

# CHAPTER

# 28

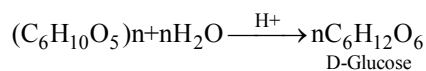
## Biomolecules

1. RNA is different from DNA because RNA contains [2002]
  - (a) ribose sugar and thymine
  - (b) ribose sugar and uracil
  - (c) deoxyribose sugar and thymine
  - (d) deoxyribose sugar and uracil.
2. Complete hydrolysis of cellulose gives [2003]
  - (a) D-ribose                      (b) D-glucose
  - (c) L-glucose                    (d) D-fructose
3. The reason for double helical structure of DNA is operation of [2003]
  - (a) dipole-dipole interaction
  - (b) hydrogen bonding
  - (c) electrostatic attractions
  - (d) van der Waals' forces
4. Which base is present in RNA but not in DNA ?
  - (a) Guanine                      (b) Cytosine [2004]
  - (c) Uracil                        (d) Thymine
5. Insulin production and its action in human body are responsible for the level of diabetes. This compound belongs to which of the following categories ? [2004]
  - (a) An enzyme                  (b) A hormone
  - (c) A co-enzyme                (d) An antibiotic
6. Which of the following is a polyamide? [2005]
  - (a) Bakelite                      (b) Terylene
  - (c) Nylon-66                    (d) Teflon
7. In both DNA and RNA, heterocyclic base and phosphate ester linkages are at – [2005]
  - (a)  $C_5'$  and  $C_1'$  respectively of the sugar molecule
  - (b)  $C_1'$  and  $C_5'$  respectively of the sugar molecule
  - (c)  $C_2'$  and  $C_5'$  respectively of the sugar molecule
  - (d)  $C_5'$  and  $C_2'$  respectively of the sugar molecule
8. The term anomers of glucose refers to [2006]
  - (a) enantiomers of glucose
  - (b) isomers of glucose that differ in configuration at carbon one (C-1)
  - (c) isomers of glucose that differ in configurations at carbons one and four (C-1 and C-4)
  - (d) a mixture of (D)-glucose and (L)-glucose
9. The pyrimidine bases present in DNA are [2006]
  - (a) cytosine and thymine
  - (b) cytosine and uracil
  - (c) cytosine and adenine
  - (d) cytosine and guanine
10. The secondary structure of a protein refers to [2007]
  - (a) fixed configuration of the polypeptide backbone
  - (b)  $\alpha$ -helical backbone
  - (c) hydrophobic interactions
  - (d) sequence of  $\alpha$ -amino acids.
11.  $\alpha$  - D-(+)-glucose and  $\beta$ -D-(+)-glucose are [2008]
  - (a) conformers                  (b) epimers
  - (c) anomers                      (d) enatiomers

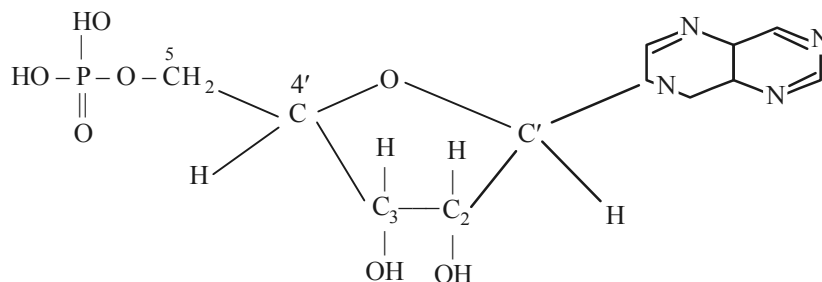
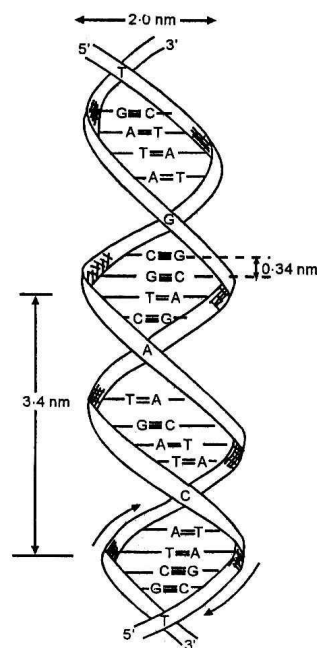


## SOLUTIONS

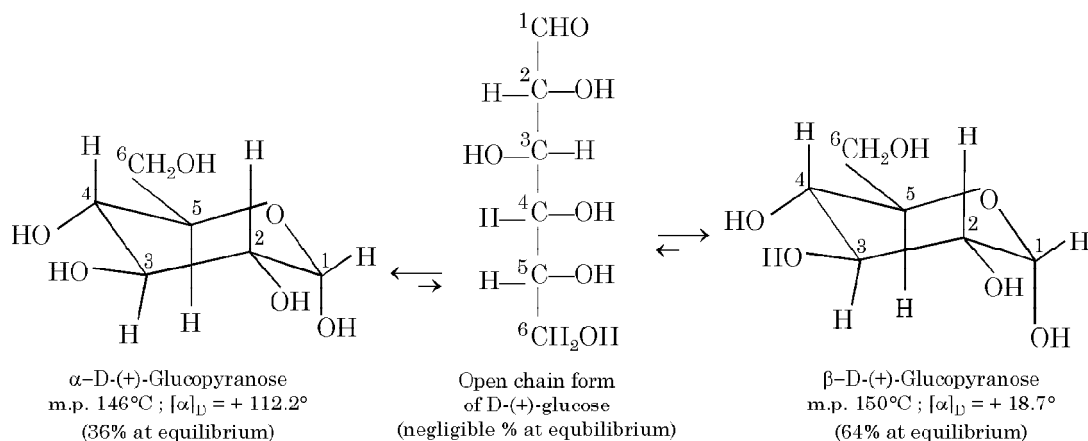
1. (b) In RNA, the sugar is D-ribose and base is uracil where as in DNA, the sugar is D-2 deoxyribose and the nitrogenous base is thymine.
2. (b) Cellulose is a linear polymer of  $\beta$ -D- glucose in which  $C_1$  of one glucose unit is connected to  $C_4$  of the other through  $\beta$ -D glucosidic linkage. It does not undergo hydrolysis easily. However on heating with dilute  $H_2SO_4$  under pressure. It does undergo hydrolysis to give only D- glucose.



3. (b) DNA consists of two polynucleotide chains, each chain forms a right handed spiral with ten bases in one turn of the spiral. The two chains coil to double helix and run in opposite direction held together by hydrogen bonding.
4. (c) RNA contains cytosine and uracil as pyrimidine bases while DNA has cytosine and thymine. Both have the same purine bases i.e., Guanine and adenine.
5. (b) Insulin is a biochemically active peptide hormone secreted by pancreas.
6. (c) Nylon is a general name for all synthetic fibres forming polyamides.
7. (b) In DNA and RNA heterocyclic base and phosphate ester are at  $C_1'$  and  $C_5'$  respectively of the sugar molecule.



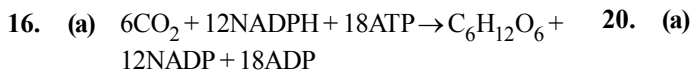
8. (b) Cyclization of the open chain structure of D-(+)-glucose has created a new stereocenter at  $C_1$  which explains the existence of two cyclic forms of D-(+)-glucose, namely  $\alpha$ - and  $\beta$ -. These two cyclic forms are *diastereomers*, such *diastereomers* which differ only in the configuration of chiral carbon developed on hemiacetal formation (it is  $C_1$  in glucose and  $C_2$  in fructose) are called **anomers** and the hemiacetal carbon ( $C_1$  or  $C_2$ ) is called the **anomeric carbon**.



9. (a) The pyrimidine bases present in DNA are cytosine and thymine.
10. (b) The secondary structure of a protein refers to the shape in which a long peptide chain can exist. There are two different conformations of the peptide linkage present in protein, these are  $\alpha$ -helix and  $\beta$ -conformation. The  $\alpha$ -helix always has a right handed arrangement. In  $\beta$ -conformation all peptide chains are stretched out to nearly maximum extension and then laid side by side and held together by intermolecular hydrogen bonds. The structure resembles the pleated folds of drapery and therefore is known as  $\beta$ -pleated sheet.
11. (c) Since  $\alpha$ -D-(+)-glucose and  $\beta$ -D-(+) glucose differ in configuration at C-1 atom so they are anomers.
- NOTE** Anomers are those diastereomers that differ in configuration at C-1 atom. i.e., (c) in the correct answer.
12. (c) **NOTE** Glucose is considered as a typical carbohydrate which contains  $-\text{CHO}$  and  $-\text{OH}$  group.
13. (a) Biuret test produces violet colour on addition of dilute  $\text{CaSO}_4$  to alkaline solution of a compound containing peptide linkage. Polypeptides, proteins and urea have  $-\text{C}-\text{NH}-$  (peptide) linkage while
- $$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{NH}- \end{array}$$
- carbohydrates have glycosidic linkages. So, test of carbohydrates should be different from that of other three.
14. (b) **Molisch's Test** : This is a general test for carbohydrates. One or two drops of alcoholic solution of  $\alpha$ -naphthol is added to 2 ml glucose solution. 1 ml of conc.  $\text{H}_2\text{SO}_4$  solution is added carefully along the sides of the test-tube. The formation of a violet ring at the junction of two liquids confirms the presence of a carbohydrate or sugar.
15. (c) With the exception of glycine all the 19 other common amino acids have a uniquely different functional group on the central tetrahedral alpha carbon.
- $$\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}-\text{COOH} \\ | \\ \text{NH}_2 \\ \text{glycine} \end{array}$$

c-142

Chemistry

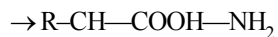


17. (a) DNA contains ATGC bases  
So quinoline is not present in DNA.

18. (c) Water-soluble vitamins dissolve in water and are not stored by the body. The water soluble vitamins include the vitamin B-complex group and vitamin C.

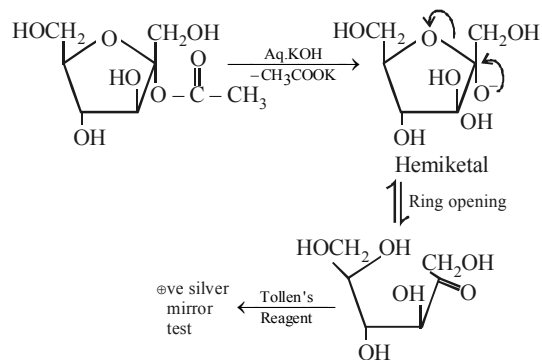
19. (a) Among 20 naturally occurring amino acids "Cysteine" has '-SH' or thiol functional group.

⇒ General formula of amino acid



⇒ Value of R =  $-\text{CH}_2-\text{SH}$  in Cysteine.

20. (a)



(a Reducing sugar)  $\alpha$ -hydroxy ketone