

Carbohydrate

Definition -

In olden day the name carbohydrate was originally given to those compound which having the general formula $C_x(H_2O)_y$ i.e. hydrated of carbon, but this is misleading term because it does not justify the following facts

① Many of the compound like $HCHO$ (Formaldehyde), CH_3COOH (acetic acid) etc. which fulfill the general formula but they do not have the characteristics of carbohydrate.

② There are many carbohydrate like rhamnose ($C_6H_{12}O_5$), rhamnohexose ($C_7H_{14}O_6$) which are not hydrated of carbon.

In the light of these facts the old definition of the carbohydrate lost its significance then the modern definition of carbohydrate is,

"Polyhydroxy aldehydes or ketones or the compound which yields these on hydrolysis and contain at least one chiral carbon atom in the molecule"

e.g. $C_6H_{12}O_6$ - glucose

$C_6H_{12}O_6$ - Fructose

$C_{12}H_{22}O_{11}$ - Sucrose.

31 Thursday

1 Friday

2 Saturday

Classification

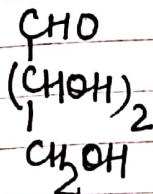
Carbohydrate

↓
Monosaccharide

↓
Oligosaccharide

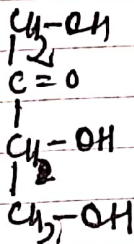
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Polysaccharide

① Erythrose and Threose



Aldotetrose

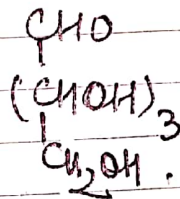
② Erythrulose



Ketotetrose.

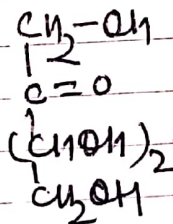
③ aldopentose

Ribose, Arabinose, Xylose and ~~3~~ Lyxose.



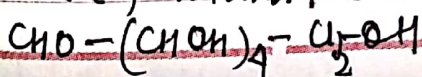
④ ketopentose

Ribulose and Xylulose



⑤ Aldohexose

Glucose, Mannose Galactose

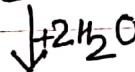


① Disaccharide

Sucrose, Sugar
Maltose, Lactose
($\text{C}_{12}\text{H}_{22}\text{O}_{11}$)

② Trisaccharide

Raffinose
($\text{C}_{18}\text{H}_{32}\text{O}_{16}$)

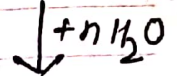


$\text{C}_6\text{H}_{12}\text{O}_6 + \text{C}_6\text{H}_{12}\text{O}_5 + \text{C}_6\text{H}_{12}\text{O}_6$
glucose fructose galactose

③ Tetrasaccharide

$\text{C}_{24}\text{H}_{42}\text{O}_{21}$ - Stachyose.

($\text{C}_6\text{H}_{10}\text{O}_5$)_n

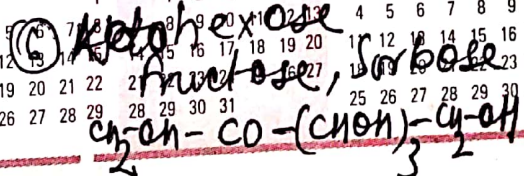


n $\text{C}_6\text{H}_{12}\text{O}_6$
glucose

① Starch

② Cellulose

NOVEMBER							DECEMBER							JANUARY						
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
						1	1	2	3	4	5	6						1	2	3
30														4	5	6	7	8	9	10
2	3	4	5	6	7	8	8	9	10	11	12	13	14	1	2	3	4	5	6	7
9	10	11	12	13	14	15	15	16	17	18	19	20	21	11	12	13	14	15	16	17
16	17	18	19	20	21	22	22	23	24	25	26	27	28	18	19	20	21	22	23	24
23	24	25	26	27	28	29	29	30	31					25	26	27	28	29	30	31



18 Thursday

19 Friday

20 Saturday

Another way of classification

Carbohydrates are classified into the following types

(A) Monosaccharides - These are the simplest carbohydrates, which cannot be hydrolysed further into smaller unit, having the general formula $C_n(H_2O)_n$

Where $n = 3 \text{ to } 7$

On the basis of functional group these are classified as

(i) Aldoses - Monosaccharide containing aldehyde function group ($-CHO$)

e.g. Glyceraldehyde ($HOCH_2 - \overset{*}{CHOH} - CHO$)

Glucose ($HOCH_2 - (\overset{*}{CHOH})_4 - CHO$)

(ii) Ketoses - Monosaccharides containing a ketone functional group

e.g. Fructose

$HOCH_2 - CO(\overset{*}{CHOH})_3CH_2OH$

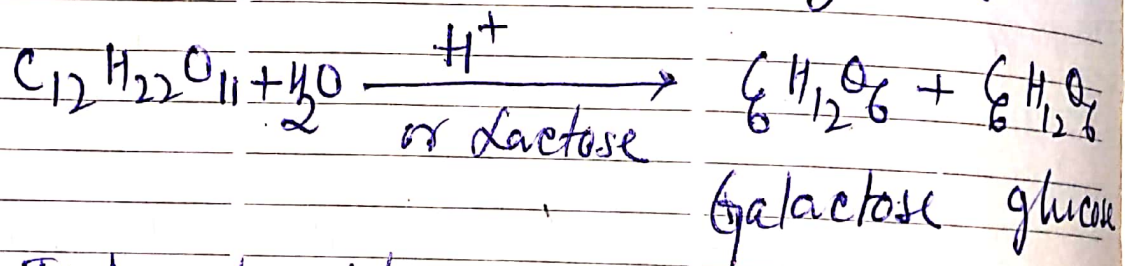
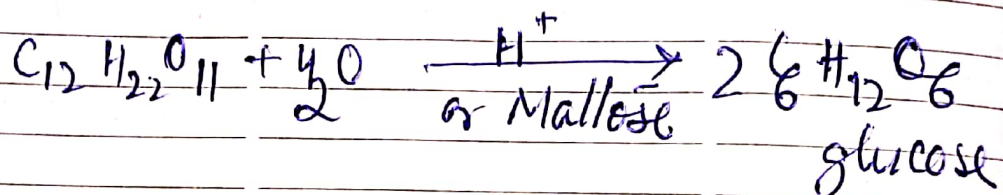
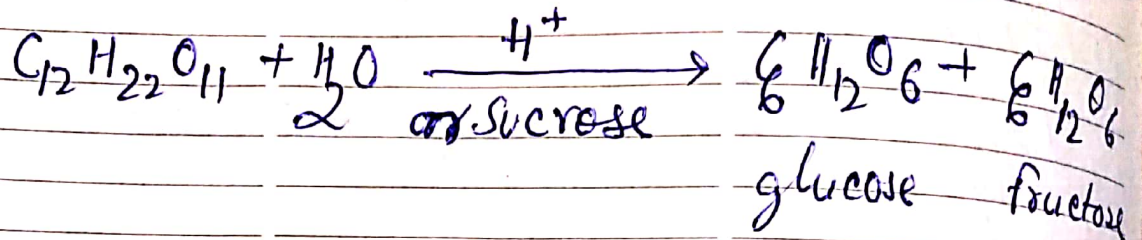
21 Sunday

(B) Oligosaccharides - These are carbohydrates which on hydrolysis gives 2 to 9 molecules of monosaccharides depending upon the number of monosaccharides molecules obtained by after hydrolysis, these oligosaccharides are classified as.

JANUARY							FEBRUARY							MARCH						
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
				1	2	3	1	2	3	4	5	6	7		1	2	3	4	5	6
				4	5	6	8	9	10	11	12	13	14	7	8	9	10	11	12	13
11	12	13	14	15	16	17	15	16	17	18	19	20	21	14	15	16	17	18	19	20
18	19	20	21	22	23	24	22	23	24	25	26	27	28	21	22	23	24	25	26	27
25	26	27	28	29	30	31	29							28	29	30	31			

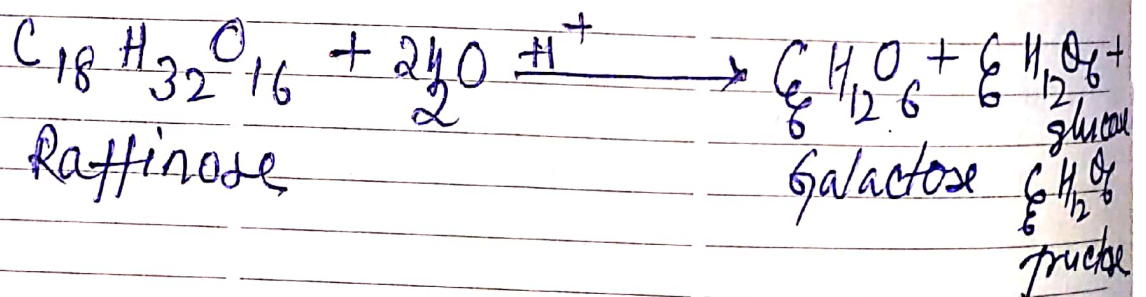
(a) Disaccharides - Carbohydrates which produce two molecules of monosaccharides after hydrolysis are called disaccharides. The general formula of disaccharides are $C_{12}H_{22}O_{11}$

e.g. - Sucrose
Maltose
Lactose etc.



(b) Trisaccharides :-

These carbohydrates give three molecules of monosaccharides on hydrolysis



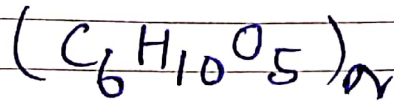
February 2016

25 Thursday

26 Friday

27 Saturday

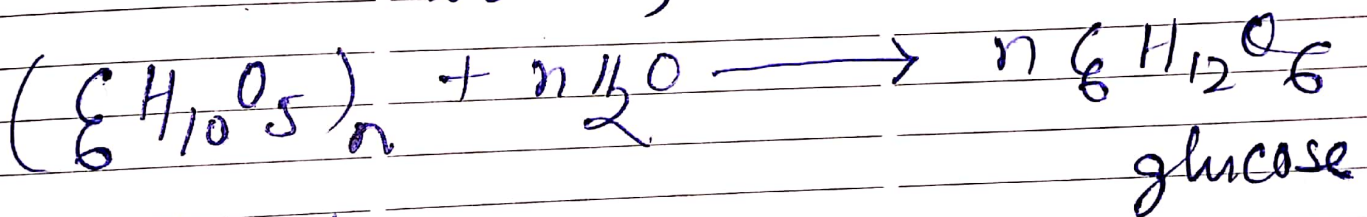
© Polysaccharides \div Carbohydrates which upon hydrolysis gives a large number of monosaccharides molecules are called polysaccharides. These molecules having the general formula is



where $n = 100$ to 3000

e.g. starch, cellulose, glycogen etc

(these carbohydrates stored in animal muscles)



Starch

$\xrightarrow{\quad}$

28 Sunday

JANUARY
M T W T F S S
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

FEBRUARY
M T W T F S S
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

MARCH
M T W T F S S
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31