effectiveness of education.

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