

General Biochemistry

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Carbohydrate

Class of carbohydrate which cannot be hydrolyzed further, is known as

- A. Disaccharides
- B. Polysaccharides
- C. Proteoglycan
- D. Monosaccharide

The long chain of small molecular units

- A. Polymer
- B. Monomer
- C. Organic molecule
- D. Inorganic molecule

Polysaccharides

- A. Yield more than 10 molecules of monosaccharide on hydrolysis
- B. May be linear or branched
- C. Include hexosans and pentosans depending on the type of monosaccharide produced on hydrolysis
- D. All the above

Milk sugar is made from

- A. Maltose and fructose
- B. Sucrose and fructose
- C. Glucose and fructose
- D. Glucose and galactose

Carbohydrates are

- A. Polyhydroxy aldehydes and phenols
- B. Polyhydroxy aldehydes and ketones
- C. Polyhydroxy ketones and phenols
- D. Polyhydroxy phenols and alcohols

Which of the following is not true about monosaccharides

- A. They are white crystalline solids
- B. They are soluble in water
- C. They have sweet taste
- D. They can be hydrolyzed

N-acetyl glucosamine (NAG) and N-acetyl muramic acid (NAM) in peptidoglycan is connected byglycosidic linkage

- A. α 1 - 4
- B. β 1 - 4
- C. α 1 - 2
- D. β 1 - 2

Chitin is

- A. Homopolysaccharide of invertebrates
- B. Formed of N-acetyl glucosamine units
- C. Formed by 1-4 β -glucosidic bonds
- D. All the above

Which of the following are an example of epimers

- A. Glucose and galactose
- B. Glucose and ribose
- C. A & D
- D. Mannose and glucose

ملاحظة : الدكتور يستخدم خاصية تغيير ترتيب الخيارات وال ينتبه انه من الممكن ان يصبح السؤال خاطيء فمثال تصبح

الخيارات كالآتي: ولكن تبقى الاجابة كما هي والله اعلم

- A. Glucose and ribose
- B. Glucose and galactose
- C. Mannose and glucose
- D. A & D

In lactose, the linkage is

- A. β 1-4 linkage
- B. β 1-2 linkage
- C. α 1-4 linkage
- D. α 1-2 linkage

In maltose, between which of the following carbons there is a linkage

- A. C1, C2
- B. C2, C3
- C. C1, C4
- D. C2, C4

Amylopectin has

- A. β -1-4 & β -1-6 linkage
- B. β -1-2 linkage
- C. α -1-4 & α -1-6 linkage
- D. α -1-2 linkage

The difference in disaccharides is due to

- A. Number of H atoms
- B. Arrangement of atoms within
- C. Number of C atoms
- D. Number of O atoms

Monosaccharides such as ribose, fructose, glucose and mannose differ significantly in

- A. Their sweetness
- B. The positions of their carbonyl group

- C. Their diastereomeric configuration
- D. Their number of carbon atoms
- E. All but the first choice are significant differences

A hemiacetal is a compound that contains a hydroxyl group [-OH] and an alkoxy group [-OR] on adjacent carbon atoms

- A. True
- B. False

All carbohydrates except for dihydroxyacetone, contain one or more chirality centers

- A. True
- B. False

The units of carbohydrates which cannot be further hydrolyzed to simpler compounds are

- A. Disaccharides
- B. Polysaccharides
- C. Monosaccharides
- D. Oligosaccharides

Amylose

- A. Is a straight-chain with coiled structure
- B. Gives blue color with iodine
- C. Constitutes 15-20% of starch
- D. All the above

When a monosaccharide forms a cyclic hemiacetal, the carbon atom that is part of the hemiacetal is a new chirality center, called the anomeric carbon

- A. True
- B. False

Glycogen

- A. Is formed by 1-4 glucosidic bonds only

- B. Is reducing
- C. Gives pink color with iodine
- D. All the above

Starch is

- A. A homopolysaccharide of plant origin
- B. Formed of alpha-glucose units linked by 1-4 and 1-6 glucosidic bonds
- C. Formed of two types of chains: amylose and amylopectin
- D. All the above

Inulin is

- A. A glucosan
- B. Formed by liver cells
- C. Used to measure glomerular filtration rate
- D. All the above

Non-reducing disaccharides include

- A. Sucrose
- B. Cellobiose
- C. Both A and B
- D. Maltose

Cellulose

- A. Increases the bulk of stool and stimulate peristalsis
- B. Is digested by bacterial enzymes in the digestive tract of herbivorous animals
- C. Yields cellobiose then glucose on hydrolysis
- D. All the above

The β anomer of a cyclic monosaccharide has the -OH group drawn down, below the ring

- A. True
- B. False

When two carbohydrates are epimers

- A. One is a pyranose, the other a furanose
- B. One is an aldose, the other a ketose
- C. They differ in length by one carbon
- D. They differ only in the configuration around one carbon atom

Iodine gives no blue color when added to which of the following mixtures kept at 37°C

- A. Starch and glycogen
- B. Starch and saliva
- C. Starch and sucrose
- D. Starch and milk

Which of the following are the storage polysaccharides

- A. Glycogen
- B. Cellulose
- C. Chitin
- D. Glucose

The glycosidic bond

- A. Joins glucose and fructose to form sucrose
- B. In sucrose is hydrolyzed by bees to make honey from nectar
- C. In maltose is not hydrolyzed in "lactose intolerant" humans
- D. In lactose is hydrolyzed by human infants to make two galactose monosaccharides
- E. the first two choices are both correct

Certain monosaccharides notably aldopentoses and ketohexoses form five-membered rings, not six- membered rings in solution

- A. True
- B. False

Which of the following is a reducing sugar

- A. Glucose
- B. Dihydroxyacetone

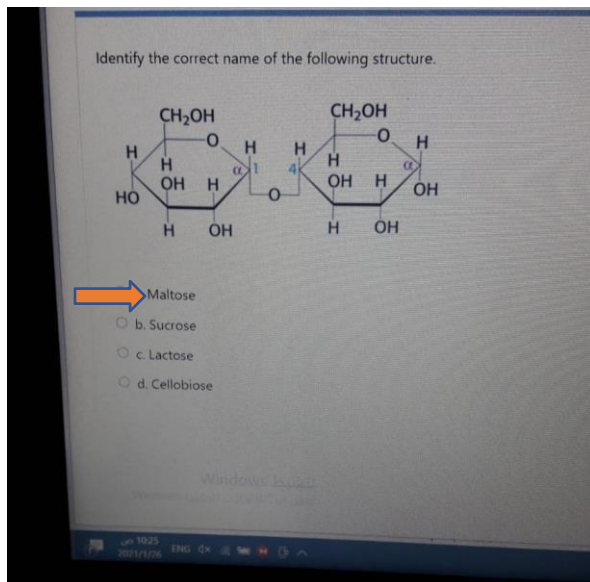
- C. Erythulose
- D. None of these

Maltose

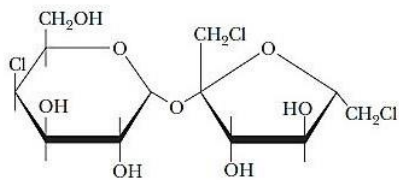
- A. Is formed of two molecules of glucose joined by 1-4, β -glycosidic bond
- B. Results from complete acid hydrolysis of starch
- C. Shows mutarotation
- D. Is a non-reducing sugar

Cellulose

- A. Is a straight chain homopolysaccharide formed of glucose units
- B. Is formed by 1-4 α -glucosidic bonds
- C. Is digested by cellulase of the human intestine
- D. Gives blue color with iodine

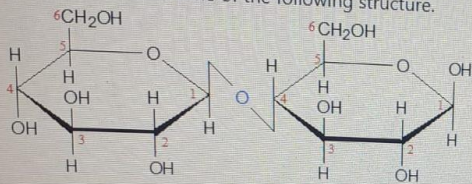


Identify the correct name of the following structure.



- ☐ a. Lactose
- ☐ b. Cellobiose
- ☐ c. Sucrose
- ☒ d. Sucralose

Identify the correct name of the following structure.



- ☐ a. Maltose
- ☐ b. Lactose
- ☐ c. Sucrose
- ☒ d. Cellobiose

200 MCQ on CHO with answers

1- Carbohydrates:

- (a) are organic compounds that contain carbon, hydrogen and oxygen.
- (b) generally, but not always, have the number of hydrogen atoms double that of oxygen atoms.
- (c) include polyhydroxy aldehydes or polyhydroxy ketones and their polymers and derivatives.
- (d) are all of the above.

2- Monosaccharides:

- (a) cannot be hydrolyzed to simpler sugars.
- (b) are the building blocks for oligo- and polysaccharides.
- (c) both (a) and (b).
- (d) neither (a) nor (b).

3- Monosaccharides include:

- (a) glucose, lactose, and galactose.
- (b) fructose, ribose, and glycerose.
- (c) fructose, sucrose, and mannose.
- (d) all the above.

4- Disaccharides

- (a) can be hydrolyzed by acid or enzymes.
- (b) yield two monosaccharide molecules when hydrolyzed.
- (c) include sucrose, lactose and maltose.
- (d) all the above.

5- Oligosaccharides

- (a) yield 3-10 monosaccharide units on hydrolysis.
- (b) include the trisaccharide maltotriose.
- (c) both (a) and (b).
- (d) neither (a) nor (b).

6- Polysaccharides

- (a) yield more than 10 molecules of monosaccharide on hydrolysis.
- (b) may be linear or branched.
- (c) include hexosans and pentosans depending on the type of monosaccharide produced on hydrolysis.
- (d) all the above.

7- Hexosans

- (a) include starch, glycogen and cellulose as glucosans.
- (b) include inulin as a fructosan.
- (c) may be taken in diet or synthesized in the body.
- (d) all the above.

17- Trioses include:

- (a) erythrose and pseudoheptulose
- (b) glyceraldehyde and dihydroxyacetone
- (c) both (a) and (b).
- (d) neither (a) nor (b).

18- Glycerose is

- (a) a triose.
- (b) glyceraldehyde.
- (c) an aldose.
- (d) all the above.

19- Maltotriose is

- (a) an aldotriose.
- (b) a ketotriose.
- (c) a disaccharide.
- (d) an oligosaccharide.

20- Erythrose is

- (a) an aldotetrose.
- (b) of no biological importance.
- (c) a sugar having five carbon atoms.
- (d) all the above.

21- Pentoses are

- (a) sugars with four carbon atoms per molecule.
- (b) hydrolyzed to five monosaccharides.
- (c) components of nucleotides and nucleic acids.
- (d) all the above.

22- Isomers are compounds that have

- (a) the same molecular formula.
- (b) the same structural groups.
- (c) different molecular formulae.
- (d) different structural groups.

23- Stereoisomers are compounds that have

- (a) the same molecular formula.
- (b) the same structural formula.
- (c) different orientation of structural groups.
- (d) all the above.

24- An asymmetric carbon atom

- (a) is one which is attached to four different groups.
- (b) confers optic activity on the molecule.
- (c) causes optical isomerism.
- (d) all the above.

25- A compound with no asymmetric carbon is

- (a) galactose.
- (b) glyceraldehyde.
- (c) dihydroxyacetone.
- (d) none of the above.

26-This compound is

- (a) D-glyceraldehyde.
- (b) L-glyceraldehyde.
- (c) L-glycerose.
- (d) a ketotriose.

27-This compound is

- (a) L-galactose.
- (b) D-glucose.
- (c) D-mannose.
- (d) D-ketose.

28- D-glucose is one of how many possible optical isomers?

- (a) two.
- (b) four.
- (c) eight.
- (d) sixteen.

29-This compound is

- (a) an aldehyde derivative of a polyhydric alcohol.
- (b) D-galactose.
- (c) a 4-epimer of glucose.

(d) all the above.

30-This compound shown as Haworth projection is

(a) alpha-D-glucose.

(b) beta-D-fructose.

(c) beta-D-galactose.

(d) alpha-D-galactose.

37- Mutarotation

(a) is the gradual change of specific rotation of the sugar solution.

(b) is due to change of the alpha to the beta anomer or the reverse.

(c) necessitates the presence of an open chain form.

(d) is all the above.

58- A racemic mixture

(a) is a mixture of equal amounts of D and L forms of a compound.

(b) is usually produced by synthetic non-enzymatic reactions.

(c) does not rotate the plane-polarized light.

(d) is all the above.

59- As regards D and L forms of sugars

(a) Most of the monosaccharides occurring in mammals are of the D configuration.

(b) Mammalian enzymes are mostly specific for the D configuration of sugars.

(c) L-Xylulose is found in urine in the disease known as essential pentosuria.

(d) All the above is correct.

65- Glucose differs from fructose in that

(a) glucose is an aldohexose and fructose is a ketopentose.

(b) glucose is mainly present in pyranose form while fructose is mainly present in furanose form.

(c) D-glucose is levorotatory while D- fructose is dextrorotatory.

(d) all the above is correct.

66- Isomerism shown by monosaccharides includes

(a) aldose-ketose isomerism.

(b) anomerism and epimerism.

(c) D-L isomerism.

(d) all the above.

67- Ring structure of sugars

(a) is due to formation of hemiacetal or hemiketal.

(b) causes the presence of anomers.

(c) causes pyranose-furanose isomerism.

(d) all the above is correct.

68- Glucopyranose

(a) is the main form of glucose.

(b) is mainly present in the chair form.

(c) both (a) and (b).

(d) neither (a) nor (b).

69- Glycosides

(a) are formed by condensation between the anomeric hydroxyl of a monosaccharide and a second molecule.

(b) must contain a sugar residue and an aglycone.

(c) when the sugar residue is glucose, are called galactosides.

(d) all the above is correct.

70- Glycosides include

- (a) disaccharides (e.g., lactose, maltose, and sucrose).
- (b) cardiac glycosides (digitalis drugs) and aminoglycosides (e.g., streptomycin.)
- (c) nucleosides (e.g. adenosine) and cerebrosides and gangliosides (glycolipids).
- (d) all the above.

71- A glycoside is formed by attaching the sugar to another molecule at a

- (a) nitrogen atom (N-glycosidic linkage).
- (b) oxygen atom (O-glycosidic linkage).
- (c) either (a) or (b).
- (d) neither (a) nor (b).

72- Oxidation of carbon 6 of glucose results in formation of

- (a) saccharic acid.
- (b) gluconic acid.
- (c) glucuronic acid.
- (d) a mixture of the above mentioned acids.

73- Sugar alcohols include

- (a) sorbitol and mannitol.
- (b) inositol and glycerol.
- (c) both (a) and (b).
- (d) neither (a) nor (b).

74- Reduction of fructose results in formation of

- (a) sorbitol.
- (b) mannitol.
- (c) both (a) and (b).
- (d) neither (a) nor (b).

75- Sorbitol results from

- (a) oxidation of glucose.
- (b) oxidation of fructose.
- (c) reduction of glucose.
- (d) reduction of mannose.

76- Aminosugars are important components of

- (a) glycoproteins.
- (b) proteoglycans.
- (c) some antibiotics.
- (d) all the above.

87- The molecular weight of water = 18 and that of glucose = 180 while the molecular weight of sucrose =

- (a) = 280
- (b) = 342
- (c) = 360
- (d) = 378

88- Maltose

- (a) is formed of two molecules of glucose joined by 1-4, β -glucosidic bond.
- (b) results from complete acid hydrolysis of starch.
- (c) shows mutarotation.
- (d) is a non-reducing sugar.

89- Maltose

- (a) is a non-fermentable sugar.
- (b) can be produced from starch.
- (c) does not have a free anomeric carbon.
- (d) cannot be hydrolyzed in the intestine.

90- Lactose

(a) is the disaccharide synthesized by sweet plant roots.

(b) is a galactoside.

(c) is fermented by yeast enzymes.

(d) is present in only alpha and not beta form.

91- Lactose

(a) is formed by alpha glucosidic bond.

(b) may be found in blood and urine in certain cases.

(c) is non-reducing.

(d) cannot be digested.

92- Lactose

(a) can be hydrolyzed by acid or enzyme catalysis.

(b) results from enzymatic hydrolysis of glycogen.

(c) both (a) and (b).

(d) neither (a) nor (b).

93- Sucrose is

(a) a disaccharide formed by some human cells.

(b) formed by 1-2 linkage between α -D-glucose and β -D-fructose.

(c) both (a) and (b).

(d) neither (a) nor (b).

94- Sucrose

(a) is a non-reducing sugar.

(b) has a free anomeric carbon.

(c) results from partial hydrolysis of glycogen.

(d) none of the above is true.

95- Sucrose

(a) dissolves in water, dissociating to glucose and fructose.

(b) changes its specific rotation by time.

(c) is fermentable.

(d) none of the above is correct.

96- Sucrose

(a) is present in alpha or beta forms.

(b) is hydrolyzed by invertase enzyme.

(c) cannot be hydrolyzed by acid catalysis.

(d) all the above is correct.

97- Disaccharidases

(a) are enzymes which hydrolyze disaccharides.

(b) include sucrase, lactase, and maltase.

(c) are produced by intestinal cells.

(d) all the above is true.

98- Invert sugar is

(a) the hydrolysate of sucrose.

(b) a mixture of glucose and fructose.

(c) levorotatory.

(d) all the above.

99- Invert sugar is

(a) produced from maltose by acid treatment.

(b) present in honey as a natural source.

(c) non-reducing.

(d) all the above.

100- Invert sugar is

(a) mannose and glucose.

(b) reducing.

(c) found in blood.

(d) produced by the liver cells.

126- Starch is

(a) a homopolysaccharide of plant origin.

(b) formed of α -glucose units linked by 1-4 and 1-6 glucosidic bonds.

(c) formed of two types of chains: amylose and amylopectin.

(d) all the above.

127- Starch

(a) is reducing.

(b) gives blue color with iodine.

(c) is hydrolyzed by maltase.

(d) None of the above is true.

128- Amylose

(a) is a straight chain with coiled structure.

(b) gives blue color with iodine.

(c) constitutes 15-20% of starch.

(d) all the above.

129- Amylopectin

(a) is a branched chain with no helical structures.

(b) gives no blue color with iodine.

(c) has 1-6 glucosidic bonds at branching points.

(d) all the above.

130- Starch is completely hydrolyzed to glucose by

(a) acid hydrolysis.

(b) hydrolysis by amylase.

(c) hydrolysis by maltase.

(d) hydrolysis by isomaltase.

131- Partial digestion of starch by amylase gives

(a) amylopectin, erythropectin and achropectin.

(b) maltose and glucose.

(c) dextrans and glucose.

(d) any of the above.

132- Storage form of carbohydrate in mammalian cells is

(a) starch.

(b) glycogen.

(c) dextrans.

(d) all the above.

133- Glycogen is

(a) a highly branched homopolysaccharide.

(b) formed mainly by liver and muscle cells.

(c) often called animal starch..

(d) all the above.

134- Glycogen

(a) is formed by 1-4 glucosidic bonds only.

(b) is reducing.

(c) gives pink color with iodine.

(d) all the above.

135- A polysaccharide of plant cell wall is

- (a) starch.
- (b) glycogen.
- (c) cellulose.
- (d) chondroitin.

136- Cellulose

- (a) increases the bulk of stool and stimulate peristalsis.
- (b) is digested by bacterial enzymes in the digestive tract of herbivorous animals.
- (c) yields cellobiose then glucose on hydrolysis.
- (d) all the above

137- Cellulose

- (a) is a straight chain homopolysaccharide formed of glucose units.
- (b) is formed by 1-4 α -glucosidic bonds.
- (c) is digested by cellulase of the human intestine.
- (d) gives blue color with iodine.

138- Dextrins are

- (a) homopolysaccharides formed of glucose units.
- (b) obtained by partial hydrolysis of starch.
- (c) branched and non-branched chains.
- (d) all the above.

139- Dextrins are

- (a) present in some food products like corn syrup and.
- (b) extensively used as adhesives.
- (c) digested by the enzyme amylase yielding maltose.
- (d) all the above.

140- Dextrans are

- (a) formed by some micro-organisms.
- (b) highly branched homopolysaccharides formed by 1-4, 1-6, and 1-3 α -glucosidic bonds.
- (c) used in plasma substitute solutions.
- (d) all the above.

141- Chitin is

- (a) a homopolysaccharide of invertebrates.
- (b) formed of N-acetyl glucosamine units.
- (c) formed by 1-4 β -glucosidic bonds.
- (d) all the above.

142- Inulin is

- (a) a glucosan
- (b) formed by liver cells.
- (c) used to measure glomerular filtration rate.
- (d) all the above.

143- Pectins are

- (a) mixed polysaccharides.
- (b) present in fruits of some plants.
- (c) give galactose, arabinose, and galacturonic acid on hydrolysis.
- (d) all the above.

144- Main carbohydrates of diet are

- (a) glucose, fructose, galactose and ribose.
- (b) glucose, fructose, mannose and deoxyribose.
- (c) sucrose, lactose, starch and cellulose.
- (d) sucrose, lactose, galactose and glycogen.

145- Main end products of carbohydrate digestion in man are

(a) glucose, fructose, lactose and starch.

(b) glucose, fructose, galactose and cellulose.

(c) glucose, fructose, maltose and cellulose.

(d) glucose, fructose, ribose and starch.

146- Reducing sugars include

(a) glucose, fructose, galactose and lactose.

(b) glucose, fructose, sucrose and maltose.

(c) glucose, fructose, galactose and sucrose.

(d) glucose, fructose, galactose and cellulose.

156- Some carbohydrates can be produced by mammalian cells, e.g.,

(a) lactose, sucrose, starch and glycogen.

(b) glucose, fructose, galactose and cellulose.

(c) glucose, fructose, galactose and lactose.

(d) glucose, fructose, galactose and starch

157- An energy store in man is

(a) amylose.

(b) glycogen.

(c) inulin.

(d) glucose.

158- A carbohydrate which is not a glucosan is

(a) glycogen

(b) dextrin

(c) inulin

(d) cellulose.

159- Production of a red precipitate in Benedict test is due to

(a) hydrolysis.

(b) reduction.

(c) polymerization.

(d) acetylation.

160- The cause of red coloration on boiling semen with concentrated hydrochloric acid is

(a) lactose.

(b) galactosamine.

(c) fructose.

(d) sucrose.

161- Iodine gives no blue color when added to which of the following mixtures kept at 37°C?

(a) starch and glycogen.

(b) starch and saliva.

(c) starch and sucrose.

(d) starch and milk.

162- Mannose is

(a) a reducing disaccharide.

(b) a glucosan.

(c) a glucose anomer.

(d) a carbohydrate.

163- An important constituent of DNA is

(a) alpha D-glucose.

(b) 2-deoxyribose.

(c) N-acetyl galactosamine.

(d) ribose in ring form.

164- Carbohydrate normally present in large intestine of man include

- (a) glycogen and starch.
- (b) L-glucose.
- (c) cellulose.
- (d) invert sugar.

165- Carbohydrates important for nucleic acid synthesis are

- (a) glucuronic acid.
- (b) aminohexoses.
- (c) pentoses.
- (d) oxidized pentoses.

166- Sugar acids are produced by oxidation of

- (a) carbon 1.
- (b) carbon 6.
- (c) anomeric carbon.
- (d) an aldehyde or hydroxyl group.

167- Hydrolysis of starch by pancreatic amylase produces

- (a) a reducing disaccharide.
- (b) a reducing monosaccharide.
- (c) a non-reducing disaccharide.
- (d) a non-reducing sugar.

168- Sugars absorbed from the intestine of a breast-fed baby are

- (a) glucose and lactose.
- (b) glucose and fructose.
- (c) glucose and galactose.
- (d) glucose and sucrose.

169- The red precipitate obtained by boiling glucose solution with Fehling solution is

- (a) cuprous oxide.
- (b) cupric hydroxide.
- (c) cupric sulfate.
- (d) a mixture of all the above.

170- When glycogen is boiled with 1 N sulfuric acid, the resulting solution is

- (a) a reducing sugar.
- (b) a levorotatory solution.
- (c) both (a) and (b).
- (d) neither (a) nor (b).

171- Phytic acid

- (a) is mannitol hexaphosphate.
- (b) binds calcium and iron in the intestine preventing their absorption.
- (c) both (a) and (b).
- (d) neither (a) nor (b).

177- Boiling sucrose with concentrated hydrochloric acid gives

- (a) a red to orange color.
- (b) a non-reducing mixture.
- (c) a dextrorotatory mixture.
- (d) all the above.

178- A carbohydrate introduced by intravenous infusion as a dehydrating (osmotically active) agent is

- (a) sucrose.
- (b) mannitol.
- (c) mannose.
- (d) starch.

179- In diabetes mellitus, the reducing sugar present in urine is

- (a) lactose.
- (b) galactose.
- (c) glucose.
- (d) fructose.

180- Levulose is

- (a) sucrose.
- (b) fructose.
- (c) lactose.
- (d) inositol.

181- Milk intolerance can be due to lack of

- (a) milk lactose.
- (b) intestinal lactase.
- (c) milk galactose.
- (d) intestinal glucosidase.

182- Glycosaminoglycans are

- (a) mixed polysaccharides which are also called mucopolysaccharides.
- (b) formed of repeating disaccharide units containing aminosugars and uronic acids in addition to acetyl and sulfate groups.
- (c) structural polysaccharides of animal tissues, and when linked to proteins, they form proteoglycans.
- (d) all the above.

183- Glycosaminoglycans include

- (a) heparin and heparan sulfate.
- (b) hyaluronic acid and chondroitin sulfate
- (c) keratan sulfate and dermatan sulfate.
- (d) all the above.

184- Heparin

- (a) is an anticoagulant released by mast cells.
- (b) contains glucosamine as the aminosugar while the uronic acids are glucuronic acid and its 5-epimer iduronic acid.
- (c) is highly sulfated and contains acetyl groups as well.
- (d) all the above.

185- Hyaluronic acid

- (a) is found in various tissues including synovial fluid, vitreous body of the eye, connective tissue and wall of the ovum.
- (b) is formed of glucuronic acid and N-acetyl glucosamine, but no sulfate.
- (c) is hydrolyzed by hyaluronidase enzyme (spreading factor) secreted by some bacteria and by spermatozoa.
- (d) all the above.

186- Chondroitin sulfate

- (a) is found in cartilage, bone, skin, tendons and cornea.
- (b) is formed of glucuronic acid and N-acetyl galactosamine (N-acetyl chondrosamine).
- (c) is highly sulfated at position 4 or 6 of N-acetyl galactosamine.
- (d) all the above.

187- Glycoproteins (mucoproteins) are

- (a) proteins attached to a carbohydrate branched or non-branched chain, up to 15 units.
- (b) contain uronic acids like glucuronic acid and iduronic acid.
- (c) contain hexoses like glucose and fructose.
- (d) all the above.

188- Carbohydrates of glycoproteins include

- (a) hexoses: mannose and galactose together with N-acetyl glucosamine and N-acetyl galactosamine.
- (b) pentoses: arabinose and xylose and the methyl pentose L-fucose (6-deoxy L-galactose).
- (c) sialic acids e.g., N-acetyl neuraminic acid.

(d) all the above.

189- Carbohydrates of the cell membrane are located

(a) on the outer surface of the membrane forming a glycocalyx.

(b) on the inner (cytoplasmic) surface of the membrane.

(c) between the two sides of the membrane.

(d) all the above.

190- Carbohydrates of cell membrane

(a) constitute about 5% of the cell membrane components.

(b) are present in glycoproteins and glycolipids.

(c) can bind to certain plant proteins known as lectins.

(d) all the above.

191- Sialic acids

(a) are N- or O- acyl derivatives of neuraminic acid.

(b) are present only in glycoproteins and not in glycolipids.

(c) include N-acetyl neuraminic acid which is the least found sialic acid.

(d) all the above.

192- Neuraminic acid

(a) results from oxidation of mannose.

(b) is a 9-carbon sugar derived from mannosamine and pyruvate.

(c) is sulfated glucuronic acid.

(d) is sulfated N-acetyl glucosamine.

193- Sialic acids are components of

(a) glycoproteins.

(b) glycolipids.

(c) both (a) and (b).

(d) neither (a) nor (b).

194- Glycoproteins include

(a) cardiac glycosides.

(b) blood group antigens.

(c) phosphatidyl inositol.

(d) all the above.

195- Glycoproteins are

(a) present in cell membrane.

(b) formed of cellulose and aminoacids.

(c) constituents of hyaluronic acid.

(d) all the above.

196- Glucuronic acid is

(a) a reducing mucopolysaccharide.

(b) oxidized glucose.

(c) an important constituent of amylopectin.

(d) none of the above.

197- Glycosaminoglycans are important for

(a) building nucleic acids.

(b) adding bulk to stool.

(c) acting as structural components of tissues.

(d) none of the above.

198- Carbohydrates present in glycoproteins include

(a) glucose and fructose.

(b) xylose and arabinose.

(c) both (a) and (b).

(d) neither (a) nor (b).

199- Glucuronidase is essential for degradation of

(a) hyaluronic acid.

(b) glycoproteins.

(c) Glucosans.

(d) all the above.

200- Carbohydrates covalently bind proteins at

a) Hydroxyl group of serine.

b) Amide group of asparagine.

(c) either (a) or (b).

d) neither (a) nor (b).

1) Which of the following Biomolecules simply refers to as “Staff of life”?

(a) Lipids

(b) Proteins

(c) Vitamins

(d) Carbohydrates

2) Which of the following is the simplest form of carbohydrates?

(a) Carboxyl groups

(b) Aldehyde and Ketone groups

(c) Alcohol and Carboxyl groups

(d) Hydroxyl groups and Hydrogen groups

3) Which of the following monosaccharides is the majority found in the human body?

(a) D-type

(b) L-type

(c) LD-types

(d) None of the above

4) Which of the following is the most abundant biomolecule on the earth?

(a) Lipids

(b) Proteins

(c) Carbohydrates

(d) Nucleic acids.

5) Which of the following are the major functions of Carbohydrates?

(a) Storage

(b) Structural framework

(c) Transport Materials

(d) Both Storage and structural framework

6) Which of the following is the general formula of Carbohydrates?

(a) $(C_4H_2O)_n$

(b) $(C_6H_2O)_n$

(c) $(CH_2O)_n$

(d) $(C_2H_2O)_n$ COOH

7) Which of the following is the smallest carbohydrate – triose?

(a) Ribose

(b) Glucose

(c) Glyceraldehyde

(d) Dihydroxyacetone

$$-\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$$

When converting a Fischer projection to a Haworth projection, where are all of the substituents on the right side of the carbon skeleton drawn in the Haworth projection?

down

The formation of what color in the Benedict's test indicates a reducing sugar is present in solution?

brick red

Disaccharides and polysaccharides contain monosaccharide units joined together by glycosidic linkages

Lactose is present in milk. What type of sugar is lactose?

a disaccharide

Why are humans not able to digest cellulose?

branched skeleton of glucose molecules joined by 1 to 4- α -glycoside linkages

What is the structure of amylopectin?

unbranched skeleton of glucose molecules joined by 1 to 4- β -glycoside linkages

What is the most common type of starch molecules?

amylopectin

What is the polysaccharide form in which glucose is stored in animals?

glycogen

What monosaccharide is found in cellulose, starch, and glycogen?

glucose

What is responsible for the different blood types in humans?

three or four monosaccharides attached to a membrane protein on the surface of red blood cells

Which is not a reducing sugar?

-glucose

-fructose

-sucrose

-galactose

-an aldopentose

What is the difference between the disaccharides lactose and maltose?

The two monosaccharides in lactose are joined by a 1 to 4- β -glycoside bond, while the two monosaccharides in maltose are joined by a 1 to 4- α -glycoside bond.

Humans store excess glucose for short term energy requirements in the polysaccharide cellulose.

false

When a monosaccharide forms a cyclic hemiacetal, the carbon atom that is part of the hemiacetal is a new chirality center, called the anomeric carbon.

true

The B anomer of a cyclic monosaccharide has the -OH group drawn down, below the ring.

false

A hemiacetal is a compound that contains a hydroxyl group (-OH) and an alkoxy group (-OR) on adjacent carbon atoms.

false

At equilibrium, a solution of glucose in water is an equal mixture of the α anomer, the β anomer, and the acyclic aldehyde.

false

Certain monosaccharides—notably aldopentoses and ketohexoses—form five-membered rings, not six-membered rings, in solution.

true

An alditol contains an -OH group on every carbon atom

true

Carbohydrates that are oxidized with Benedict's reagent are called reducing sugars, because they reduce the Cu^{2+} in Benedict's reagent to Cu^+ during the reaction.

true

Modern glucose meters are electronic devices that measure the amount of oxidizing agent that reacts with the glucose in a known amount of blood.

true

All disaccharides contain at least one acetal that joins the rings together

true

An a glycoside has the glycosidic linkage oriented down, below the plane of the ring that contains the acetal joining the monosaccharides.

true

In addition to the three monosaccharides that occur in all blood types, type A blood contains the monosaccharide N-acetyl-D-galactosamine, and type B blood contains an additional D-galactose unit.

true

Individuals with type AB blood are called universal recipients because their blood contains no antibodies to blood types A, B, or O. Individuals with type AB blood can receive blood of any type.

true

a-D-galactose and B-D-galactose are enantiomers

false

Glucose and other naturally occurring sugars are D sugars.

true

Carbohydrates serve important energy and structural roles for both plants and animals.

true

Carbohydrates are structurally defined as polyhydroxyaldehydes and polyhydroxyketones, or compounds that can be hydrolyzed to them.

true

Monosaccharides with a carbonyl group at C2 are called ketoses.

true

All carbohydrates, except for dihydroxyacetone, contain one or more chirality centers.

true

.....

To possess optical activity, a compound must be:

A) a carbohydrate.

B) a hexose.

C) asymmetric.

D) colored.

E) D-glucose.

Which of the following monosaccharides is not an aldose?

A) erythrose

B) fructose

C) glucose

D) glyceraldehyde

E) ribose

The reference compound for naming D and L isomers of sugars is:

A) fructose.

B) glucose.

C) glyceraldehyde.

D) ribose.

E) sucrose.

When two carbohydrates are epimers:

A) one is a pyranose, the other a furanose.

B) one is an aldose, the other a ketose.

C) they differ in length by one carbon.

D) they differ only in the configuration around one carbon atom.

E) they rotate plane-polarized light in the same direction.

Which of the following is an epimeric pair?

A) D-glucose and D-glucosamine

B) D-glucose and D-mannose

C) D-glucose and L-glucose

D) D-lactose and D-sucrose

E) L-mannose and L-fructose

Which of the following is an anomeric pair?

A) D-glucose and D-fructose

B) D-glucose and L-fructose

C) D-glucose and L-glucose

D) alpha-D-glucose and beta-D-glucose

E) alpha-D-glucose and beta-L-glucose

When the linear form of glucose cyclizes, the product is a(n):

A) anhydride.

B) glycoside.

C) hemiacetal.

D) lactone.

E) oligosaccharide.

Which of the following pairs is interconverted in the process of mutarotation?

A) D-glucose and D-fructose

B) D-glucose and D-galactose

C) D-glucose and D-glucosamine

D) D-glucose and L-glucose

E) alpha-D-glucose and beta-D-glucose

Which of the following is not a reducing sugar?

A) Fructose

B) Glucose

C) Glyceraldehyde

D) Ribose

E) Sucrose

Which of the following monosaccharides is not a carboxylic acid?

A) 6-phospho-gluconate

B) gluconate

C) glucose

D) glucuronate

E) muramic acid

D-Glucose is called a reducing sugar because it undergoes an oxidation-reduction reaction at the anomeric carbon. One of the products of this reaction is:

A) D-galactose.

B) D-gluconate.

C) D-glucuronate.

D) D-ribose.

E) muramic acid.

Hemoglobin glycation is a process where is attached to hemoglobin.

A) glycerol; covalently

B) glucose; enzymatically

C) glucose; non-enzymatically

D) N-acetyl-galactosamine; enzymatically

E) galactose; non-enzymatically

From the abbreviated name of the compound Gal(1→4)Glc, we know that:

A) C-4 of glucose is joined to C-1 of galactose by a glycosidic bond.

B) the compound is a D-enantiomer.

C) the galactose residue is at the reducing end.

D) the glucose is in its pyranose form.

E) the glucose residue is the beta anomer.

Starch and glycogen are both polymers of:

A) fructose.

B) glucose1-phosphate.

C) sucrose.

D) alpha-D-glucose.

E) beta-D-glucose.

Which of the following statements about starch and glycogen is false?

A) Amylose is unbranched; amylopectin and glycogen contain many (alpha1→6) branches.

B) Both are homopolymers of glucose.

C) Both serve primarily as structural elements in cell walls.

D) Both starch and glycogen are stored intracellularly as insoluble granules.

E) Glycogen is more extensively branched than starch.

Which of the following is a heteropolysaccharide?

A) Cellulose

B) Chitin

C) Glycogen

D) Hyaluronate

E) Starch

The basic structure of a proteoglycan consists of a core protein and a:

A) glycolipid.

B) glycosaminoglycan.

C) lectin.

D) lipopolysaccharide.

E) peptidoglycan.

In glycoproteins, the carbohydrate moiety is always attached through the amino acid residues:

A) asparagine, serine, or threonine.

B) aspartate or glutamate.

C) glutamine or arginine.

D) glycine, alanine, or aspartate.

E) tryptophan, aspartate, or cysteine.

Which of the following is a dominant feature of the outer membrane of the cell wall of gram negative bacteria?

A) Amylose

B) Cellulose

C) Glycoproteins

D) Lipopolysaccharides

E) Lipoproteins

The biochemical property of lectins that is the basis for most of their biological effects is their ability to bind to:

A) amphipathic molecules.

B) hydrophobic molecules.

C) specific lipids.

D) specific oligosaccharides.

E) specific peptides.

1. The most abundant bio molecule on the earth:
 - a. nucleic acid
 - b. protien
 - c. lipids
 - d. carbohydrates
2. the major function of carbohydrates include:
 - a. structural framework
 - b. storage
 - c. both a and b
 - d. none of these
3. the general formula of carbohydrate:
 - a. $(CH_2O)_n$
 - b. $(C_4H_2O)_n$
 - c. $(C_6H_2O)_n$
 - d. $(C_2H_2O)_n COOH$
4. Carbohydrates are:
 - a. polyhydroxy aldehydes and phenols
 - b. polyhydroxy aldehydes and ketones
 - c. polyhydroxy ketones and phenols
 - d. polyhydroxy phenols and alcohols
5. Structural polysaccharides includes:
 - a. cellulose, hemicellulose and chitin
 - b. cellulose, starch and chitin
 - c. cellulose, starch and glycogen
 - d. cellulose, glycogen, and chitin
6. nutritional polysaccharides are
 - a. starch and glycogen
 - b. starch and chitin
 - c. starch and cellulose
 - d. starch and glucose
7. Glycogen in animals are stored in
 - a. liver and spleen
 - b. liver and muscle
 - c. liver and bile
 - d. liver and adipose tissue
8. carbohydrates accounts
 - a. 30% in plants and 20% in animals
 - b. 30 in plants and 10% in animals
 - c. 30% in plants and 1% in animals
 - d. 50% in plants and 50% in animals
9. smallest carbohydrates are trioses. which of the following is a triose?
 - a. glucose
 - b. ribulose
 - c. ribose
 - d. glyceraldehyde
10. which of the following is a reducing sugar:
 - a. glucose
 - b. dihydroxyacetone
 - c. erythulose
 - d. none of these

11. oligosaccharides linked to protein are called;

a. glycoproteins

b. glycolipids

c. galactosides

d. ganglioside

12. in polysaccharides, monosaccharides are joined by:

a. peptide bond

b. glucose bond.

c. glycosidic bond

d. covalent bond

13. Lactose is a disaccharide consists of

a. glucose and fructose

b. glucose and galactose

c. glucose and sucrose

d. glucose and ribose

14. In lactose the linkage is

a. β 1-4 linkage

b. β 1-2 linkage

c. α 1-4 linkage

d. α 1-2 linkage

15. Maltose is a disaccharide consists of

a. glucose and fructose

b. glucose and galactose

c. glucose and sucrose

d. glucose and glucose

16. In maltose, the linkage is

a. β 1-4 linkage

b. β 1-2 linkage

c. α 1-4 linkage

d. α 1-2 linkage

17. Starch consists of

a. unbranched amylose and branched amylopectin

b. branched amylose and branched amylopectin

c. unbranched amylose and unbranched amylopectin

d. none

1. the general chemical formula of carbohydrate is

a. $(CH_2O)_n$

b. $(CH_2O)_2n$

c. $(CHO)_n$

d. $C_nH_{2n}O$

which of the following is an aldotriose

a. dihydroxyacetone

b. glyceraldehyde

c. ribulose

d. erythrose

what is the molecular formula of sucrose

a. $C_{12}H_{22}O_{11}$

b. $C_{10}H_{20}O_{10}$

c. $C_6H_{12}O_6$

the glycosidic linkage between glucose molecule in

a. B 1-4

b. a 1-2

c. a 1-4

d. B 1-2

a Keto pentose will have _____ stereoisomers

a. 4

b. 6

c. 8

d. 10

The reserve food material of green algae is

a. laminarin

b. chrysolamerian

c. Floridian starch

d. starch

The only carbohydrate which is not having any chiral carbon atom is :

a. glyceraldehyde

b. Erythrose

c. Dihydroxyacetone

d. Erythrulose

Select the odd one from the following :

a. Arabinose

b. xylose

c. lyxose

d. Erythrose

A pentose sugar reported to be present in heart cells:

a. xylose

b. arabinose

c. lyxose

d. Xylulose

which of the following is an epimeric pair:

a. D- glucose and D-mannose

b. D-glucose and D-galactose

c. D-glucose and L- galactose

d. both A and B

select the odd one from the following:

a. xylulose

b. dihydroxyacetone

c. glyceraldehyde

d. ribulose

which of the following sugar give a positive result with selivanoff test

a. sucrose

b. glucose

c. galactose

d. mannose

which of the following is a keto tetrose:

a. Erythrulose

b. xylulose

c. sorbose

d. psicose

the glycosidic linkage between two glucose molecules in isomaltose is

- a. a 1-4
- b. B 1-4
- c. a 1-6
- d. B 1-6

which of the following is an alpha lactone

- a. Vit C
- b. Vit D
- c. Vit A
- d. Vit K

a sweetner used in sugar less gums and candies

- a. ribitol
- b. xylitol
- c. inositol
- d. mannitol

the glycosidic linkage in cellobiose

- a. a 1-4
- b. B 1-4
- c. a 1-6
- d. B 1-6

Pick out the odd one from the following

- a. Deoxyribose
- b. Rhamanose
- c. fucose
- d. Altarose

Lectins are

- a. sugars specfic to protiens
- b. protiens spesfic to sugars
- c. enzymes spesfic to carbs
- d. carbs specific to enzymes

which of the following is a keto triose

- a. dihydroxyacetone
- b. glyceraldehyde
- c. ribulose
- d. erthyrose

maltose is a disacchriades of

- a. glucose and galactose
- b. glucose and glucose
- c. glucose and lactose
- d. fructose and lactose

glycosidic bond in sucrose is

- a. a 1-4
- b. B 1-4
- c. a 1-2
- d. B 1-2

Minimum number if carbon required for ketose sugar to have cyclic structre is :

- a. 3
- b. 4
- c. 5
- d. 6

an aldo hexose will have _____ stereoisomers

- a. 8
- b. 10
- c. 14
- d. 16

which of the following is not a disachhrides:

- a. hyaluriuc acid
- b. maltose
- c. lactose
- d. sucrose

what is the molecular formula of glucose?

- a. CH₃ OH
- b. C₁₂ H₂₂ O₁₁
- c. C₆ H₁₂ O₆
- d. C₆ H₁₂ O₅

sucrose is composed of which two sugars:

- a. glucose and glucose
- b. glucose and fructose
- c. glucose and galactose
- d. fructose and galactose

which of the following forms glucose is stored in plants

- a. starch
- b. dextrans
- c. glycogen
- d. cellulose

which out of the following is carbohydrate with no nutritional value

- a. glycogen
- b. starch.
- c. dextrans
- d. cellulose

choose a sugar out of the following that is non reactive to seliwanoff reagent

- a. sucrose
- b. fructose
- c. inulin
- d. ribose

choose a keto triose

- a. glyceraldehyde
- b. dihydroxyacetone
- c. erythrose
- d. arabinose

a pentose sugar in the heart muscle

- a. xylose
- b. xyluose
- c. lycose
- d. aldose

d. glucose and l-glucose are

- a. stero isomers
- b. anomers
- d. keto-aldos isomers
- c. optical isomers

all of the following tests are for lactose except

a. bendict

b. barfoed

c. molisch

d. osazone

11- glucose can have _____ isomers to the presence of 4 asymmetric carbon atoms

a. 4

b. 2

c. 12

d. 16

12- fructose and ribulose are

a. epimers

b. anomers

c. ketoses

d. ketose- aldose isomers

The functional groups of a monosaccharide can be modified to form a variety of derivatives.

True

1. Carbohydrates are also known as _____

a) Hydrates of carbon

b) Carbonates

c) Glycolipids

d) Polysaccharides

2. Class of carbohydrate which cannot be hydrolyzed further, is known as?

a) Disaccharides

b) Polysaccharides

c) Proteoglycan

d) Monosaccharide

3. Which class of carbohydrates is considered as non-sugar?

a) Monosaccharides

b) Disaccharides

c) Polysaccharides

d) Oligosaccharides

4. Sugars which differs from each other only around single carbon atom is called epimer.

a) True

b) False

5. A molecule of amylopectin which contains 1500 glucose residues and is branched after every 30 residues. How many reducing ends are there?

a) 0

b) 1

c) 2

d) 5

6. What is the name of the drug which inhibits Na^+/K^+ pump across the cell membrane?

a) Taxol

b) Vinblastine

c) Quinone

d) Ouabain

7. Mark the INCORRECT statement about sugar alcohol?

a) Addition of -itol as a suffix

b) A linear molecule that cannot cyclize

c) Carbonyl groups reduced to a hydroxyl group

d) Terminal -OH group oxidizes

8. Which of the following amino sugar are present in the bacterial cell wall?

a) N-acetylmuramic acid

b) Sialic acid

c) Aminoglycoside

d) Azide

9. Which of the following glycosidic linkage found in maltose?

a) Glucose (α -1 – 2 β) Fructose

b) Glucose (α 1 – 4) Glucose

c) Galactose (β 1 – 4) Glucose

d) Glucose (β 1 – 4) Glucose

10. Which of the following is also known as invert sugar?

a) Sucrose

b) Fructose

c) Dextrose

d) Glucose

11. Name the major storage form of carbohydrates in animals?

a) Cellulose

b) Chitin

c) Glycogen

d) Starch

.....

1. Carbohydrates are also known as _____

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d) Monosaccharide

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View Answer

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- d) Glucose

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b) Chitin

c) Glycogen

d) Starch

.....

1. Anthrone method is preferred in the determination of _____

a) Carbohydrates

- b) Proteins
- c) Vitamins
- d) Fats

2. Which of the following is an example of epimers?

a) Glucose & Galactose

- b) Glucose & Ribose
- c) Mannose & Glucose
- d) Galactose & Mannose

3. Which of the following has reducing properties?

a) Glucuronic acid

- b) Gluconic acid
- c) Glucaric acid
- d) Mucic acid

View Answer

4. The red precipitate formed when glucose is heated with "Benedict's reagent" is _____

- a) Cupric hydroxide
- b) Cuprous hydroxide
- c) Cupric oxide
- d) Cuprous oxide

5. Fructose and Glucose can be distinguished by _____

a) Selwinoff's reagent

b) Benedict's reagent

c) Fehling's reagent

d) Barfoed's reagent

6. Which of the following is an example of monosaccharide?

a) Galactose

b) Sucrose

c) Lactose

d) Maltose

7. Which of the following is an example of disaccharide?

a) Glucose

b) Fructose

c) Galactose

d) Maltose

8. In maltose, between which of the following carbons there is a linkage?

a) C1, C2

b) C2, C3

c) C1, C4

d) C2, C4

9. Which of the following carbohydrates is a triose?

a) Glucose

b) Ribose

c) Ribulose

d) Glyceraldehyde

10. Lactose is a disaccharide of which of the following sugar units?

a) Glucose and fructose

b) Glucose and galactose

c) Glucose and sucrose

d) Glucose and ribose

.....

1. Carbohydrates are also known as _____

A Hydrates of carbon

B Carbonates

C Glycolipids

D Polysaccharides

2. Class of carbohydrate which cannot be hydrolyzed further, is known as?

A Disaccharides

B Polysaccharides

C Proteoglycan

Multiple Choice Questions

D Monosaccharide

3. Chitin consists of

A N-acetyl muramic acid

B N-acetyl glucosamine

C D-glucose units

D N-acetyl muramic acid and N-acetyl glucosamine

4. Amylopectin has

A β -1-4 and β -1-6 linkage

B β -1-2 linkage

C α -1-4 and α -1-6 linkage

D α -1-2 linkage

5. Cellulose is made up of repeating units of

A β -1-4 linkage between D-glucose units

B β -1-2 linkage between D-glucose units

C α -1-4 linkage between D-glucose units

D α -1-2 linkage between D-glucose units

6. Starch consists of

A unbranched amylose and branched amylopectin

B branched amylose and branched amylopectin

C unbranched amylose and unbranched amylopectin

D none of these

7. In maltose, the linkage is

A β -1-4 linkage

Multiple Choice Questions

B β -1-2 linkage

C α -1-4 linkage

D α -1-2 linkage

8. In lactose, the linkage is

A β -1-4 linkage

B β -1-2 linkage

C α -1-4 linkage

D α -1-2 linkage

9. Lactose is a disaccharide consists of

A glucose and fructose

B glucose and galactose

C glucose and sucrose

D glucose and ribose

10. Sucrose is a

A monosaccharide

B disaccharide

C polysaccharide

D triose

11. In polysaccharides, monosaccharides are joined by

A Peptide bond

B Glucose bond

C Glycosidic bond

D Covalent bond

12. Oligosaccharides linked to proteins are called

A Glycoproteins

B Glycolipids

C Galactosides

D Ganglioside

13. Which of the following is a reducing sugar

A Glucose

B Dihydroxyacetone

C Erythulose

D None of these

14. Smallest carbohydrates are trioses. Which of the following is a triose?

A Glucose

B Ribulose

C Ribose

D Glyceraldehyde

15. Carbohydrates accounts

A 30% in plants and 20% in animals

B 30% in plants and 10% in animals

C 30% in plants and 1% in animals

D 50% in plants and 50% in animals

Answer: 30% in plants and 1% in animals

16. Glycogen in animals are stored in

A Liver and spleen

B Liver and muscles

C Liver and bile

D Liver and adipose tissue

17. Nutritional polysaccharides are

A Starch and glycogen

B Starch and chitin

C Starch and cellulose

D Starch and glucose

18. Structural polysaccharides include

A cellulose, hemicellulose and chitin

B cellulose, starch and chitin

C cellulose, starch and glycogen

D cellulose, glycogen and chitin

19. Carbohydrates are

A polyhydroxy aldehydes and phenols

B polyhydroxy aldehydes and ketones

C polyhydroxy ketones and phenols

D polyhydroxy phenols and alcohols

20. The general formula of carbohydrate is

A $(CH_2O)_n$

B $(C_4H_2O)_n$

C $(C_6H_2O)_n$

D $(C_2H_2O)_n COOH$

21. The major functions of Carbohydrates include

A structural framework

B storage

C both a and b

D none of these

22. The most abundant bio molecule on the earth

A Nucleic acids

B proteins

C lipids

D carbohydrates

23. Which of the following is also known as invert sugar?

A Sucrose

B Fructose

C Dextrose

D Glucose

24. Which of the following glycosidic linkage found in maltose?

A Glucose (α -1 – 2 β) Fructose

B Glucose (α 1 – 4) Glucose

C Galactose (β 1 – 4) Glucose

D Glucose (β 1 – 4) Glucose

25. Which of the following amino sugar are present in the bacterial cell wall?

A N-acetylmuramic acid

B Sialic acid

C Aminoglycoside

D Azide

1. Stereochemistry is introduced at the aldehyde C atom, there are 2 possible products, which are known as anomers.

a) Monomers

b) Anomers

c) Monosaccharides

d) Glycosidic

2. The C atom of the aldehyde or ketone is entitled the anomeric C atom.

a) True

b) False

3. The cyclic forms of carbohydrates are represented by Kraft projections.

a) True

b) False

4. The acid- or base-catalyzed conversion of 1 anomer into its equilibrium mixture of anomers is known

a) Optical rotation

b) Muto rotation

c) Hetero rotation

d) Homo rotation

5. More complex carbohydrates occur in nature when 2 or more simple sugars are linked altogether. In nature, the linkages are _____ linkages, that's, acetal or ketal bonds involving the anomeric carbon of just one of the monosaccharides involved. These bonds are called _____ linkages.

a) Glycosidic

b) Optical

c) Muto

d) Hydrosilic

6. _____ linkages of compounds in aqueous solution are subject to hydrolysis in the presence of acid at low back temp.

a) Glycosidic

b) Optical

c) Muto

d) Hydrosilic

1. Which of the following is an example of bacterial and yeast polysaccharide?

a) Starch

b) Glycogen

c) Cellulose

d) Dextrans

2. In which of the following, glucose residues are linked by β 1 $\rightarrow$ 4 glycosidic bonds?

a) Amylose

b) Starch

c) Cellulose

d) Glycogen

3. What is the chemical difference between cellulose and chitin?

- a) Replacement of the hydroxyl group at C2 with an acetylated amino group
- b) Replacement of the hydroxyl group at C3 with an acetylated amino group
- c) Replacement of the hydroxyl group at C4 with an acetylated amino group
- d) Replacement of the hydroxyl group at C5 with an acetylated amino group

4. When all the monosaccharides in a polysaccharide are same type, such type of a polysaccharide is called

a) _____

- a) Glycogen
- b) Homoglycan
- c) Heteroglycan
- d) Oligosaccharide

5. In which of the following forms, glucose is stored in plants?

- a) Glycogen
- b) Starch
- c) Dextrin
- d) Cellulose

6. In which of the following forms, glucose is stored in the liver?

- a) Glycogen
- b) Starch
- c) Dextrin
- d) Cellulose

7. Which of the following are the storage polysaccharides?

- a) Glycogen
- b) Cellulose
- c) Chitin
- d) Glucose

8. Which of the following are the structural polysaccharides?

- a) Glycogen
- b) Starch
- c) Chitin
- d) Glucose

9. Which of the following is an analogous to starch?

- a) Cellulose
- b) Glycogen
- c) Sucrose
- d) Chitin

10. Which of the following is not a monosaccharide with 5 carbon atoms?

- a) Arabinose
- b) Xylulose
- c) Trehalose
- d) Ribulose

1. Which of the following are found in connective tissues?

- a) Glycosaminoglycans
- b) Proteoglycans
- c) Glycoproteins
- d) Glycolipids

2. Which of the following statements is false about proteoglycans?

- a) They hold less amount of water
- b) Chondroitin sulfate is a proteoglycan
- c) They possess charge
- d) They are made of amino acids and sugars

3. In cell membranes, carbohydrates in glycoproteins or glycolipids are oriented?
- a) Towards outside
 - b) Towards inside
 - c) Towards outside and inside
 - d) Randomly distributed
4. Which of the following is an oligosaccharide linked to protein?
- a) Glycolipid
 - b) Glycoprotein
 - c) Ganglioside
 - d) Galactoside
5. The protein core of proteoglycan is rich in
- a) Serine and threonine
 - b) Serine and methionine
 - c) Threonine and methionine
 - d) Alanine and serine
6. Which of the following are included in the types of glycolipids?
- a) N-acetylgalactosamine
 - b) N-acetylglucosamine
 - c) Xylose
 - d) Cerebrosides
7. Which of the following blood group individuals have N-acetylgalactosamine sugar attachment?
- a) A
 - b) B
 - c) AB
 - d) O
8. Which of the following blood group individuals have galactose?
- a) A
 - b) B
 - c) AB
 - d) O
9. Which of the following glycoprotein functions as a lubricant and protective agent?
- a) Collagens
 - b) Mucins
 - c) Transferrins
 - d) Immunoglobulins
10. Which of the following are important for white blood cell recognition?
- a) Glycosaminoglycans
 - b) Proteoglycans
 - c) Glycoproteins
 - d) Glycolipids
1. Name the pathway for glucose synthesis by non-carbohydrate precursors?
- a) Glycogenesis
 - b) Glycolysis
 - c) Gluconeogenesis
 - d) Glycogenolysis
2. What is the site for gluconeogenesis?
- a) Liver
 - b) Blood
 - c) Muscles
 - d) Brain

3. Which of the following is not the precursor of gluconeogenesis?
- a) Glycolytic products
 - b) Citric acid cycle intermediates
 - c) Glucogenic amino acid
 - d) Lysine or leucine
4. Name the enzyme which is responsible for the conversion of pyruvate to phosphoenolpyruvate (PEP)?
- a) Pyruvate carboxylase
 - b) Pyruvate carboxykinase
 - c) Glucose 6-phosphatase
 - d) Phosphofructokinase
5. Gluconeogenesis is also carried out in muscle and brain.
- a) True
 - b) False
6. Which of the following are major sites for glycogen storage?
- a) Adipose tissue
 - b) Bones
 - c) Muscle and liver
 - d) Kidney and liver
7. Which of the following is the precursor of glycogen?
- a) Glycerol 3-phosphate
 - b) Malate
 - c) UDP-glucose
 - d) Leucine and lysine
8. The priming function in glycogen synthesis is carried out by
- a) Lysine
 - b) Arginine
 - c) Glycogenin
 - d) Glutamate
9. Name the enzyme which is used for branching of glycogen?
- a) Branching enzyme
 - b) Hexokinase
 - c) Phosphoglucomutase
 - d) Glycogen synthase
10. Which of the following hormone maintain blood glucose level by activation of gluconeogenesis?
- a) Nor-epinephrine
 - b) Glucagon
 - c) Insulin
 - d) Epinephrine
11. Name the hormone which is secreted in an emergency or in stress condition?
- a) Epinephrine
 - b) Glucagon
 - c) Insulin
 - d) Melanin
1. Which of these is a macromolecule?
- a) Vitamins
 - b) Minerals
 - c) Lipids
 - d) Polysaccharides

2. Which of these is present in the acid insoluble pool of homogenized, strained tissue?

- a) Ions
- b) Minerals
- c) Polysaccharides
- d) Vitamins

3. Polysaccharide chains are made of

- a) disaccharides
- b) glucose
- c) sugars
- d) fructose

4. Which of these is not a monosaccharide?

- a) Sucrose
- b) Glucose
- c) Fructose
- d) Galactose

5. Cellulose is a

- a) heteropolymer
- b) homopolymer
- c) dimer
- d) monomer

6. Cellulose is a polymer of

- a) galactose and fructose
- b) glucose and fructose
- c) glucose
- d) glucose and galactose

7. Which of these is a storehouse of energy in plant tissues?

- a) Starch
- b) Cellulose
- c) Glucose
- d) Fructose

8. Which of these is a storehouse of energy in animal tissues?

- a) Glucose
- b) Cellulose
- c) Starch
- d) Glycogen

9. Inulin is a polymer of

- a) glucose and fructose
- b) glucose
- c) fructose
- d) glucose, fructose and galactose

10. Fructose does not form homopolymers. True or false?

- a) True
- b) False

11. Which part of glycogen is the reducing end?

- a) Second monomer from the left
- b) Second monomer from the right
- c) Left end
- d) Right end

12. Which part of cellulose is the non-reducing end?

- a) Second monomer from the left
- b) Second monomer from the right

c) Left end

d) Right end

13. The building blocks of polysaccharides are

- a) glucose units
- b) disaccharides

c) monosaccharides

d) carbon molecules

14. Which of these is not true about cellulose?

a) It is the second most abundant organic polymer

b) It has linear chains

c) It is made of glucose subunits

d) It is a homopolymer

15. Which of these statements is not true regarding polysaccharides?

a) Cellulose has a linear structure

b) Inulin is a heteropolymer

c) Glycogen has a branched structure

d) Polysaccharide chains have a non-reducing left end

1. Disaccharides on _____ with dilute HCl yield two same or different monosaccharides.

a) hydration

b) hydrolysis

c) oxidation

d) carbonation

View Answer

2. Which of the following disaccharides on hydrolysis with invertase gives two different monosaccharides?

a) Sucrose

b) Lactulose

c) Lactose

d) Maltose

3. Two monosaccharides are joined through a _____ bond to form a disaccharide.

a) ionic

b) peptide

c) glycosidic

d) phosphodiester

4. Sucrose is a _____ compound and the product mixture obtained from its hydrolysis is _____ in nature.

a) dextrorotatory; dextrorotatory

b) dextrorotatory; laevorotatory

c) laevorotatory; dextrorotatory

d) laevorotatory; laevorotatory

5. Which of the following is false regarding the reaction of sucrose to give fructose and glucose?

a) It can take place in the presence of enzyme sucrase

b) It results in the formation of a glycosidic bond.

c) It is an inversion reaction

d) It is a hydrolysis reaction

6. Sucrose is made of which of the following monosaccharides?

a) α -D-glucose, α -D-fructose

b) α -D-glucose, β -D-fructose

c) β -D-glucose, α -D-fructose

d) β -D-glucose, β -D-fructose

8. Which of the following is incorrect regarding maltose?

- a) It consists of two glucopyranose units
- b) It is a non-reducing sugar**
- c) Glycosidic bond between C1 of one unit and C4 of the other unit
- d) It is a disaccharide

9. Which of the following is also known as beet sugar?

- a) Fructose
- b) Sucrose**
- c) Maltose
- d) Lactose

11. Which of the following statements is incorrect with respect to starch?

- a) It is a reducing carbohydrate**
- b) It is a polymer of α -D-glucose
- c) It gives blue colour with iodine
- d) It consists of branched chains

12. Amylum is one of the components of starch.

- a) True
- b) False**

13. The branching in the _____ component of starch occurs by the glycosidic linkage between _____ carbons.

- a) amylose; C1-C4
- b) amylose; C1-C6
- c) amylopectin; C1-C4
- d) amylopectin; C1-C6**

14. Cellulose is a _____ saccharide.

- a) reducing
- b) branched chain
- c) β -glucose straight chain**
- d) oligo

15. Starch : Plants : : X : Animals. Identify X.

- a) Starch
- b) Glucose
- c) Cellulose
- d) Glycogen**

1. Which Biomolecules simply refers as “Staff of life” in the given macromolecules?

- a) Protein
- b) Lipids
- c) Carbohydrate**
- d) Vitamins

2. In carbohydrates which are the main functional groups are present?

- a) Alcohol & Carboxyl groups**
- b) Aldehyde & Ketone groups
- c) Hydroxyl groups & Hydrogen groups
- d) Carboxyl groups & Others

3. Majority of the monosaccharides found in the human body are of which type stereoisomer?

- a) L-type
- b) D-type**
- c) neutral
- d) racemic mixture

4. Which is the simplest carbohydrate?
a) Dihydroxy acetone
b) Glyceraldehyde
c) Glucose
d) Gulose
5. Which of the following is the examples of Epimers?
a) Glucose & Galactose
b) Glucose & Ribose
c) Mannose & Glucose
d) fructose and glucose
6. Which of the following is true about Turanose?
a) Reducing disaccharides of glucose and fructose
b) Non-reducing disaccharide
c) 7-methyl sugar
d) a deoxy sugar
7. Which of the following is not a disaccharide?
a) Sucrose
b) Maltose
c) Lactose
d) Galactose
8. Which sugars are present in Sucrose?
a) Fructose and glucose
b) Glucose and glucose
c) Glucose and galatose
d) Fructose and galatose
9. Which of the following carbohydrate do not have any essential nutritional value?
a) Sucrose
b) Cellulose
c) Dextrin
d) Glycogen
10. Which of the following will not be reactive towards selivanoff reagent?
a) Maltose
b) Inulin
c) Fructose
d) Sucrose
2. Which of these is a branched polysaccharide?
a) Sucrose
b) Cellulose
c) Glycogen
d) Chitin
3. What is the shape of the secondary structure of starch?
a) Spherical
b) Linear
c) Helical
d) Branched
4. Which molecule can starch hold in its helix?
a) Iodine
b) DNA
c) Amylopectin
d) Cellulose

5. In which part of the starch chain is iodine incorporated?

- a) Left non-reducing end
- b) Right reducing end

c) Helix

- d) Branched portion

6. What color is the starch-iodine complex?

- a) Yellow
- b) Brick red

c) Blue

- d) Black

7. Which of these molecules can hold iodine molecules?

a) Starch

- b) Cellulose
- c) Chitin
- d) Sucrose

8. The absence of which structure in cellulose does not allow it to hold iodine molecules?

- a) Branches
- b) Left non-reducing end
- c) Right reducing end

d) Helix

9. What is the main component of the plant cell wall?

- a) Lipids
- b) Glycogen

c) Cellulose

- d) Peptidoglycan

10. Cotton fiber is made of cellulose. True or false?

a) True

- b) False

11. Which of these structures do not contain cellulose as its major constituent?

- a) Cotton fibers
- b) Plant cell wall
- c) Jute

d) Fungal cell wall

12. Chitin is a _____

- a) monomer
- b) heteropolymer

c) homopolymer

- d) dimer

13. Which of these is a complex polysaccharide?

- a) Glycogen
- b) Inulin

c) Chitin

- d) Starch

14. What is the main constituent of the exoskeleton of arthropods?

a) Chitin

- b) Cellulose
- c) Glycogen
- d) Starch

15. Which of these statements is not true regarding polysaccharides?

a) Inulin is a polysaccharide made of fructose

b) Chitin is a heteropolymer

c) Glycogen is a highly branched polysaccharide

d) Cellulose makes up cotton fibers

CARBOHYDRATES 1

1. The general chemical formula of carbohydrate is

- A. $(\text{CH}_2\text{O})_n$
- B. $(\text{CH}_2\text{O})_{2n}$
- C. $(\text{CHO})_n$
- D. $\text{C}_n\text{H}_{2n}\text{O}$

2. Which of the following is an aldotriose?

- A. Dihydroxyacetone
- B. Glyceraldehyde
- C. Ribulose
- D. Erythrose

3. What is the molecular formula of sucrose?

- A. $\text{C}_{12}\text{H}_{22}\text{O}_{11}$
- B. $\text{C}_{10}\text{H}_{20}\text{O}_{10}$
- C. $\text{C}_6\text{H}_{12}\text{O}_6$
- D. $\text{C}_{12}\text{H}_{20}\text{O}_{11}$

4. The glycosidic linkage between glucose molecules in maltose is

- A. $\beta 1-4$
- B. $\alpha 1-2$
- C. $\alpha 1-4$
- D. $\beta 1-2$

5. A keto pentose will have _____ stereoisomers

- A. 4
- B. 6
- C. 8
- D. 10

6. The reserve food material of green algae is

- A. Laminarin
- B. Chrysolaminarin
- C. Floridian starch

D. Starch

7. The only carbohydrate which is not having any chiral carbon atom is

- A. Glyceraldehyde
- B. Erythrose
- C. Dihydroxyacetone
- D. Erythrulose

8. Select the odd one from the following

- A. Arabinose
- B. Xylose
- C. Lyxose
- D. Erythrose

9. A pentose sugar reported to be present in heart cells

A. Xylose

B. Arabinose

C. Lyxose

D. Xylulose

10. Which of the following is an epimeric pair?

A. D-glucose and D-mannose

B. D-glucose and D-galactose

C. D-glucose and L-glucose

D. Both A and B

11. Select the odd one from the following

A. Xylulose

B. Dihydroxyacetone

C. Glyceraldehyde

D. Ribulose

12. Which of the following sugars gives a positive result with Seliwanoff's test?

A. Sucrose

B. Glucose

C. Galactose

D. Mannose

13. Which of the following is a keto tetrose?

A. Erythrulose

B. Xylulose

C. Sorbose

D. Psicose

14. The glycosidic linkage between two glucose molecules in isomaltose is

A. α 1-4

B. β 1-4

C. α 1-6

D. β 1-6

15. Which of the following is an alpha lactone?

A. Vit. C

B. Vit. D

C. Vit. A

D. Vit. K

16. A sweetener used in sugarless gums and candies

A. Ribitol

B. Xylitol

C. Inositol

D. Mannitol

17. The glycosidic linkage in cellobiose is

A. α 1-4

B. β 1-4

C. α 1-6

D. β 1-6

18. Pick out the odd one from the following

A. Deoxyribose

B. Rhamnose

C. Fucose

D. Altrose

19. Lectins are _____

A. Sugar specific proteins

B. Protein specific proteins

C. Enzyme specific proteins

D. Carbohydrate specific to enzymes

20. Which of the following is a keto triose?

A. Dihydroxyacetone

B. Glyceraldehyde

C. Ribulose

D. Erythrose

21. Maltose is a disaccharide of _____

A. Glucose and galactose

B. Glucose and glucose

C. Glucose and lactose

D. Fructose and lactose

22. Glycosidic bond in sucrose is _____

A. α 1-4

B. β 1-4

C. α 1-2

D. β 1-2

23. Minimum number of carbon required for a ketose sugar to have a cyclic structure is

A. 3

B. 4

C. 5

D. 6

24. An aldohexose will have _____ stereoisomers

A. 8

B. 10

C. 14

D. 16

25. Minimum number of carbon required for a monosaccharide

- A. 1
- B. 2
- C. 3
- D. 4

CARBOHYDRATES 2

1. The vitreous humor of eye is composed of _____

- A. Heparin
- B. Hyaluronic acid
- C. Keratan sulfate
- D. Chondroitin sulfate

2. N-acetyl glucosamine (NAG) and N-acetyl muramic acid (NAM) in peptidoglycan is connected by _____ glycosidic linkage.

- A. α 1–4
- B. β 1–4
- C. α 1–2
- D. β 1–2

3. Sulbactam is a _____

- A. β -Lactam antibiotic
- B. β Lactamase
- C. β Lactamase inhibitor
- D. A class of penicillin

4. Which of the following is not a sugar molecule of the O-antigen of Gram-negative bacteria?

- A. Tyvelose
- B. Abequose
- C. 2 keto-3-deoxyoctanoate
- D. Teichoic acid

5. Glycosidic bond between galactose and glucose in lactose is _____

- A. α 1–4
- B. β 1–4
- C. α 1–2
- D. β 1–2

6. Which of the following is a sugar alcohol?

- A. Arabitol
- B. Mannitol
- C. Sorbitol
- D. All of these

7. Minimum number of carbons required for an aldose sugar to have a cyclic structure is _____

- A. 3
- B. 4
- C. 5
- D. 6

8. The reserve food materials of Rhodophyceae (red algae) is _____

- A. Laminarin
- B. Chrysolaminarin

C. Floridian starch

- D. Starch

9. Reserve food material of fungi is _____

- A. Glucose
- B. Starch
- C. Laminarin

D. Glycogen

10. Glycosidic bond in Trehalose is _____

- A. α 1–4
- B. α 1–2

C. α 1–1

- D. β 1–2

11. Which of the following is a nonreducing sugar?

- A. Maltose
- B. Lactose

C. Trehalose

- D. Cellobiose

12. A disaccharide of galactose and fructose joined by β 1–4 glycosidic linkage

- A. Trehalose

B. Lactulose

- C. Gentiobiose
- D. Melibiose

13. Which of the following sugar do not form a cyclic structure?

- A. Erythrulose
- B. Dihydroxyacetone

C. Both A and B

- D. Erythrose

14. A disaccharide of two glucose molecules joined by β 1–6 glycosidic linkage

- A. Trehalose

B. Gentiobiose

- C. Lactulose
- D. Melibiose

15. Glycerol moieties in teichoic acid of bacterial cell wall are linked to each other by _____

- A. Ether bonds
- B. Ester bonds

C. Phosphodiester bonds

- D. Glycosidic bonds

16. A disaccharide of galactose and glucose in α 1–6 glycosidic linkage

A. Lactose

B. Melibiose

C. Gentiobiose

D. Verbascose

17. Which of the following sequence correctly represents the sweetness of Glucose, Sucrose, and Fructose?

A. Glucose < Sucrose < Fructose

B. Sucrose < Glucose < Fructose

C. Glucose $\leq$ Sucrose < Fructose

D. Glucose > Fructose > Sucrose

18. After the osazone test, the sample sugar gave needle-shaped crystals; the sample sugar will be _____

A. Glucose

B. Fructose

C. Maltose

D. Cellulose

19. Partial fermentation of cane sugar by *Leuconostoc mesenteroides* produce

A. Glucose and Fructose

B. Glucose and Gluconic acid

C. Fructose and Gluconic acid

D. Dextran

20. Which of the following commonly acts as the precursor for the synthesis of Vitamin C (Ascorbic acid) in plants?

A. Fructose

B. Ribose

C. Glucose

D. Ribulose

CARBOHYDRATES 3

1. Which of the following is an example for a trisaccharide?

A. Verbascose

B. Stachyose

C. Raffinose

D. Sucralose

2. Chrysolaminarin is _____

A. A storage polysaccharide of green algae

B. A storage polysaccharide of brown algae

C. A storage polysaccharide of red algae

D. A storage polysaccharide of diatoms

3. Which of the following is an example for an artificial sweetener of saccharide origin?

A. Sucralose

B. Saccharin

C. Stachyose

D. All of these

4. In a chemical reaction "X" is able to convert Cu^{2+} ions to Cu^{+} ions. If "X" is a carbohydrate, which of the following best explains to be the "X"?

- A. "X" is a reducing sugar
- B. "X" is a nonreducing sugar
- C. "X" is a monosaccharide
- D. Both A and B

E. Both A and C

5. Which of the following is a reducing sugar?

A. Glucose in closed ring form

B. Glucose in open chain form

C. Sucrose

D. None of the above

6. D-glucose reacts with molecular oxygen (O_2) in the presence of the enzyme glucose oxidase to form D-glucono- δ -lactone and _____

A. H_2O

B. H_2O_2

C. H_2

D. O_3

7. Most prominent carbohydrate component of hemicellulose is

A. Pectin

B. Arabinose

C. Arabinoxylan

D. Suberin

8. Which of the following is an example for heteropolysaccharide?

A. Hyaluronic acid

B. Gelatin

C. Glycogen

D. Both A and B

9. Glucose on oxidation with bromine water forms

A. Glucuronic acid

B. Glucosaccharic acid

C. Gluconic acid

D. Mannose

10. Dextrin is a branched bacterial homopolysaccharide of _____ linked D-glucose with _____ branches

A. α 1–6 and α 1–3

B. β 1–6 and β 1–3

C. β 1–6 and α 1–3

D. α 1–6 and β 1–3

11. Laminarin is _____

A. A storage polysaccharide of red algae

B. A storage polysaccharide of brown algae

C. A structural polysaccharide of red algae

D. A structural polysaccharide of brown algae

12. Caramelization of sucrose yields

A. Glucose

B. Fructose

C. Glucose and Fructose

D. Charcoal

13. Which of the following reaction is called "Maillard reaction"?

A. Reaction between amino group and hydroxyl group

B. Reaction between amino group and keto group

C. Reaction between amino group and aldehyde group

D. Reaction between amino group and carboxylic group

14. Bial's test is used to detect the presence of _____

A. Triose

B. Tetrose

C. Pentose

D. Hexose

15. Which of the following animals possesses cellulose?

A. Coelenterates

B. Sponges

C. Tunicates

D. Protozoans

16. Glucose residues in amylose are linked by

A. α 1-4

B. β 1-4

C. α 1-6

D. β 1-6

17. Chitin is a _____

A. Homopolysaccharide of N acetyl glucosamine

B. Heteropolysaccharide of N acetyl glucosamine and N acetyl muramic acid

C. A complex polymer of many sugars

D. A branched homopolysaccharide of N acetyl glucosamine

18. The branch points of amylopectin are connected by

A. α 1-4

B. β 1-4

C. α 1-6

D. β 1-6

19. Which of the following is an example for a homopolysaccharide?

A. Cellulose

B. Starch

C. Glycogen

D. All of the above