



## INDIAN SCHOOL AL WADI AL KABIR



|                                 |                                                                     |                                 |
|---------------------------------|---------------------------------------------------------------------|---------------------------------|
| <b>Class: XII</b>               | <b>DEPARTMENT: SCIENCE (2024-2025)</b><br><b>SUBJECT: CHEMISTRY</b> | <b>DATE: 20/08/2024</b>         |
| <b>WORKSHEET NO: 5</b>          | <b>TOPIC: BIOMOLECULES</b>                                          | <b>NOTE: A4 FILE<br/>FORMAT</b> |
| <b>NAME OF THE<br/>STUDENT:</b> | <b>CLASS &amp; SEC:</b>                                             | <b>ROLL NO.</b>                 |

### MULTIPLE CHOICE QUESTIONS

1. The vitamins which are stored in our body are

- (a) Vitamin A, B, D and E
- (b) Vitamin A, C, D and K
- (c) Vitamin A, B, C and D
- (d) Vitamin A, D, E and K

2. DNA and RNA differ in

- (a) sugar
- (b) purines
- (c) pyrimidines
- (d) both (a) and (c)

3. Proteins are found to have two different types of secondary structures:  $\alpha$  helix and  $\beta$  pleated structure.  $\alpha$  helix structure of proteins is stabilised by

- (a) peptide bonds.
- (b) van der Waals forces
- (c) hydrogen bonds
- (d) dipole dipole interaction

4. Amino acids are \_\_\_\_\_

- (a) acidic
- (b) basic
- (c) neutral
- (d) amphoteric

5. Two among the three components of DNA are 2-Deoxyribose and a Nitrogen containing heterocyclic base. The third component is

- (a) D-Ribose
- (b) Thymine
- (c) Guanine
- (d) Phosphoric acid

6. An  $\alpha$ -helix is a structural feature of

- (a) Sucrose
- (b) Polypeptides
- (c) Nucleotides
- (d) Starch

7. Hydrolysis of sugar is called

- (a) Inversion
- (b) Hydration
- (c) Saponification
- (d) Esterification

8. Which of the following is a non-reducing sugar?

- (a) Fructose
- (b) Sucrose
- (c) Maltose
- (d) Lactose

9. Which of the following is not true about amino acids?

- (a) They are constituents of all proteins
- (b) Alanine has one amino and one carboxylic group
- (c) Most naturally occurring amino acids have D-configuration
- (d) Glycine is the only naturally occurring amino acid which is optically inactive.

10. Globular proteins are present in

- (a) blood
- (b) eggs
- (c) milk
- (d) all of these

### **ASSERTION REASON TYPE**

11. **Assertion(A):** Glucose and fructose are reducing sugars.

**Reason(R):** Glucose and fructose contain a free aldehydic and ketonic group adjacent to a -CHOH group respectively.

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

12. **Assertion(A):** Enzymes are very specific for a particular reaction and for a particular substrate.  
**Reason(R):** Enzymes are biocatalysts.  
(a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.  
(b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.  
(c) Assertion is correct, but reason is wrong statement.  
(d) Assertion is wrong, but reason is correct statement.
13. **Assertion(A):** The two strands of DNA are complementary to each other.  
**Reason(R):** The hydrogen bonds are formed between specific pairs of bases.  
(a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.  
(b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.  
(c) Assertion is correct, but reason is wrong statement.  
(d) Assertion is wrong, but reason is correct statement.
14. **Assertion(A):** Glucose gives a reddish-brown precipitate with Fehling's solution.  
**Reason(R):** Reaction of glucose with Fehling's solution gives CuO and gluconic acid  
(a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.  
(b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.  
(c) Assertion is correct, but reason is wrong statement.  
(d) Assertion is wrong, but reason is correct statement
15. **Assertion(A):**  $\beta$  glycosidic linkage is present in maltose.  
**Reason(R):** Maltose is composed of two glucose units in which C1 of one glucose unit is linked to C4 of another unit.  
(a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.  
(b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.  
(c) Assertion is correct, but reason is wrong statement.  
(d) Assertion is wrong, but reason is correct statement

### VERY SHORT ANSWER TYPE (2M)

16. (a) DNA fingerprinting is used to determine paternity of an individual. Which property of DNA helps in the procedure?  
(b) What structural change will occur when a native protein is subjected to change in pH?
17. Name two water soluble vitamins, their sources and the diseases caused due to their deficiency in diet.
18. How are hormones and vitamins different in respect of their source and functions?

19. (a) Which polysaccharide component of carbohydrate is present in bread?  
(b) What type of linkage is present in Nucleic acids?
20. Write chemical reactions to show the presence of  
(a) straight chain  
(b) aldehyde functional group in Glucose.

### SHORT ANSWER TYPE (3M)

21. Amino acids may be acidic, basic or neutral. How does this happen? What are essential and non-essential amino acids. Name one of each type.
22. (a) Give the structural difference between amylose and amylopectin.  
(b) Name the protein and its shape present in oxygen carrier in human body.  
(c) Name two fat storing tissues in human body.
23. Define the following as related to proteins.  
(a) Peptide linkage  
(b) Primary structure  
(c) Denaturation
24. Explain the following  
(a) Amino acids behave like salts rather than simple amines or carboxylic acids.  
(b) The two strands of DNA are complementary to each other.  
(c) Reaction of glucose that indicates the presence of five -OH groups.
25. Define the following terms.  
(a) Invert sugar  
(b) Oligosaccharides  
(c) Nucleoside

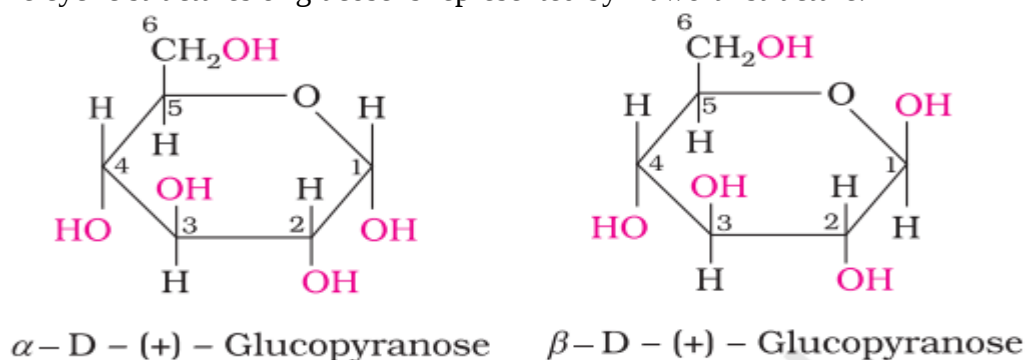
### LONG ANSWER TYPE (5M)

26. (a) Which among the following is a disaccharide?  
**Glucose, Fructose, Starch, Maltose**  
(b) What is the difference between fibrous and globular proteins?  
(c) Write the name of the vitamin whose deficiency causes bone deformities in children.  
(d) Draw the pyranose ring structure of  $\alpha$ -D-Glucose  
(e) Write the names of two monosaccharides obtained on hydrolysis of lactose sugar.

### PASSAGE BASED QUESTION (4M)

27. Pentose and hexose undergo intramolecular hemiacetal or hemiketal formation due to the combination of the -OH group with the carbonyl group. The actual structure is either of five or six membered ring containing an oxygen atom. In the free state, all pentoses and hexoses exist in pyranose form (resembling pyran) However

in the uncombined state, some of them exist as five membered cyclic structures called furanose (resembling furan) The cyclic structures of glucose is represented by Haworth structure.



$\alpha$  and  $\beta$ -D-Glucose have different configuration at anomeric C-1 carbon atom, hence are called anomers and the C-1 carbon atom is called anomeric carbon (glycosidic carbon). The six membered cyclic structure of glucose is called pyranose structure.

- (a) What is meant by anomers of glucose?
- (b) Name the two functional groups present in a typical carbohydrate.
- (c) How are the  $\alpha$  and  $\beta$  forms of glucose different from each other?

**OR**

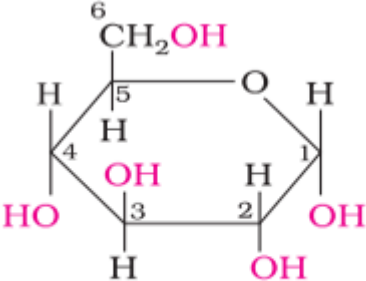
- (c) Give any two properties of glucose that cannot be explained the open structure.

ANSWERS/HINTS

| S. No | Answers                                                                                                       |
|-------|---------------------------------------------------------------------------------------------------------------|
| 1     | (d) Vitamin A, D, E and K                                                                                     |
| 2     | (d) both (a) and (c)                                                                                          |
| 3     | (c) hydrogen bonds                                                                                            |
| 4     | (d) amphoteric                                                                                                |
| 5     | (d) Phosphoric acid                                                                                           |
| 6     | (b) Polypeptides                                                                                              |
| 7     | (a) Inversion                                                                                                 |
| 8     | (b) Sucrose                                                                                                   |
| 9     | (c) Most naturally occurring amino acids have D-configuration                                                 |
| 10    | (d) all of these                                                                                              |
| 11    | (a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion. |

| 12                        | (b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                            |         |                     |                         |                                |                                                                                                            |                           |                                                |                        |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|---------|---------------------|-------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------|---------------------------|------------------------------------------------|------------------------|
| 13                        | (a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                            |         |                     |                         |                                |                                                                                                            |                           |                                                |                        |
| 14                        | (c) Assertion is correct, but reason is wrong statement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                            |         |                     |                         |                                |                                                                                                            |                           |                                                |                        |
| 15                        | (d) Assertion is wrong, but reason is correct statement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                            |         |                     |                         |                                |                                                                                                            |                           |                                                |                        |
| 16                        | (a) A sequence of bases on DNA is unique for a person and it's the genetic material transferred from the parent which helps in the determination of paternity.<br>(b) During denaturation, the hydrogen bonds are disturbed. Due to this, globules unfold and helix get uncoiled and protein loses its biological activity. The primary sequence remains intact.                                                                                                                                                                                                                                                                                                                                                          |                                                                                                            |         |                     |                         |                                |                                                                                                            |                           |                                                |                        |
| 17                        | <table><tr><th>Vitamins</th><th>Sources</th><th>Deficiency diseases</th></tr><tr><td>Vitamin B2 (Riboflavin)</td><td>Milk, egg white, liver, kidney</td><td>Cheilosis (fissuring at corners of mouth and lips), digestive disorders and burning sensation of the skin.</td></tr><tr><td>Vitamin C (Ascorbic acid)</td><td>Citrus fruits, amla and green leafy vegetables</td><td>Scurvy (bleeding gums)</td></tr></table>                                                                                                                                                                                                                                                                                                 | Vitamins                                                                                                   | Sources | Deficiency diseases | Vitamin B2 (Riboflavin) | Milk, egg white, liver, kidney | Cheilosis (fissuring at corners of mouth and lips), digestive disorders and burning sensation of the skin. | Vitamin C (Ascorbic acid) | Citrus fruits, amla and green leafy vegetables | Scurvy (bleeding gums) |
| Vitamins                  | Sources                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Deficiency diseases                                                                                        |         |                     |                         |                                |                                                                                                            |                           |                                                |                        |
| Vitamin B2 (Riboflavin)   | Milk, egg white, liver, kidney                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Cheilosis (fissuring at corners of mouth and lips), digestive disorders and burning sensation of the skin. |         |                     |                         |                                |                                                                                                            |                           |                                                |                        |
| Vitamin C (Ascorbic acid) | Citrus fruits, amla and green leafy vegetables                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Scurvy (bleeding gums)                                                                                     |         |                     |                         |                                |                                                                                                            |                           |                                                |                        |
| 18                        | Hormones are synthesised in the body and help in regulation of our body systems. They help to maintain the balance of biological activities in the body. Eg Glucagon<br>Vitamins are organic compounds required in the diet in small amounts to perform specific biological functions for normal maintenance of optimum growth and health of the organism.eg Vitamin C. They are synthesised in the laboratories or can be obtained through diet.                                                                                                                                                                                                                                                                         |                                                                                                            |         |                     |                         |                                |                                                                                                            |                           |                                                |                        |
| 19                        | (a) Starch<br>(b) Phosphodiester linkage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                            |         |                     |                         |                                |                                                                                                            |                           |                                                |                        |
| 20                        | (a) Reaction with HI.<br><div><div><div>CHO</div><div> </div><div>(CHOH)<sub>4</sub></div><div> </div><div>CH<sub>2</sub>OH</div></div><div><math>\xrightarrow{\text{HI, } \Delta}</math></div><div><div>CH<sub>3</sub>-CH<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>-CH<sub>3</sub></div><div>(n-Hexane)</div></div></div><br>(b) Reaction with Br <sub>2</sub> water.<br><div><div><div>CHO</div><div> </div><div>(CHOH)<sub>4</sub></div><div> </div><div>CH<sub>2</sub>OH</div></div><div><math>\xrightarrow{\text{Br}_2 \text{ water}}</math></div><div><div><div>COOH</div><div> </div><div>(CHOH)<sub>4</sub></div><div> </div><div>CH<sub>2</sub>OH</div></div><div>Gluconic acid</div></div></div> |                                                                                                            |         |                     |                         |                                |                                                                                                            |                           |                                                |                        |
| 21                        | Acidic amino acids- Those amino acids which contain more -COOH groups than NH <sub>2</sub> group.eg Aspartic acid<br>Basic amino acids- Those amino acids which contain more NH <sub>2</sub> groups than -COOH group<br>Eg Lysine                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                            |         |                     |                         |                                |                                                                                                            |                           |                                                |                        |

|                                                                      | <p>Neutral amino acids- Those amino acids which contain same number of COOH group and NH<sub>2</sub> group. Eg Alanine</p> <p>Non-Essential amino acids- The amino acids, which can be synthesised in the body, are known as non-essential amino acids. Eg-Alanine</p> <p>Essential amino acids- Those amino acids which cannot be synthesised in the body and must be obtained through diet, are known as essential amino acids. Eg Leucine</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |         |             |               |                 |                                         |                                             |                       |                |                                                                      |                                                                                |
|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------|---------------|-----------------|-----------------------------------------|---------------------------------------------|-----------------------|----------------|----------------------------------------------------------------------|--------------------------------------------------------------------------------|
| 22                                                                   | <p>(a)</p> <table border="1"> <thead> <tr> <th>AMYLOSE</th><th>AMYLOPECTIN</th></tr> </thead> <tbody> <tr> <td>Water soluble</td><td>Water insoluble</td></tr> <tr> <td>15-20% of starch is made up of Amylose.</td><td>80-85% of starch is made up of Amylopectin.</td></tr> <tr> <td>Long unbranched chain</td><td>Branched chain</td></tr> <tr> <td><math>\alpha</math>-D-Glucose units held together by C1-C4 glycosidic linkage.</td><td><math>\alpha</math>-D-Glucose units held together by C1-C4 and C1-C6 glycosidic linkage.</td></tr> </tbody> </table> <p>(b) Globular protein, spherical</p> <p>(c) Liver and adipose tissue.</p>                                                                                                                                                                                                                                                                                                                                                                                                                           | AMYLOSE | AMYLOPECTIN | Water soluble | Water insoluble | 15-20% of starch is made up of Amylose. | 80-85% of starch is made up of Amylopectin. | Long unbranched chain | Branched chain | $\alpha$ -D-Glucose units held together by C1-C4 glycosidic linkage. | $\alpha$ -D-Glucose units held together by C1-C4 and C1-C6 glycosidic linkage. |
| AMYLOSE                                                              | AMYLOPECTIN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         |             |               |                 |                                         |                                             |                       |                |                                                                      |                                                                                |
| Water soluble                                                        | Water insoluble                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |         |             |               |                 |                                         |                                             |                       |                |                                                                      |                                                                                |
| 15-20% of starch is made up of Amylose.                              | 80-85% of starch is made up of Amylopectin.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         |             |               |                 |                                         |                                             |                       |                |                                                                      |                                                                                |
| Long unbranched chain                                                | Branched chain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |         |             |               |                 |                                         |                                             |                       |                |                                                                      |                                                                                |
| $\alpha$ -D-Glucose units held together by C1-C4 glycosidic linkage. | $\alpha$ -D-Glucose units held together by C1-C4 and C1-C6 glycosidic linkage.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |         |             |               |                 |                                         |                                             |                       |                |                                                                      |                                                                                |
| 23                                                                   | <p>(a) The amide linkage formed between NH<sub>2</sub> group of one amino acid and COOH group of the other amino acid by loss of a water molecule.</p> <p>(b) The sequence of amino acids in a polypeptide of a particular protein.</p> <p>(c) When a protein in its native form, is subjected to physical change like change in temperature or chemical change like change in pH, the hydrogen bonds are disturbed. Due to this, globules unfold and helix get uncoiled and protein loses its biological activity. This is called denaturation of proteins. Eg curdling of milk</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |         |             |               |                 |                                         |                                             |                       |                |                                                                      |                                                                                |
| 24                                                                   | <p>(a) In aqueous solution, the carboxyl group can lose a proton and amino group can accept a proton, giving rise to a dipolar ion known as zwitter ion. In zwitter ionic form, amino acids show amphoteric behaviour as they react both with acids and bases.</p> <p>(b) The two strands of DNA have bases which are paired with one another by H bonds. Adenine pairs with Thymine through two hydrogen bonds. Guanine pairs with Cytosine through three H bonds. The sequence of bases on one strand determines the sequence of bases on the other.</p> <p>(c) Acetylation of glucose with acetic anhydride gives glucose pentaacetate which confirms the presence of five –OH groups.</p> $  \begin{array}{ccc}  \begin{array}{c} \text{CHO} \\   \\ (\text{CHOH})_4 \\   \\ \text{CH}_2\text{OH} \end{array} & \xrightarrow{\text{Acetic anhydride}} & \begin{array}{c} \text{CHO} \quad \text{O} \\   \quad \parallel \\ (\text{CH}-\text{O}-\text{C}-\text{CH}_3)_4 \\   \quad \parallel \\ \text{CH}_2-\text{O}-\text{C}-\text{CH}_3 \end{array}  \end{array}  $ |         |             |               |                 |                                         |                                             |                       |                |                                                                      |                                                                                |
| 25                                                                   | <p>(a) Invert sugar - Sucrose is dextrorotatory but after hydrolysis gives dextrorotatory glucose and laevorotatory fructose. Since the laevorotation of fructose (–92.4°) is more than dextrorotation of</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |             |               |                 |                                         |                                             |                       |                |                                                                      |                                                                                |

|                                                                                                                                   | <p>glucose (+ 52.5°), the mixture is laevorotatory. Thus, hydrolysis of sucrose brings about a change in the sign of rotation, from dextro (+) to laevo (–) and the product is named as invert sugar.</p> <p>(b) Oligosaccharide- : Carbohydrates that yield two to ten monosaccharide units, on hydrolysis, are called oligosaccharides.</p> <p>(c) Nucleoside-A unit formed by the attachment of a base to 1' position of sugar is known as nucleoside.</p>                                                                                                                                                                                                                                                                                                                                                                                                                |                 |                  |                                                                                                                                   |                                                                   |                              |                             |                                                                                 |                      |
|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|------------------------------|-----------------------------|---------------------------------------------------------------------------------|----------------------|
| 26                                                                                                                                | <p>(a) Maltose</p> <p>(b)</p> <table border="1"> <tr> <th>Fibrous protein</th><th>Globular protein</th></tr> <tr> <td>The polypeptide chains run parallel and are held together by hydrogen and disulphide bonds, then fibre– like structure is formed.</td><td>The chains of polypeptides coil around to give a spherical shape.</td></tr> <tr> <td>Generally insoluble in water</td><td>Generally soluble in water.</td></tr> <tr> <td>Examples- Keratin (present in hair, wool, silk) and myosin (present in muscles)</td><td>Insulin and albumins</td></tr> </table> <p>(c) Vitamin D</p> <p>(d)</p> <div style="text-align: center;">  <p><math>\alpha - D - (+) - \text{Glucopyranose}</math></p> </div> <p>(e) <math>\beta</math>-D-Galactose and <math>\beta</math>-D-Glucose</p> | Fibrous protein | Globular protein | The polypeptide chains run parallel and are held together by hydrogen and disulphide bonds, then fibre– like structure is formed. | The chains of polypeptides coil around to give a spherical shape. | Generally insoluble in water | Generally soluble in water. | Examples- Keratin (present in hair, wool, silk) and myosin (present in muscles) | Insulin and albumins |
| Fibrous protein                                                                                                                   | Globular protein                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |                  |                                                                                                                                   |                                                                   |                              |                             |                                                                                 |                      |
| The polypeptide chains run parallel and are held together by hydrogen and disulphide bonds, then fibre– like structure is formed. | The chains of polypeptides coil around to give a spherical shape.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                 |                  |                                                                                                                                   |                                                                   |                              |                             |                                                                                 |                      |
| Generally insoluble in water                                                                                                      | Generally soluble in water.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |                  |                                                                                                                                   |                                                                   |                              |                             |                                                                                 |                      |
| Examples- Keratin (present in hair, wool, silk) and myosin (present in muscles)                                                   | Insulin and albumins                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |                  |                                                                                                                                   |                                                                   |                              |                             |                                                                                 |                      |
| 27                                                                                                                                | <p>(a) The forms of glucose which differ in the configuration of only C1 position.</p> <p>(b) Aldehyde and ketone functional groups.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 |                  |                                                                                                                                   |                                                                   |                              |                             |                                                                                 |                      |

(c) The  $\alpha$ -form of glucose (m.p. 419 K) is obtained by crystallisation from concentrated solution of glucose at 303 K while the  $\beta$ -form (m.p. 423 K) is obtained by crystallisation from hot and saturated aqueous solution at 371 K. They differ in the configuration at C1 position.

**OR**

(c)

(i) Glucose does not form  $\text{NaHSO}_3$  addition product. Despite having aldehyde group, it does not give 2,4-DNP and does not respond to Schiff's reagent test.

(ii) Glucose pentaacetate does not react with  $\text{NH}_2\text{OH}$  due to the absence of aldehyde group.

*Prepared by:*

*Ms Jasmin Joseph*