Question bank for carbohydrate

Define

Carbohydrates, Simple sugar, Monosaccharide, , aldose, ketose, tetrose, hexose, ketopentose, aldotriose, Oligosaccharide, Polysaccharides, Enantiomers, Epimers, anomeric carbon, Fischer projection, Haworth projections, glycosidic bond, glycoside, Homopolysaccharides, Hetropolysaccharides, Amylose, Amylopectin, Cellulose, Glycogen, Mucopolysaccharides, Hyaluronic acid, Heparin

What is Glycoside, and how is formed?

Write Fischer projections for L-ribose

Define the term anomeric carbon. In glucose, which carbon is the anomeric carbon?

Which is the anomeric carbon in a 2-ketohexose?

Fill the blanks

1. The Carbohydrates are widely distributed in ----- and -------- tissue

2. In plant, carbohydrate is synthesized by chlorophyll from ----- and ------- using sunlight as a source of energy in the process called ----------
3. --------- is the storage form of carbohydrates in plant, while -------- is the storage form of carbohydrates in animals
4. ----------is monosaccharides containing aldehyde group
5. The monosaccharides held together by ------- bonds to form oligo or polysaccharides.
6. --------- is monosaccharides containing ketone group
7. The most abundant monosaccharide in nature is ----------.
8. The simplest aldose is -----, and the simplest ketose is ----------
9. Lactose is hydrolyzed to ----- and ------- by lactase enzyme in human.
10. Sucrose is a disaccharide contains ------- and -------and hydrolyzed by sucrose enzyme
11. Maltose is hydrolyzed to ----- and ------- by maltase enzyme in human.
12. --------- is formed during the starch digestion of α-amylase enzyme in the small intestine and then hydrolyzed to glucose by a maltase enzyme.
13. Polysaccharides serve two main functions in the living organisms, which are-------, and ----------
14. Homopolysaccharides are made up of single kind of monosaccharide residues or their derivatives. On hydrolysis, yield one type of monosaccharides.
15. Inulin is a homopolymer made of ------- units linked by -------- bonds.
16. Heteropolysaccharides are polymers that contain -------- types of monosaccharide units or their derivative.
17. A mucopolysaccharides or glycosaminoglycans are linear polymers composed of repeating ---------- units (acidic sugar- amino sugar)

18. The amino sugar in Mucopolysaccharides is either -------- or -------; the acidic sugar is either -------- or ----------
19. Hyaluronic acid is a heteropolysaccharide, composed of repeating disaccharide units linked by -------- linkages.
20. Heparin is a ---------- composed of -------- units
21. The glycosidic bonds at the branching points in the structure of starch are----
22. The carbons are numbered starting from aldehyde group as carbon ----. In case of ketoses the carbon of ketone group is the carbon ----
23. In plant, carbohydrate is synthesized by-------
24. Starch is the storage form of carbohydrates in ----, while glycogen is the storage form of carbohydrates in ---- found abundant in the ---- and ---
25. L & D isomerism depends on the configuration of asymmetric carbon ---- from the carbonyl group (the aldehyde or ketone group).
26. Most of the monosaccharides occurring in the living belong to the -------- form
27. In general, the pyranose form is favored for ---- sugars, and furanose structures are more stable for -----.
28. The monosaccharides held together by O-glycosidic bonds to form ----- or ----------.
29. Sucrose is a disaccharide contains ----- and ---- molecule linked by ----- glycosidic bond.
30. Lactose is a principal ----- found in the milk
31. Lactose contains a galactose joined to a glucose by a ------ glycosidic bond.
32. Maltose is formed during the starch digestion of ----- enzyme in the small intestine and then hydrolyzed to glucose by a ----- enzyme.

33. The designated α means that the ---------- attached to C-1 or C-2 is below the plane of the ring.
34. The designated β means that the ---------- attached to C-1 or C-2 is above the plane of the ring.
35. N- Glycosidic bonds are found in --------

Multiple choice questions

1. Ribose and deoxyribose differ in structure around a single carbon, namely
   (a)C1 (b)C2 (c) C3 (d)C4.
2. One of the following is not an aldose
   (a)Glucose (b)Galactose (c)Mannose(d) Fructose.
3. The glycosaminoglycan that serves as an anticoagulant
   (a)Heparin(b) Hyaluronic acid(c) Chondroitin sulfate(d) Dermatan sulfate.
4. The following polysaccharide is composed of B-glycosidic bonds
   (a)Starch (b)Glycogen (c)Dextrin (d)Cellulose.

Explain, why?

The monosaccharides are also called simple sugars

Cellulose cannot be digested in humans body.

Sucrose is non-reducing sugar

Are α-D-glucose and β-D-glucose enantiomers.

Write the structure of

α –D- glucopyranose and β-D- glucopyranose

α -D-ribofuranose and β -D-ribofuranose

α –D- galactopyranose and β-D- galactopyranose

α –D- mannopyranose and β-D- mannopyranose

α –D- fructofuranose and β-D- fructofuranose

Write the structure, systematic name of the following compounds

Maltose, lactose, and sucrose, Amylose

Write the type of glycosidic bond in

Maltose, lactose, and sucrose, fructose, glucose, amylose, amylopectin, cellulose, glycogen, Dextran, Inulin, Chitin, Hyaluronic acid,

Explain the difference between:

1- A ketohexose and an aldohexose
2- A triose and a pentose
3- simple and complex sugars.

4- aldose and a ketose

5- monosaccharide and a disaccharide

6- cellulose and the amylose

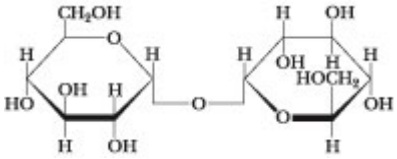
7- amylose and amylopectin

8- amylose and glycogen

9- amylopectin and glycogen

10- Maltose and Isomaltose

Trehalose, a disaccharide produced in fungi, has the following structure:



a. What is the systematic name for this disaccharide?

b. Is trehalose a reducing sugar? Explain.

What is the major physiological purpose of glycogen? Where in the body do you find glycogen stored?

Draw

a. Fischer Projections for the stereoisomers of glyceraldehyde
b. The Haworth projections of (a) α and β-D-galactose and of (b) α – and β-D-ribose.
c. the structures of D-ribose and L-ribose.
d. the structure of L-galactose
e. the structure for D-glucose

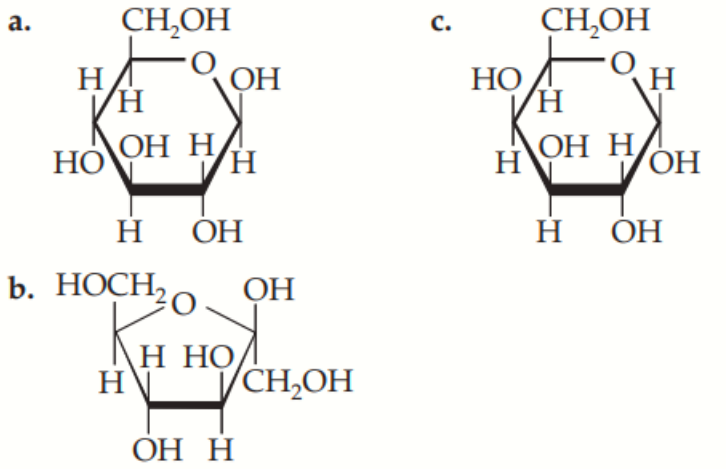
f. Draw the Haworth projections of α – and β -D-glucopyranose

Draw the structure of the open-chain form of D-fructose, and show how it cyclizes to form α- and β-D-fructofuranose

What is the major storage form of sugar in a plant?

19- What is the major structural form of sugar in a plant?

- Identify each of the following sugars. Label each as either a hemiacetal or a hemiketal:



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Write the type of glycosidic bond in

Lactose, Maltose, sucrose, amylose, amylopectine, glycogene, cellulose, fructose, Chitin, Pectin, Inulin, Heparin, Hyaluronic acid.