

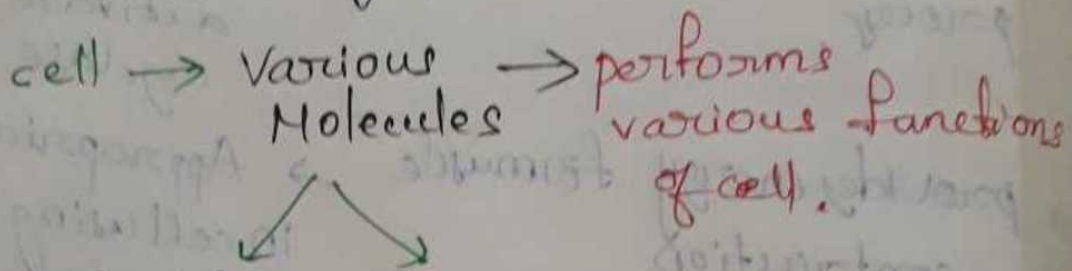
①

Bio Molecules

Introduction

In a simplified way, Biomolecules those molecules which are present in the living system.

→ Basic unit of living system.



Organic
(C, H, O, N, P, S)

Inorganic.

- proteins
- Amino acids
- Nucleic acids
- Lipids
- Fats
- carbohydrates
- Monosaccharides
- Disaccharides
- polysaccharides
- enzymes etc.

Minerals & vitamins

- essential Mineral for plants
Ex: Na, K, Ca, Mg, Fe, Mn etc.
- Essential Mineral & vitamins for Animal.
- Ex) Minerals
Ca, Mg, P, Fe, K, I, Se, Mn & Zn
- vitamin
↳ vit A, B₁, B₂, B₆, B₇, B₁₂, C, D, E, K.

BioMolecules:-

(2)

These are certain molecules, which are involved in Maintenance & Metabolic processes of living organisms/cells.

- Bio Molecules are Mainly contains, C, H, N, P, S.
- Elementary composition of Biomolecules are
 - Carbon (C) → 50%
 - Oxygen (O) → 20%
 - Hydrogen (H) → 10%
 - Nitrogen (N) → 8.5%
 - Phosphorous (P) → 2.5%
 - Sulfur → 0.8%

These six elements together constitute about more than 90% of dry weight of human body.

Characteristics of Most BioMolecules:-

- The Most of Most BioMolecules are organic in nature.
- They have characteristic size and three-dimensional (3-D) structures.
- Functional group present in the biomolecules is responsible for the chemical properties.
- Structure of BioMolecules are asymmetrical.
- Initially BioMolecules are gross due to the chemical reactions.

① Chemical Nature & Classification of carbohydrates

→ carbohydrates are "the hydrates of carbon"

→ Empirical formula: $[C(H_2O)_n]$, where $n \leq 3$

Ratio of C:H:O will be 1:2:1 (Mostly)

→ Definition:-

Carbohydrates may be defined as polyhydroxy aldehydes or ketones, or which produce them on hydrolysis.

→ Classification:-

↳ Mono saccharides.

↳ Oligo saccharides.

↳ Poly saccharides.

① Mono saccharides:-

Sweet to taste,

Crystalline in nature,

soluble in water,

considered as sugars

→ categorised in two groups:-

→ The functional group present

↳ Aldoses → Aldehyde ($-CHO$)

↳ ketoses → ketone ($-C(=O)-H$)

④ As per the no of carbohydrates carbon atoms
 Monosachharides are classified into 5 types -

S.No.	Types	Aldoses	Ketoses
①	Trioses (3C)	Aldotrioses (Glyceraldehyde)	ketotriose (Dihydroxy acetone)
②	Tetroses (4C)	Aldotetrose (Erythrose, threose)	ketotetrose (Erythrulose)
③	pentose (5C)	Aldopentose (Ribose, xylose Arabino, lyxose)	ketopentose (Ribulose, xylulo se)
④	Hexose (6C)	Aldohexose (Glucose, Galactose, Mannose)	ketohexose (fructose)
⑤	Heptoses (7C)	Aldo heptose (Glucoheptose)	ketohexose (sedoheptose)

② Oligosachharides! -

They contain 2-10 Monosachharide units.
 → only three types of oligosachharides are
 Naturally occurring which are

- ↳ Disachharides → Sucrose, Maltose, lactose
- ↳ Trisachharides → Raffinose.
- ↳ Tetra sachharides → starchyose.

③ Poly sachharides! - Non sugars
 polymers of Monosachharides, tasteless,

⑤ High Molecular weight compounds & considered as polysaccharides.

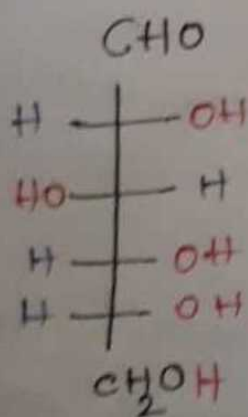
↳ Homopolysaccharides → starch, Glycogen, Inuline etc

↳ Heteropolysaccharides

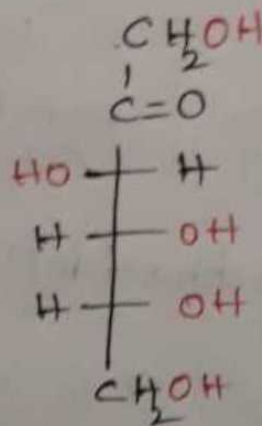
↳ Gums, Agar, pectin etc.

Chemical Nature of Mono saccharides

- Monosaccharides are colorless & crystalline solids, freely soluble in water
- Not soluble in nonpolar solvents
- Sweet in taste → Sugar.



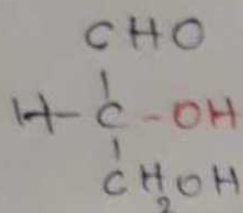
D-Glucose



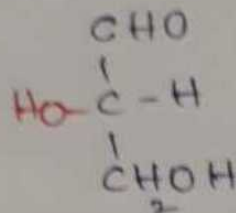
D-Fructose

- only one carbon atom is double bonded with oxygen atom (O)
- carbonyl group present at end of the chain is Aldehyde known as Aldose.
- Carbonyl group present at any other position is ketone group.

⑥ D & L Designation:-



D-Glyceraldehyde



L-Glyceraldehyde

- D & L denotes about the arrangement of groups of horizontal line at a symmetrical carbon atom.
- Sugars having same configuration as of D-Glyceraldehyde at the most distant asymmetrical carbon atom is considered as D-sugars.
- Sugars having opposite configuration (or like L-Glyceraldehyde) is considered as L-sugars.