

A Brief Note on Chemistry

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Received date: December 04, 2021, Manuscript No. IPDCS-22-12605; Editor assigned date: December 09, 2021, PreQC No. IPDCS-22-12605 (PQ);

Reviewed date: December 23, 2021, QC No. IPDCS-22-12605; Revised date: December 28, 2021, Manuscript No. IPDCS-22-12605 (R); Published date: January 04, 2022, DOI: 10.36648/0976-8505.13.1.4

Citation: Deepthi Y (2022) A Brief Note on chemistry. Der Chem Sin Vol.13 No.1: 4.

Description

The scientific study of matter's properties and behaviour is known as chemistry. It is a natural science that studies the elements that make up matter, as well as the compounds made up of atoms, molecules, and ions, and their composition, structure, properties, and behaviour, as well as the changes that occur when they mix with other things [1]. Chemistry is a discipline that falls somewhere between physics and biology in terms of scope. It is also referred to as the "core science" since it provides a fundamental framework for understanding both basic and applied scientific disciplines [2].

Chemistry, for example, explains aspects of plant chemistry (botany), the formation of igneous rocks (geology) how atmospheric ozone is formed and how environmental pollutants are degraded (ecology) the properties of lunar soil (Cosmo chemistry), how medications work (pharmacology) and how to collect DNA evidence at a crime scene (criminology) (forensics). Chemistry examines how atoms and molecules combine to produce new chemical compounds through chemical bonding. Chemical bonds can be divided into two categories: covalent and non-covalent. 1. Primary chemical bonds, such as covalent bonds, in which atoms share one or more electrons; ionic bonds, in which one or more electrons are donated to another atom to produce ions; metallic bonds; and 2. Secondary chemical bonds, such as hydrogen bonds, Van der Waals force bonds, ion-dipole interaction, and so on [3].

A chemical reaction is the conversion of one or more chemicals into other ones. The rearranging of electrons in chemical bonds between atoms is at the heart of such a chemical transition. It can be represented symbolically using a chemical equation, which usually has atoms as subjects. In a chemical transformation equation, the number of atoms on the left and right are equal. Chemical laws limit the types of chemical reactions a substance can have and the energy changes that can occur as a result of those reactions. Matter is defined in chemistry as anything made up of particles that have rest mass and volume (takes up space). The particles that make up matter have rest mass as well; however, not all particles, such as photons, have rest mass. A pure chemical substance or a mixture of substances can be considered matter. Chemistry's fundamental unit is the atom. It is made up of a dense core termed the atomic nucleus that is surrounded by an electron cloud [4]. The nucleus contains of positively charged protons

and neutral neutrons, whereas the electron cloud is made up of negatively charged electrons that orbit the nucleus. The negatively charged electrons in a neutral atom balance out the positive charge of the protons. The nucleus is dense; a nucleon's mass is roughly 1,836 times that of an electron, whereas an atom's radius is roughly 10,000 times that of its nucleus [5].

The quantum mechanical atomic structure model is currently widely used. Traditional chemistry is based on the study of elementary particles, atoms, molecules, substances, metals, crystals, and other groupings of matter. Matter can be studied in solid, liquid, gas, and plasma phases alone or in combination. Chemical interactions, reactions, and transformations are usually the result of atoms interacting, causing chemical bonds to rearrange. Such behaviours are examined in a chemistry lab. In chemical labs, various types of laboratory glassware are routinely used [6]. Glassware, on the other hand, isn't required for chemistry, and most experimental (as well as applied/ industrial) chemistry is carried out without it.

Element

A chemical element is a pure material made up of only one type of atom. It is identified by the number of protons in the nuclei of its atoms, which is known as the atomic number and symbolized by the letter Z. The total of the number of protons and neutrons in a nucleus is the mass number.

Although all the nuclei of all atoms belonging to one element will have the same atomic number, they may not have the same mass number; isotopes are atoms of the same element with varying mass numbers [7]. For instance, all atoms having 6 protons in their nucleus are carbon atoms; however carbon atoms can also have mass numbers of 12 or 13. The atom is also the smallest entity capable of retaining the element's chemical properties, such as electronegativity, ionization potential, and preferred oxidation state (s).

Compound

A compound is a pure chemical substance that contains many elements. The qualities of a compound differ significantly from those of its constituent parts. The International Union of Pure and Applied Chemistry establish a uniform nomenclature for compounds. The organic nomenclature system is used to name organic substances. The inorganic nomenclature system is used

to provide names for inorganic substances. When a compound comprises more than one component, the electropositive and electronegative components are separated into two categories. The Chemical Abstracts Service has also developed a system for indexing chemical compounds. Each chemical substance is identified by a number known as its CAS registration number under this approach [8].

Molecule

A molecule is the tiniest, indivisible part of a pure chemical substance with its own set of chemical properties, such as the ability to undertake specific chemical interactions with other chemicals [9]. This concept, however, only applies to substances made up of molecules, which is not the case for many substances. Molecules are normally made up of a collection of atoms joined by covalent bonds in such a way that the structure is electrically neutral and all valence electrons are paired with other electrons in bonds or lone pairs. Unlike ions, molecules exist as electrically neutral units. A molecular ion or a polyatomic ion is the outcome of breaking this rule and giving the "molecule" a charge.

Phase

Chemicals can exist in a variety of phases, in addition to the precise chemical qualities that distinguish them from one another. Chemical classifications are, for the most part, independent of bulk phase classifications; nonetheless, some more unusual phases are incompatible with specific chemical features. A phase is a group of chemical system states that have comparable bulk structural features over a wide range of circumstances, such as pressure or temperature. Physical parameters like density and refractive index tend to be within phase-specific ranges. The phase of matter is described by the

phase transition, which occurs when energy is introduced into or removed from a system and instead of changing the bulk conditions, it is used to rearrange the structure of the system [10].

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