

CHEMISTRY

BOOKS - NCERT CHEMISTRY (ENGLISH)

BIOMOLECULES

Multiple Choice Questions

1. Glycogen is a branched chain polymer of $\alpha - D$ glucose units in which chain is formed by $C1 - C4$ glycosidic linkage where as branching occurs by the formation of $C1 - C6$ glycosidic linkage.

Structure of glycogen is similar to

A. (a) amylose

B. (b) amylopectin

C. (c) cellulose

D. (d) glucose

Answer: B



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2. Which of the following polymers of glucose is stored by animals?

a. Cellulose

b. Amylose

c. Amylopectin

d. Glycogen

A. Amylose

B. Cellulose

C. Amylopectin

D. Glycogen

Answer: D



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3. Sucrose (cane sugar) is a disaccharide. One molecule of sucrose on hydrolysis gives..... .

A. 2 molecules of glucose

B. 2 molecules of glucose +1 molecule of fructose

C. 1 molecule of glucose +1 molecule of fructose

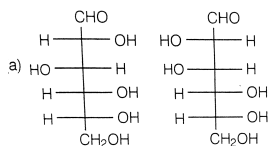
D. 2 molecules of fructose

Answer: C

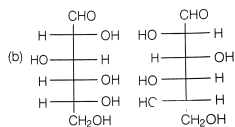


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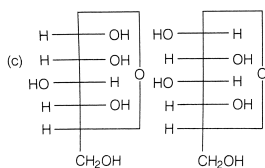
4. Which of the following pairs represents anomers?



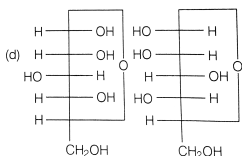
A.



B.



C.



D.

Answer: C



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5. Proteins are found to have two different types of secondary structures viz α -helix and β -pleated sheet structure. α -helix structure of protein is stabilised by

- A. peptiode bonds
- B. van der Waals, forces
- C. hydrogen bonds
- D. dipole-dipole interactions

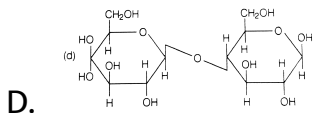
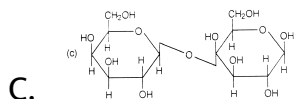
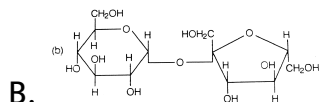
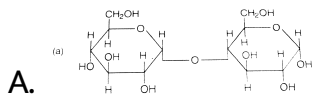
Answer: C



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6. In disaccharides, if the reducing groups of monosaccharides, i.e., aldehydic or ketonic groups are bonded, these are non-reducing

sugars. Which of the following disaccharide is a non-reducing sugar?



Answer: B

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7. Which of the following acids is a vitamin?

A. Aspartic and

B. Ascorbic acid

C. Adipic acid

D. Saccharic acid

Answer: B



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8. Dinucleotide is obtained by joining two nucleotides together by phosphodiester linkage. Between which carbon atoms of pentose sugars of nucleotides are these linkages present ?

(a) 5' and 3'

(b) 1' and 5'

(c) 5' and 5'

(d) 3' and 3'

A. 5' and 3'

B. 1' and 5'

C. 5' and 5'

D. 3' and 3'

Answer: A



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9. Nucleic acids are the polymers of

A. nucleosides

B. nucleotides

C. bases

D. sugars

Answer: B



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10. Which of the following statements is not true about glucose?

- (a) It is an aldohexose
- (b) On heating with HI it forms n-hexane
- (c) It is present in furanose form
- (d) It does not give 2,4-DNP test

A. It is an aldohexose

B. On heating with HI it forms n-hexane

C. It is present in furanose form

D. It does not give 2,4-DNP test

Answer: C



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11. Each polypeptide in a protein has amino acids linked with each other in a specific sequence. This sequence of amino acids is said to be... .

- A. primary structure of proteins
- B. secondary structure of proteins
- C. tertiary structure of proteins
- D. quateranary structure of proteins

Answer: A



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12. DNA and RNA contain four bases each. Which of the following bases is not present in RNA?

- A. Adenine

B. Uracil

C. Thymine

D. Cytosine

Answer: C



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13. Which of the following B group vitamins can be stored in our body?

A. Vitamin B_1

B. Vitamin B_2

C. Vitamine B_6

D. Vitamin B_{12}

Answer: D



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14. Which of the following bases is not present in DNA?

A. Adenine

B. Thymine

C. Cytosine

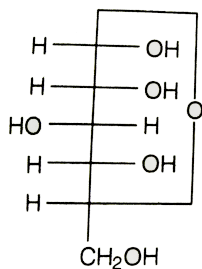
D. Uracil

Answer: D

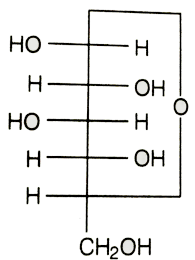


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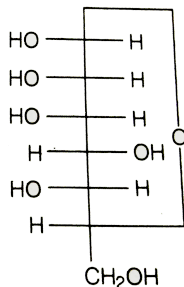
15. These cyclic structures of monosaccharides are given below which of these are anomers.



(i)



(ii)



(iii)

A. I and II

B. II and III

C. I and III

D. III is anomer of I and II

Answer: A



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16. Which of the following reactions of glucose can be explained only by its cyclic structure?

(a) Glucose forms pentaacetate

(b) Glucose reacts with hydroxylamine to form an oxime

(c) Pentaacetate of glucose does not react with hydroxyl amine

(d) Glucose is oxidised by nitric acid to glyconic acid

A. Glucose forms pentaacetate

B. Glucose reacts with hydroxylamine to form an oxime

C. Pentaacetate of glucose does not react with hydroxyl amine

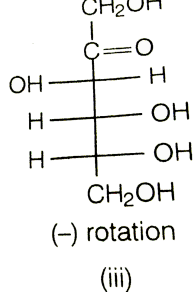
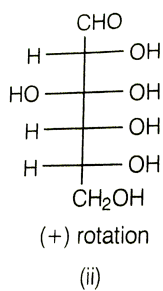
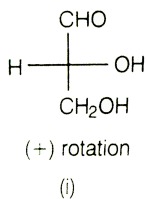
D. Glucose is oxidised by nitric acid to glyconic acid

Answer: C



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17. Optical rotations of some compounds alongwith their structures are given below which of them have D configuration.



(a) I, II, III

(b) II, III

(c) I, II

(d) III

A. I, II, III

B. II, III

C. I, II

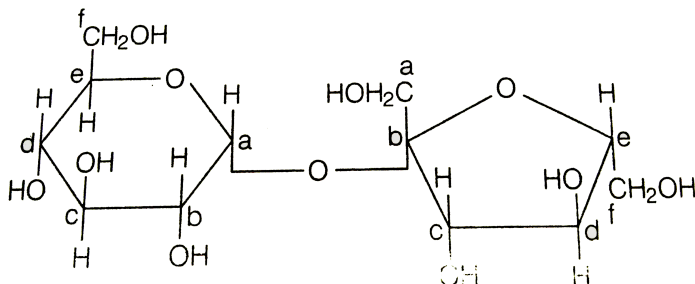
D. III

Answer: A



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18. Structure of disaccharide formed by glucose and fructose is given below. Identify anomeric carbon atoms in monosaccharide units.



(a) 'a' carbon of glucose and 'a' carbon of fructose

(b) 'a' carbon of glucose and 'e' carbon of fructose

(c) 'a' carbon of glucose and 'b' carbon of fructose

(d) 'f' carbon of glucose and 'f' carbon of fructose

A. 'a' carbon of glucose and 'a' carbon of fructose

B. 'a' carbon of glucose and 'e' carbon of fructose

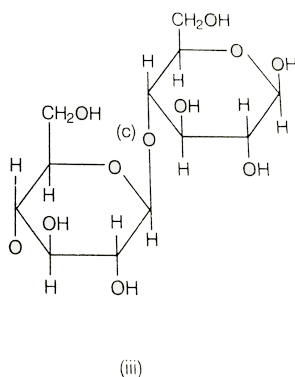
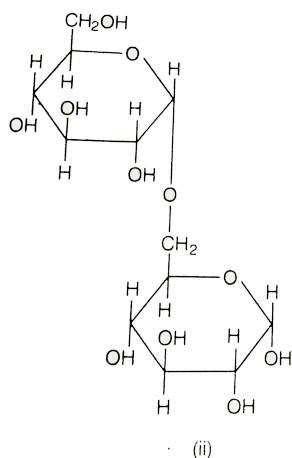
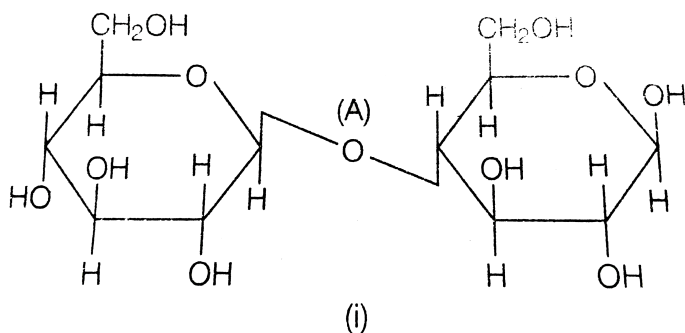
C. 'a' carbon of glucose and 'b' carbon of fructose

D. 'f' carbon of glucose and 'f' carbon of fructose

Answer: C



19. Three structures are given below in which two glucose units are linked. Which of these linkages between glucose units are between C_1 and C_4 and which linkages are between C_1 and C_6 ?



(a)(A) is between C_1 and C_4 , (B) and (C) are between C_1 and C_6

(b)(A) and (B) are between C_1 and C_4 , (C) is between C_1 and C_6

(c)(A) and (C) are between C1 and C4, (B) is between C1 and C6

(d)(A) and (C) are between C1 and C6, (B) is between C_1 and C_4

A. (A) is between C1 and C4, (B) and (C) are between C1 and C6

B. (A) and (B) are between C1 and C4, (C) is between C1 and C6

C. (A) and (C) are between C1 and C4, (B) is between C1 and C6

D. (A) and (C) are between C1 and C6, (B) is between C_1 and C_4

Answer: C



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20. Carbohydrates are classified on the basis of their behaviour on hydrolysis and also as reducing or non-reducing sugar. Sucrose is a

.....

A. monosaccharide

- B. disaccharide
- C. reducing sugar
- D. non-reducing sugar

Answer: B::D



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21. Proteins can be classified into two types on the basis of their molecular shape, i.e., fibrous proteins and globular proteins.

Examples of globular proteins are

- A. insulin
- B. keratin
- C. albumin
- D. myosin

Answer: A::C



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22. Which of the following carbohydrates are branched polymer of glucose?

A. Amylose

B. Amylopectin

C. Cellulose

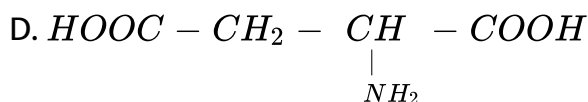
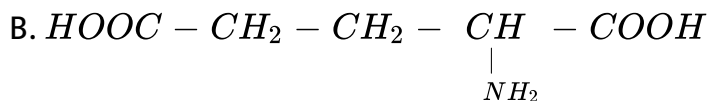
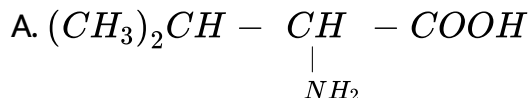
D. Glycogen

Answer: B::D



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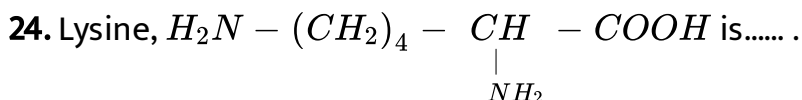
23. Amino acids are classified as acidic, basic or neutral depending upon the relative number of amino and carboxyl groups in their molecule. Which of the following are acidic?



Answer: B::D



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(a) α -amino acid

(b) β -amino acid

(c) amino acid synthesised in body

(d) None of these

A. α -amino acid

B. β -amino acid

C. amino acid synthesised in body

D. None of these

Answer: A::B::C



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25. Which of the following monosaccharides are present as five membered cyclic structure (furanose structure)?

(a) Ribose

(b) Glucose

(c)Fructose

(d)Galactose

A. Ribose

B. Glucose

C. Fructose

D. Galactose

Answer: A::C



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26. In fibrous proteins, polypeptide chains are held together by.....

(a)van der Waals forces

(b)disulphide linkage

(c)electrostatic forces of attraction

(d)hydrogen bonds

- A. van der Waals forces
- B. disulphide linkage
- C. electrostatic forces of attraction
- D. hydrogen bonds

Answer: B::D



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27. Which of the following are purine bases?

- A. Guanine
- B. Adenine
- C. Thymine
- D. Uracil

Answer: A::B



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28. Which of the following terms are correct about enzyme?

- A. Proteins
- B. Dinucleotides
- C. Nucleic acids
- D. Biocatalysts

Answer: A::D



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Short Answer Type Questions

1. Name the sugar present in milk. How many monosaccharide units are present in it? What are such oligosaccharides called?

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2. How do you explain the presence of all the six carbon atoms in glucose in a straight chain?

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3. In nucleoside, a base is attached at 1' position of sugar moiety. Nucleotide is formed by linking of phosphoric acid unit to the sugar unit of nucleoside. At which position of sugar unit is the phosphoric acid linked in a nucleoside to give a nucleotide?

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4. Name the linkage connecting monosaccharide units in polysaccharides.



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5. Under what conditions glucose is converted to gluconic acid and saccharic acid?



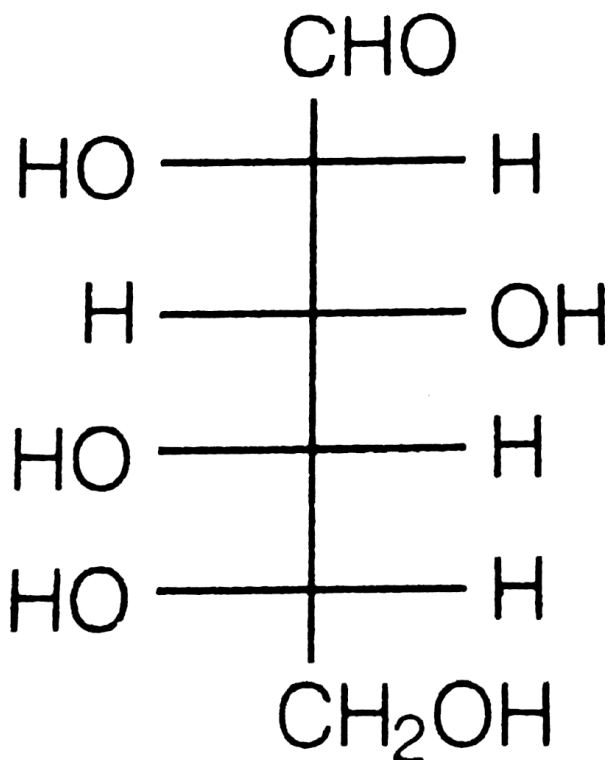
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6. Monosaccharides contain carbonyl group hence are classified, as aldose or ketose. The number of carbon atoms present in the monosaccharide molecule are also considered for classification. In which class of monosaccharide will you place fructose?



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7. The letters 'D' or 'L' before the name of a stereoisomer of a compound indicate the correlation of configuration of that particular stereoisomer. This refers to their relation with one of the isomers of glyceraldehyde. Predict whether the following compound has 'D' or 'L' configuration.



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8. Aldopentoses named as ribose and 2-deoxyribose are found in nucleic acids. What is their relative configuration?

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9. Which sugar is called invert sugar? Why is it called so?

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10. Amino acids can be classified as α - , β - , γ - , δ -and so depending upon the relative position of amino group with respect to carboxyl group. Which type of amino acids form polypeptide chain in proteins?

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11. α – helix is a secondary structure of proteins formed by twisting of polypeptide chain into right handed screw like structure. Which type of interactions are responsible for making the α -helix structure stable?



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12. Some enzymes are named after the reaction, where they are used. What name is given to the class of enzymes which catalyse the oxidation of one substrate with simultaneous reduction of another substrate?



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13. During curdling of milk, what happens to sugar present in it?



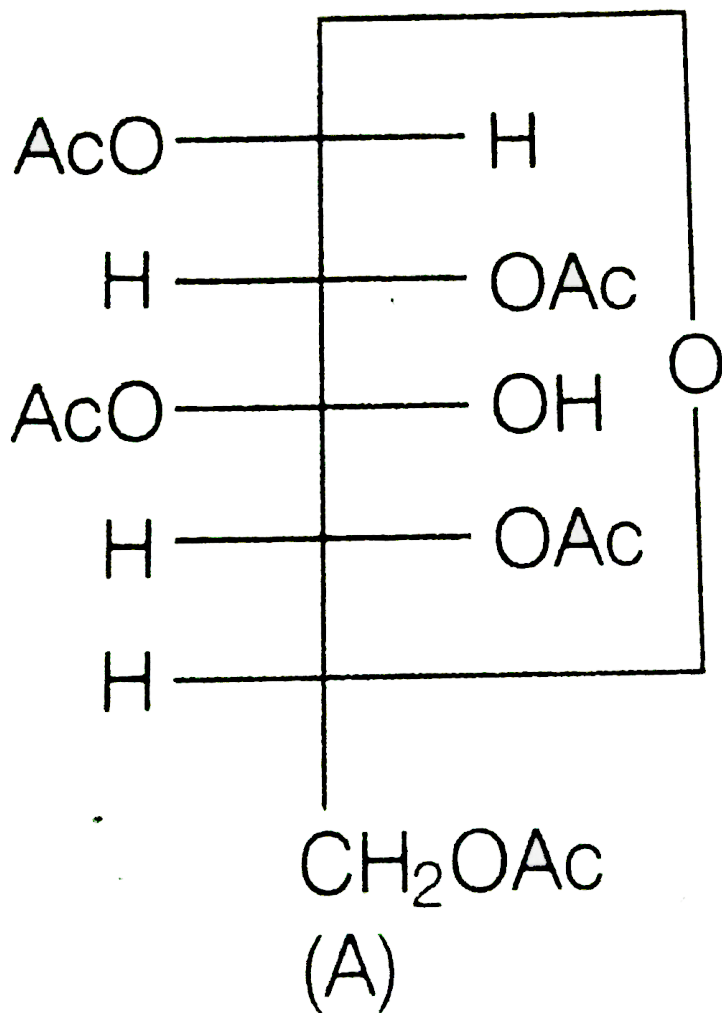
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14. How do you explain the presence of five $-OH$ groups in glucose molecule?



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15. Why does compound (A) given below not form an oxime?



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16. Why must vitamin C be supplied regularly in diet?

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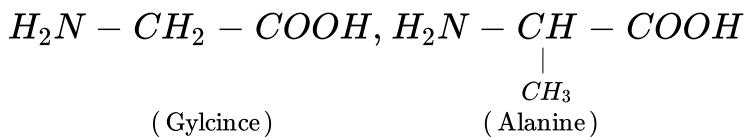
17. Sucrose is dextrorotatory but the mixture obtained after hydrolysis is laevorotatory. Explain.

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18. Amino acids behave like salts rather than simple amines or carboxylic acids. Explain.

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19. Structure of glycine and alanine are given below. Show the peptide linkage in glycylalanine.



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20. Protein found in a biological system with a unique three-dimensional structure and biological activity is called a native protein. When a protein in its native form, is subjected to a physical change like change in temperature or a chemical change like, change in pH, denaturation of protein takes place. Explain the cause.

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21. Activation energy for the acid catalysed hydrolysis of sucrose is 6.22 kJ mol^{-1} , while the activation energy is only 2.15 kJ mol^{-1} when hydrolysis is catalysed by the enzyme sucrase. Explain.

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22. How do you explain the presence of an aldehydic group in a glucose molecule?

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23. Which moieties of nucleosides are involved in the formation of phosphodiester linkage present in dinucleotides? What does the word diester in the name of linkage indicate? Which acid is involved in the formation of this linkage?

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24. What are glucosidic linkages? In which type of biomolecules are they present?



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25. Which monosaccharide units are present in starch, cellulose and glucose and which linkage link these units?



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26. How do enzymes help a substrate to be attacked by the reagent effectively?



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27. Describe the term D- and L-configuration used for amino acids with examples.



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28. How will you distinguish 1° and 2° hydroxyl groups present in glucose? Explain the reactions.

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29. Coagulation of egg white on boiling is an example of denaturation of protein. Explain it in terms of structural changes.

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Matching The Columns

1. Match the vitamins given in Column I with the deficiency disease they cause given in Column II.

<i>Column I</i> (Vitamins)	<i>Column II</i> (Diseases)
A. VitaminA	1. Pernicious anaemia
B. Vitamin B_1	2. Increased blood clotting time
C. Vitamin B_{12}	3. Xerophthalmia
D. VitaminC	4. Rickets
E. VitaminD	5. Muscular weakness
F. VitaminE	6. Night blindness
G. VitaminK	7. Beri-beri
	8. Bleeding gums
	9. Osteomalacia

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2. Match the following enzymes given in Column I with the reactions they catalyse given in Column II.

<i>Column I</i> (Enzymes)	<i>Column II</i> (Reactions)
A. Invertase	1. Decomposition of urea into NH_3 and CO_2
B. Maltase	2. Conversion of glucose into enthyl alcohol
C. Pepsin	3. Hydrolysis of maltose into glucose
D. Urease	4. Hydrolysis of cane sugar
E. Zymase	5. Hydrolysis of proteins into peptides

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1. Assertion (A) $D(+)$ – Glucose is dextrorotatory in nature.

Reason (R) 'D' represents its dextrorotatory nature.

(a) Assertion and reason both are correct statements and reason explains the assertion.

(b) Both assertion and reason are wrong statements

(c) Assertion is correct statement and reason is wrong statement

(d) Assertion is wrong statement and reason is correct statement.

A. Assertion and reason both are correct statements and reason explains the assertion.

B. Both assertion and reason are wrong statements

C. Assertion is correct statement and reason is wrong statement.

D. Assertion is wrong statement and reason is correct statement.

Answer: C



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2. Assertion (A) Vitamin D can be stored in our body.

Reason (R) Vitamin D is fat soluble vitamin.

(a) Assertion and reason both are correct statements and reason explains the assertion.

(b) Both assertion and reason are wrong statements

(c) Assertion is correct statement and reason is wrong statement.

(d) Assertion is wrong statement and reason is correct statement.

A. Assertion and reason both are correct statements and reason explains the assertion.

B. Both assertion and reason are wrong statements

C. Assertion is correct statement and reason is wrong statement.

D. Assertion is wrong statement and reason is correct statement.

Answer: A



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3. Assertion (A) β -glycosidic linkage is present in maltose.

Reason (R) Maltose is composed of two glucose units in which C-1 of one glucose unit is linked to C-4 of another glucose unit.

(a) Assertion and reason both are correct statements and reason explains the assertion.

(b) Both assertion and reason are wrong statements

(c)Assertion is correct statement and reason is wrong statement.

(d)Assertion is wrong statement and reason is correct statement.

A. Assertion and reason both are correct statements and reason explains the assertion.

B. Both assertion and reason are wrong statements

C. Assertion is correct statement and reason is wrong statement.

D. Assertion is wrong statement and reason is correct statement.

Answer: D



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4. Assertion (A) All naturally occurring α -aminoacids except glycine are optically active.

Reason (R) Most naturally occurring amino acids have L-configuration.

A. Assertion and reason both are correct statements and reason explains the assertion.

B. Both assertion and reason are wrong statements

C. Assertion is correct statement and reason is wrong statement.

D. Assertion and reason both are correct statement but reason does not explain assertion.

Answer:



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5. Assertion (A) Deoxyribose, $C_5H_{10}O_4$ is not a carbohydrate.

Reason (R) Carbohydrates are hydrates of carbon so compounds which follow $C_x(H_2O)_y$ formula are carbohydrates.

A. Assertion and reason both are correct statements and reason explains the assertion.

B. Both assertion and reason are wrong statements

C. Assertion is correct statement and reason is wrong statement.

D. Assertion is wrong statement and reason is correct statement.

Answer: B



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6. Assertion (A) Glycine must be taken through diet.

Reason (R) It is an essential amino acid.

(a) Assertion and reason both are correct statements and reason explains the assertion.

(b) Both assertion and reason are wrong statements

(c) Assertion is correct statement and reason is wrong statement.

(d) Assertion is wrong statement and reason is correct statement.

A. Assertion and reason both are correct statements and reason explains the assertion.

B. Both assertion and reason are wrong statements

C. Assertion is correct statement and reason is wrong statement.

D. Assertion is wrong statement and reason is correct statement.

Answer: B



7. Assertion (A) In presence of enzyme, substrate molecule can be attacked by the reagent effectively.

Reason (R) Active sites of enzymes hold the substrate molecule in a suitable position.

(a) Assertion and reason both are correct statements and reason explains the assertion.

(b) Both assertion and reason are wrong statements

(c) Assertion is correct statement and reason is wrong statement.

(d) Assertion is wrong statement and reason is correct statement.

A. Assertion and reason both are correct statements and reason explains the assertion.

B. Both assertion and reason are wrong statements

C. Assertion is correct statement and reason is wrong statement.

D. Assertion is wrong statement and reason is correct statement.

Answer: A

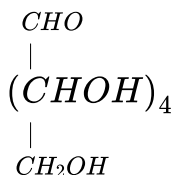
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Long Answer Type Questions

1. Write the reactions of D-glucose which can't be explained by its open chain structure. How can cyclic structure of glucose explain these reactions?

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2. On the basis of which evidences D-glucose was assigned the following structure?



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3. Carbohydrates are essential for life in both plants and animals. Name the carbohydrates that are used as storage molecules in plants and animals, also name the carbohydrate which is present in wood or in the fibre of cotton cloth.

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4. Explain the terms primary and secondary structures of proteins. What is the difference between α -helix and β -pleated sheet

structure of proteins?



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5. Write the structures of fragments produced on complete hydrolysis of DNA. How are they linked in DNA molecule? Draw a diagram to show pairing of nucleotide bases in double helix of DNA.



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