

*Art paper* : It contains china clay which provides a clean, smooth surface.

## QUESTIONS

1. What are carbohydrates ? How are they classified. Discuss the ring structure of Glucose.

2. What are oligo saccharides ? Give an example of a Trisaccharide.
3. Give the mechanism of osazone formation.
4. How would you establish that glucose has Pyranose structure.
5. How will you convert :
- (i) Glucose into fructose
  - (ii) Fructose into Glucose
  - (iii) Arabinose into glucose
  - (iv) Glucose into Arabinose
6. Write short notes on :
- (i) Muta rotation
  - (ii) Epimerisation
  - (iii) Invert sugar and
  - (iv) Molisch test / How is carbohydrate gp. tested in lab.
7. Distinguish between :
- (i) Glucose and fructose
  - (ii) Glucose and cane sugar
  - (iii) Sucrose and fructose
8. How D-glucose is converted into D-Mannose. How will test in lab that a given compound is glucose and not cane sugar.
11. Give the difference between  $\alpha$ - and  $\beta$ -glycosidic linkage.
12. What happens when glucose is treated with :
- (i) Acetone
  - (ii) Fehling's solution
  - (iii) 12% HCl
  - (iv) Dimethyl sulphate in presence of NaOH
  - (v) Lime water
  - (vi) Phenyl hydrazine in excess
13. How glucose is obtained on large scale ? Give its important reactions.
14. Discuss the constitution of glucose.
15. How fructose is obtained from cane sugar ? Establish its structure.
16. Describe the manufacture of cane sugar.
17. Indicate briefly the experimental basis on which the structure of glucose is based. What is its relationship with fructose.
18. How will you show that :
- (i) Glucose is a penta hydroxyl aldehyde.
  - (ii) Glucose has an aldehydic and not a keto group.
  - (iii) Fructose contains a keto group at position 2.
  - (iv) Fructose gives two isomeric alcohols on reduction.
19. Explain the following :
- (i) Why glucose and fructose form the same osazone with phenyl hydrazine.
  - (ii) Why prefix D is given to fructose though it is laevorotatory.
  - (iii) Glucose does not react with  $\text{NaHSO}_3$  though it has an aldehydic group.
  - (iv) Fructose contains a keto group and glucose an aldehydic group yet both reduce Fehling solution.
20. (+) Glucose reacts with acetic anhydride to give two isomeric penta acetyl derivatives neither of which reduces Fehling or Tollen's reagent. Explain these facts.
21. Explain why  $\alpha$ - and  $\beta$ -D-glucose exhibit mutarotation whereas their mono-methyl glucoside do not show mutarotation.
22. Explain why sucrose is a non-reducing sugar.

23. Why glucose does not show Schiff's Test.
24. Explain the following :
- Sucrose is dextrorotatory whereas hydrolysis product is laevorotatory.
  - Why sucrose does not show mutarotation.
25. Write the correct answer from the given alternatives with reason :
- Pyranose structure of glucose was proposed by :
    - E. Fischer
    - Haworth & Hirst
    - Hakomori
    - Hudson
- Ans. (ii) Proposed on the basis of methylation studies.
- Cellulose on hydrolysis with  $H^+$  gives :
    - Glucose + fructose
    - Fructose
    - Glucose only
    - Galactose + glucose
- Ans. (iii) Found on identification of the products of hydrolysis.
- The sugar occurs in the milk of mammals is :
    - Lactose
    - Maltose
    - Fructose
    - Sucrose
- Ans. (i) Found on analysis and confirmed by isolation and identification.
- Mutarotation is :
    - Free rotation about C - C bond
    - Restricted rotation about C = C bond.
    - Inter conversion of  $\alpha$ - and  $\beta$ -anomers
    - None of these
- Ans. (iii) It is the inter conversion of  $\alpha$ - and  $\beta$ -anomers.
- Methylation followed by oxidation of glucose gives xylo - tri methoxyglutaric acid. It is :
    - Pyranose ring structure
    - Furanose ring structure
    - Both pyranose and furanose
    - None of these
- Ans. (i) It has five carbon atoms in the ring.
- Complete methylation and oxidation of glucose gives dimethyl tartaric acid it shows :
    - Pyranose ring structure
    - Furanose ring structure
    - Pyranose & Furanose ring structure
    - None of these
- Ans. (ii) It has only four carbon atoms in the ring.
- The designation D or L before the name of a monosaccharide :
    - Indicates the direction of rotation of polarized light
    - Indicates the length of the carbon chain in the carbohydrate
    - Indicates the position of the OH group on the carbon next to the primary alcohol group
    - Indicates the position of the asymmetric carbon atom in the carbohydrate
- Ans. (iii) It refers to stereo chemical relationship.
- The principal sugar in blood is :
    - Fructose
    - Glucose
    - Sucrose
- Ans. (ii)

9. Which of the following statement is false about glucose ?

- (i) It is a reducing sugar  
 (ii) It is a disaccharide  
 (iii) It has a pyranose form  
 (iv) It is a polyalcohol

Ans. (ii) Glucose is a monosaccharide and can not be further hydrolysed into simple sugars.

10. Which of the following statement is false about  $\alpha$ -D-glucose ?

- (i) It has a pyranose ring  
 (ii) It is a hemiacetal  
 (iii) It shows mutarotation  
 (iv) It is the purest form of table sugar

Ans. (iv)  $\alpha$ -D-glucose is a monosaccharide while table sugar is disaccharide *i.e.*, sucrose.

11.  $\alpha$ -D-glucose is different from  $\beta$ -D-glucose :

- (i) In the configuration at C - 1.  
 (ii) Because they are mirror images of each other  
 (iii) Because they are enantiomers  
 (iv) Because they are geometrical isomers

Ans. (i) In  $\alpha$ -D-glucose at C - 1, OH - gp. is present on axial position while in  $\beta$ - it is on equatorial position.

12. Which of the following statement is false about glyceraldehyde ?

- (i) Its IUPAC name is 1, 2-dihydroxypropanal  
 (ii) It is isomeric with 1, 3-dihydroxypropanone  
 (iii) It is optically active  
 (iv) It shows mutarotation

Ans. (iv) It has open chain structure and does not form hemiacetal ring structure.

13. Which of the following carbohydrates will not give a red precipitate of  $\text{Cu}_2\text{O}$  when heated with Benedict's solution ?

- (i) Maltose  
 (ii) Glucose  
 (iii) Sucrose  
 (iv) Fructose

Ans. (iii) Same as 39.

14. Which of the following statement is false about cellulose ?

- (i) It is a polymer of glucose molecules joined in  $\beta$ -1, 4 linkages  
 (ii) It is a major component of cotton  
 (iii) It is used in the manufacture of Dacron fibres  
 (iv) It is used in the manufacture of Rayon fibres

Ans. (iii) It is used in the manufacture of Dacron fibres.

15. Which of the following product is not derived from cellulose ?

- (i) Rayon  
 (ii) Insulin  
 (iii) Gun cotton  
 (iv) Paper

Ans. (ii) It is a hormone and made up of amino acids.

