

## UNIT 13

## BIOMOLECULES

1. **Carbohydrates** : These are optically active polyhydroxy aldehydes or ketones or the compounds which produce these on hydrolysis.

2. **Classification** :

(i) **Monosaccharides** : Those carbohydrates which cannot be hydrolysed into further simpler carbohydrates. *E.g.*, glucose, fructose, galactose etc.

(ii) **Disaccharides** : Those carbohydrates which produces two monosaccharides on hydrolysis. *E.g.*, sucrose, maltose and lactose.

(iii) **Oligosaccharides** : Those carbohydrates which give two to ten monosaccharides on hydrolysis.

(iv) **Polysaccharides** : Those carbohydrates which on hydrolysis give large number of monosaccharides hydrolysis. *E.g.*, starch, cellulose, glycogen.

3. **Sugar** : Carbohydrates which are sweet in taste.

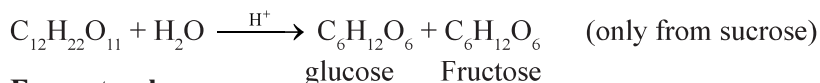
(i) **Reducing sugars** : Those which reduce Fehling's or Tollen's reagent due to availability of free aldehydic groups. *E.g.*, glucose, fructose, galactose.

(ii) **Non-reducing sugars** : Those which do not reduce Fehling's or Tollen's reagent. They do not have free aldehydic group. *E.g.*, sucrose.

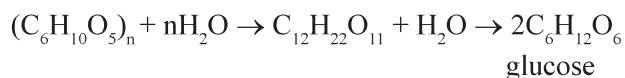
4. **Glucose** : It is a monosaccharide with molecular formula  $C_6H_{12}O_6$ .

5. **Preparation** :

(i) **From sucrose** :



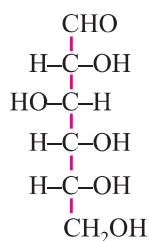
(ii) **From starch** :



6. **Structure** :

**Fischer structure** :

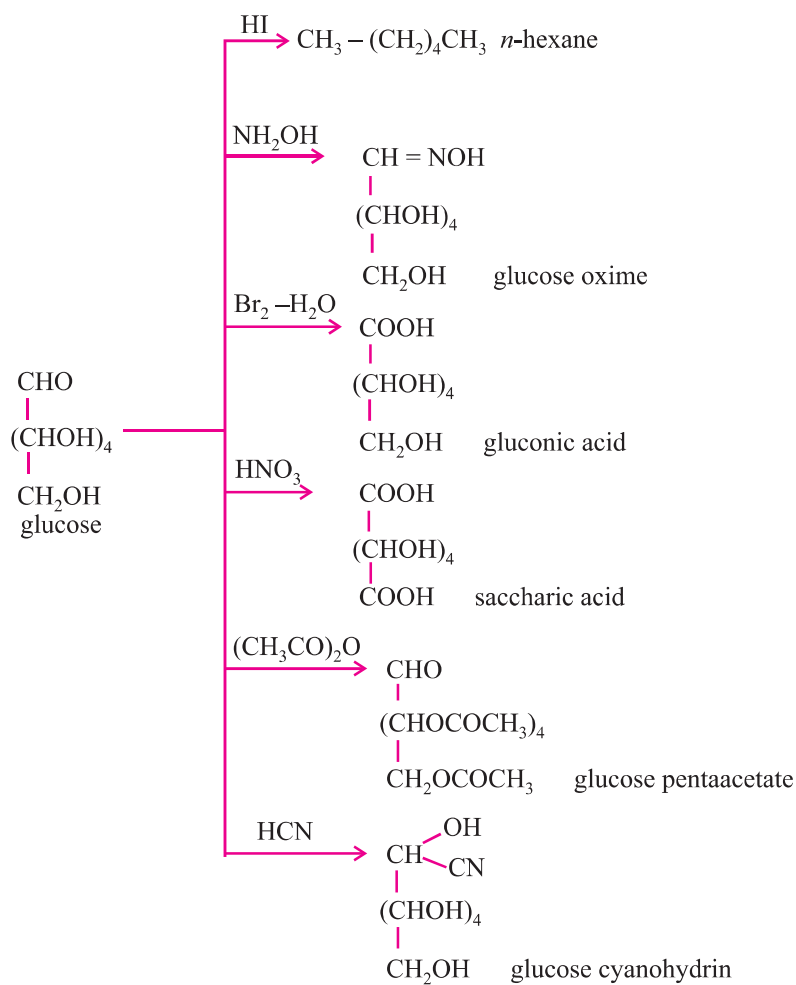
(+) glucose has 'D' configuration as shown :



D-(+)-glucose

'D'- means – OH group on first chiral 'C' from the bottom is on right hand and (+) means it is dextrorotatory *i.e.*, it rotates plane polarized light towards right.

### Reactions of glucose :



### Objections against open chain structure of glucose

The open chain structure was unable to explain the following reactions :

- It does not give the 2, 4-DNP test, Schiff's test and does not form the hydrogensulphite product with  $\text{NaHSO}_3$ .
- The pentacetate of glucose does not react with  $\text{NH}_2\text{OH}$ , indicating the absence of free aldehydic group.
- Glucose exist in 2 different crystalline forms  $\alpha$  and  $\beta$  forms. These are called anomers. They differ in optical rotation, they also differ in melting point.

After which a close chain (cyclic) structure of glucose was proposed by Haworth.

\* Anomers are isomers which have a different configuration at C-1 functional group c-atom

- Glycosidic linkage :** The linkage between two monosaccharide units through oxygen is called the glycosidic linkage.
- Proteins :** These are macro molecules made up of amino acids joined by amide linkage  $[-(-\text{CONH}-)-]$  is here called as peptide linkage. These are required for growth and development of the body.
- Amino acids :** These contain an amino ( $-\text{NH}_2$ ) and an acidic ( $-\text{COOH}$ ) group and are therefore amphoteric in nature. In solution they exist in the form of zwitter ion (a dipolar ion).
- Classification**

Fibrous Protein	Glubular Protein
(i) Polypeptide chains run par'allel or anti-parallel and held together by hydrogen and disulphide bonds.	(i) Chains of polypeptide coil around to give a spherical shape.
(ii) Generally insoluble in water <i>e.g.</i> , keratin, collagen, myosin, fibroin.	(ii) Usually soluble in water, <i>e.g.</i> , insulin, thyroglobin, albumin, haemoglobin and fibrinogen gets converted into fibrous protein fibroin on clotting of blood.

11. **Structure and shape of protein (Ref. page no. 416 NCERT Book)**

Primary structure	Secondary structure	Tertiary structure	Quaternary structure
The specific sequence of amino acids in the polypeptide chain. Change in amino acids sequence changes the protein completely. They have covalent bonds.	It is the shape in which the long polypeptide chain can exist. It is of two types : $\alpha$ -helix and $\beta$ -pleated. These structures arise due to regular folding of the backbone of the polypeptide chain due to H-bonding between the C = O and -NH - groups of the peptide bond.	Represents overall folding of the polypeptide chain. It gives rise to the fibrous or globular molecular shapes. Forces stabilizing the 2° and 3° structures are hydrogen bonds, disulphide linkages, van der Waal's and electrostatic forces of attraction.	Protein can be composed of two or more polypeptide chains called sub-units. The spatial arrangement of these sub-units with respect to each other is quaternary structure of the protein.

12. **Native state of protein :** The parental state or the natural state in which the protein is found.

13. **Denaturation of protein :** Destruction of the native state of protein is denaturation. It can be brought by physical and chemical methods. The 2° and 3° structures are destroyed, only 1° structure is retained.

**Enzymes :** These are biocatalyst and generally globular proteins *e.g.*, invertase, zymase, phenylalanine hydroxylase, urease etc.

**Main characteristics of enzymes :**

- (i) It speed up the biological reaction upto million times.
- (ii) It is highly specific and work on lock and key theory.
- (iii) It is highly sensitive to pH and temperature.

14. **Vitamins :** They are organic compounds required in the diet in small amounts to perform specific biological functions for maintenance of optimum growth and health of the organism. They are classified as follows :

- (i) **Fat soluble vitamins :** Vitamin A, D, E and K. They are stored in liver and adipose tissues.

- (ii) **Water soluble vitamins** : B group vitamins and vitamin C. They need to be supplied regularly in diet as they are excreted in urine and cannot be stored (except vitamin B<sub>12</sub>) in our body.

Their deficiency causes diseases. (Ref. table in page no. 418 of NCERT Book)

Biotin (Vit H) is however neither fat nor water soluble. Its deficiency leads to loss of hair.

15. **Nucleic acids** : These are biomolecules which are long chain polymers of nucleotides. They are of two types :

(i) **Deoxyribonucleic acid (DNA)**

(ii) **Ribonucleic acid (RNA)**

16. Vitamin	Deficiency disease
A	Xerophthalmia, night blindness
B <sub>1</sub>	Beri-beri
B <sub>2</sub>	Ariboflavinosis, cheilosis, burning sensation of skin
B <sub>12</sub>	Pernicious anaemia, inflammation of tongue and mouth
C	Scurvy
D	Rickets & osteomalacia
E	Increased fragility of RBC and muscular weakness
K	Increased blood clotting time
H	Loss of hair

17. Hormones are chemical substances which are produced in ductless glands in the body.

18. Nucleoside = Base + Sugar

Nucleotide = Base + Sugar + Phosphoric acid

19. DNA	RNA
(i) Double helical.	(i) Single stranded.
(ii) Sugar is 2-deoxyribose.	(ii) Sugar is ribose.
(iii) Bases : A, T, G, C.	(iii) Bases : A, U, G, C.
(iv) Property of replication.	(iv) Do not replicate.
(v) It is responsible for transmission of heredity character.	(v) Helps in protein biosynthesis.

**MULTIPLE CHOICE QUESTIONS**

- 1. Which of the following statement is not true about glucose?**
  - (a) it is an aldohexose
  - (b) on heating with HI it forms n-hexane
  - (c) it is present in furanose form
  - (d) it does not give 2, 4-DNP test
- 2. Which of the following acids is a vitamin?**
  - (a) aspartic acid
  - (b) ascorbic acid
  - (c) asipic acid
  - (d) saccharic acid
- 3. Which of the following base is not present in RNA?**
  - (a) adenine
  - (b) uracil
  - (c) thymine
  - (d) cytosine
- 4. Which of the following vitamins can be stored in our body?**
  - (a) vitamin B<sub>1</sub>
  - (b) vitamin B<sub>2</sub>
  - (c) vitamin B<sub>6</sub>
  - (d) vitamin B<sub>12</sub>
- 5. Which one given below is non-reducing sugar?**
  - (a) glucose
  - (b) sucrose
  - (c) maltose
  - (d) lactose
- 6. In a protein molecule amino acids are linked together by:**
  - (a) peptide bond
  - (b) dative bond
  - (c) glycosidic bond
  - (d) phosphodiester bond
- 7. In DNA, the complementary bases are:**
  - (a) adenine and thymine ; guanine and cytosine
  - (b) adenine and thymine; guanine and uracil
  - (c) adenine and guanine; thymine and cytosine
  - (d) uracil and adenine; cytosine and guanine
- 8. Deficiency of vitamin B<sub>1</sub>, cause the disease:**
  - (a) convulsions
  - (b) beri-beri
  - (c) cheilosis
  - (d) sterility
- 9. One strand of DNA has the sequence. ATGCTT, the sequence of complementary strand would be:**
  - (a) TCCGAA
  - (b) TACGTA
  - (c) TACGAA
  - (d) TAGCTA

- 10. The correct statement regarding RNA and DNA is:**
- (a) The sugar component RNA is arabinose and sugar in DNA is ribose
  - (b) The sugar component in RNA is 2'-deoxyribose and the sugar component in DNA is arabinose.
  - (c) The sugar component in RNA is arabinose and the sugar component in DNA is 2'-deoxyribose.
  - (d) The sugar component in RNA is ribose and sugar component in DNA is 2'-deoxyribose.
- 11. Which of the following vitamin given below is water soluble?**
- (a) vitamin C
  - (b) vitamin D
  - (c) vitamin K
  - (d) vitamin E
- 12. In both DNA and RNA, base and phosphate ester linkage are at**
- (a)  $C_5'$  and  $C_2'$  respectively of sugar molecule
  - (b)  $C_2'$  and  $C_5'$  respectively of sugar molecule
  - (c)  $C_3'$  and  $C_5'$  respectively of sugar molecule
  - (d)  $C_5'$  and  $C_1'$  respectively of sugar molecule
- 13. The two functional groups present in a typical carbohydrates are:**
- (a)  $-\text{OH}$  and  $-\text{COOH}$
  - (b)  $-\text{CHO}$  and  $-\text{COOH}$
  - (c)  $> \text{C}=\text{O}$  and  $-\text{OH}$
  - (d)  $-\text{CHO}$  and  $-\text{COCl}$
- 14. The presence or absence of hydroxyl group on which carbon atom of sugar differentiates RNA and DNA.**
- (a) 1<sup>st</sup>
  - (b) 2<sup>nd</sup>
  - (c) 3<sup>rd</sup>
  - (d) 4<sup>th</sup>
- 15. Which of the following is called invert sugar**
- (a) lactose
  - (b) sucrose
  - (c) maltose
  - (d) glucose
- 16. Carbohydrates which give two molecules of mono-saccharides are called disaccharides. These are:**
- (a) maltose
  - (b) cellulose
  - (c) maltase
  - (d) lactose
- 17. Starch is a mixture of:**
- (a) amylose
  - (b) amylopectin
  - (c) amylose
  - (d)  $\beta$ -D-glucose
- 18. Which of the following contain transition metal?**
- (a) Vitamin B-12
  - (b) Chlorophyll
  - (c) Haemoglobin
  - (d) RNA

19. Which of the following has glycosidic linkage?

- (a) Maltose (b) Anylose  
(c) galactose (d) sucrose

20. Fibrous proteins are present in:

- (a) myosin (b) albumin  
(c) collagen (d) fibroin

### Assertion and Reasoning Type

The question given below consist of an Assertion and the Reason. Use the following key to choose the appropriate answer.

- (a) Assertion and reason both are CORRECT and reason is the CORRECT explanation of the assertion.  
(b) Assertion and reason both are wrong statements.  
(c) Assertion is correct statement but reason is wrong statement.  
(d) Assertion is wrong statement but reason is correct statement.  
(e) Assertion and reason both are correct statements but reason is not correct explanation of assertion.

21. **Assertion :** A solution of sucrose in water is dextro rotatory but on hydrolysis in presence of little HCl it becomes laevorotatory.

**Reason :** Sucrose on hydrolysis gives unequal amount of glucose and fructose as a result sign of rotation changes.

22. **Assertion :** Fructose does not contain aldehyde group but still reduce Tollen's reagent.

**Reason :** In the presence of base, fructose undergoes rearrangement to form glucose and mannose.

### Matching Column Type

23. Match the carbohydrate in Column I with its characteristic given in Column II

- | Column-I               | Column-II   |
|------------------------|---|
| (A) Lactose            | (p) Ketohehexose  |
| (B) Starch             | (q) Disaccharide  |
| (C) Sucrose            | (r) Polysaccharide  |
| (D) Fructose           | (s) on hydrolysis gives $\beta$ -D-glucose and $\beta$ -D-galactose |
| (a) A-s, B-r, C-p, D-q | (b) A-p, B-q, C-r, D-s  |
| (c) A-r, B-s, C-p, D-q | (d) A-s, B-r, C-q, D-p  |



24. Match the carbohydrate in Column I with its characteristic given in Column II

Column-I	Column-II
(A) Keratin	(p) protein
(B) Haemoglobin	(q) $\beta$ -pleated protein
(C) Riboflavin	(r) $\alpha$ -amino acid
(D) Glycine	(s) Water soluble vitamin
(a) A-p, B-q, C-s, D-r	(b) A-q, B-p, C-s, D-r
(c) A-q, B-p, C-r, D-s	(d) A-s, B-r, C-q, D-p

25. The no. of chiral carbon present in  $\beta$ -D-(+)-glucose is:

0	1	2	3	4	5	6	7	8	9
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### Answers

1. (c) 2. (b) 3. (c) 4. (d) 5. (b) 6. (a) 7. (a) 8. (b) 9. (c) 10. (d)  
 11. (a) 12. (c) 13. (c) 14. (b) 15. (b)  
 16. (a, d) 17. (b, c) 18. (a, c) 19. (a, b, d) 20. (a, c, d)  
 21. (c) 22. (a)  
 23. (a)—(q, s), (b)—(r), (c)—(q), (d)—(p)  
 24. (a)—(p, q), (b)—(p), (c)—(s), (d)—(r)  
 25. 5

### VERY SHORT ANSWER TYPE QUESTIONS (1 Mark)

Q. 1. Name polysaccharides which is stored in the liver of animals.

Ans. Glycogen.

Q. 2. What structural feature is required for a carbohydrate to behave as reducing sugar ?

Ans. The carbonyl group of any one monosaccharide present in carbohydrate should be free.

Q. 3. Give the significance of (+) sign in the name D-(+)-glucose.

Ans. (+) sign indicates dextro-rotatory nature of glucose.

Q. 4. Glucose is an aldose sugar but it does not react with sodium hydrogen sulphite. Give reason.

Ans. The  $-\text{CHO}$  group reacts with  $-\text{OH}$  group at C-5 to form a cyclic hemiacetal.

**Q. 5. Why is sucrose called invert sugar ?**

**Ans.** When sucrose is hydrolysed by water, the optical rotation of solution changes from positive to negative.

**Q. 6. Name the amino acid which is not optically active.**

**Ans.** Glycine.

**Q. 7. Give reason :**

**Amylase present in the saliva becomes inactive in the stomach.**

**Ans.** HCl present in stomach decreases the pH.

**Q. 8. Which forces are responsible for the stability of  $\alpha$ -helical structure of proteins ?**

**Ans.** Hydrogen bonding.

**Q. 9. Which nucleic acid is responsible for carrying out protein synthesis in the cell ?**

**Ans.** RNA (Ribonucleic acid)

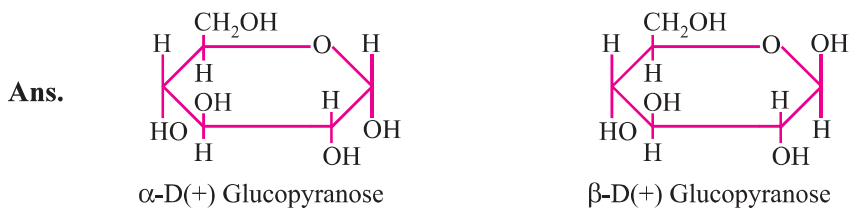
**Q. 10. When RNA is hydrolysed, there is no relationship among quantities of different bases obtained. What does this fact suggest about structures of RNA ?**

**Ans.** RNA is single stranded.

**Q. 11. What type of linkage holds together the monomers of DNA and RNA ?**

**Ans.** Phosphodiester linkage.

**Q. 12. Give the Haworth projection of D-glucopyranose.**



**Q. 13. Name the vitamin responsible for coagulation of blood.**

**Ans.** Vitamin K.

**Q. 14. Where does the water present in the egg go after boiling the egg ?**

**Ans.** On boiling, during denaturation process water gets absorbed in denaturated proteins.

**Q. 15. What is native state of protein ?**

**Ans.** The energetically most stable shape of the protein at normal pH and temperature is called native state.

**Q. 16. Why is cellulose not digested in human body ?**

**Ans.** It is due to the fact that human beings do not have enzyme to digest cellulose.

**Q. 17. Name the enzyme that is used to dissolve blood clots ?**

**Ans.** Streptokinase.

**Q. 18. Name two diseases caused due to deficiency of enzymes.**

**Ans.** Albinism and phenyl keto urea.

**Q. 19. Give one example of : (a) water soluble, (b) fat soluble vitamins.**

**Ans.** (a) Vitamin C                      (b) Vitamin D

**Q. 20. Name a protein which is insoluble in water.**

**Ans.** Keratin.

**Q. 21. Name the deficiency disease resulting from lack of Vitamin 'A' in the diet.**

**Ans.** Night blindness, Xerophthalmia.

**Q. 22. Mention two important functions of carbohydrates in plants.**

**Ans.** Major energy source, storage molecules like starch in plants.

**Q. 23. Name two of the different types of RNA molecules found in cells of organisms.**

**Ans.** tRNA, mRNA, rRNA.

**Q. 24. The deficiency of which vitamin causes the disease pernicious anaemia ?**

**Ans.** Vitamin B<sub>12</sub>.

**Q. 25. Why are carbohydrates generally optically active ?**

**Ans.** Because they contain one or more chiral atom.

**Q. 26. During curdling of milk, what happens to sugar present in it ?**

**Ans.** Lactose changes to lactic acid.

**Q. 27. What are the products of hydrolysis of lactose ?**

**Ans.**  $\beta$ -D-galactose and  $\beta$ -D-glucose.

**Q. 28. The two strands in DNA are not identical but complementary. Explain.**

**Ans.** Base pairing rule is followed; A = T and G ≡ C.

**Q. 29. If one strand of DNA has the sequence 5'-G-G-A-C-T-A-C-T-3', what is the sequence of bases in the complementary strand ?**

**Ans.** 3'-C-C-T-G-A-T-G-A-5'

**Q. 30. What are monosaccharides ?**

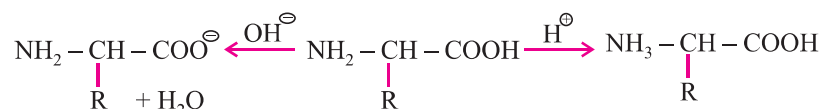
**Ans.** Sugars which cannot be hydrolysed to give simpler units or compounds.

**Q. 31. What is the difference between native protein and denatured protein ?**

**Ans.** Proteins found in a biological system with unique 3D-structure and biological activity is called native protein. When native protein is subjected to physical and chemical change, protein loses its biological activity and is called denatured protein.

**Q. 32. Amino acids are amphoteric in nature. Explain.**

**Ans.** It can react with acid and base both as per the following reaction :



### SHORT ANSWER-I TYPE QUESTIONS (2 Marks)

**Q. 1. Define the following terms in relation to proteins :**

- (i) Peptide linkage      (ii) Denaturation

**Ans. (i) Peptide linkage :** A link between two amino acids with loss of water – CO – NH – peptide linkage.

- (ii) A process that changes the three dimensional structure of native protein is called denaturation of protein. It results into breaking of hydrogen bonds and disulphide linkages. Thus, a completely denatured protein has a shape of random coil.

**Q. 2. List the reactions of glucose which cannot be explained by its open chain structure.**

**Ans. (i)** Despite having the aldehyde group, glucose does not give 2, 4 DNP test or Schiff's test.

- (ii) It does not form hydrogensulphite addition product with  $\text{NaHSO}_3$ .
- (iii) The penta acetate of glucose does not react with hydroxylamine indicating the absence of free  $-\text{CHO}$  group.

**Q. 3. Explain what is meant by :**

(i) **Biocatalyst**

**Ans. (i)** Biocatalysts are the catalysts which increases the rate of metabolism/ biochemical reactions.

**Q. 4. Explain the following terms :**

(i) **Invert sugar**

(ii) **Polypeptides**

**Ans. (i)** An equimolar mixture of glucose and fructose produced on hydrolysis of sucrose is called invert sugar. It is called so because sucrose is dextro rotatory whereas its hydrolysis product is laevo rotatory.

(ii) Polypeptides are polymers of amino acids containing less than 100 amino acids. For example, oxytocin, vasopressin, etc.

**Q. 5. Explain what is meant by :**

(i) **Glycosidic linkage**

**Ans. (i)** The linkage between the monosaccharide units through oxygen is called glycosidic linkage.

**Q. 6. Name the product of hydrolysis of sucrose. Why is sucrose not a reducing sugar ?**

**Ans.** On hydrolysis, sucrose gives equimolar mixture of D-(+)-glucose and D(-)-fructose. Sucrose is not a reducing sugar as glucose and fructose are linked through their reducing centres in structure of sucrose.

**Q. 7. State clearly what are known as nucleotides and nucleosides.**

**Ans.** A nucleoside contain only two basic components of nucleic acids *i.e.*, pentose sugar and nitrogenous base.

A nucleotide contains all the three basic components of nucleic acids *i.e.*, a phosphoric acid group, pentose sugar and nitrogenous base.

**Q. 8. Describe what do you understand by primary structure and secondary structure of proteins.**

**Ans. Primary structure of proteins :** The protein in which amino acids linked with each other in a specific sequence is said to be the primary structure of that protein.

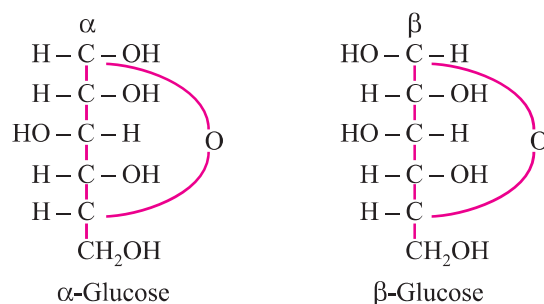
**Secondary structure of proteins :** It refers to the shape in which a long polypeptide chain can exist *i.e.*,  $\alpha$ -helix and  $\beta$ -pleated structure.

**Q. 9. What is essentially the difference between  $\alpha$ -form of glucose and  $\beta$ -form of glucose ? Explain.**

**Ans.**  $\alpha$ -form of glucose and  $\beta$ -form of glucose differ only in the configuration of the hydroxyl group at  $C_1$  in cyclic structure of glucose/hemiacetal form of glucose.

**Q. 10. What are anomers ? Give the structures of two anomers of glucose.**

**Ans.** Monosaccharides which differs in configuration at functional *gp-c*-atom ( $C_1$  and  $C_2$ ), *e.g.*,  $\alpha$ -glucose and  $\beta$ -glucose.



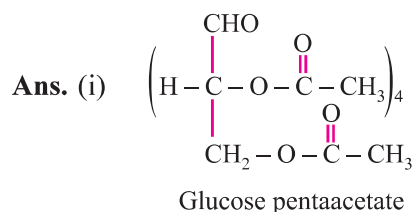
**Q. 11. Write the hydrolysed product of :**

- (i) Maltose                      (ii) Cellulose

**Ans.** (i)  $\alpha$ -D-glucose                      (ii)  $\beta$ -D-glucose

**Q. 12. (i) Acetylation of glucose with acetic anhydride gives glucose penta-acetate. Write the structure of penta acetate.**

(ii) Explain why glucose penta acetate does not react with hydroxylamine ?



(ii) The molecule of glucose penta acetate has a cyclic structure in which  $-\text{CHO}$  is involved in ring formation.

**Q. 14. What are vitamins ? How are they classified ?**

**Ans.** Vitamins are a group of biomolecules (other than carbohydrates, fats and proteins) most of which cannot be produced by body but must be supplied in small amount to perform specific biological functions of the body.

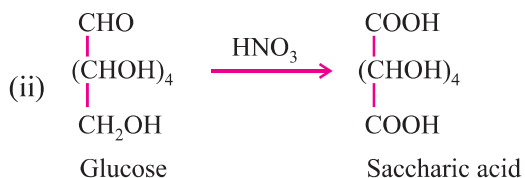
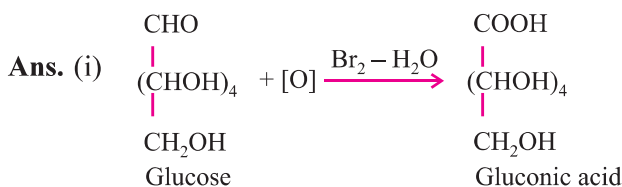
**Types :**

- (i) **Water soluble vitamins :** Vitamin B and C.
- (ii) **Fat soluble vitamins :** Vitamin A, D, E and K.

**Q. 14. Write the products of oxidation of glucose with :**

(i) **Bromine water**

(ii) **Nitric acid**



**Q. 15. State two main differences between globular and fibrous proteins.**

Ans. **Globular protein**

**Fibrous protein**

- |  |   |
|--|---|
| (i) They form a $\alpha$ -helix structure. | (i) They have $\beta$ -pleated structure. |
| (ii) They are water soluble.               | (ii) They are water insoluble.            |

**Q. 16. (i) Name the disease caused by deficiency of vitamin D.**

(ii) **Why cannot vitamin C be stored in our body ?**

Ans. (i) Rickets.

(ii) Vitamin C is a water soluble vitamin which is excreted in urine and cannot be stored in our body.

**Q. 17. Name the constituents of starch and what is the difference between them ?**

Ans. **Amylose :** A linear polymer of  $\alpha$ -glucose, water soluble.

**Amylopectin :** Branched polymer of  $\alpha$ -glucose, water insoluble.

**Q. 18. What are essential and non-essential amino acid ? Give two examples of each type.**

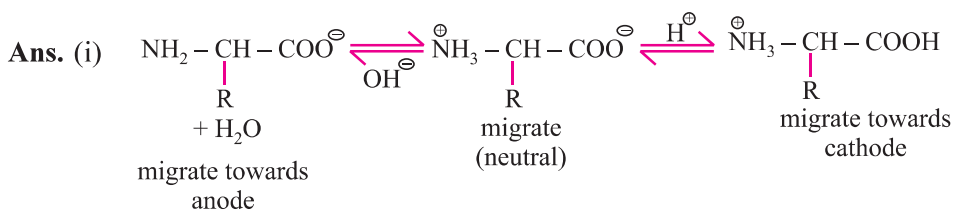
**Ans.** Essential amino acids are those which are not produced in our body and required to be supplied from outside, *e.g.*, valine, leucine.

Non-essential amino acids are those which are produced by our body, *e.g.*, glycine, alanine.

**Q. 19. Give reasons :**

(i) **On electrolysis in acidic solution amino acids migrate towards cathode while in alkaline solution these migrate towards anode.**

(ii) **The monoamino monocarboxylic acids have two  $pK_a$  values.**



(ii) Due to zwitter ion formation.

**Q. 20. Coagulation of egg white on boiling is an example of denaturation of protein. Explain it in terms of structural changes.**

**Ans.** Protein albumin present in egg white gets denatured *i.e.*, 2° & 3° structures are destroyed and 1° structure is retained.

**Q. 21. Describe two important functions of nucleic acids.**

**Ans. (i)** DNA is responsible for transfer of heredity information from one generation to another.

(ii) RNA is responsible for protein synthesis.

### SHORT ANSWER-II TYPE QUESTIONS (3 Marks)

**Q. 1. (i) Deficiency of which vitamin causes scurvy ?**

(ii) **What type of linkage is responsible for the formation of proteins ?**

(iii) **Write the product formed when glucose is treated with HI.**

**Ans. (i)** Vitamin C.

(ii) Peptide linkage.

(iii) n-hexane.



**Q. 2. Differentiate between the following :**

- (i) **Secondary and tertiary structure of protein**
- (ii)  **$\alpha$ -helix and  $\beta$ -pleated sheet structure of protein**
- (iii) **Fibrous and globular protein**

**Ans. (i) Secondary structure** is responsible for the shape of protein  $\alpha$ -helix and  $\beta$ -pleated sheets in which polypeptide chains have peptide bonds.

**Tertiary structure** represents overall folding of polypeptide chain and give rise to the fibrous or globular molecular shape.

(ii)  **$\alpha$ -helix structure :** The peptide chains coiled up to form right handed helix involving H-bonding (Intramolecular).

**$\beta$ -pleated sheets :** The peptide chains lie side by side together by intermolecular hydrogen bonding.

(iii) Same as Q. 16 (Two marks questions)

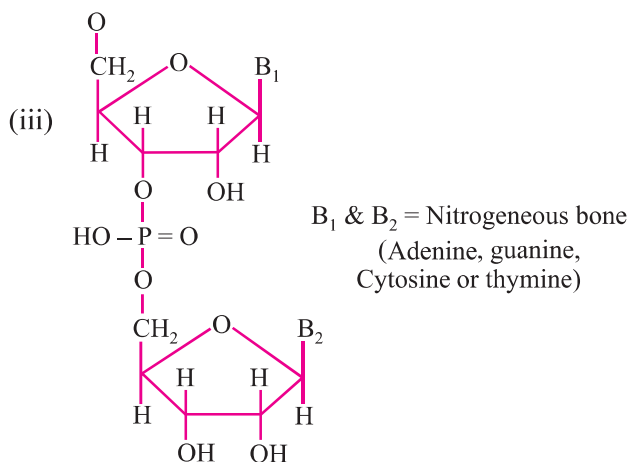
**Q. 3. (i) Name the four bases present in DNA.**

(ii) **Which of them is not present in RNA ?**

(iii) **Give the structure of a nucleotide of DNA.**

**Ans. (i)** Adenine, Guanine, Thymine, Cytosine.

(ii) Thymine.



**Q. 4. Glucose or sucrose are soluble in water but cyclohexane and benzene are insoluble in water. Explain.**

**Ans.** Glucose contain 5 – OH groups and sucrose contain eight – OH groups, because of this they form intermolecular hydrogen bonding, so they are soluble in water. But benzene and cyclohexane doesn't contain – OH groups hence doesn't form intermolecular hydrogen bonding, so they are not soluble in water.

**Q. 5.(i) Fructose contains a keto group but still it reduces Tollen's reagent. Explain.**

**(ii) Give the chemical name and sources of :**

**(a) Vitamin C**

**(b) Vitamin B<sub>1</sub>**