# Chapter one Introduction

**Biochemistry** can be defined as the science concerned with the chemical basis of life. The cell is the structural unit of living systems. Thus, biochemistry can also be described as the science concerned with studying the various molecules that occur in living cells and organisms and with their chemical reactions.

**Biochemical reactions** are involved in such areas as breaking down food molecules, generate and store energy, buildup new biomolecules, and eliminate waste. Some biomolecules are small and have only a few functional groups others are big and contain a large number of functional groups. The principal classes of biomolecules are: carbohydrates, lipids, Proteins, enzymes, vitamins and nucleic acids.

**In general, Biochemistry** is the study of the structure, composition, and chemical reactions of substances in living systems.

## **Branches of biochemistry**

Main Branches of biochemistry are:

- 1- Animal biochemistry
- 2- Plant biochemistry
- 3- Molecular biology
- 4- Cell biology
- 5- Metabolism
- 6- Immunology
- 7- Genetics
- 8- Enzymology

## **Applications of biochemistry:**

Biochemistry is applied to medicine, dentistry, and veterinary medicine. In food science, biochemists research ways to develop abundant and inexpensive sources of nutritious foods, determine the chemical composition of foods, and develop methods to extract nutrients from waste products, or invent ways to prolong the shelf life food products. In agriculture, biochemists study

the interaction of herbicides with plants. They examine the structure-activity relationships of compounds, determine their ability to inhibit growth, and evaluate the toxicological effects on surrounding life.

Biochemistry spills over into pharmacology, physiology, microbiology, and clinical chemistry. In these areas, a biochemist may investigate the mechanism of a drug action; engage in viral research; conduct research pertaining to organ function; or use chemical concepts, procedures, and techniques to study the diagnosis and therapy of disease and the assessment of health.

Also biochemistry is often related to toxicology. Toxicology is the study of the ways in which some organic compounds in the body are changed by enzymes into toxic metabolites.

### Elemental compositions for biomolecules are:

C, H, O&N ~ (97%)
Ca, P, K&S ~(3%)
Cl, Na &Fe ~(1%)
F, I, Cu, Mn, Mg, Zn....(In small amounts)

#### **Basic components of biomolecules:**

- 1- Organic compounds (8-25%)
- 2- Inorganic compounds (2-5%)
- 3- Water (70-90%)

### The basic organic compounds in the cell are:

- 1- Carbohydrates
- 2- Lipids
- 3- Amino acids and proteins
- 4- Enzymes
- 5- Vitamins
- 6- Nucleic acids
- 7- Hormones