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B.Sc. - IInd year

[Paper - III]

∴ Physiology and Biochemistry :-

[Unit - IV]

[General Chemistry and Classification of Carbohydrates, Lipids and Proteins, Enzymes]

(01)

Carbohydrate

C, H & O containing organic compound, in which Ratio of H & O is 2:1 is called Carbohydrate. Carbohydrate defined as "Aldehyde & Ketone derivatives of Polyhydroxy Alcohol, which having either Aldehyde group or Keto-group called Carbohydrate."

Carbohydrate undergo oxidation and give instant energy.

* Significance of Carbohydrate :->

- (i) Carbohydrate give instant energy, therefore it provide Calorie to body.
- (ii) Glucose & Fructose naturally found in vegetables & Fruits, which give energy.
- (iii) Fructose found in Honey, which is source of antiseptic and energy.
- (iv) Cereals i.e. wheat, Barley, maize are rich source of maltose, which give energy.
- (v) Lactose found in Milk, which give energy.
- (vi) Sucrose found in Cane Sugar, which give energy and used in making table sugar.
- (vii) Ribose sugar constitute RNA.
- (viii) Deoxy ribose sugar constitute DNA.
- (ix) "Cellulose" constitute the cell wall of plant cells.
- (x) Starch is reserve food material of plants.
- (xi) Starch give energy after oxidation, which readily found in Rice, Potato, sago etc.
- (xii) Sulphur containing gluco poly saccharide is agar agar obtain from Red Algae used in making culture media & confectioneries.



(xiii) → Mucopolysaccharide containing Plantago ovata (Isabgole) is used as purgative and significant in constipation.

(xiv) → Glycogen is R.F.M. of animal and fungi.

(xv) → Gums is a type of polysaccharide obtain from Acacia.

Classification: → Carbohydrate, on basis of Hydrolysis classified into three categories: →

(i) → monosaccharides

(ii) → oligosaccharides

(iii) → polysaccharides

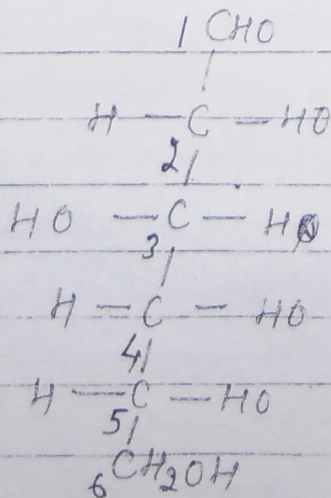
(i) → monosaccharides: → Those carbohydrates do not undergo hydrolysis are called monosaccharides. They are simple sugar and soluble in water. They follow formula $C_nH_{2n}O_n$. On basis of number of carbon monosaccharides are of following types: →

(i) Trioses (3C) — $C_3H_6O_3$ → eg: → Glyceraldehyde

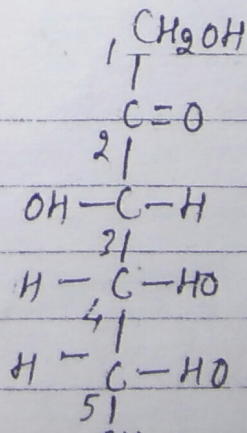
(ii) Tetroses (4C) — $C_4H_8O_4$ → eg: → Erythrulose

(iii) Pentoses (5C) — $C_5H_{10}O_5$ → eg: → Ribose sugar

(iv) Hexoses (6C) — $C_6H_{12}O_6$ → eg: → Glucose & Fructose



Glucose (aldose)



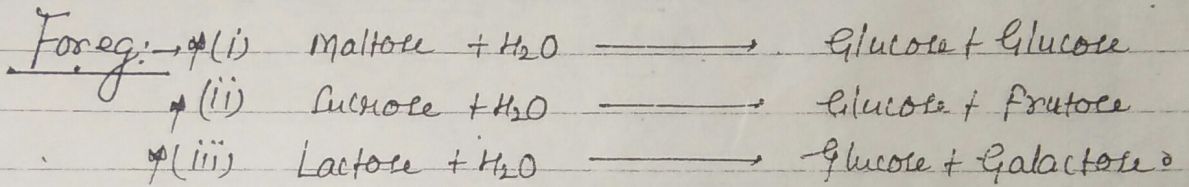
Fructose (ketose)

(11) → Oligosaccharides! → Those carbohydrates which undergo hydrolysis and give rise 2-10 monosaccharides are called oligosaccharides. They are complex sugar but soluble in water. In nature two types of oligosaccharides takes place —

⊗ (a) → Disaccharides

⊗ (b) → Trisaccharides

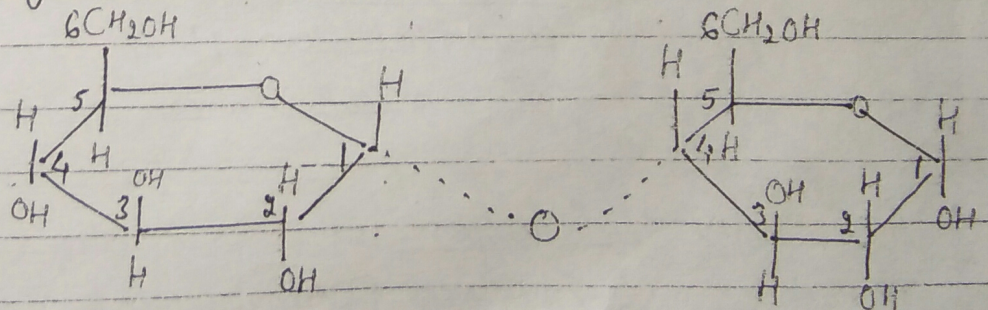
(a) → Disaccharides! → Those oligosaccharides undergoes hydrolysis and give rise 2 monosaccharides are called Disaccharides.



In Disaccharides 2 monosaccharides are join together by Glycosidic bond. There are two glycosidic bond found in disaccharides.

⊗ (i) → 1,4-glycosidic bond! → It is found in maltose & Lactose.

⊗ (ii) → 1,2-glycosidic bond! → It is found in sucrose



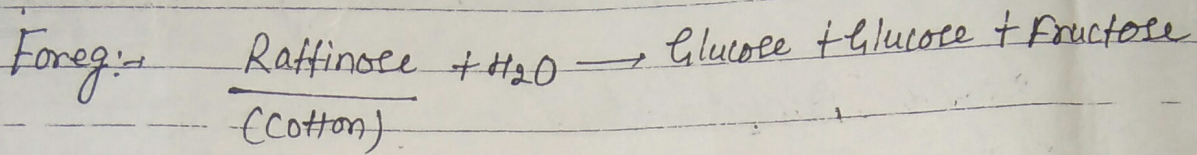
Glucose

1,4 glycosidic bond

Glucose

MALTOSE

(b) → Disaccharides → These oligosaccharides undergo hydrolysis and give rise to 2-monosaccharides are called disaccharides.



(iii) → Polysaccharides → These carbohydrates undergo hydrolysis and give rise to more than 10 monosaccharides are called polysaccharides. They are complex sugar and "insoluble" in water. There are following polysaccharides found in nature.

- * (a) → Starch
- * (b) → Glycogen
- * (c) → Cellulose
- * (d) → Pectine
- * (e) → grulin

(a) → Starch → It is derivatives of amylose & Amylopectine, it is found as reserve food material in plant cell. Rice, potato & sago are rich source of starch.

(b) → Glycogen → It is also derivatives of amylose & Amylopectine, it is R.F.M. of Animal cell and fungal cell.

(c) → cellulose → It is β -**D**-glucose chain. It constitutes the cell wall of plant cells. It

(5)

is "highest amount" carbohydrate on earth.

(d) → Pectine :- It is derivatives of Glucose, constitute the cell wall of Algae & cell wall of some fruit cell.

(e) → Inulin :- It is chain of Fructose. It is found in root of "dahlia".