

# Introduction to Biochemistry

- Biochemistry is the branch of science which deals with study of **chemical processes**.
- Biology + Chemistry together Biochemistry.
- Focus on - Processes at molecular level.
  - What happens inside the cell
  - studying components like Proteins, lipids, organelles.
  - It also looks at how cell communicates with each other.
- Biochemistry deals with genetics, microbiology, forensic, plant science and medicine.
- Biomolecules and Cell:
  - The living matter is composed of mainly six elements, **Carbon, Hydrogen, Oxygen, Nitrogen, Phosphorus & Sulfur**.
  - These elements contribute 90% of the dry weight of the human body
  - Other functionally important elements are also found in the cell like **Ca, K, Na, Cl, Mg, Fe, Cu, Co, I, Zn, F, Mo, Se**.
  - Carbon is the most predominant and versatile element of life. (stable covalent bond & unlimited length)
  - It is estimated about 90% of compounds found in living system contain carbon.
- Chemical molecules of life
  - life is composed of lifeless chemical molecules.
  - eg: **Escherichia coli** - contains 6000 different organic compounds
  - Man (Homo sapiens)** - 100,000 organic compounds.

- Complex biomolecules:
  - **Monomeric units** - Amino acids, nucleotides & monosaccharides (building blocks)
  - Complex molecule - Proteins, nucleic acids (DNA & RNA) and polysaccharides

Biomolecules	Building block	Function
1. Protein	Amino acid	Fundamental basis of structure and function of cell
2. DNA	Deoxyribonucleotides	Hereditary
3. RNA	Ribonucleotides	Essentially required for protein biosynthesis.
4. Polysaccharide (glycogen)	Monosaccharide (glucose)	storage form of energy (short term)
5. Lipid	Fatty acid, glycerol	storage form of energy (long term)

- Structural hierarchy of an organism

Biomolecules	Macromolecules	supramolecular complex
1. Sugar	cellulose	cell wall
2. Amino Acid	Proteins	plasma membrane
3. Nucleotides	DNA	chromosome

\* Chemical composition of normal Man (Weight 65 kg)

- |                        |                             |
|------------------------|-----------------------------|
| 1) Water 61.6% - 40 kg |                             |
| 2) Protein 17% - 11 kg | 4) Carbohydrate 1.5% - 1 kg |
| 3) Lipid 13.8% - 9 kg  | 5) Minerals 6.1% - 4 kg     |

## • Importance of Biochemistry :

- 1) Medicine - Pathology & physiology  
- Hormone deficiency.
- 2) Agriculture - To prevent diseases and increases yield.  
- To enhance growth eg - Fertilizers.
- 3) Fisheries - To check quality of water by biochemical test.
- 4) Nutrition - To check deficiency of Vit, Carbohydrate.
- 5) Pharmacy - To fix half life of drugs  
( shelf life / expire date (sunlit) - by Biochemical Test ).

## • Scope of Biochemistry :

- Cell Biology
- Genetics
- Enzymology
- Endocrinology
- Biomolecules
- Molecular Biochemistry
- Clinical Biochemistry.