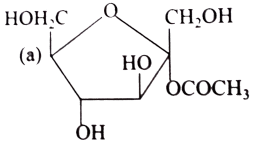
CHEMISTRY

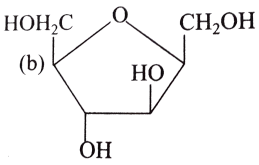
BOOKS - IIT-JEE PREVIOUS YEAR (CHEMISTRY)

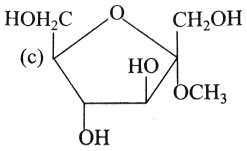
BIOMOLECULES AND CHEMISTRY IN DAILY LIFE

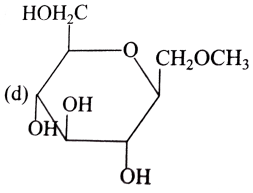
Jee Main And Advanced

1. Which of the following compounds will behave as a reducing sugar in an aqueous KOH solution ?

A. 

B. 

C. 

D. 

Answer: A

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2. Thiol group is present in

A. cystine

B. cysteine

C. methionine

D. cytosine

Answer: B

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3. Which of the vitamins given below is water soluble ?

A. Vitamin C

B. Vitamin D

C. Vitamin E

D. Vitamin K

Answer: A

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

A. Quinoline

B. Adenine

C. Cytosine

D. Thymine

Answer: A

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5. Synthesis of each molecule of glucose in photosynthesis involves.

A. 18 molecules of ATP

B. 10 molecules of ATP

C. 8 molecules of ATP

D. 6 molecules of ATP

Answer: A

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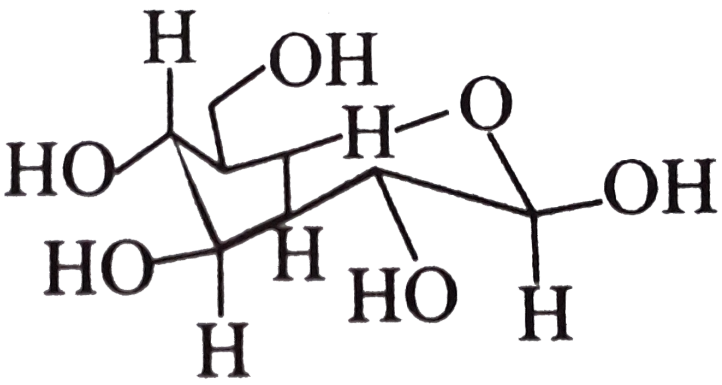
6. The following carbohydrate is



A. a ketohexose

B. an aldohexose

C. an $\alpha -$ furanose

D. an $\alpha -$ pyranose

Answer: B

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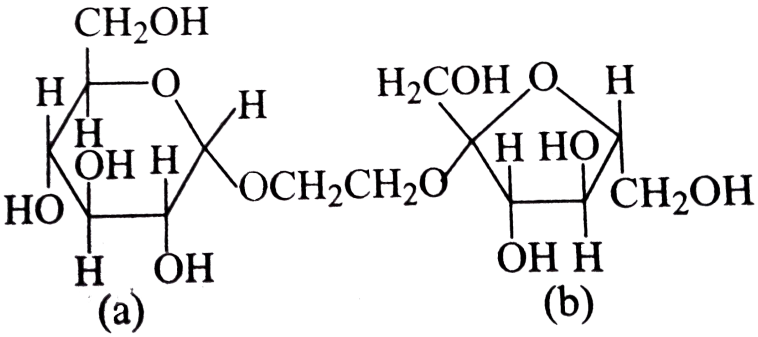
7. The correct statement about the following disaccharide is



A. Ring (a) is pyranose with α – glycosidic link

B. Ring (a) is furanose with α – glycosidic link

C. Ring (b) is furanose with α – glycosidic link

D. Ring (b) is pyranose with β – glycosidic link

Answer: A

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8. Two forms of D-glucopyranose, are called

A. enantiomers

B. anomers

C. epimers

D. diastereomers

Answer: B

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9. Which of the following pairs give positive Tollen's test ?

A. Glucose, sucrose

B. Glucose, fructose

C. Hexanal, acetophenone

D. Fructose, sucrose

Answer: B

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10. For 'ivert sugar', the correcr statement(s) is (are)

(Given : specific rotations of (+) - sucrose, (+) - maltose, + 66°, $+140^\circ$, -52° and 92° respectively)

A. Invert sugar is prepared by acid catalysed hydrolysis of maltose

B. Invert sugar is an equimolar mixture of D-(+)-glucose and D-(-)-fructose

C. Specific rotation of invert sugar is -20°

D. On reaction with Br_2 water, invert sugar forms saccharic acid as one of the products.

Answer: B::C

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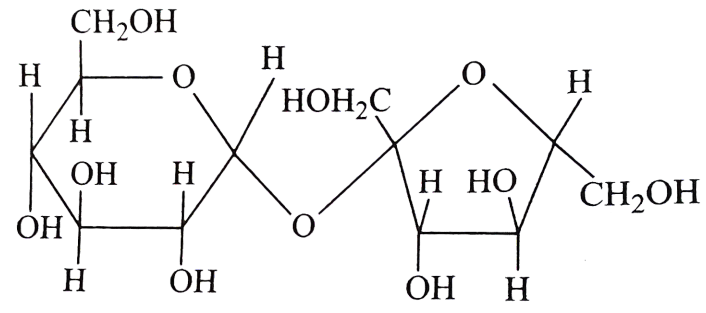
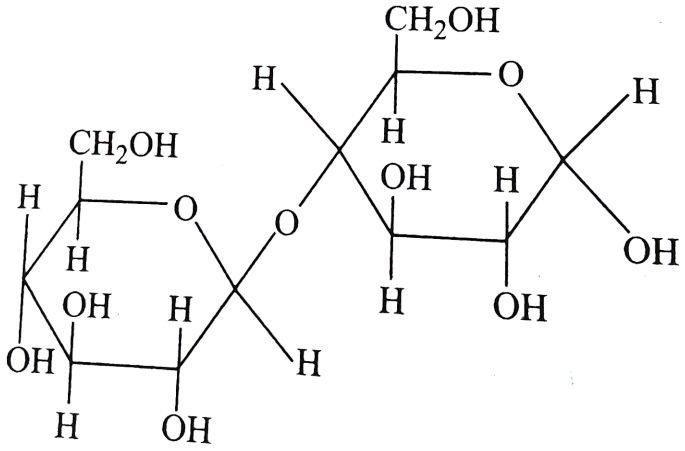
11. The correct statement(s) about the following sugars X and Y is/are :



X



Y

A. X is qa reducing sugar and Y is a non-reducing sugar

B. X is a non-reducing sugar and Y is a reducing sugar

C. The glucosidic linkages in X and Y are α and β, respectively

D. The glucosidic linkages in X and Y are β and α, respectively

Answer: B::C

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12. Statement I : Glucose gives a reddish-brown precipitate with Fehling's solution

Statement II : Reaction of glucose with Fehling's solution gives CuO and gluconic acid

A. Statement I is correct , Statement II is correct , Statement II is a correct explanation of Statement I.

B. Statement I is correct , Statement II is correct , Statement II is not be correct explanation of Statement I

C. Statement I is correct , Statement II is incorrect

D. Statement I is incorrect , Statement II is correct

Answer: C

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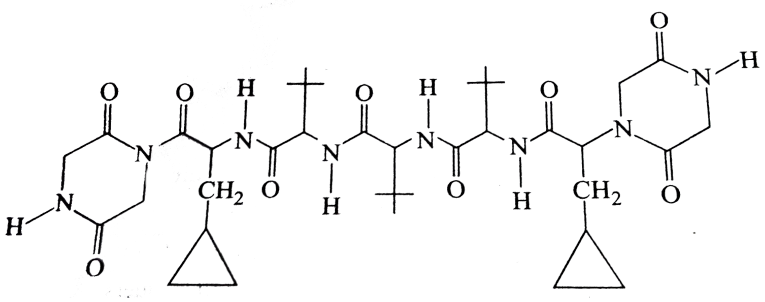
13. The total number of distinct naturally occuring amino acids obtained by complete acidic hydrolysis of the

peptide shown below is



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14. A tetrapeptide has $-COOH$ group on alanine. This produces glycine (Gly), valine (Val), phenyl alanine (Phe) and alanine (Ala), on complete hydrolyses. For this tetrapeptide, the number of possible sequences (primary structures) with $-NH_2$ group attached to a chiral centre is

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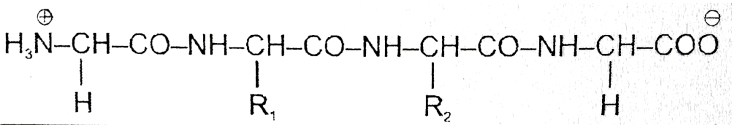
15. The substituents R_1 and R_2 for nine peptides are listed in the table given below. How many of these peptides are positively charged at $pH = 7.0$?



Peptide	R_1	R_2
I	H	H
II	H	CH_3
III	CH_2COOH	H
IV	CH_2CONH_2	$(CH_2)_4NH_2$
V	CH_2CONH_2	CH_2CONH_2
VI	$(CH_2)_4NH_2$	$(CH_2)_4NH_2$
VII	CH_2COOH	CH_2CONH_2
VIII	CH_2OH	$(CH_2)_4NH_2$
IX	$(CH_2)_4NH_2$	CH_3

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16. When the following aldohexose exists in its D-configuration, the total number of stereoisomers in its

pyranose form, is

$$
\begin{array}{l}
CHO \\
| \\
CH_2 \\
| \\
CHOH \\
| \\
CHOH \\
| \\
CHOH \\
| \\
CH_2OH
\end{array}
$$

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17. A decapeptide (Molecular weight 796) on complete hydrolysis gives glycine (Molecular weight 75), alanine and phenylanine. Glycine contributes 47.0 % to the total weight of the hydrolysed products. The number of glycine units present in the decapeptide is

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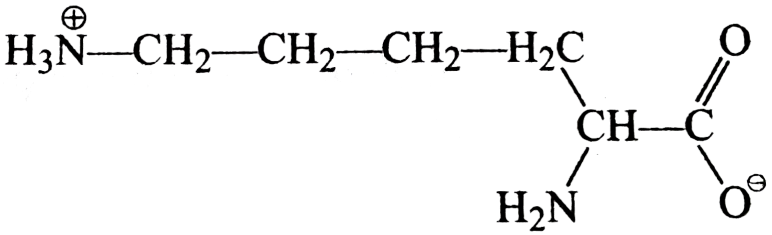
18. The total number of basic groups in the following form of lysine is



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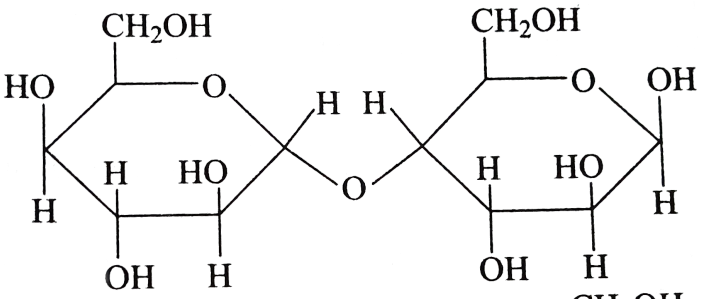
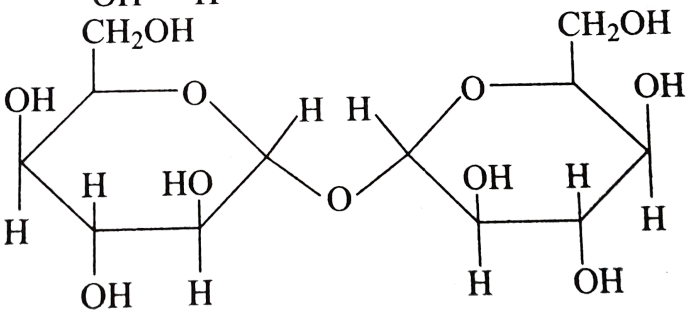
19. Which of the following disaccharide will not reduce Tollen's reagent ?

(a)



(b)



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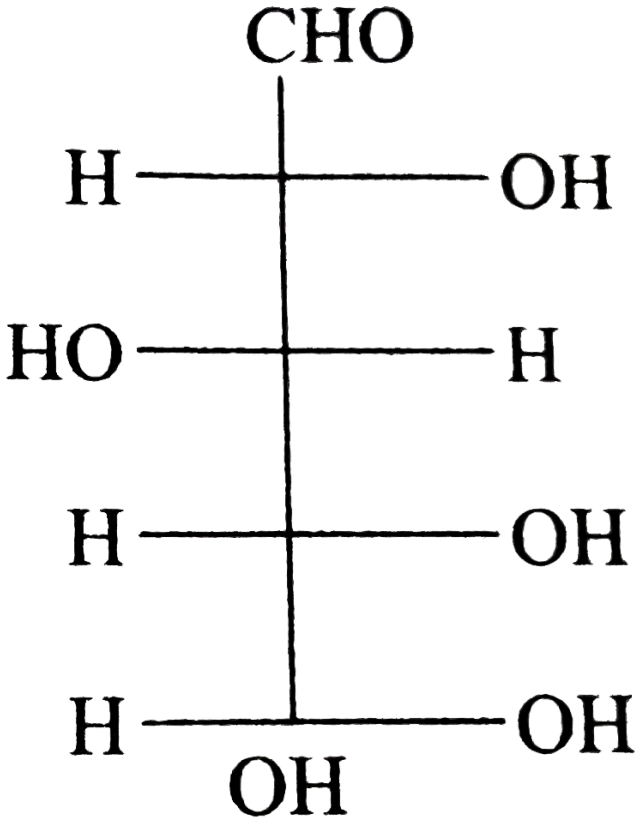
20. The structure of D-glucose is as follows :



(i) Draw the structure of L-glucose

(ii) Give the reaction of L-glucose with Tollen's reagent.

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21. Following two amino acids lysine and glutamine form dipeptide linkage. What are two possible dipeptides ?

$$H_2N-CH-COOH \qquad H_2N-CH-COOH$$
$$\quad | \qquad\qquad\qquad\qquad\quad |$$
$$CH_2CH_2CH_2CH_2NH_2 \qquad CH_2CH_2COOH$$

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22. Aspartame, an artificial sweetener, is a peptide and has the following structure

$$\begin{array}{l} \qquad\qquad\qquad\qquad\quad CH_2C_6H_5 \\ \qquad\qquad\qquad\qquad\quad | \\ H_2N-CH-CONH-CH-COOCH_3 \\ \quad | \\ CH_2-COOH \end{array}$$

(i) Identify the four functional groups

(ii) write the Zwitter ionic structure

(iii) Write the structures of the amino acids obtained from

the hydrolysis of aspartame

(iv) Which of the two amino acids is more hydrophobic ?

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23. Give the structure of the products in the following reaction

Sucrose $\xrightarrow{H^+} A + B$

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24. Write the structure of alanine at pH = 2 and pH = 10.

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25. The formation of which of the following polymers involves hydrolysis reaction ?

A. Nylon-6

B. Bakelite

C. Nylon-6,6

D. Terylne

Answer: A

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26. Which of the following statements about low density polythene is false ?

A. It is a poor conductor of electricity

B. Its synthesis required dioxygen or a peroxide initiator as a catalyst

C. It is used in the manufacture of buckets, dustbins etc

D. Its synthesis requires high pressure

Answer: C

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27. Which of the following is an anionic detergent ?

A. Sodium lauryl sulphate

B. Cetyltrimethyl ammonium bromide

C. Glyceryl oleate

D. Sodium sterate

Answer: A

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28. On complete hydrogenation, natural rubber produces

A. ethylene-propylene copolymer

B. vulcanised rubber

C. polypropyl lene

D. polybutylene

Answer: A

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29. Which polymer is used in the manufacture of paints and lacquers ?

A. Bakelite

B. Glyptal

C. Polypropene

D. Polyvinyl chloride

Answer: B

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30. Match the polymers in Column I with their man uses in Column II and choose the correct answer :

	Column I		Column II
(A)	Polystyrene	1.	Paints and lacqures
(B)	Glyptal	2.	Raincoats
(C)	Polyvinyl chloride	3.	Manufacture of toys
(D)	Bakelite	4.	Computer discs

Codes.

A.

A	B	C	D
2	1	3	4

B.

A	B	C	D
3	1	2	4

C.

A	B	C	D
2	4	3	1

D.

A	B	C	D
3	4	2	1

Answer: B

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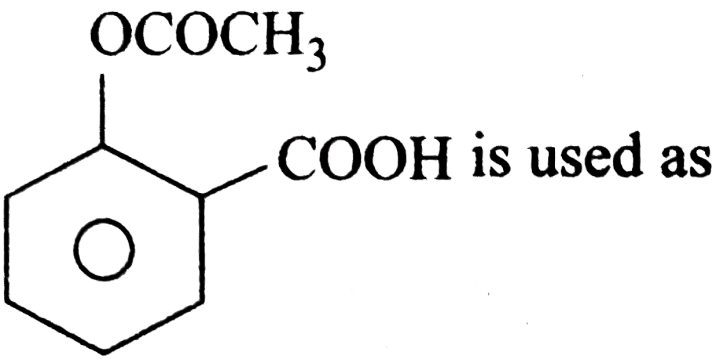
31. This Compound used as a



A. Insecticide

B. Antihistamine

C. Analgesic

D. Antacid

Answer: C

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32. Which of the following is not an antacid ?

A. Aluminium hydroxide

B. Cimetidine

C. Phenelzine

D. Ranitidine

Answer: C

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33. Which one is classified as a condensation polymer ?

A. Dacron

B. Neoprene

C. Teflon

D. Acrylonitrile

Answer: A

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34. Among cellulose, poly (vinyl chloride), nylon and natural rubber, the polymer in which the intermolecular force of attraction is weakest is

A. nylon

B. poly (vinyl chloride)

C. cellulose

D. natural rubber

Answer: D

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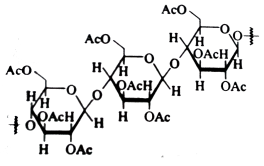
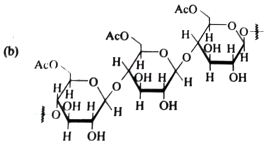
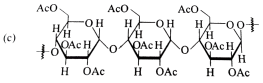
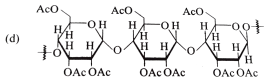
35. Cellulose upon acetylation with excess acetic anhydride/H_2SO_4 (catalytic) gives cellulose triacetate whose structure is

A. 

B. 

C. 

D. 

Answer: A

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36. Under hydrolysis conditions, the compounds used for preparation of linear polymer and for chain termination, respectively are

A. CH_3SiCl_3 and $Si(CH_3)_4$

B. $(CH_3)_2SiCl_2$ and $(CH_3)_3SiCl$

C. $(CH_3)SiCl_2$ and CH_3SiCl_3

D. $SiCl_4$ and $(CH_3)_3SiCl$

Answer:

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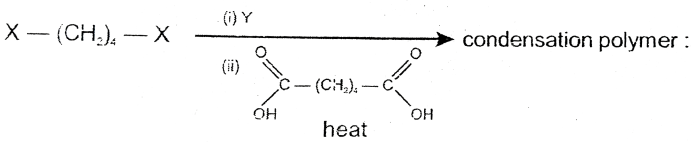
37. The correct functional group X and the reagent//reaction conditions Y in the following scheme are



A. $X = COOCH_3, Y = H_2 / Ni / \text{heat}$

B. $X = CONH_2, Y = H_2 / Ni / \text{heat}$

C. $X = CONH_2, Y = Br_2 / NaOH$

D. $X = CN, Y = H_2 / Ni / \text{heat}$

Answer: A::B::C::D

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38. Match the chemical substances in Column I with type of polymers/type of bond in Column II

	Column I		Column II
A.	Cellulose	p.	Natural polymer
B.	Nylon-66	q.	Synthetic polymer
C.	Protein	r.	Amide linkage
D.	Sucrose	s.	Glycoside linkage

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39. Monomer A of a polymer on ozonolysis yields two moles of HCHO and one mole of CH_3COCHO

(a) Deduce the structure of A.

(b) Write the structure of 'all cis'-form of polymer of compound A.

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40. Name the heterogeneous catalyst used in the polymerisation of ethylene.

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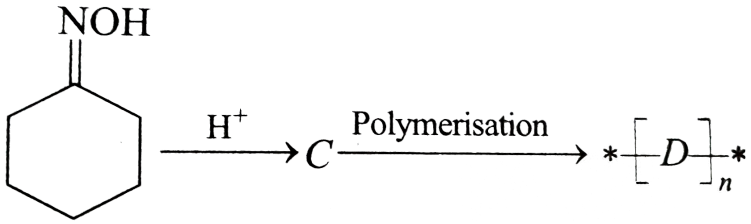
41. Give the structure of the products in the following reaction.



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42. Which of the following amino acids has an amide side chain ?

A. Aspartic acid

B. Glutamic acid

C. Asparagine

D. Methionine

Answer: C

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43. Which of the following amino acids is achiral ?

A. Alanine

B. Glycine

C. Serine

D. Cysteine

Answer: B

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44. What is not true regarding nylons ?

A. Usually a high melting solid polymer

B. Possesses a very high degree of crystallinity

C. Nylons are usually hydrophobic

D. Nylons have very mechanical strength

Answer: C

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45. Which of the following is correct regarding teflon ?

A. It is a linear unbranched polymer of tetrafluoro ethylene

B. It has very high thermal stability

C. Polymer molecules are associated by strong dipole-dipole attraction

D. Polymer is soluble in water

Answer: A::B::C

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46. Assertion (A) Cellulose is insoluble in water while starch is water soluble

Reason (R) Hydroxy groups present on the repeating

glucoside units are linked through intramolecular H-bonding while the same in starch are free for intermolecular H-bonding with water.

A. Both assertion and reason are correct and reason is the correct explanation of the assertion

B. Both assertion and reason are correct but reason is not the correct explanation of assertion

C. Assertion is correct but reason is incorrect

D. Assertion is incorrect but reason is correct

Answer: A


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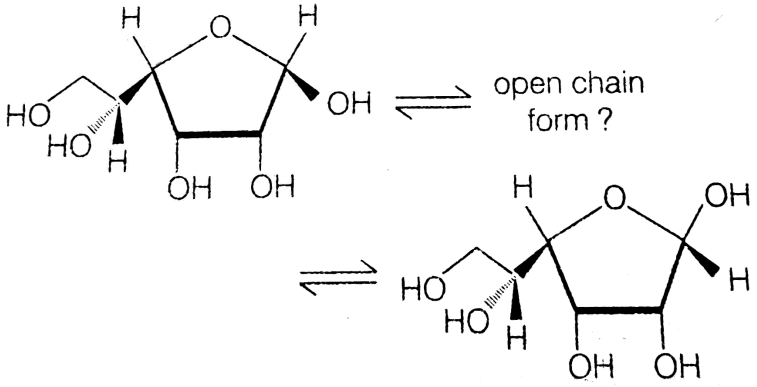
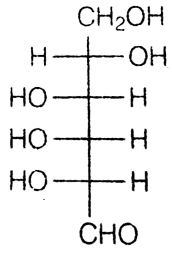
Chapter Test

1. Which Fischer structure represents the open chain form of the following two anomers ?



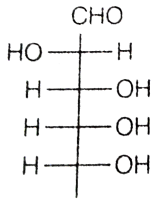
A.

(a)

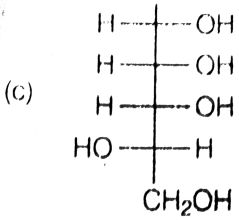


B.

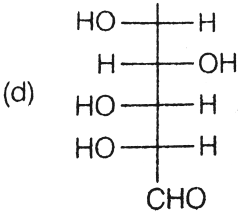
(b)



C.



D.



Answer: D

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2. Which of the following compounds does not undergo mutarotation ?

A. Glucose

B. Sucrose

C. Ribose

D. Fructose

Answer: B

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3. Which of the following is/are characteristic of an $\alpha -$ amino acid at their isoelectric point ?

A. It possesses no net change

B. Both acid and amino groups remain in their neutral state

C. It does not move towards either electrode under influence of applied electric field

D. It has no net effect on the moistented litmus paper

Answer: A::C

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4. In which of the following case, the forms of amino acid and pH is (are) correctly matched ?

A. $\text{Alanine}: \ \text{pH}=3\,, \quad H_3\overset{+}{N} - \underset{\displaystyle CH_3}{\underset{|}{C}} - COO^-$

B. Leucine : pH=10 , $H_2N-\underset{\displaystyle CH_2-CH(CH_3)-CH_3}{\underset{|}{C}H}-COO^-$

C. Asparic acid : pH=9 , $H_2N-\underset{\displaystyle CH_2-COO^-}{\underset{|}{C}H}-COO^-$

D. Lysine : pH=3 , $H_3\overset{+}{N}-\underset{\displaystyle CH_2CH_2CH_2CH_2\overset{+}{N}H_3}{\underset{|}{CH}}-COOH$

Answer: B::C::D

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5. Compound A is a D-aldopentose that on oxidation with dilute NHO_3 give optically active aldaric acid B. On Kiliani-Fisher chain extension shown below. A is converted

into C and D-glucose

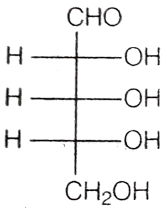
$$\underset{(\text{An aldopentose})}{A} \xrightarrow[H_2O]{HCN} \xrightarrow[BaSO_4]{H_3/Pd} C + D - \text{Glucose}$$

Answer the following three questions based on the above information.

Which of the following on oxidatiobn with dilute HNO_3 will produce an enantiomer of B ?

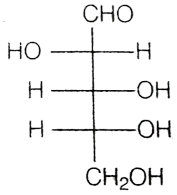
A.

(a)



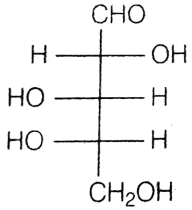
B.

(b)

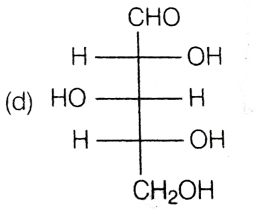


C.

(c)



D.



Answer: C

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6. Compound A is a D-aldopentose that on oxidation with dilute NHO_3 give optically active aldaric acid B. On Kiliani-Fisher chain extension shown below. A is converted into C and D-glucose

$$\underset{(\text{An aldopentose})}{A} \xrightarrow[H_2O]{HCN} \xrightarrow[BaSO_4]{H_3/Pd} C + D - \text{Glucose}$$

Answer the following three questions based on the above information.

Which of the following is not true regarding C and D-glucose ?

A. Both will form same osazone on treatment with excess of phenyl hydrazone

B. Both are reducing sugar

C. Both will form same aldaric acid on treatment will dilute HNO_3

D. They are diastereomers.

Answer: C

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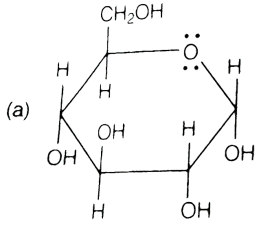
7. Compound A is a D-aldopentose that on oxidation with dilute NHO_3 give optically active aldaric acid B. On Kiliani-Fisher chain extension shown below. A is converted into C and D-glucose

$$\underset{(\text{An aldopentose})}{A} \xrightarrow[H_2O]{HCN} \xrightarrow[BaSO_4]{H_3 / Pd} C + D - \text{Glucose}$$

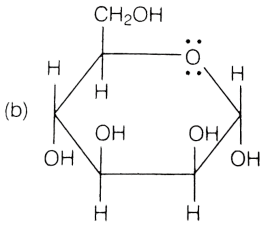
Answer the following three questions based on the above information.

Which of the following represents the alpha (α) anomer of C ?

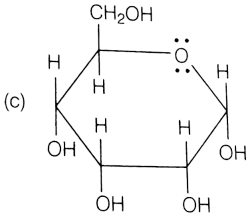
A.



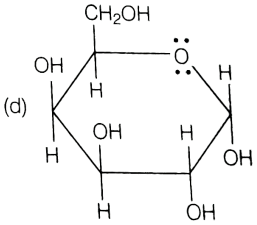
B.



C.



D.



Answer: B

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8. Assertion (A) D-glucose when dissolved in water undergo mutarotation while sucrose solution does not show mutarotation

Reason (R) D-glucose exist in two cyclic anomeric forms.

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9. Match the quantity of Column I with the quantity of Column II

	Column I		Column II
(A)	Glycine	(p)	Has S-S linkage
(B)	Arginine	(q)	Optically active
(C)	Glutamic acid	(r)	Has pH less than 7
(D)	Cystine	(s)	Has pH greater 7

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