

Biological Chemistry: Introduction

Biological chemistry or biochemistry is the study of molecules that are important to living things. Most of these molecules are organic molecules. Organic compounds are composed of carbon, hydrogen and oxygen. Carbon forms the backbone or basic structure of these molecules. Its ability to form 4 covalent bonds to 4 different atoms produces an incredible number of chemically diverse molecules. Carbon skeletons can occur as straight chains, branched chains and rings. Chemical formulas are used to describe the atomic composition of molecules. For example, one such formula is $C_6H_{12}O_6$. This formula indicates that a single molecule of this substance is composed of 6 atoms of carbon, 12 atoms of hydrogen and 6 atoms of oxygen. The chemical formula alone however does not tell the entire story because of the diversity of arrangements that can occur in organic molecules. This formula is the formula for a hexose, a six carbon sugar, however depending on the actual structure this molecule could be galactose or glucose (blood sugar). Galactose is one of sugars that makes lactose, the sugar found in milk.

Most biologically important molecules are polymers or macromolecules. Macro- indicates the molecules are very large; the term polymer suggests the molecules are made of many subunits. The subunits are called monomers. The individual subunits or monomers are joined to each other through the process of condensation or dehydration synthesis. Dehydration synthesis or condensation synthesis joins to monomers by removing a hydrogen ion (H^+) from one unit and a hydroxide ion (OH^-) from another to form a new covalent bond. The hydrogen ion and hydroxide ion form a water molecule, hence the name dehydration synthesis.

There are 4 categories of biologically important macromolecules. These four groups are the proteins, carbohydrates, lipids and nucleic acids. Each group can be identified by its composition, monomer unit, and function.