

CARBOHYDRATES

(Saccharides)

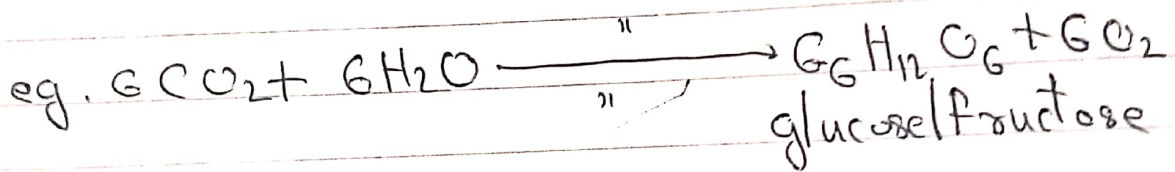
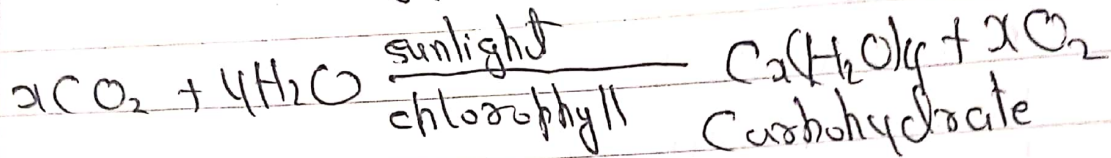
(Sascharoses)

Imp

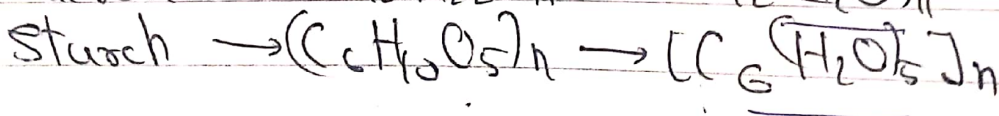
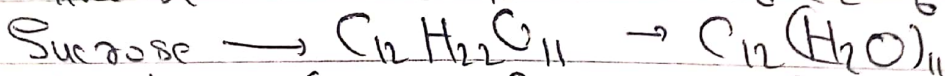
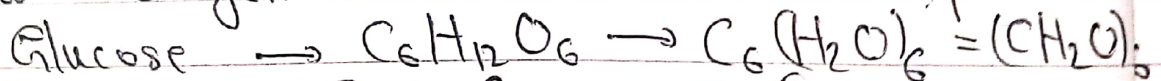
Carbon = Carbon

hydrate = water

Carbohydrates are natural products present in plants and animals. They are composed of C, H and O atoms. In plants carbohydrates are synthesised by photosynthesis in presence of chlorophyll (green leaves) in presence of solar energy.

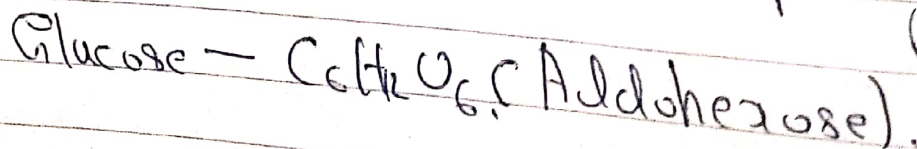


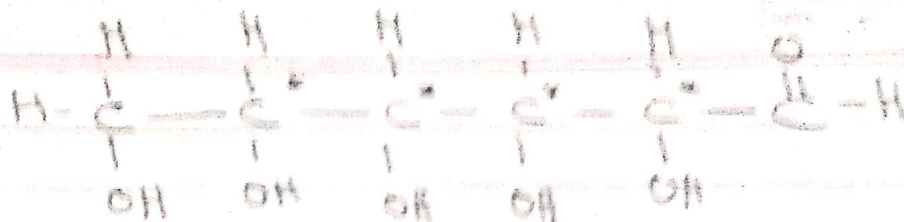
Most of the carbohydrates are represented by the formula $C_x(H_2O)_y$ however this is not a general formula of carbohydrates.



Definition: Carbohydrates are poly hydroxy aldehydes or ketones or such compounds which give them on hydrolysis.

Most of them are optically active.





It has -

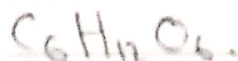
- (a) Five -OH groups (pentahydroxy)
- (b) An aldehyde group (-C-H)
- (c) It has four asymmetric carbon atoms (chiral centres) hence it is optically active.

No. of optical isomers = $2^n = 2^4 = 16$

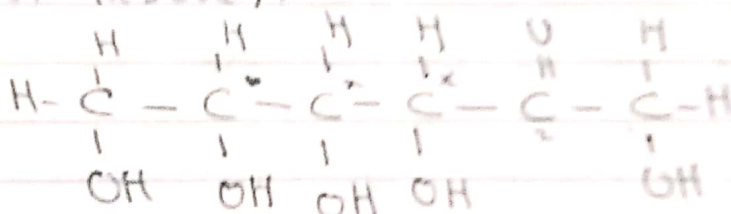
(8 pairs of enantiomers exist)

Therefore glucose is a carbohydrate.

Fructose:



(Keto hexose).



- (a) It has five -OH groups (pentahydroxy).
- (b) A keto at second carbon (-C=O)
- (c) It has three asymmetric carbon atoms. Hence optically active.

No. of optical isomers = $2^3 = 8$ isomers

∴ Fructose is a carbohydrate.

Nomenclature of carbohydrates -

- (1) Simple carbohydrates are named by ending "OSE".
- (2) Compounds with aldehyde group → ALDOSE.
Compounds with keto ketose → KETOSE.
- (3) Number of carbon atoms are also

mentioned.

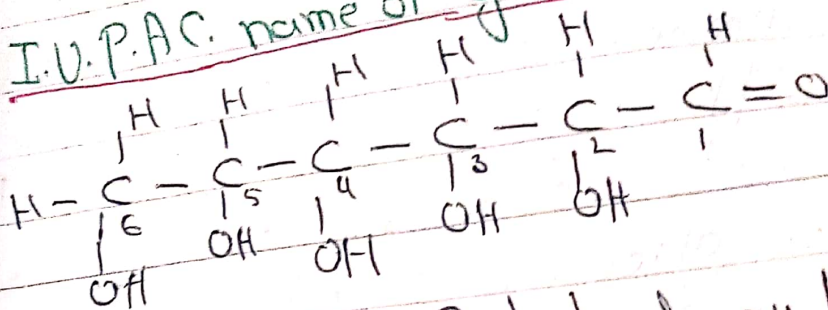
3 triose.

4 tetrose.

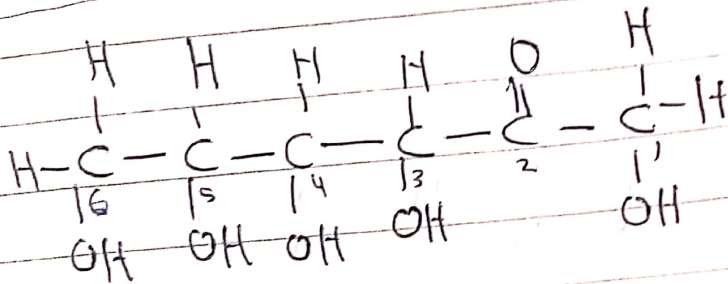
eg. Glucose = $C_6H_{12}O_6$ = Aldohexose

Fructose = $C_6H_{12}O_6$ = Ketohexose.

I.U.P.A.C. name of glucose and fructose



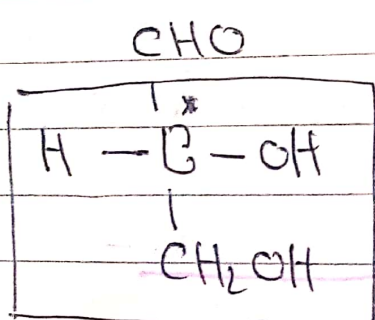
Glucose \rightarrow 2, 3, 4, 5, 6 - Pentahydroxy hexanal.



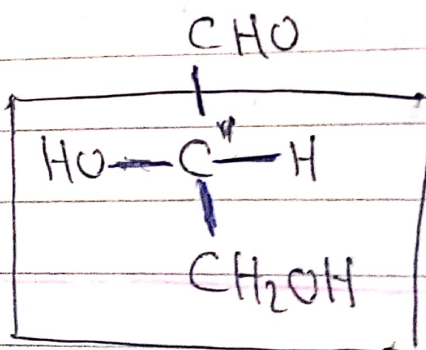
Fructose \rightarrow 1, 3, 4, 5, 6 Pentahydroxy hexan-2-one.

Configuration of carbohydrates

Glyceraldehyde is optically active and taken as a standard



D-form



L-form.

(OH is right)

(OH is left).

