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Power of real gurus

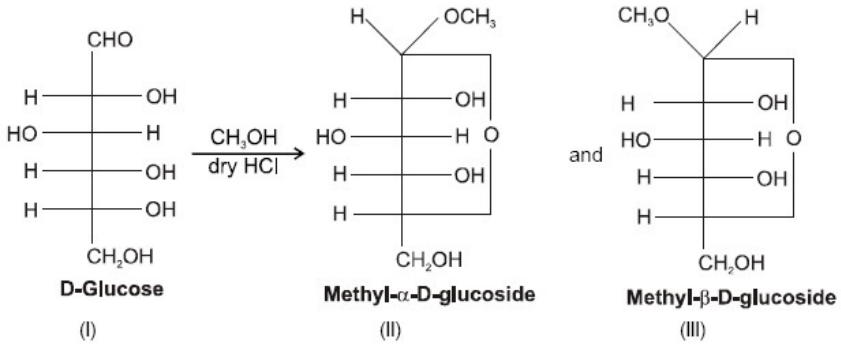
CHEMISTRY

TARGET : JEE Advanced - 2023

CAPS – 25

Biomolecule questions

1. D-glucose, on treating with methanol in presence of dry HCl gives methyl glucosides according to the following reaction



Mention true (T) and False (F) from the following statements

S_1 : The glucosides do not reduce fehling's solution

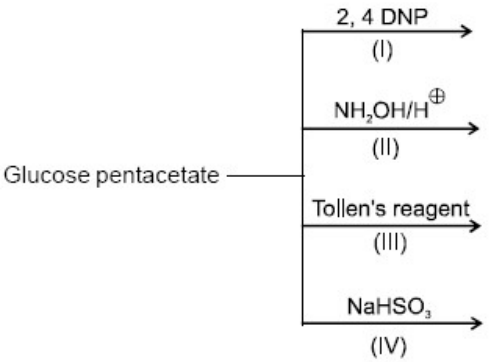
S_2 : The glucosides do not react with hydrogen cyanide or hydroxylamine

S_3 : Behavior of glucosides as stated in S_1 and S_2 indicates the absence of free – CHO group.

S_4 : The two forms of glucosides are enantiomers.

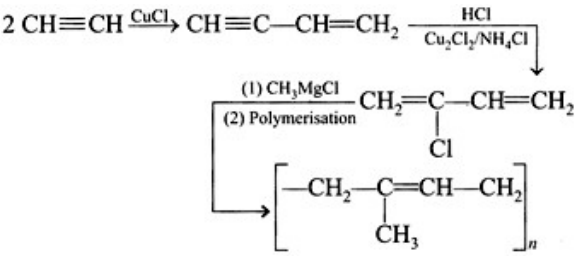
(A) TTFF (B) FTTT (C) TTTF (D) TFTF

2. Observe the following laboratory tests for glucose pentacetate and mention +ve or –ve from the code given below.



(A) + + + + (B) – – – – (C) + – + – (D) + + – –

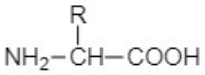
3. The polymerization reaction shown below



would produce :

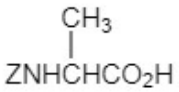
(A) PVC (B) neoprene (C) chloroprene (D) Rubber

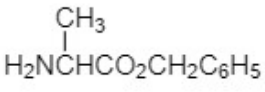
4. An amino acid may be represented by general formula

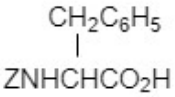


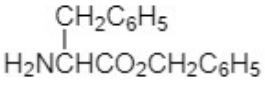
If R = $-CH_2C_6H_5$

Then it is phenylalanine (Phe) and if R = CH_3 then it is alanine (Ala). Find the sequence of reagents from those given below to synthesize Phe – Ala.

1. 

2. 

3. 

4. 

(A) 1 and 2 (B) 1 and 4 (C) 2 and 3 (D) 3 and 4

5. At iso-electric point:

(A) Conc. of cation is equal to conc. of anion

(B) Net change is zero.

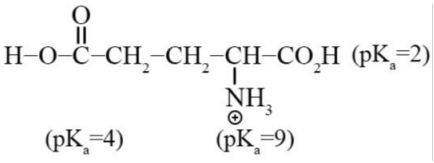
(C) Maximum conc. of di-polar ion (Zwitter ion) will he present

(D) All of the above

6. Which of following amino acid has lowest iso-electric point?

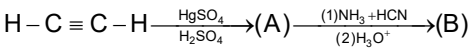
(A) Glycine (B) Alanine (C) Aspartic acid (D) Lysine

7. Find iso-electric point of the given amino acid



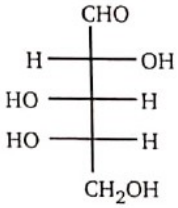
(A) 5.5 (B) 6.5 (C) 3 (D) 5

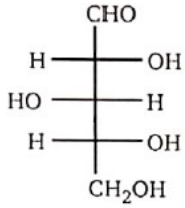
8. Product (B) of given reaction is:

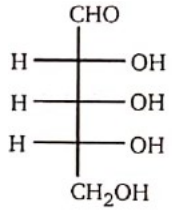


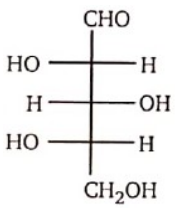
(A) Glycine (B) Alanine (C) valine (D) Leucine

9. Which L-sugar on oxidation gives an optically active dibasic acid (2 COOH groups) ?

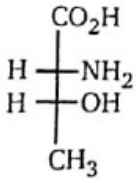
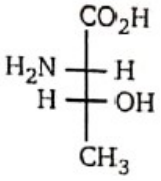
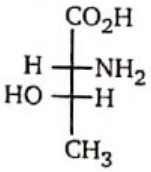
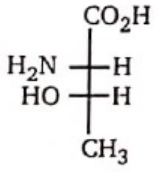
(A) 

(B) 

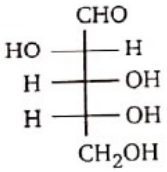
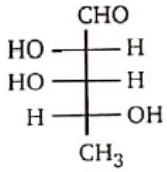
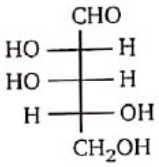
(C) 

(D) 

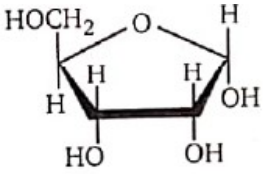
10. Which of the following is the Fischer projection of L-threonine (also known as (2S, 3R)-2-amino-3-hydroxybutanoic acid)?

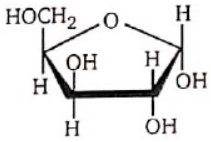
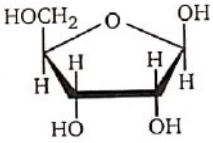
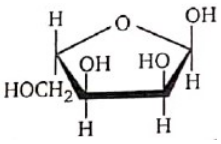
(A)  (B)  (C)  (D) 

11. Among the three compounds shown below, two yield the same product on reaction with warm HNO_3. The exception is:

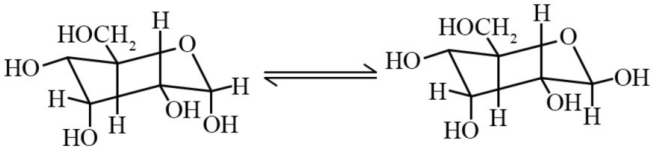
(A)  (B)  (C)  (D) None of these

12. Which of the following represents the anomer of the compound shown ?



(A)  (B)  (C)  (D) None of these

13. Which one of the statements concerning the equilibrium shown is true ?



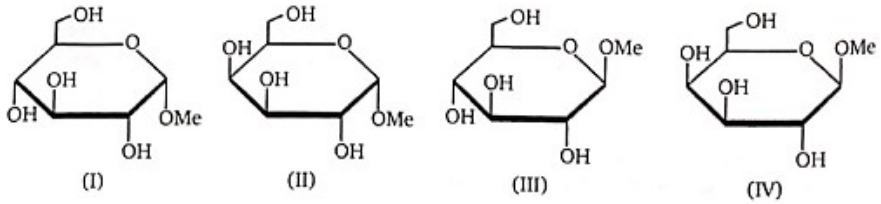
(A) The two structures are enantiomers of each other. They have equal but opposite optical rotations and recemize slowly at room temperature

(B) The two structures are enantiomers of each other. They racemize too rapidly at room temperature for their optical rotations to be measured

(C) The two structures are diastereomers of each other. Their interconversion is called mutarotation

(D) The two structures are diastereomers of each other. Their interconversion does not require breaking and making bonds, only a change in conformation

14. Identify the correct set of stereochemical relationships amongst the following monosaccharides I-IV



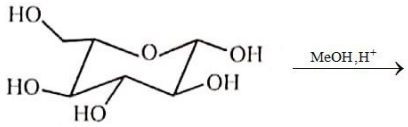
(A) I and II are anomers ; III and IV are epimers

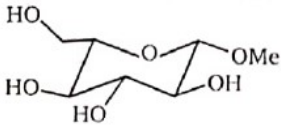
(B) I and III are epimers ; II and IV are anomers

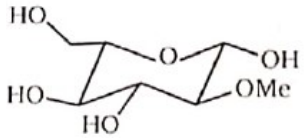
(C) I and II are epimers ; III and IV are anomers

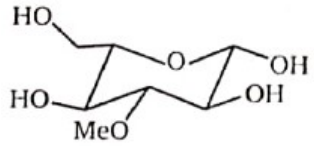
(D) I and III are anomers ; I and II are epimers

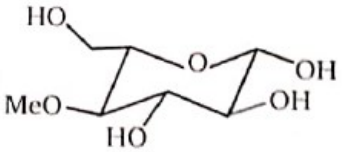
15. Predict the product of the following reaction.



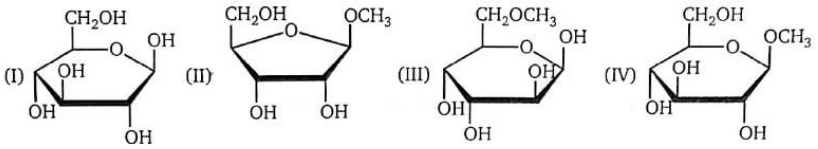
(A) 

(B) 

(C) 

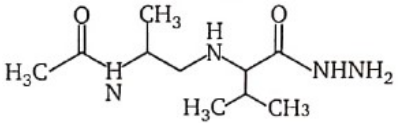
(D) 

16. Which of the following carbohydrate(s) would not undergo mutarotation in aqueous solution?



(A) II only (B) I, III and IV only (C) II and IV only (D) I and III only

17. The number of peptide bonds in the compound.



(A) 1 (B) 2 (C) 3 (D) 4

18. **Statement 1:** The percentage of β−D(+)-glucopyranose is more than α−D(+)-glucopyranose at equilibrium.

Statement 2: The presence of bulky groups in axial position makes β−D(+)-glucopyranose more stable.

(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 Tue; 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.

19. **Statement-1:** A solution of sucrose in water is dextrorotatory but on hydrolysis in presence of H + , the solution becomes leavorotatory

Statement-2: Inversion of sugar follows first order kinetics.

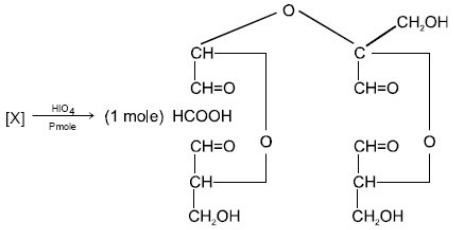
(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1

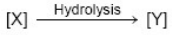
(B) Statement-1 is True, Statement-2 is True; Statement-2 is not a correct explanation for Statement-1.

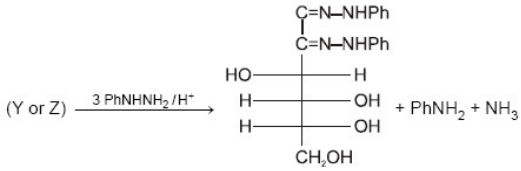
(C) Statement-1 is True, Statement-2 is False

(D) Statement-1 is False, Statement-2 is True.

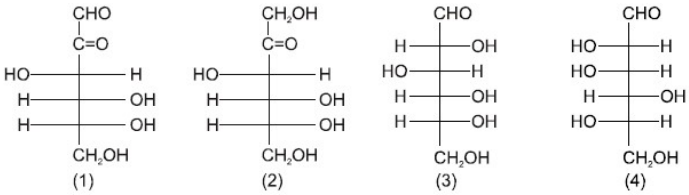
Comprehension 20 to 21







20. Compounds Y and Z can be :

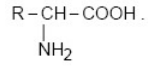


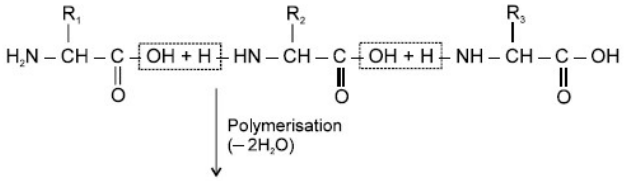
(A) 1 only (B) 2, 3 (C) 1, 4 (D) 2, 3, 4

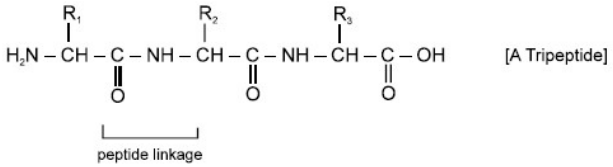
21. Number of moles (P) of HIO4 used per moles of compound X is :

(A) 2 (B) 3 (C) 4 (D) 5

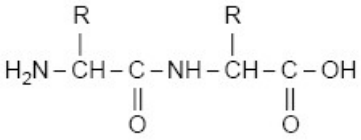
Comprehension 22 to 23

Proteins are biomolecules composed of α-amino acids. An α-amino acid has a general formula  The amino acids polymerise and form an amide linkage (peptide linkage) between two monomeric amino acid units. The polymerisation takes place as follows





Two or more similar amino acids can also polymerise, for example a dimer will be like



22. In the above trimer, if R_1 = H ; R_2 = CH_3 & R_3 = Ph
then total number of optically active stereoisomers will be :

(A) 8 (B) 6 (C) 4 (D) 2

23. Which statement is incorrect about the given trimer.

(A) it will liberate CO_2 with $NaHCO_3$.

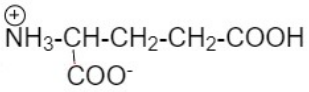
(B) It will liberate N_2 with $NaNO_2$ / HCl

(C) It will give yellow precipitate with 2, 4-Dinitrophenylhydrazine

(D) It will rotate plane polarized light.

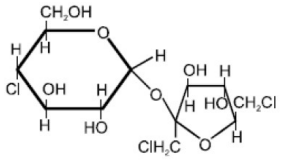
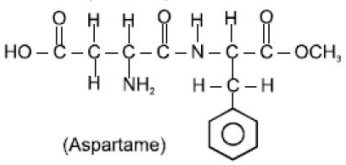
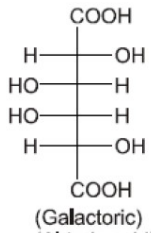
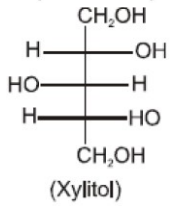
NUMERIC

24. How many acidic group is present in given amino acid ?



Matrix

25. Match the Following :

Column I (Artificial sweetners)	**Column II (Characteristics)**
(A)  (Sucralose)	(p) A derivative of dipeptide
(B)  (Aspartame)	(q) A derivative of disaccharide
(C)  (Galactoric) (Aldaric acid)	(r) Reduction prouct of an aldopentose
(D)  (Xylitol)	(s) Oxidation product of aldohexose

Subjective

26. Compound (A), $C_6H_{12}O_6$, is oxidized by bromine water into a monobasic acid and also reduces Tollen's reagent and Fehling's solution. It also responds to the following reactions. Identify the compound (A).