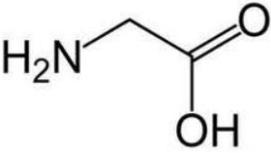
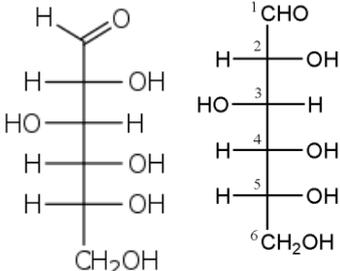
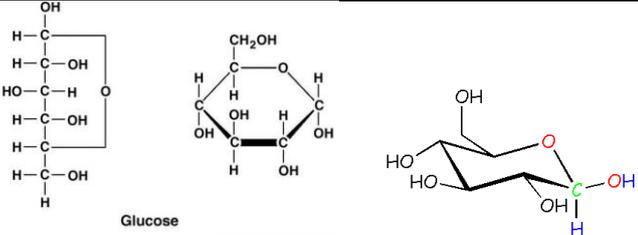
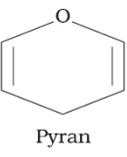
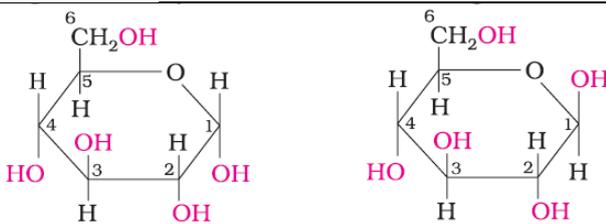
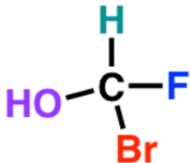
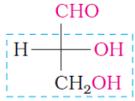
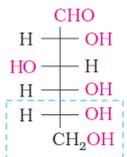
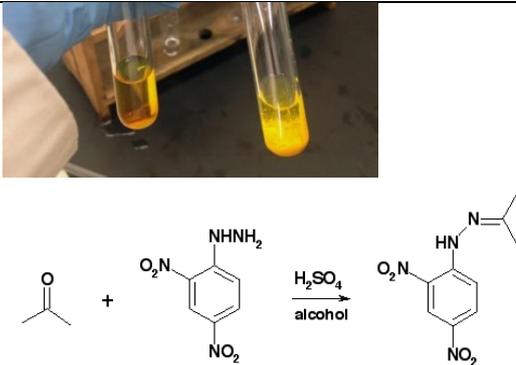
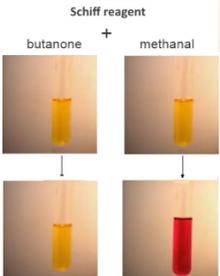
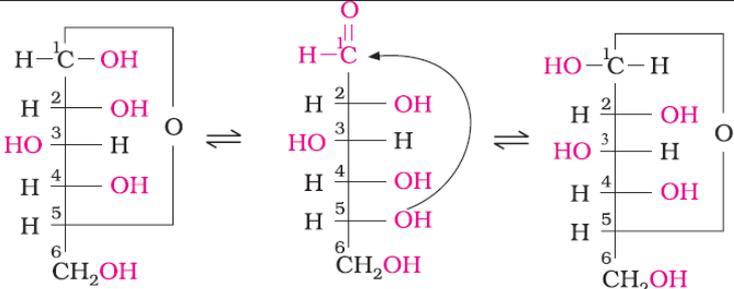
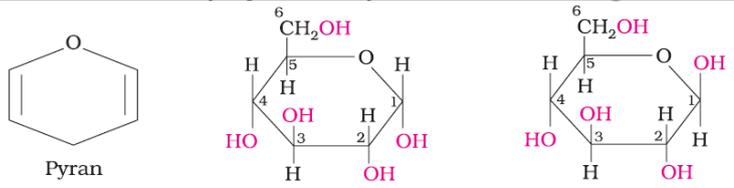
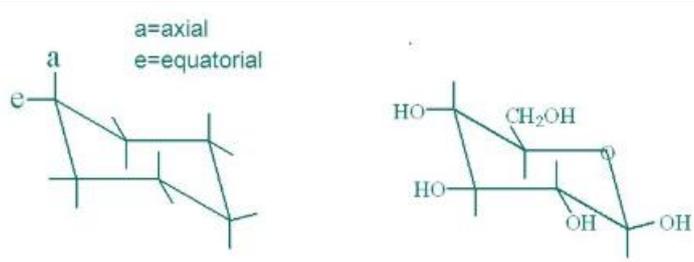
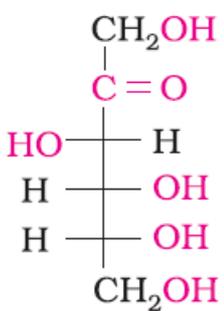
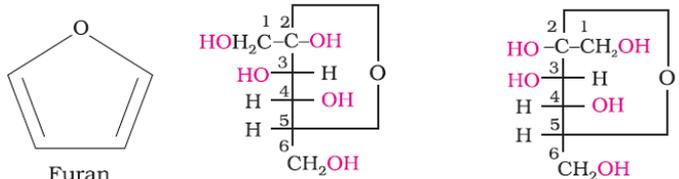
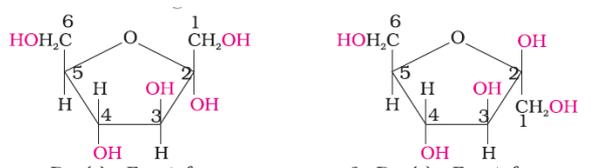
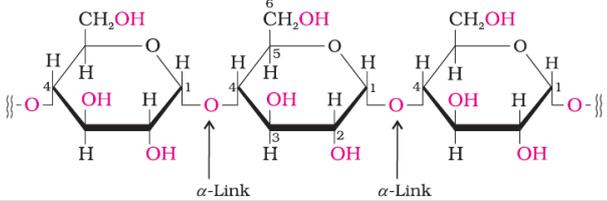
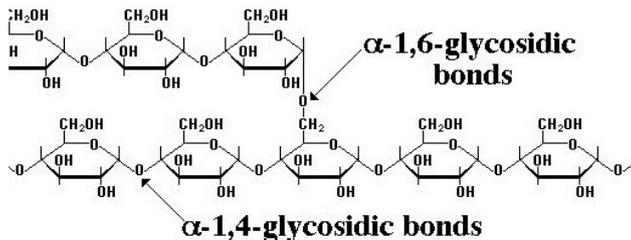
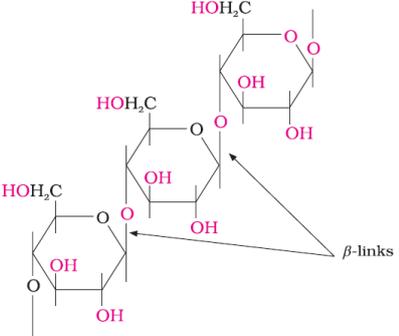


#	Topic Tree	1. Carbohydrates 2. Proteins 3. Enzymes 4. Vitamins 5. Nucleic acids																								
1.	Carbohydrates	<ul style="list-style-type: none"> • CHO units • Polyhydroxy aldehydes or ketones • Broadly classified as monosaccharides, disaccharides and polysaccharides. 																								
2.	Monosaccharide	Has single unit of CHO, e.g. glucose, fructose																								
3.	Disaccharides	Have double units of CHO, e.g. sucrose, maltose, cellobiose																								
4.	Oligosaccharides	Oligo means a few, represents di and tri-saccharides																								
5.	polysaccharides	Have many fundamental units of CHO, e.g. starch, cellulose																								
6.	-ose	Suffix for sugar																								
7.	aldose	Sugar having aldehyde group																								
8.	ketose	Sugar having keto group																								
9.	hexose	Sugar having 6 C atoms																								
10	Glycosidic linkage	The bond between two monosaccharides																								
11	Proteins	The polymers of about twenty different alpha-amino acids																								
12	Peptide linkage	Bonding between two amino acid units to form dipeptide, tripeptide, polypeptide																								
13	Alpha amino acid CH ₃ COOH – acetic acid NH ₂ CH ₂ COOH – alpha amino acetic acid																									
14	Enzymes	Biocatalysts Chemically proteins																								
15	Vitamins	Accessory food factors required in the diet. Its deficiency leads to many diseases.																								
16	Nucleic acids	Polymers of nucleotides. It consists of a pentose sugar, base and phosphate Two types – DNA (deoxy ribonucleic acid), RNA (ribonucleic acid)																								
17	Different types of monosaccharides	<table border="1"> <thead> <tr> <th>Carbon atoms</th> <th>General term</th> <th>Aldehyde</th> <th>Ketone</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>Triose</td> <td>Aldotriose</td> <td>Ketotriose</td> </tr> <tr> <td>4</td> <td>Tetrose</td> <td>Aldotetrose</td> <td>Ketotetrose</td> </tr> <tr> <td>5</td> <td>Pentose</td> <td>Aldopentose</td> <td>Ketopentose</td> </tr> <tr> <td>6</td> <td>Hexose</td> <td>Aldohexose</td> <td>Ketohexose</td> </tr> <tr> <td>7</td> <td>Heptose</td> <td>Aldoheptose</td> <td>Ketoheptose</td> </tr> </tbody> </table>	Carbon atoms	General term	Aldehyde	Ketone	3	Triose	Aldotriose	Ketotriose	4	Tetrose	Aldotetrose	Ketotetrose	5	Pentose	Aldopentose	Ketopentose	6	Hexose	Aldohexose	Ketohexose	7	Heptose	Aldoheptose	Ketoheptose
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18	Structure of glucose C ₆ H ₁₂ O ₆																									

19	Glucose as ring structure 6 membered ring Called glucopyranose Alpha glucose	 <p style="text-align: center;">Glucose</p>
20	Pyran	 <p style="text-align: center;">Pyran</p>
21	Haworth structures of two types of glucose. There is a rotation around the potential aldehyde group. It is responsible for two types of glucose, viz., alpha and beta.	 <p style="text-align: center;">α-D-(+)-Glucopyranose β-D-(+)-Glucopyranose</p>
22	Structural Elucidation of Glucose	Evidences of structure of glucose
23	Glucose is an aldohexose. Aldo – aldehyde as potential functional group Hexose – 6 C sugar Molecular formula $C_6H_{12}O_6$	$\begin{array}{c} \text{CHO} \\ \\ (\text{CHOH})_4 \\ \\ \text{CH}_2\text{OH} \end{array}$
24	Prolonged heating of glucose with HI results n-hexane. A proof for 6 C atoms linked in straight chain.	$\begin{array}{c} \text{CHO} \\ \\ (\text{CHOH})_4 \\ \\ \text{CH}_2\text{OH} \end{array} \xrightarrow{\text{HI}, \Delta} \text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-CH}_3$ <p style="text-align: center;">(n-Hexane)</p>
25	Reaction with hydroxyl amine gives oxime – a proof of presence of carbonyl group Reaction with HCN gives cyanohydrin. Another proof for carbonyl group.	$\begin{array}{c} \text{CHO} \\ \\ (\text{CHOH})_4 \\ \\ \text{CH}_2\text{OH} \end{array} \xrightarrow{\text{NH}_2\text{OH}} \begin{array}{c} \text{CH=N-OH} \\ \\ (\text{CHOH})_4 \\ \\ \text{CH}_2\text{OH} \end{array} \quad \begin{array}{c} \text{CHO} \\ \\ (\text{CHOH})_4 \\ \\ \text{CH}_2\text{OH} \end{array} \xrightarrow{\text{HCN}} \begin{array}{c} \text{CH} \begin{array}{l} \text{CN} \\ \text{OH} \end{array} \\ \\ (\text{CHOH})_4 \\ \\ \text{CH}_2\text{OH} \end{array}$

31	Asymmetric carbon atom C atom attached to different atoms or group of atoms.	
32	D(+) glyceraldehyde	
33	D(+) Glucose	
34 Cyclic structure of glucose		
35	DNP Test	 <p>DNP (dinitrophenylhydrazine) test for aldehyde forms yellow precipitate for –CHO group.</p>
36	Negative test (no yellow ppt) indicates the absence of free aldehyde group.	But, DNP test is negative in glucose
37	Schiff reagent test	 <p>Schiff base + aldehyde = red ppt</p>
38	Proof – absence of free aldehyde	Negative Schiff's test in glucose
39	Absence of free aldehyde	Does not form addition product with NaHSO ₄

40 Cyclic hemiacetal ring Alpha and beta glucose are called anomers.	 <p style="text-align: center;"> α-D-(+)-Glucose Open Str. Of G β-D-(+)-Glucose Ring structure of alpha G Ring struc. Of Beta G </p>
41 Haworth synthesis of Glucose	 <p style="text-align: center;"> α-D-(+)-Glucopyranose β-D-(+)-Glucopyranose </p>
42 Chair form of glucose	 <p style="text-align: center;"> Chair β-D-glucopyranose </p>
43 Fructose A ketohexose D(-)fructose Molecular formula $C_6H_{12}O_6$	 <p style="text-align: center;">D - (-) - Fructose</p>
44 Fructofuranose cyclic structure	 <p style="text-align: center;"> α-D-(-)-Fructofuranose β-D-(-)-Fructofuranose </p>
45 Haworth structure of fructose	 <p style="text-align: center;"> α-D-(-)-Fructofuranose β-D-(-)-Fructofuranose </p>
46 Disaccharide	Two monosaccharide units joined through glycosidic linkage = disaccharide

53	Amylose vs amylopectin	<p style="text-align: center;">Amylose</p> <ol style="list-style-type: none"> 1. It has a simple unbranched structure 2. It is soluble in water 3. It has α, 1-4 glycosidic linkages 4. Gives blue colour with dilute iodine solution 5. The molecular weight ranges from 10,000 -50,000 	<p style="text-align: center;">Amylopectin</p> <p>It has branched chain structure It is insoluble in water, can absorb water and swells up. It has α, 1-4 glycosidic and α, 1-6 glycosidic linkages Gives yellow or orange colour with iodine solution The molecular weight ranges from 50,000 - One million</p>
54	Structure of amylose		
55	Structure of amylopectin	<p style="text-align: center;">Amylopectin</p> 	
56	Cellulose Straight chain polymer of beta D glucose units which are joined by C1-C4 beta glycosidic linkage		
57	Glycogen Carbohydrate stored in animal body. Also called animal starch. Structure is similar to amylopectin. Present in liver, muscles, brain		

58 Importance of carbohydrates

