INDIAN SCHOOL AL WADI AL KABIR		
Class: XII	**Department: SCIENCE 2023-24** **SUBJECT : CHEMISTRY**	**Date: 04.09.2023**
Worksheet NO. 6 **WITH ANSWERS**	CHAPTER : BIOMOLECULES	**Note: A4 FILE FORMAT**
NAME OF THE STUDENT:	**CLASS & SEC:**	**ROLL NO.**

I. MULTIPLE CHOICE QUESTIONS (1 MARK)

1. Which of the following is not a monosaccharide?
(a) Glucose
(b) Sucrose
(c) Fructose
(d) Ribose

2. Which of the following is the basic structural unit of starch?
(a) Glucose
(b) Fructose
(c) Maltose
(d) Lactose

3. Which of the following is not a protein?
(a) Insulin
(b) DNA
(c) Keratin
(d) Haemoglobin

4. Which of the following is the basic structural unit of proteins?
(a) Amino acids
(b) Nucleotides
(c) Monosaccharides
(d) Fatty acids

5. Which of the following is a nucleic acid?
(a) DNA
(b) RNA
(c) Both DNA and RNA
(d) None of the above

6. Which of the following is the sugar component of DNA?
(a) Glucose
(b) Fructose
(c) Ribose
(d) Deoxyribose

7. Which of the following is the nitrogenous base that is unique to DNA?
(a) Adenine
(b) Guanine
(c) Cytosine
(d) Thymine

II. ASSERTION REASON TYPE QUESTIONS (I MARK)

For the following questions, two statements are given- one labelled *Assertion* (A) and theother labelled *Reason* (R). Select the correct answer to these questions from the codes (i),(ii), (iii) and (iv) as given below

(i) Both A and R are true and R is the correct explanation of the assertion.
(ii) Both A and R are true but R is not the correct explanation of the assertion.
(iii)A is true but R is false.
(iv)A is false but R is true.

11. Assertion: Amino acids are essential for humans.
Reason: Amino acids are the building blocks of proteins, and proteins are essential for many biological functions, including growth, development, and repair.

12. Assertion: Enzymes are specific in their action.
Reason: Enzymes have an active site that binds to the specific substrate.

13. Assertion: Enzymes are biological catalysts.
Reason: Enzymes are proteins that speed up chemical reactions in the body.

III. 2 MARKS QUESTIONS

14 What are the different types of carbohydrates based on hydrolysis products?
15. Explain the difference between starch and cellulose in terms of their structure and function.
16 What is the difference between a nucleoside and a nucleotide?
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1V 3 MARKS QUESTIONS

17. Explain the importance of enzymes in biological systems.
18. Distinguish between DNA and RNA on the basis of their structure and function.
19. When sucrose is hydrolysed the optical rotation values are measured using a polarimeter and

are given in the following table:

S.No.	Time (hours)	Specific Rotation
1	0	+ 66.5°
2	∞	-39.9°

(a) Account for the two specific rotation values.
(b) What is the specific name given to sucrose based on the above observation?
(c) One of the products formed during the hydrolysis of sucrose is a glucose, that reacts with hydroxylamine to give compound A. Identify compound A.

V 5 MARKS QUESTIONS

20. Describe the structure of a protein in detail.
21. Explain the following:
    (i) Maltose is a reducing sugar.
    (ii) Sucrose is a non-reducing sugar.
    (iii) Write the Zwitterionic form of glycine.
    (iv) Name the enzyme that catalyses the hydrolysis of maltose into glucose.
    (v) How is the classification of Nucleic acids done?

22. (i) Write the difference between
    (a) fibrous protein and globular protein.
    (b) α-helix and β-pleated sheet structures of protein
    (ii) Give one example of each of the following:
        (a) Essential amino acid
        (b) Non-essential amino acid
        (c) Fat-soluble vitamin
        (d) Water-soluble vitamin

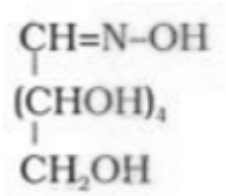
VI PASSAGE BASED /CASE STUDY BASED QUESTIONS

23. When a protein in its native form is subjected to physical changes like change in temperature or chemical changes 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 protein. The denaturation causes change in secondary and tertiary structures but primary structures remains intact. Examples of denaturation of protein are coagulation of egg white on boiling, curding of milk, formation of cheese when an acid is added to milk.

(i) Name one example of a denaturing agent.
(ii) What is denaturation of protein?
(iii) What is the difference between native protein and denatured protein?

(iv) Why is it advised to avoid cooking protein rich food at high temperatures?

Q. No.	ANSWERS
1.	(b) Sucrose
2.	(a) Glucose
3.	(b) DNA
4.	(a) Amino acids
5.	(c) Both DNA and RNA
6.	(d) deoxyribose
7.	(d) Thymine
8.	(a)
9.	(b)
10.	(d)
11.	(a)
12.	(a)
13.	(a)
14.	There are three main types of carbohydrates: monosaccharides, disaccharides, and polysaccharides. Monosaccharides are the simplest carbohydrates and cannot be broken down into smaller molecules. Disaccharides are made up of two monosaccharides joined together. Polysaccharides are made up of many monosaccharides joined together.
15.	Starch and cellulose are both carbohydrates, but they have different structures and functions. Starch is a polymer of ά D glucose molecules that is found in plants. It is used for energy storage. Cellulose is also a polymer of β D glucose molecules, Cellulose is found in plant cell walls. It provides structural support for plants.
16.	A nucleoside is a molecule made up of a sugar molecule and a nitrogenous base. A nucleotide is a molecule made up of a nucleoside and a phosphate group. The main difference between nucleosides and nucleotides is that nucleotides have a phosphate group attached to the sugar molecule.
17.	Enzymes are biological catalysts that speed up chemical reactions in the body. They are essential for many biological processes, such as digestion, metabolism, and cell signalling. Enzymes work by lowering the activation energy of a reaction, which makes it happen faster. This allows the body to function efficiently and effectively.
18.	DNA and RNA are both nucleic acids, but they have different structures and functions. DNA is the genetic material of all living cells. It is a double-stranded molecule that contains the instructions for making proteins. RNA is a single-stranded molecule that is involved in the translation of the genetic information

	in DNA into proteins.
19.	(a) The reactant Sucrose is dextrorotatory. On hydrolysis it gives glucose dextrorotatory and fructose which is levorotatory. The specific rotation of fructose is higher than glucose Sucrose is dextrorotatory but after hydrolysis gives dextrorotatory glucose and levorotatory fructose. Since the levorotation of fructose (–92.4°) is more than dextrorotation of glucose (+ 52.5°), the mixture is levorotatory. (b) Invert sugar, the hydrolysis of sucrose brings about a change in the sign of rotation, from dextro (+) to laevo (–) and the product is named as invert sugar (c) 
20.	The structure of proteins can be divided into four levels: Primary structure: The primary structure of a protein is the sequence of amino acids in the polypeptide chain. The primary structure of a protein determines its overall shape and function. Secondary structure: The secondary structure of a protein is the folding of the polypeptide chain into alpha helices and beta sheets. Alpha helices are coils of amino acids, while beta sheets are flat sheets of amino acids. The secondary structure of a protein is determined by the amino acids in the primary structure and the forces of attraction between them. Tertiary structure: The tertiary structure of a protein is the overall folding of the polypeptide chain into its final shape. The tertiary structure of a protein is determined by the secondary structure, the amino acids in the primary structure, and the forces of attraction between them. Quaternary structure: The quaternary structure of a protein is the association of two or more polypeptide chains into a complex structure. The quaternary structure of a protein is determined by the tertiary structure of the individual polypeptide chains and the forces of attraction between them.
21.	(i) Maltose is a disaccharide formed from two glucose units by joining the C1 and C4 of glucose units. As the CHO group of one Glucose is free Maltose is reducing. (ii) Sucrose is formed by joining C1 of ά D Glucose and C2 of βD Fructose. As the C1 group of Glucose is used in linking and not free its reducing nature is lost. (iii) $^{+}H_3NCH_2COO^{-}$ (iv) Maltase (v) Nucleic acids are classified into two main types: deoxyribonucleic acid (DNA) and ribonucleic

acid (RNA). The difference between the two is the sugar molecule they contain. DNA contains deoxyribose, while RNA contains ribose.

22. (i) (a) Fibrous proteins are long, thread-like molecules that are typically insoluble in water. They are often found in structural tissues, such as tendons, ligaments, and hair
e.g. Keratin Myosin
Globular proteins are round or spherical molecules that are typically soluble in water
e.g. Enzymes Insulin
(b)

Feature	**Alpha helix**	**Beta pleated sheet**
Shape	Right-handed coil	Extended, sheet-like
Number of amino acids	3.6 amino acids per turn	3-10 amino acids per strand
Hydrogen bonding	Intramolecular hydrogen bonding	Intermolecular hydrogen bonding
Stability	More stable	Less stable
Examples	Keratin, myosin, hemoglobin	Collagen, fibroin, immunoglobulins

(ii) (a) Leucine
(b) Alanine
(c) Vitamin A
(d) Vitamin B

23. (i) pH or temperature
(ii) Denaturation is the process in which a protein loses its native structure and function. This can be caused by a variety of factors, including heat, pH changes, and the presence of chemicals
(iii) The main difference between native proteins and denatured proteins is their structure. Native proteins have a specific three-dimensional structure that is essential for their function. Denatured proteins, on the other hand, have lost their three-dimensional structure and are unable to function properly.
(iv) It is advised to avoid cooking protein-rich food at high temperatures because it can cause the proteins to denature. Denatured proteins lose their natural structure and shape, which can make them less digestible and less nutritious.

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