

Chemistry: Periodic nature and properties of atoms and molecules

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Course:

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1.0 Periodic nature and properties of atoms and molecules

Since ancient Greek, scientists have been making continuous efforts to understand the true nature of matter. One of the most important achievements that have been made is the periodic table which not only organizes known information, but also enables scientists to predict unknown properties (Hinchliffe, 2011, p.14). Elements in the periodic table are arranged according to their atomic structure which is a systematic increasing the number of atoms. The elements display other characteristics and trends that distinguish them from others which is their chemical, physical and atomic properties (Scerri, 2011, p.12). These trends are well understood by analyzing the elements of electronic configurations. This, according to Lagerkvist (2012), is what is referred to as the periodicity of atoms and molecules.

2.0 Reactivity of elements as per Medvedev's understanding

Halogens and alkali metals are highly reactive. These group 1 elements of the periodic table which include Lithium, Sodium, Rubidium, Cesium and Francium, while halogens include Fluorine, chlorine, Bromine and Iodine. When they react, a reaction that combines a metal and a nonmetal happens in creating ionic compounds. Alkali metals have a +1 charge and have a larger atom size than other elements. This size is determined by the atomic radius of the atoms which is the distance between two nuclei of two identical atoms. By losing the electron the alkali metal gets a stable electronic configuration (Scerri, 2011, p.133). This change is also referred to as electron affinity whereby an electron is added to a gaseous atom. The electron is easy to be lost as the size of the atom increases the distance of the electron from the nucleus. The reason for the high reactivity of alkali and halogens is their ability to easily lose and gain electrons (Lagerkvist, 2012, p.45).

3.0 Properties of similar compounds

Chemical compounds from the same family of atoms are all similar as they resemble the characteristics of the similar atom. Compounds such as H_2O , H_2S and H_2Se are compounds within the hydrogen group in group 1A. Their similarity comes from the similarity in their covalent bond on how they share electrons. The hydrogen bonds with atoms becomes stronger downwards the family. This is evident as acids become stronger going down the group such as H_2Se which is stronger than H_2O . The intermolecular forces in these compounds decrease downwards in the group which explains why the compounds changes in structure from liquid to gas form. The odor in the compounds also changes downwards with H_2 having no odor to strongest odor in the H_2Te (Islam& Ghosh, 2011, p.137).

4.0 Electronic structure of atoms and the importance of understanding them

Electronic structure of atoms refers to the physical arrangement of electrons in the atom, referring to where they are located. The electrons are formed in rings or orbits spinning around the orbital. Electrons that are in outermost orbit are responsible for bonding with other atoms (Lagerkvist, 2012). When the electronic structure of atoms is established, it is easier to know how they will lose electrons, hence noting how the atoms will bond with those of other elements (Hinchlife, 2011, p.14). This also makes it possible to calculate the isoelectric nature of the atoms and helps scientists know the valence of the outer shell of the atoms. This makes it possible to understand oxidation reduction reactions through accurate calculation of electronic structures of atoms (Scerri, 2011, p.45).

References

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