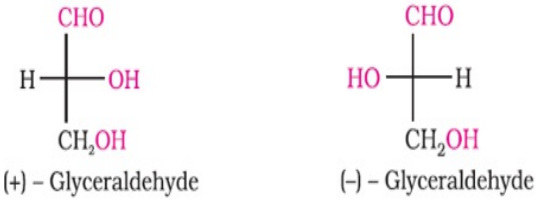
CBSE Test Paper-02

Class - 12 Chemistry (Biomolecules)

1. Zwitter ionic form of amino acids behave like
   a. cation
   b. anion
   c. dipolar ion
   d. non – polar molecule
2. Choose the appropriate answer(s) for the below representation from the options given



   a. Stereo isomers
   b. Dextro and laevo rotatory molecules
   c. Enantiomers
   d. All of these
3. ATP is
   a. Adrnosine
   b. Nucleoside
   c. Nucleotide
   d. Cytosine
4. Commercially glucose is obtained by
   a. hydrolysis of sucrose
   b. boiling sucrose with dilute HCl or H_2SO_4 in alcoholic solution
   c. hydrolysis of starch by boiling it with dilute H_2SO_4 at 393 K under pressure.
   d. crushing ripe grapes
5. Reducing sugars are
   a. all monosaccharides
   b. All of these
   c. those carbohydrates which reduce Tollen's reagent
   d. those carbohydrates which reduce Fehling’s solution

6. Name the purines present in DNA.
7. Name different bases present in (i) DNA (ii) RNA
8. Deficiency of which vitamin causes night-blindness.
9. Glucose or sucrose are soluble in water but cyclohexane or benzene (simple six membered ring compounds) are insoluble in water. Explain.
10. When is a protein said to be denatured?
11. What do you understand by secondary structure of proteins?
12. Enumerate the reactions of D-glucose which cannot be explained by its open chain structure.
13. Give a diagrammatic representation of protein structure (two subunits of two types in quaternary structure).
14. How are harmones and vitamins different in respect of their sources and functions?
15. How do you explain the absence of aldehyde group in the pentaacetate of D-glucose?

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Solutions

1. (c) dipolar ion

   Explanation: Amino acids behave like salts rather than simple amines or carboxylic acids. This behaviour is due to the presence of both acidic (carboxyl group) and basic (amino group) groups in the same molecule. 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. This is neutral but contains both positive and negative charges.
2. (d) All of these

   Explanation: Glyceraldehyde has one chiral centre (the asymmetric C) and has two enantiomers as we can see they are mirror images of each other. Stereoisomers of a compound are those isomers of the compound which have same molecular formula but different spatial arrangements of their atoms in space. So these compounds are stereoisomers. These compounds are dextrorotatory (+) isomer and laevorotatory (-) isomers as one rotates the path of light in right direction whereas the other rotates in left direction.
3. (c) Nucleotide

   Explanation: When nucleoside is linked to phosphoric acid at 5'-position of sugar moiety, we get a nucleotide. ATP (Adenosine triphosphate) is nucleotide of adenosine with 3 phosphoric acid molecules.
4. (c) hydrolysis of starch by boiling it with dilute H_2SO_4 at 393 K under pressure.

   Explanation: Commercially glucose is obtained by hydrolysis of starch by boiling it with dilute H_2SO_4 at 393 K under pressure (2-3 atm).

   $(C_6H_{10}O_5)_n + nH_2O \rightarrow nC_6H_{12}O_6$
5. (b) All of these

   Explanation: All those carbohydrates which reduce Fehling's solution and Tollens' reagent are referred to as reducing sugars. All monosaccharides whether aldose or ketose are reducing sugars.

6. Adenine and Guanine.

7. Bases present in DNA - Thyamine (T), Adenine (A), Guanine (G), Cytosin (C) and in RNA are uracil (U), Adenine (A), Cytosine (C) and Guanine (G).

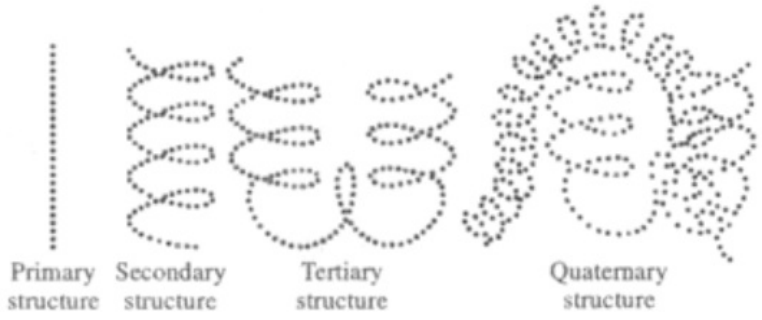
8. Vitamin A

9. A glucose molecule contains five -OH groups while a sucrose molecule contains eight -OH groups. Thus, glucose and sucrose undergo extensive H-bonding with water. Hence, these are soluble in water.
   But cyclohexane and benzene do not contain -OH groups. Hence, they cannot undergo H-bonding with water and as a result, are insoluble in water.

10. When 2° and 3° structure of protein is destroyed by changing pH or in temperature protein is said to be denatured.

11. The secondary structure of protein refers to the shape in which a long polypeptide chain can exist arising due to regular folding of the backbone of poly peptide chain due to hydrogen bonding between > C = O and - N –H group of poly peptide chain.

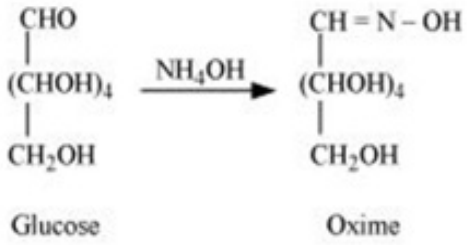
12. (1) Aldehydes give 2, 4-DNP test, Schiff's test, and react with $NaHSO_4$ to form the hydrogen sulphite addition product. However, glucose does not undergo these reactions.
    (2) The pentaacetate of glucose does not react with hydroxylamine. This indicates that a free -CHO group is absent from glucose.
    (3) Glucose exists in two crystalline forms -$\propto and \beta$. The form (m.p. = 419 K) crystallises from a concentrated solution of glucose at 303 K and the β form (m.p = 423 K) crystallises from a hot and saturated aqueous solution at 371 K. This behavior cannot be explained by the open chain structure of glucose.

13. 

14. Hormones are secreted by endocrine glands I.e. ductless glands. They have specific

biological function. They are responsible for growth and development and various metabolic activities of living organisms. There is no external source of hormones except biological. Vitamins are complex compounds obtained from fruits and vegetables. They can't be synthesised inside the body.

15. D-glucose reacts with hydroxylamine NH_2OH to form an oxime because of the presence of aldehydic (-CHO) group or carbonyl carbon. This happens as the cyclic structure of glucose forms an open chain structure in an aqueous medium, which then reacts with NH_2OH to give an oxime.



But pentaacetate of D-glucose does not react with NH_2OH. This is because pentaacetate does not form an open chain structure.