CHE – MATTER AND LIFE

Matter is defined as anything that occupies space and has mass. The basic building blocks of all matter are atoms. Only 94 different kinds of atoms occur in nature, and these are known as the naturally occurring elements. In addition, chemists and physicists have created 21 more in the laboratory, but they are so unstable that they break down into simpler elements. Atoms are made up of protons, neutrons and electrons, which in turn are made up of still smaller particles.

Atoms can build a great variety of things. Also, natural materials can be taken apart into their separate atoms and the atoms can be reassembled into different materials. All chemical reactions, whether they occur in a test tube, in the environment, or inside living things and whether they occur slowly or very fast, involves rearrangements of atoms to form different kinds of matter.

Atoms do no change during the disassembly and reassembly of different materials. A carbon atom, for instance, will always remain a carbon atom. Furthermore, atoms are neither created nor destroyed during chemical reactions. The same number and kind of different atoms exist before and after any reaction. This constancy of atom is regarded as a fundamental natural law, the law of conservation of matter.

A molecule consists of two or more atoms bonded together in a specific way. The properties of a material depend on the specific way in which atoms are bonded to form molecules, as well as on the atoms themselves. Similarly, a compound consists of two or more different kinds of atoms bonded together. A molecule, therefore, may consist of two or more of the same kind of atoms, or two or more of the same kind of atoms, or two or more different kinds of atoms, bonded together, whereas at least two different kinds of atoms are always involved in a compound. For example, the fundamental units of oxygen gas, which consist of two oxygen atoms bonded together, are molecules, but not a compound. Water, by contrast, is both a molecule and a compound, because the fundamental units are two hydrogen atoms bonded to an oxygen atom.

On the chemical level, the cycle of growth, reproduction, death, and decay of organisms is a continuous process of taking various atoms from

the environment (food), assembling them into living organisms (growth), disassembling them (decay), and repeating the process.

Key elements: living things are characterized by six key elements. Carbon (C), Hydrogen (H), Oxygen (O), Nitrogen (N), Phosphorus (P), and Sulphur (S). These six elements are the essential ones in the organic molecules that make up the tissues of plants, animals and microbes. These six key elements occur in the spheres of the Earth.

Organic Compounds

The chemical compounds making up the tissues of living organisms are referred to as organic. Unlike the relatively simple molecules that occur in the environment (such as CO_2, H_2O, and N_2), the key chemical elements in living organisms (C, H, O, N, P, S) bond to form very large, complex organic molecules, such as proteins, carbohydrates, (sugars and starches), lipids (fatty substances), and nucleic acids (DNA and RNA). Some of these molecules may contain, millions of atoms, and their potential diversity is infinite.

The carbon based molecules that make up the tissues of living organisms are called organic molecules. Plastics and other countless human-made compounds based on carbon-carbon bonding are called synthetic organic compounds.