Solution

CET25C10 BIOMOLECULES

Class 12 - Chemistry

1. **(c)** Nucleotides
Explanation: Information regarding the sequence of nucleotides in the chain of a nucleic acid is called its primary structure. This gives information about sequence of bases in DNA which is primarily responsible for the hereditary character. Thus nucleotides are carrier of hereditary character.

2. **(c)** C-1
Explanation: C-1

3. **(c)** all of these
Explanation: DNA fingerprinting is now used
   i. in forensic laboratories for identification of criminals.
   ii. to determine paternity of an individual.
   iii. to identify the dead bodies in any accident by comparing the DNA's of parents or children.
   iv. to identify racial groups to rewrite biological evolution.

4. **(c)** liver and adipose tissue
Explanation: Vitamins which are soluble in fat and oils but insoluble in water are kept in fat soluble vitamins. These are vitamins A, D, E and K. These are generally stored in liver and adipose (fat storing) tissues.

5. **(d)** Albumin
Explanation: Globular proteins are formed when the chains of polypeptides coil around to give a spherical shape. These are usually soluble in water. For example albumin and insulin.

6. **(b)** Proteins
Explanation: Peptide linkage is present in proteins. It is a chemical bond formed between two molecules when the carboxyl group of one molecule reacts with the amino group of other molecules, releasing a molecule of water.

7. **(a)** Vitamin K
Explanation: Vitamin K helps to make various proteins that are needed for blood clotting and the building of bones. Prothrombin is a vitamin K-dependent protein directly involved with blood clotting.

8. **(d)** hydrogen bond
Explanation: hydrogen bond

9. **(b)** Vitamin C
Explanation: Vitamin C is water soluble

10. **(d)** hydrogen bonds
Explanation: α-helix structure of the protein is stabilized by hydrogen bonds. A polypeptide chain forms all possible hydrogen bonds by twisting into a right-handed screw helix with the -NH group of each amino acid residue hydrogen-bonded to > C = O of an adjacent turn of the helix.

11. **(c)** Starch
Explanation: Starch is a polymer of D-glucose units, thus on hydrolysis it only gives glucose.

12.

(c) Glucose

Explanation: Starch is a polymer of α-glucose.

13.

(d) nucleotides

Explanation: nucleotides

14.

(d) Vitamin A

Explanation: Vitamin A keeps eyes in good health. Deficiency of Vitamin A causes Night Blindness.

15. **(a)** Secondary structure of DNA

Explanation: DNA has a double strand helix structure. Two nucleic acid chains are wound about each other and held together by hydrogen bonds between pairs of bases. The two strands are complementary to each other because the hydrogen bonds are formed between specific pairs of bases. In secondary structure of RNA, helices are present which are only single stranded. Sometimes they fold back on themselves to form a double helix structure.

16. **(a)** Amino acids

Explanation: Only α-amino acids are obtained on hydrolysis of proteins.

17.

(c) Adipose and liver

Explanation: Vitamins which are soluble in fat and oils but insoluble in water are fat soluble vitamins. These are vitamins A, D, E and K. They are stored in liver and adipose (fat storing) tissues.

18.

(b) I and II

Explanation: Cyclic structures of monosaccharides which differ in the structure at carbon- 1 position are known as anomers. Here, I and II are anomer because they differ from each other at carbon- 1 only.

19.

(d) primary structure

Explanation: Proteins may have one or more polypeptide chains. Each polypeptide in a protein has amino acids linked with each other in a specific sequence and it is this sequence of amino acids that is said to be the primary structure of that protein. Thus the most appropriate structure for knowing about the sequence of nucleotides in the DNA chain is its primary structure.

20. **(a)** ethyl alcohol

Explanation: The nitrous acid thus produced reacts with ethyl amine and produces ethyl alcohol and nitrogen gas

21.

(b) D – 2 – deoxy ribose

Explanation: Complete hydrolysis of DNA yields a pentose sugar, phosphoric acid and nitrogen containing heterocyclic compounds (called bases). In DNA molecules, the sugar moiety is β-D-2-deoxyribose.

22.

(c) Lactose

Explanation: Lactose

23.

(d) secondary structure

Explanation: Alpha helices and beta sheets are the two most known secondary structures of protein, As the protein folds into a three-dimensional structure, the secondary structure forms an intermediate.

24. **(a)** $-\overset{\overset{\text{O}}{\|}}{\text{C}}-$ and -NH- groups

Explanation: $-\overset{\overset{\text{O}}{\|}}{\text{C}}-$ and -NH- groups

25. **(a)** all of these

Explanation: Vitamins which are soluble in fat and oils but insoluble in water are kept in fat soluble vitamins. These are vitamins A, D, E and K. They are stored in liver and adipose (fat storing) tissues. All these are insoluble in water.

26.

(c) isomers of each other.

Explanation: Glucose and fructose differ structurally and stereochemically. They have same molecular formula i.e. $C_6H_{12}O_6$.

Hence, these are isomers of each other.

27.

(d) Vitamin C

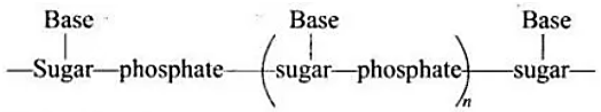
Explanation: Scurvy is caused by not having enough vitamin C in your diet over a long period of time. Vitamin C is mainly found in fruit and vegetables.

28.

(d) nucleotides

Explanation:

Nucleic acids are polymers of nucleotides in which nucleic acids are linked together by a phosphodiester linkage also called a polynucleotide.



e.g., DNA, RNA, etc.

29.

(c) Uracil

Explanation: DNA contains four bases viz. adenine (A), guanine (G), cytosine (C) and thymine (T). So Uracil is not present in DNA.

30.

(d) Vitamin B_{12}

Explanation: Vitamin B_{12}(cobalamine) can be stored in our body because it is insoluble in water.

31.

(d) Amphoteric

Explanation: Amino acids are amphoteric because they contain both basic -NH_2 group and acidic -COOH group.

32. **(a)** formation of lactic acid by the bacteria present in milk and resulting denaturation

Explanation: Curdling of milk is caused due to the formation of lactic acid by the bacteria present in milk. Milk contains proteins. 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 protein.

33.

(c) Vitamin B_{12}

Explanation: Deficiency of vitamin B_{12} (cyanocobalamin) causes the disease pernicious anaemia.

34.

(d) phosphodiester linkage

Explanation: Nucleotides are together by phosphodiester linkage between 5′ and 3′ carbon atoms of the pentose sugar.

35.

(b) Polypeptides

Explanation: In the secondary structure of Proteins, a polypeptide chain exists in two forms:

i. Alpha helix - stabilized by a hydrogen bond.
ii. Beta pleated sheet.

36.

(b) Vitamin B_2

Explanation: Deficiency of Vitamin B_2 (Riboflavin) results in Cheilosis (fissuring at corners of mouth and lips).

37.

(d) Nucleotides

Explanation: When nucleoside is linked to phosphoric acid at 5′-position of sugar moiety, we get a nucleotide and nucleotides are joined by a phosphodiester bond between 5′ and 3′ carbon atoms of the pentose sugar.

38.

(c) Guanine

Explanation: Guanine (G) is the complementary base of cytosine (C) in one stand to that in other stand of DNA. C ≡ G

39.

(c) Vitamin D

Explanation: The most common cause of rickets is a lack of vitamin D or calcium in a child's diet.

40.

(d) Proteins

Explanation: Various RNA (ribonucleic acid) molecules in the cell guide synthesise the proteins.

41.

(c) they are readily excreted in urine and cannot be stored (except vitamin B_{12}) in our body.

Explanation: B group vitamins and vitamin C are soluble in water so they are grouped together as water soluble vitamins. These must be supplied regularly in diet because they are readily excreted in urine and cannot be stored (except vitamin B_{12}) in our body.

42.

(b) Nucleoside

Explanation: A unit formed by the attachment of a base to 1′ position of sugar is known as nucleoside. Adenosine is nucleoside composed of adenine attached a ribose sugar molecule.

43.

(b) Amino acids

Explanation: Proteins are made up of amino acids containing mostly hydrogen, carbon, nitrogen and oxygen, as linked together in chains.

44.

(c) inversion

Explanation: Hydrolysis of sucrose to give glucose and fructose is called inversion

45.

(b) Maltose

Explanation: Sucrose has glucose and fructose, maltose has two units of glucose, raffinose has glucose, fructose and galactose. Galactose is a monosaccharide.
Hence, on hydrolysis maltose gives only glucose.

46.

(d) Condensation polymer

Explanation: In proteins α-amino acids are connected to each other by peptide bond or peptide linkage. Chemically, peptide linkage is an amide formed between –COOH group and $–NH_2$ group. The reaction between two molecules of similar or different amino acids, proceeds through the combination of the amino group of one molecule with the carboxyl group of the other. This results in the elimination of a water molecule and formation of a peptide bond –CO–NH–. So protein is condensation polymer.

47.

(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).
$(C_6H_{10}O_5)_n + nH_2O \rightarrow nC_6H_{12}O_6$

48.

(b) vitamin C

Explanation: B group vitamins and vitamin C are soluble in water so they are grouped together as water soluble vitamins, these must be supplied regularly in diet because they are readily excreted in urine and cannot be stored (except vitamin B_{12}) in our body.

49.

(b) साम्यवादी देशों पर

Explanation: साम्यवादी देशों पर

50.

(b) Nucleotide

Explanation: When nucleoside is linked to phosphoric acid at 5' – position of sugar moiety, we get a nucleotide.

51.

(b) Pentaacetate of glucose does not react with hydroxylamine.

Explanation: The pentaacetate of glucose does not react with the hydroxylamine indicating the absence of free -CHO group. This property of the glucose can be explained only by its own cyclic structure.

52.

(b) Lactose

Explanation: Lactose is a disaccharide consisting of glucose and galactose and is found naturally in milk.

53.

(d) Sucrose

Explanation: When hydrolyzed sucrose gives two products that is: glucose and fructose.

54. **(a)** amylopectin

Explanation: Starch is a polymer of α-glucose and consists of two components - Amylose and Amylopectin. Amylose is water-soluble component which constitutes about 15-20% of starch. Amylopectin is insoluble in water and constitutes about 80-85% of starch. Thus, Amylopectin is the major component of starch.

55.

(b) It gives 2, 4 DNP test.

Explanation: Glucose doesn't react with Schiff's reagent & 2,4 DNP reagent despite having an aldehyde group because there is no free aldehyde group present in the cyclic form as it forms hemiacetal. Thus, it does not give 2,4−DNP test.

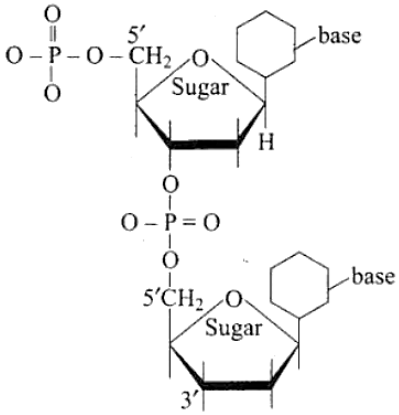
56. **(a)** $C_x(H_2O)_x$

Explanation: General formula for carbohydrate is $(CH_2O)_x$. Here x is the number of carbon atom in the molecule.

57. **(a)** 5′ and 3′

Explanation:

5′ and 3′ linkage is present between the carbon atom of pentose sugar.



58. **(a)** $H_2N.CH_2.COOH$

Explanation: Amino acids contain amino ($–NH_2$) and carboxyl (–COOH) functional groups.

59.

(c) C_1 - C_4 α linkage

Explanation: Amylose is a glucose polymer linked through C_1 - C_4 α glycosidic linkage

60. **(a)** preparing the uterus for implantation of fertilised egg.

Explanation: The combination of ovum and sperm forms the fertilized egg which further gets implanted in the uterus. This is brought about by the hormone progesterone which prepares uterus for this process.

61.

(b) Nucleic acid

Explanation: The particles in nucleus of the cell, responsible for heredity, are called chromosomes which are made up of proteins and another type of biomolecules called nucleic acids. These are mainly of two types, the deoxyribonucleic acid (DNA) and ribonucleic acid (RNA). Since nucleic acids are long chain polymers of nucleotides, so they are also called polynucleotides. Thus nucleic acid is a biological polymer.

62. **(a)** A – T

Explanation: Two nucleic acid chains are wound about each other and held together by hydrogen bonds between pairs of bases. The two strands are complementary to each other because the hydrogen bonds are formed between specific pairs of bases. Adenine forms hydrogen bonds with thymine whereas cytosine forms hydrogen bonds with guanine. So base pair in a double helix of DNA is A-T.

63.

(d) α– Aminoacid

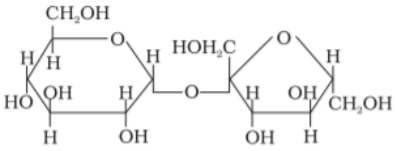
Explanation: Proteins are the polymers of α-amino acids. So building unit of a protein is α – Aminoacid.

64.

(c) information regarding the unique sequence of bases on DNA for a person

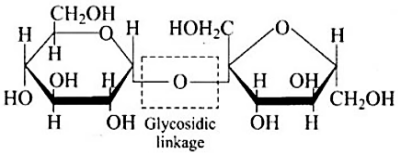
Explanation: A sequence of bases on DNA is unique for a person and information regarding this is called DNA fingerprinting. It is same for every cell and cannot be altered by any known treatment.

65. **(a)**



Explanation:

This structure represents sucrose(diasaccharides) in which α-D glucose and β-D-fructose is attached to each other by C_1-C_2 glycosidic linkage. Since reducing groups of glucose and fructose are involved in glycosidic bond formation, this is considered as a non-reducing sugar.



66. **(a)** Anomers

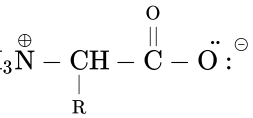
Explanation: Anomers

67.

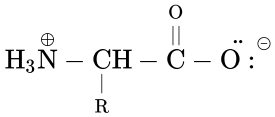
(d) Ascorbic acid

Explanation: Ascorbic acid is vitamin C. Aspartic acid is an amino acid. Adipic acid and saccharic acid are dicarboxylic acids.

68.

(d) 

Explanation: In the formation of Zwitter ion, a proton from -COOH part of the molecule is released and attaches itself to $-NH_2$ part to constitute a dipolar ion Zwitter ion is shown as below:



69.

(b) Keratin

Explanation: When the polypeptide chains run parallel and are held together by hydrogen and disulphide bonds, then fibre–like structure is formed. Such proteins called fibrous proteins are generally insoluble in water. A common example is keratin (present in hair, wool, silk).

70.

(c) Aldohexose

Explanation: Glucose is an aldohexose. It has an aldehyde group. It is a six membered sugar so the term hexose.

71.

(d) Myosin

Explanation: Globular proteins are formed when the chains of polypeptides coil around to give a spherical shape. These are usually soluble in water. When the polypeptide chains run parallel and are held together by hydrogen and disulphide bonds, then fibre– like structure is formed. Such proteins called fibrous proteins are generally insoluble in water. Myosin (present in muscles), is a fibrous protein and not a globular protein.

72.

(b) Proline

Explanation: Those amino acids which cannot be synthesised in the body and must be obtained through diet, are known as essential amino acids. Proline is not an essential amino acid.

73.

(d) n-hexane

Explanation: When D-glucose is heated with HI for a long time n-hexane is formed.

74. **(a)** they are readily excreted in urine

Explanation: B group vitamins and vitamin C are soluble in water so they are grouped together as water soluble vitamins. These must be supplied regularly in diet because they are readily excreted in urine and cannot be stored (except vitamin B_{12}) in our body.

75. **(a)** $\propto$ -D-glucose

Explanation: A disaccharide, maltose is composed of two α-D-glucose units in which C_1 of one glucose (I) is linked to C_4 of another glucose unit (II).