CARBOHYDRATE

- are polyhydroxy aldehydes / ketones or compds that can be hydrolysed to them.
- C & H ratio are same as water CH ratio, so" called Hydrates of Carbon"
- on basis of it's hydrolysis & no. of product formed it can be classified as -

① Monosaccharide → can't be hydrolysed further into polyhydroxy Aldehyde/ketone.

(ii) Oligosaccharide → Made up of 2/10 Mono-saccharide units joined by glycosidic linkages
- Most abundant is the disaccharide. with 2 Monosaccharide Unit.

(iii) Polysaccharide → are polymers with 100-1000 monosaccharide units
- Not sweet in taste.

Sunday called non-sugar

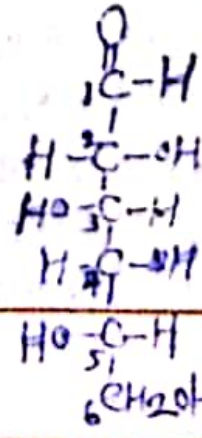
MONOSACCHARIDE :

Simple sugar that can't be hydrolysed further into simpler forms.

- They have general formula $C_nH_{2n}O_n$.
- Most abundant Monosaccharide in nature is - D-Glucose (e.g)
- Can be classified onto - 2 basis

(a) on basis of no. of carbon atoms present —
based on no. of carbon atoms with suffix 'ose' added.

E.g- 4C — Tetrose
5C - Pentose
6C - Hexose (Hexose)
7C - Heptose, etc.



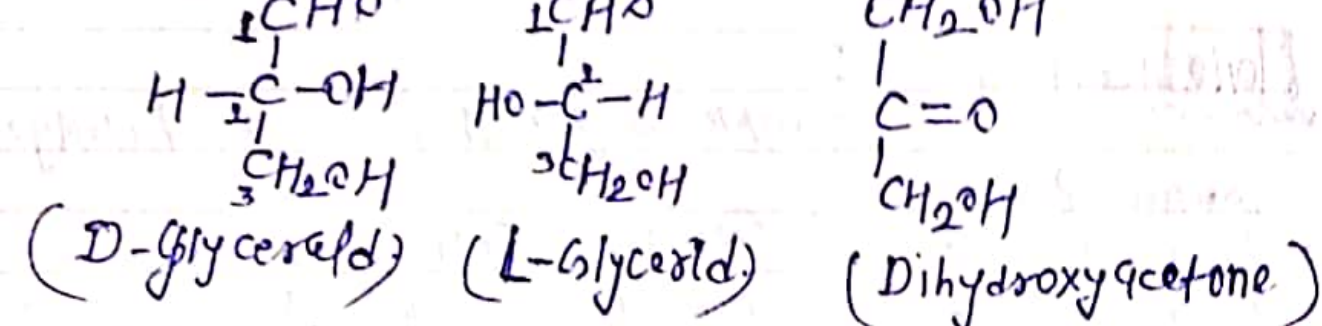
7 Monday

(b) Presence of aldehydes or ketones gp:-
Aldoses :→ are Monosaccharides with Aldehyde gp.
Ketoses :→ are " " Ketone gp.

- Eg → Glucose is → Aldohexose (Aldehyde gp containing)
- Hexose → Fructose is → Ketohexose (Ketone gp containing)

- Trioses → are simplest Monosaccharides. Two trioses — Dihydroxy-acetone & glyceraldehyde.
(Aldose) (Ketose)

8 Tuesday



- Glyceraldehyde has a central carbon (C-2) which is chiral or, asymmetrical. Chiral molecules (like glyceraldehyde) can exist in two forms or, configurations that are nonsuperimposable mirror images of each other. these two forms are called stereoisomers, optical isomers or, enantiomers.
- stereoisomers has absolute configuration (based on OH position either left or, right side, called L or D) on Chiral carbon atom

↳ "fisher projection."

Wednesday 9

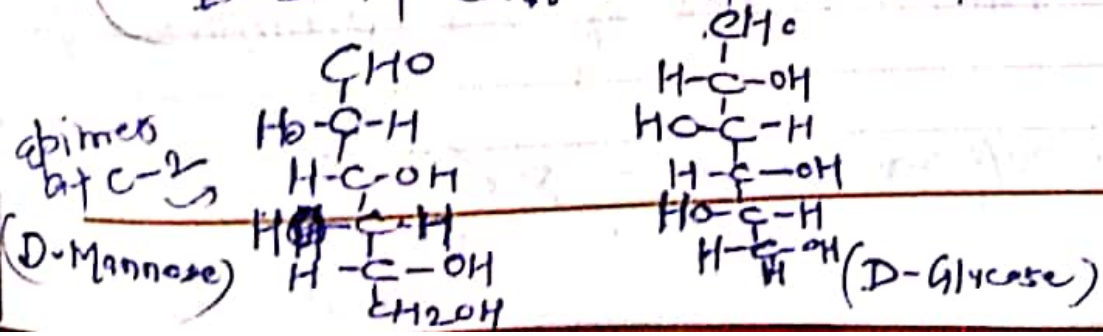
(DHA)
. Dihydroxy acetone ^ has no any chiral carbon.
. All Monosaccharides (except DHA) contain one or more chiral carbon atoms & thus occur in optically active isomeric forms.
e.g - The simplest Aldose, Glyceraldehyde, contains one chiral center, so it has 2 diff optical isomers or, enantiomer.
. As no. of chiral carbon increases, the no. of possible isomers also increases.
. A/c to Van't Hoff's rule, Total no. of possible isomers (stereoisomers) = 2^n where n = no. of chiral C'

Thursday 10

* Epimers :→ Sugars that differ only by the stereochemistry at a single carbon (other than anomeric carbon) are called epimers.

e.g -. D-glucose & D-mannose
(differ at C-2 position)
. D-glucose & D-galactose.
(Differ at C-4 position)

(But D-mannose & D-galactose are not epimers bcz it differs at more than one carbons.)



11 Friday

* **Cyclic forms:** → Monosaccharides having 5/6 C atoms in the chain give cyclic structures in aqueous solution by intramolecular addition of hemiacetal formation.

- Aldehyde can react with an alcohol to form a hemiacetal. A carbon C=O before can react with an alcohol to form a hemiacetal

$R-\underset{H}{\underset{|}{C}}=O + HO-R \rightleftharpoons R-\underset{H}{\underset{|}{C}}(OH)-OR$ / $R-\underset{R}{\underset{|}{C}}=O + HO-R \rightleftharpoons R-\underset{R}{\underset{|}{C}}(OH)-OR$

Aldehyde Alcohol Hemiacetal — Ketone Alcohol Hemiacetal

* Aldohexose such as glucose, the C-1 aldehyde in the open-chain form of glucose reacts with the C-5 hydroxyl group to form an intramolecular hemiacetal. The resulting cyclic hemiacetal, a six-membered ring, is called pyranose because of its similarity to pyran.

12 Saturday

Similarly, the C-2 keto group in the open-chain form of a ketohexose (like fructose), can form an intramolecular hemiketal by reacting with either the C-6 hydroxyl group to form a six-membered cyclic hemiketal or, the C-5 hydroxyl group to form a 5-membered cyclic hemiketal. The five-membered ring is called a furanose because of its similarity to furan.

D-glucopyranose → pyran