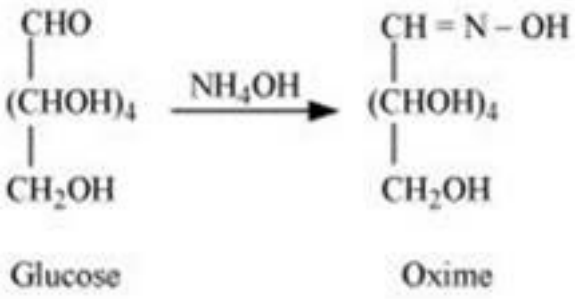
CBSE Class 12 physics
Important Questions
Chapter 14
Biomolecules

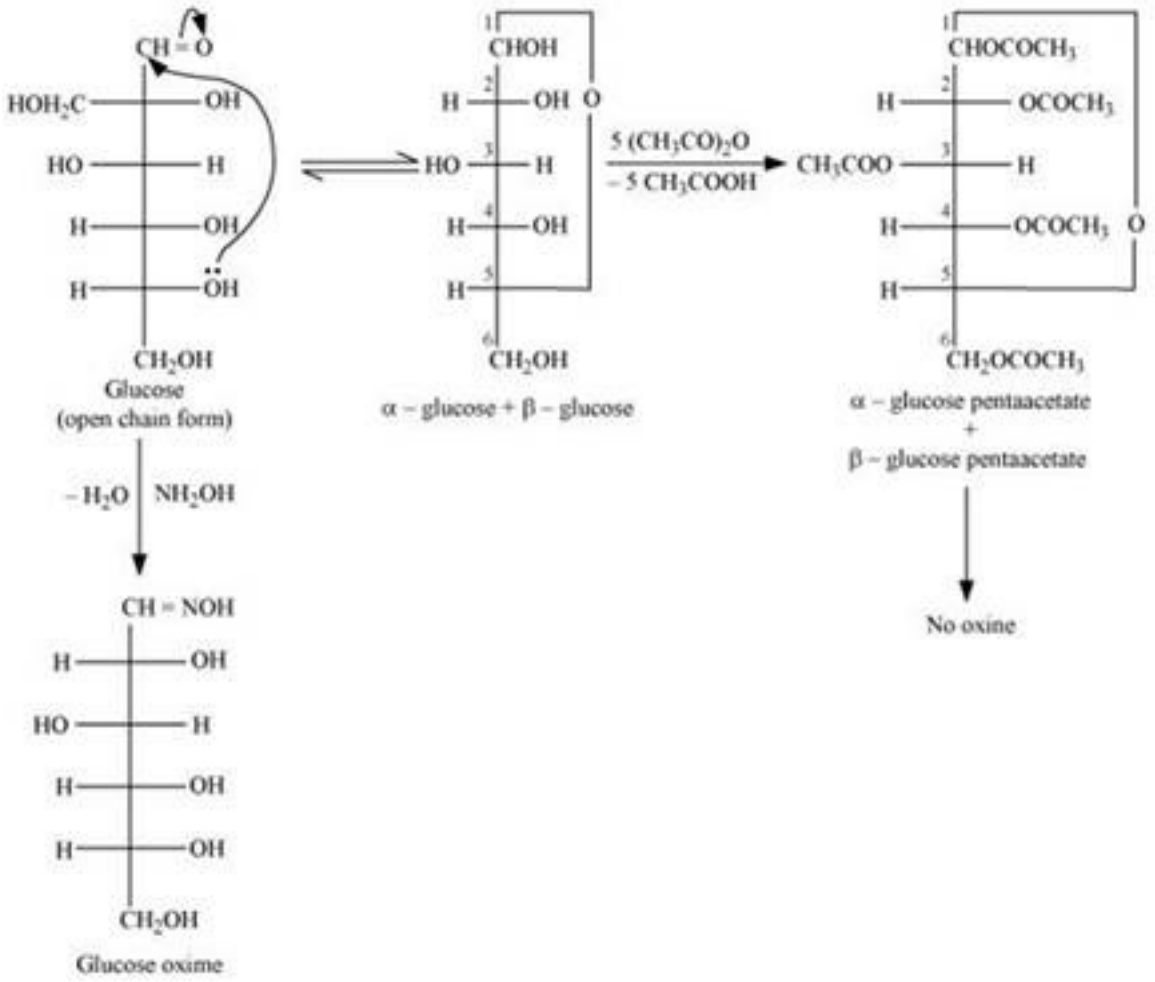
5 Mark Questions

1. How do you explain the absence of aldehyde group in the pentaacetate of D-glucose?

Ans. 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.

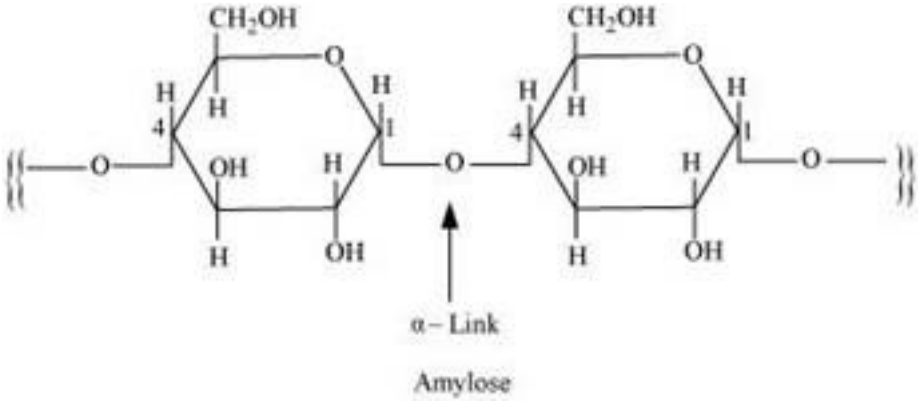


But pentaacetate of D-glucose does not react with NH_2OH . This is because pentaacetate does not form an open chain structure.

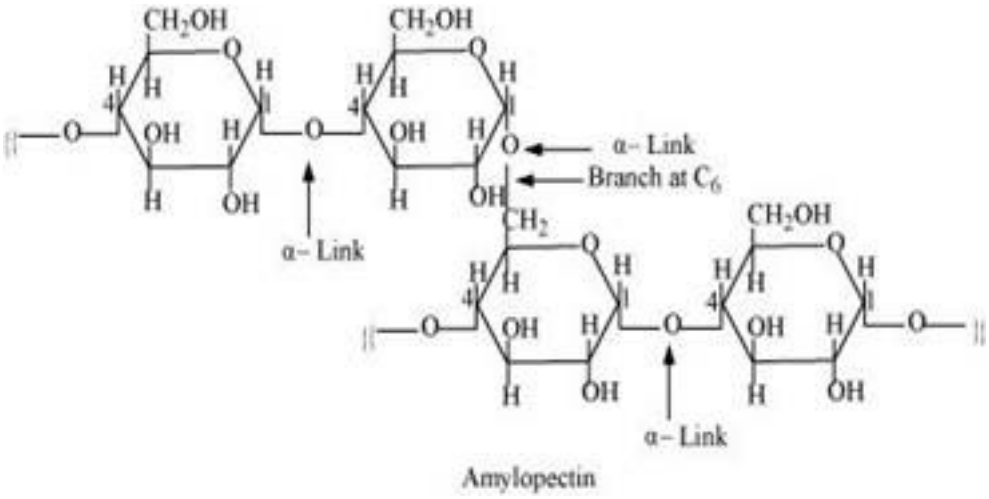


2. What is the basic structural difference between starch and cellulose?

Ans. Starch consists of two components - amylose and amylopectin. Amylose is a long linear chain of α-D-(+)-glucose units joined by $C_1 - C_4$ glycosidic linkage (α-link).

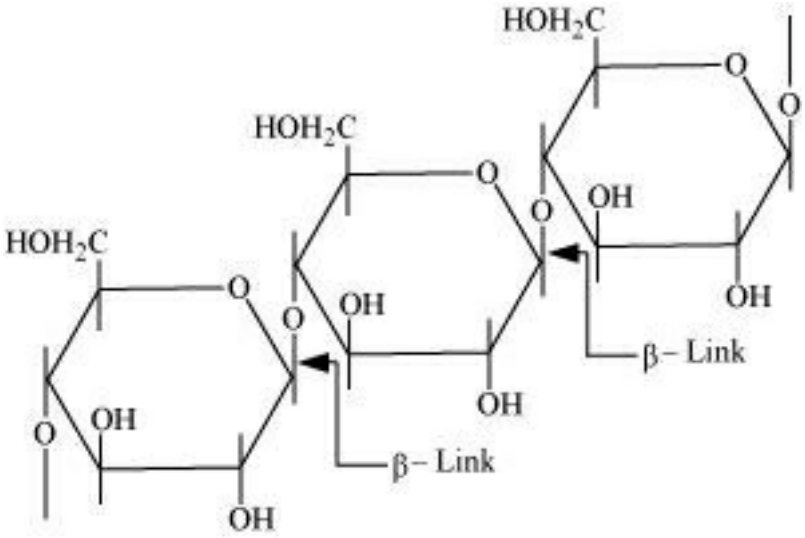


Amylopectin is a branched-chain polymer of α-D-glucose units, in which the chain is formed by $C_1 - C_4$ glycosidic linkage and the branching occurs by $C_1 - C_6$ glycosidic linkage.



Amylopectin

On the other hand, cellulose is a straight-chain polysaccharide of β -D-glucose units joined by $C_1 - C_4$ glycosidic linkage (β -link).

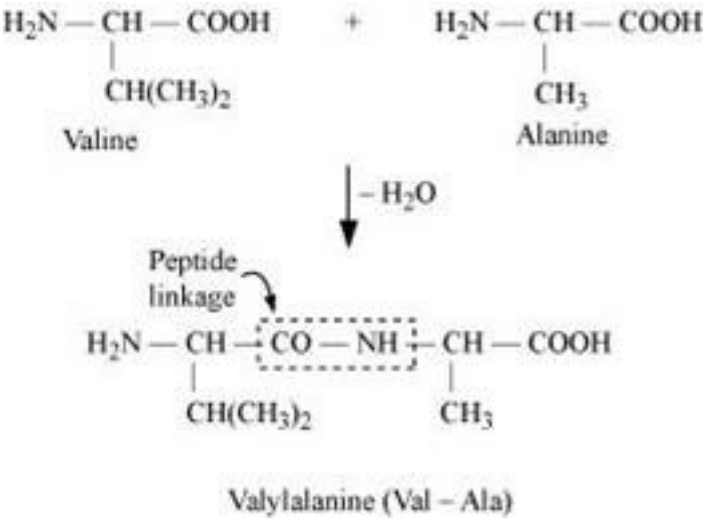


3. Define the following as related to proteins

(i) Peptide linkage (ii) Primary structure (iii) Denaturation.

Ans. (i) Peptide linkage:

The amide formed between -COOH group of one molecule of an amino acid and $-NH_2$ group of another molecule of the amino acid by the elimination of a water molecule is called a peptide linkage.



(ii) Primary structure:

The primary structure of protein refers to the specific sequence in which various amino acids are present in it, i.e., the sequence of linkages between amino acids in a polypeptide chain. The sequence in which amino acids are arranged is different in each protein. A change in the sequence creates a different protein.

(iii) Denaturation:

In a biological system, a protein is found to have a unique 3-dimensional structure and a unique biological activity. In such a situation, the protein is called native protein. However, when the native protein is subjected to physical changes such as change in temperature or chemical changes such as change in pH, its H-bonds are disturbed. This disturbance unfolds the globules and uncoils the helix. As a result, the protein loses its biological activity. This loss of biological activity by the protein is called denaturation. During denaturation, the secondary and the tertiary structures of the protein get destroyed, but the primary structure remains unaltered.

One of the examples of denaturation of proteins is the coagulation of egg white when an egg is boiled.

4. What are the common types of secondary structure of proteins?

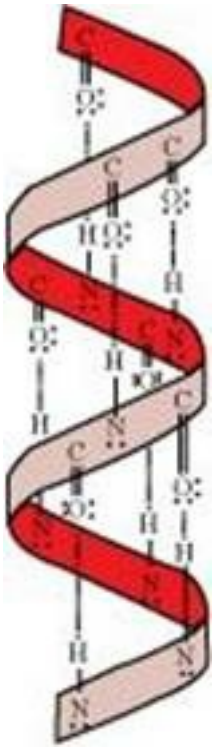
Ans. There are two common types of secondary structure of proteins:

(i) α-helix structure

(ii) β pleated sheet structure

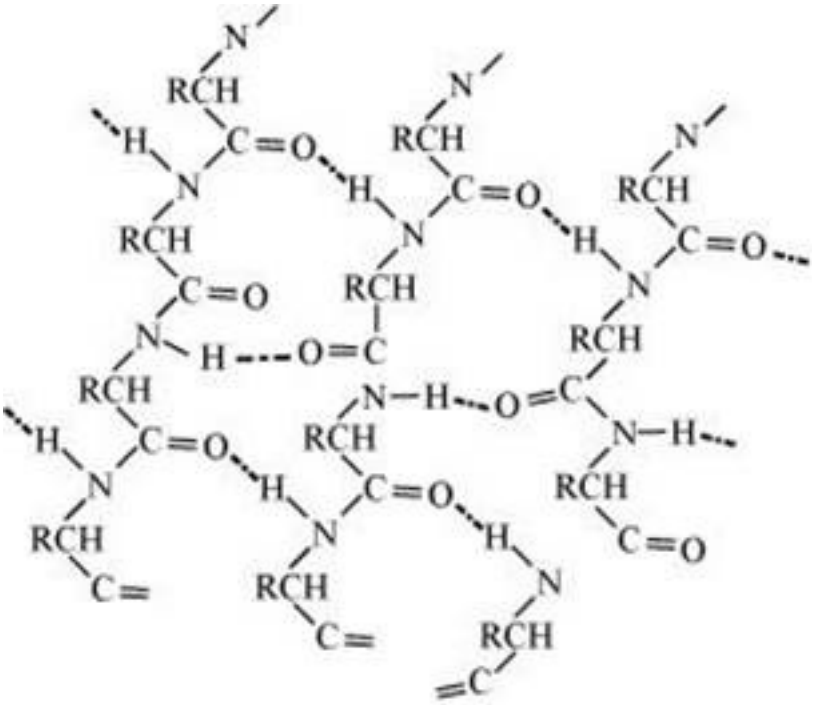
α- Helix structure:

In this structure, the -NH group of an amino acid residue forms H-bond with the $>C=O$ group of the adjacent turn of the right-handed screw (α-helix).



β pleated sheet structure:

This structure is called so because it looks like the pleated folds of drapery. In this structure, all the peptide chains are stretched out to nearly the maximum extension and then laid side by side. These peptide chains are held together by intermolecular hydrogen bonds.



5. Write the important structural and functional differences between DNA and RNA.

Ans. The structural differences between DNA and RNA are as follows:

DNA		RNA	
1.	The sugar moiety in DNA molecules is β-D-2 deoxyribose.	1.	The sugar moiety in RNA molecules is β-D-ribose.
2.	DNA contains thymine (T). It does not contain uracil (U).	2.	RNA contains uracil (U). It does not contain thymine (T).
3.	The helical structure of DNA is double - stranded.	3.	The helical structure of RNA is single-stranded.

The functional differences between DNA and RNA are as follows:

DNA		RNA	
1	DNA is the chemical basis of heredity.	1	RNA is not responsible for heredity.
2	DNA molecules do not synthesise proteins, but transfer coded message for the synthesis of proteins in the cells.	2	Proteins are synthesised by RNA molecules in the cells.