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CHEMISTRY

TARGET : JEE Advanced – 2021

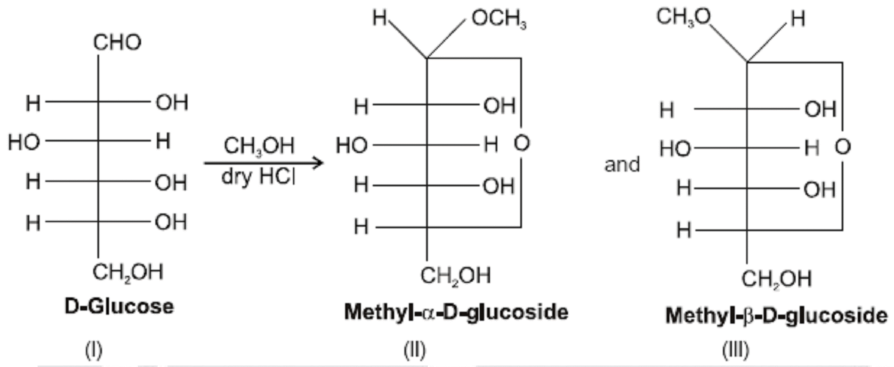
CAPS – 25
Biomolecule questions

Answer Key

1.	(C)	**2.**	(B)	**3.**	(D)	**4.**	(C)	**5.**	(B)
6.	(C)	**7.**	**(C)**	**8.**	(B)	**9.**	(A)	**10.**	(B)
11.	(B)	**12.**	(B)	**13.**	(C)	**14.**	(D)	**15.**	(A)
16.	(C)	**17.**	(A)	**18.**	(C)	**19.**	(B)	**20.**	(B)
21.	(B)	**22.**	(C)	**23.**	(C)	**24.**	(2)		
25.	(A → q, B → p, C → s, D → r)								

Solution

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

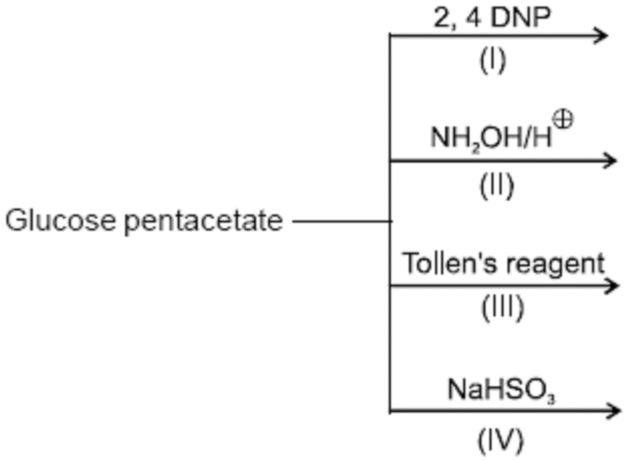
Ans. **(C)**

Sol. If carbohydrates and its derivatives contain free hemiacetal group then it can gives tollen's test, Mutarotation and Fehling's test.

In glucosides hemiacetal group is absent so it has not free -CHO group. Hence all the reaction of -CHO can not be shown by the respective glucosides.

Glucosides contain more than 2 chiral carbon and configuration of only one carbon is change so it will gives pair of diastereomers.

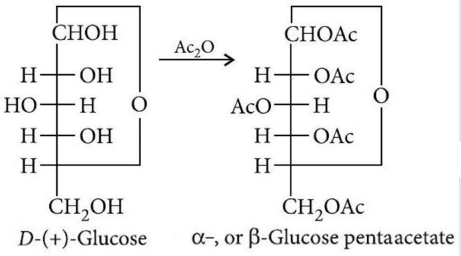
2. Observe the following laboratory tests for glucose pentacetate and mention +ve or –ve from the code given below.



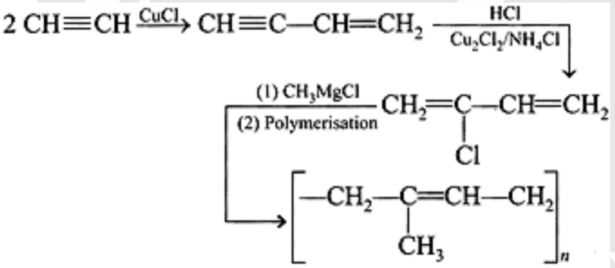
(A) + + + + (B) – – – – (C) + – + – (D) + + – –

Ans. **(B)**

Sol. Pentacetate of glucose do not have free hemiacetal group. So it can not gives any test of free -CHO group.



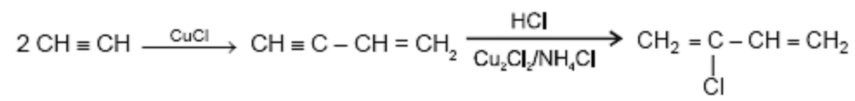
3. The polymerization reaction shown below

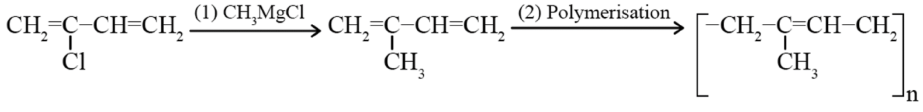


would produce :

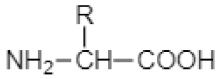
(A) PVC (B) neoprene (C) chloroprene (D) Rubber

Ans. **(D)**

Sol. 



4. An amino acid may be represented by general formula



If R = $-CH_2C_6H_5$

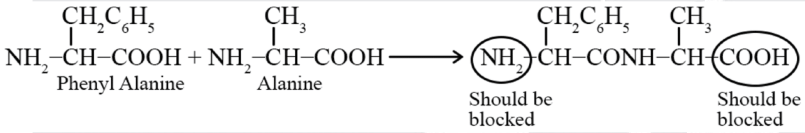
Then it is phenylalanine (Phe) and if R = CH_3 then it is alanine (Ala). Find the sequence of reagents from those given below to synthesize Phe – Ala.

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

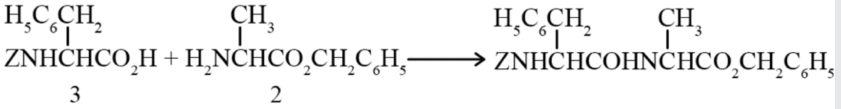
Ans. **(C)**

Sol. Phe – Ala is the dipeptide made up of phenylalanine and alanine. First amino acid is phenylalanine and second amino acid is alanine is used for the formation of Phe – Ala.

To form Phe – Ala, NH_2 group of phenylalanine and -COOH group of alanine must be blocked, so that only Phe – Ala is formed and no other peptides are formed.



For these purpose reagents are 2 and 3 in which NH_2 group of phenylalanine and -COOH group of alanine is blocked is used. Z is blocker in reagent 3 and $-CH_2C_6H_5$ in reagent 2



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

Ans. **(B)**

Sol. Conceptual

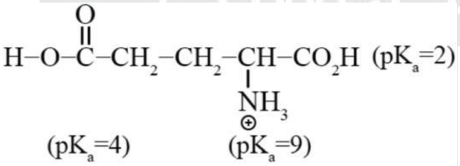
6. Which of following amino acid has lowest iso-electric point?

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

Ans. **(C)**

Sol. Aspartic acid is the acidic amino acid so its isoelectric point is the lowest. While other amino acids are neutral amino acids.

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



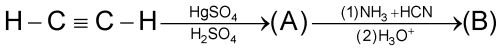
(A) 5.5 (B) 6.5 (C) 3 (D) 5

Ans. **(C)**

Sol. If an amino acid has an ionizable side chain, its isoelectric point is the average of the Pka values of the similarly ionizing groups.

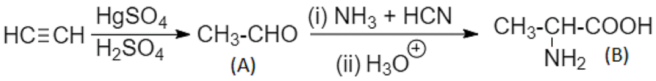
$$\frac{4+2}{2} = 3.0$$

8. Product (B) of given reaction is:

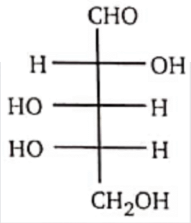
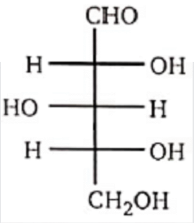
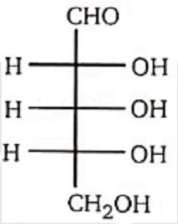
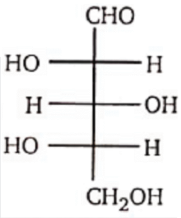


(A) Glycine (B) Alanine (C) valine (D) Leucine

Ans. **(B)**

Sol. 

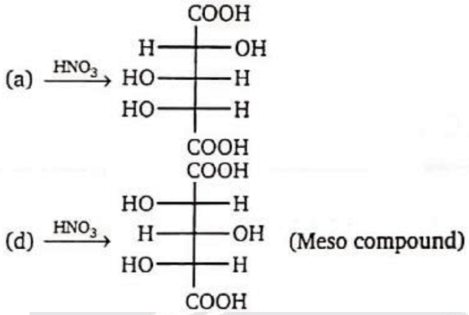
9. Which L-sugar on oxidation gives an optically active dibasic acid (2 COOH groups) ?

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

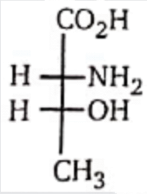
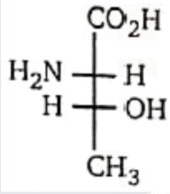
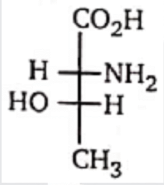
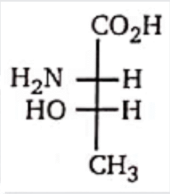
Ans. **(A)**

Sol. L-sugar are a, d

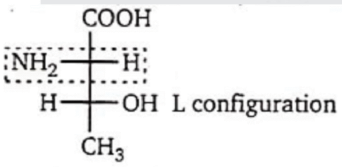
But only a will gives optically active compound



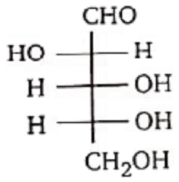
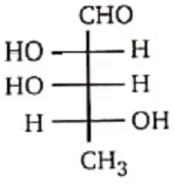
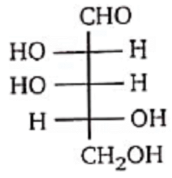
10. Which of the following is the Fischer projection of L-threonine (also known as (2S, 3R)-2-amino-3-hydroxybutanoic acid)?

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

Ans. **(B)**

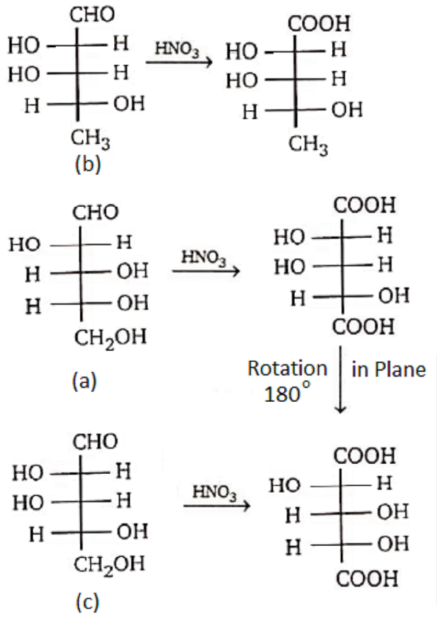
Sol. 

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

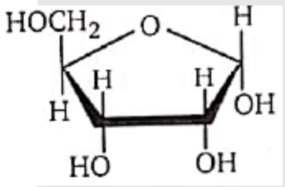
(A)  (B)  (C)  (D) None of these

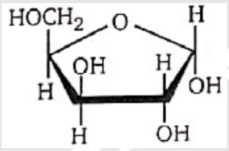
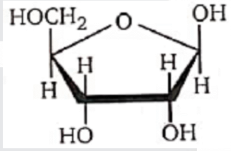
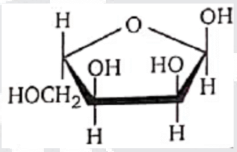
Ans. **(B)**

Sol. a and c give the same product. While b do not contain primary alcohol.



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

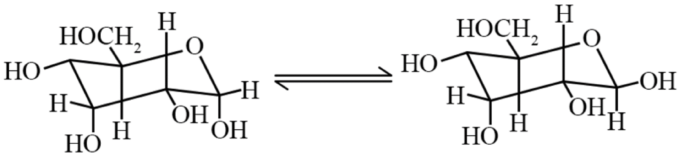


(A)  (B)  (C)  (D) None of these

Ans. **(B)**

Sol. Anomers are cyclic monosaccharides that are epimers, differing from each other in the configuration of C-1.

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

Ans. **(C)**