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BIOMOLECULES

MCQs with One Correct Answer

1. What will happen when D-(+)-glucose is treated with methanolic —HCl followed by Tollens' reagent ?
- (a) A black ppt. will be formed
- (b) A red ppt. will be formed
- (c) A green colour will appear
- (d) No characteristic colour or ppt. will be formed.

2. Which one of the following statements is not true regarding (+) lactose ?
- (a) On hydrolysis (+) lactose gives equal amount of D(+) glucose and D(+) galactose.
- (b) (+) Lactose is a β-glycoside formed by the union of a molecule of D(+) glucose and a molecule of D(+) galactose.
- (c) (+) Lactose is a reducing sugar and does not exhibit mutarotation.
- (d) (+) Lactose, $C_{12}H_{22}O_{11}$ contains 8-OH groups.

3. The term anomers of glucose refers to
- (a) enantiomers of glucose
- (b) isomers of glucose that differ in configuration at carbon one (C-1)
- (c) isomers of glucose that differ in configurations at carbons one and four (C-1 and C-4)
- (d) a mixture of (D)-glucose and (L)-glucose

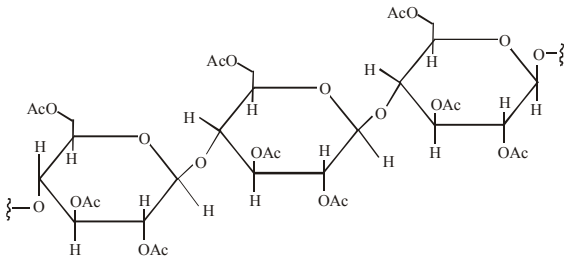
4. The linkage between the two monosaccharide units in lactose is
- (a) C_1 of β-D-glucose and C_4 of β-D-galactose
- (b) C_1 of β-D-galactose and C_4 of β-D-glucose
- (c) C_1 of α-D-galactose and C_4 of β-D-glucose
- (d) C_1 of β-D-galactose and C_4 of α-D-glucose

5. Natural glucose is termed D-glucose because :
- (a) – OH on the second carbon is on the right side in Fischer projection
- (b) – OH on the sixth carbon is on the right side in Fischer projection.
- (c) – OH on the fifth carbon is on the right side in Fischer projection.
- (d) It is dextrorotatory.

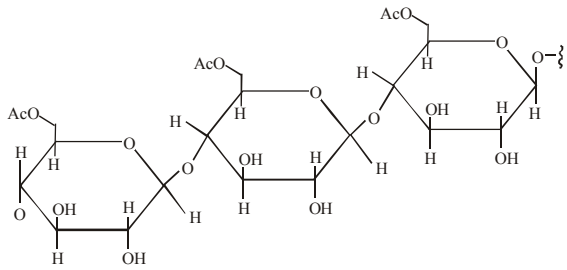
6. Which of the following statement is not correct?
- (a) Amylopectin is a branched polymer of α - glucose.
- (b) Cellulose is a linear polymer of β-glucose
- (c) Glycogen is the food reserve of plants
- (d) All proteins are polymers of α - amino acids.

7. Fructose reduces Tollen's reagent due to:
(a) enolisation of fructose followed by conversion to glucose (having aldehydic group) by the base present in Tollen's reagent
(b) asymmetric carbons
(c) primary alcoholic group
(d) secondary alcoholic group

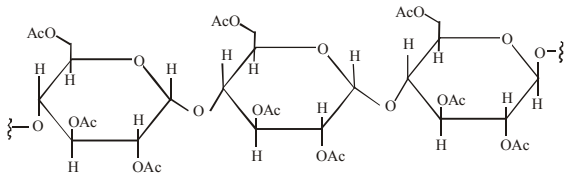
8. Cellulose upon acetylation with excess acetic anhydride/H_2SO_4 (catalytic) gives cellulose triacetate whose structure is
(a)



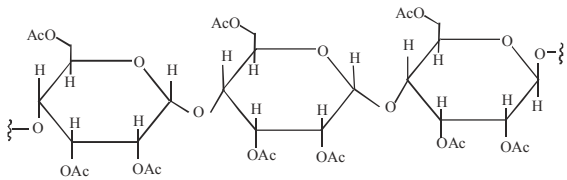
(b)



(c)



(d)



9. An organic compound with the formula $C_6H_{12}O_6$ forms a yellow crystalline solid with phenylhydrazine and gives a mixture of sorbitol and mannitol when reduced with sodium. Which among the following could be the compound?
(a) Fructose (b) Glucose
(c) Mannose (d) Sucrose

10. **Statement-1 :** Treatment of D-glucose with dilute alkali affords an equilibrium mixture consisting of D-mannose, D-fructose and starting substance D-glucose.
Statement-2 : The reaction involves an intermediate in which hybridisation of C_2 changes from sp^3 to sp^2.
(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.
(c) Statement -1 is True, Statement-2 is False.
(d) Statement -1 is False, Statement-2 is True.

11. Which of the statements about "denaturation" given below are correct ?
(A) Denaturation of proteins causes loss of secondary and tertiary structures of the protein.
(B) Denturation leads to the conversion of double strand of DNA into single strand
(C) Denaturation affects primary strucrture which gets distorted
(a) (B) and (C)
(b) (A) and (C)
(c) (A) and (B)
(d) (A), (B) and (C)

12. During the process of digestion, the proteins present in food materials are hydrolysed to amino acids. The two enzymes involved in the process

$$\text{Proteins} \xrightarrow{\text{Enzyme(A)}} \text{Polypeptides} \xrightarrow{\text{Enzyme(B)}} \text{Amino acids}$$

are respectively
(a) Diastase and lipase
(b) Pepsin and trypsin

(c) Invertase and zymase
(d) Amylase and maltase

13. In both DNA and RNA, heterocyclic base and phosphate ester linkages are at –

(a) C_5' and C_1' respectively of the sugar molecule

(b) C_1' and C_5' respectively of the sugar molecule

(c) C_2' and C_5' respectively of the sugar molecule

(d) C_5' and C_2' respectively of the sugar molecule

14. Match List I (name of vitamin) with List II (deficiency result/disease) and select the correct answer using the codes given below the lists :

	List I		List II
I.	Ascorbic acid	A.	Beri-beri
II.	Retinol	B.	Cracked lips
III.	Riboflavin	C.	Scurvy
IV.	Thiamine	D.	Night blindness

(a) I - B, II - A, III - C, IV - D
(b) I - A, II - B, III - C, IV - D
(c) I - D, II - C, III - B, IV - A
(d) I - C, II - D, III - B, IV - A

15. Chargaff's rule states that in an organism

(a) amount of adenine (A) is equal to that of guanine (G) and the amount of thymine (T) is equal to that of cytosine (C)

(b) amount of adenine (A) is equal to that of cytosine (C) and the amount of thymine (T) is equal to that of guanine (G)

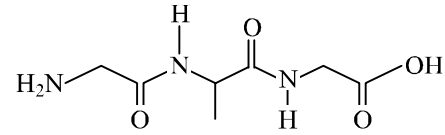
(c) amount of adenine (A) is equal to that of thymine (T) and the amount of guanine (G) is equal to that of cytosine (C)

(d) amount of all bases are equal

16. Essential amino acids cannot be made by our body. Which of the following is not essential amino acid?

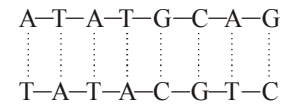
(a) Leucine (b) Lysine
(c) Serine (d) Histidine

17. How many peptide bond(s) is/are present in the following structure?



(a) One
(b) Two
(c) Three
(d) None of these

18. The average energy of each hydrogen bond in A–T pair is x kcal mol^{-1} and that in G–C pair is y kcal mol^{-1}. Assuming that no other interaction exists between the nucleotides, the approximate energy required in kcal mol^{-1} to split the following double stranded DNA into two single strands is



[Each dashed line may represent more than one hydrogen bond between the base pair]

(a) $10x + 9y$ (b) $5x + 3y$
(c) $15x + 6y$ (d) $5x + 45y$

19. A tetrapeptide is made of naturally occurring alanine, serine, glycine and valine. If the C-terminal amino acid is alanine and the N-terminal amino acid is chiral, the number of possible sequences of the tetrapeptide is

(a) 12 (b) 8
(c) 6 (d) 4

20. Which one of the following is NOT correct?

(a) D(–) Fructose exists in furanose structure
(b) D (+) Glucose exists in pyranose structure
(c) In sucrose the two monosaccharides are held together by peptide linkage
(d) Maltose is a reducing sugar

Numeric Value Answer

21. A strongly alkaline solution of a monoaminodicarboxylic acid contains how many basic groups ?

22. How many dipeptides are possible from two molecules of a typical α-amino acid ?

23. The optical rotation of α–D fructose is –21° and that of its β-form is –133°. The equilibrium mixture of these anomers has an optical rotation of –92°. What is the % of α–form (upto one decimal place) in its equilibrium mixture?

24. Consider all possible optical isomers of glucose individually. How many moles of periodic acid will be consumed by reaction of one mole of each optical isomer with it?

25. Starch is a polymer of two components: amylose and amylopectin. In the structure of amylopectin straight chain is formed by C*a* – C*b* glycosidic linkage and branching occurs by C*c* – C*d* glycosidic linkage. What is the value of $a + b + c + d$?

ANSWER KEY																			
1	(d)	**4**	(b)	**7**	(a)	**10**	(a)	**13**	(b)	**16**	(c)	**19**	(d)	**22**	(1)	**25**	(12)		
2	(c)	**5**	(c)	**8**	(a)	**11**	(c)	**14**	(d)	**17**	(b)	**20**	(c)	**23**	(36.6)				
3	(b)	**6**	(c)	**9**	(a)	**12**	(b)	**15**	(c)	**18**	(a)	**21**	(3)	**24**	(80)				