CHAPTER

9

Biomolecules

PRACTICE QUESTIONS

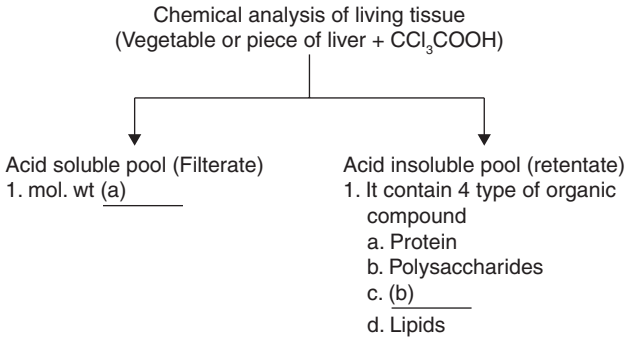
Analyzing the Chemical Composition

1. Which elements are abundantly found in living organism with comparison to earth's crust?
(a) Carbon (b) Hydrogen (c) Oxygen (d) All of these

2. To analyse the chemical composition of living tissue we solubilize them in
(a) HNO_3 (b) HCl (c) CF_3COOH (d) CCI_3COOH

3. The percentage of oxygen in human body is
(a) 65% (b) 46.6% (c) 18.5% (d) 3.3%

4.



Fill in the blanks in (1) and (2) in the above flowchart.
(a) a → greater than 1000 Dalton b → Nucleotide
(b) a → 18–800 Da b → Nucleic acid
(c) a → greater than 10,000 Da b → Oligosaccharides
(d) a → greater than 1000 Dalton b → Nucleoside

5. All the carbon compounds that we get from the living tissues can be called
(a) Bioresource (b) Bioinformatics (c) Biowar (d) Biomolecules

6. Select the incorrect compounds that we get from living tissues can be called:
(a) Elemental analysis of living tissues gives elemental composition of living tissue.
(b) Analysis of chemical compound of living tissue gives idea of organic and inorganic constituent of living tissue.
(c) Weight of small amount of living fresh tissue is known as wet weight.
(d) Acid soluble pool contain lipids, nucleic acid, polysaccharide only.

7. The biomolecule whose weight is less than____ dalton (Da) is referred to as biomicromolecule.
(a) 800 (b) 18 (c) 1000 (d) 10,000

8. Which of the following is not a macromolecule?
(a) Nucleic acid (b) Polysaccharides
(c) Lipids (d) Proteins

9. Lipids are extracted with acid insoluble fraction because
(a) Its molecular weight is less than 800 Da
(b) It form vesicle or micelle which are not water soluble
(c) It is a polymer
(d) It is not a polymer

10. Select the incorrect matching for component percentage in living cell:
(a) Water – 70 to 90%
(b) Proteins – 10 to 15%
(c) Carbohydrate – 2%
(d) Nucleic Acid – 5 to 7%

11. _____ of the total cell mass is formed by ions.
(a) 1% (b) 2% (c) 3% (d) 4%

12. Monomeric unit of cellulose is
(a) Glucose (b) Fructose (c) Mannose (d) Ribose

13. Monomeric unit of inulin is
(a) Glucose (b) Fructose (c) Mannose (d) Ribose

14. Which of the following is homopolysaccharide?
(a) Cellulose (b) Inulin (c) Starch (d) All of these

15. Starch forms helical _____ structure that can hold _____ molecule and gives blue colour.
(a) primary, I_2 (b) secondary, I_2 (c) tertiary, I_2 (d) quaternary, I_2

16. Select the incorrect statement from the following:
(a) Cellulose does not contain complex helices.
(b) Cellulose does not give colour with I_2.
(c) Cotton fibre, plant cell wall are made up of cellulose.
(d) Cellulose is heteropolysaccharide.

17. Which of the following is amino-sugar?
(a) Glucosamine (b) Galactosamine (c) Both (a) and (b) (d) None of these

18. Chitin is a
(a) Homopolysaccharide (b) Heteropolysaccharide
(c) Oligosaccharide (d) Monosaccharide

19. Chitin is present in
(a) Exoskeleton of arthropods (b) Cell wall of fungus
(c) Setae of earthworm (d) All of these

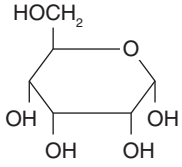
20. In glycogen, which kind of linkage is found between adjacent glucose molecule?
(a) 1, 4 (b) 1, 6 (c) both (d) 1, 2

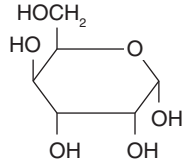
21. Which of the following is incorrect about glycogen?
(a) It is a stored form of glucose in animals.
(b) In glycogen, the right end is reducing and the left end is non-reducing.
(c) It is a branched polymer of glucose.
(d) It is a stored form of glucose in plants.

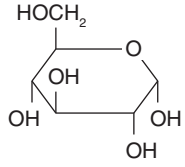
22. The bond formed between two adjacent monosaccharide is
(a) Peptide bond (b) Ester bond (c) Glycosidic bond (d) Ionic bond

23. Blood concentration of glucose in normal healthy individual is
(a) 2–3 mM (b) 4.5–5 mM (c) 6–7 mM (d) 1 mM

24. Which is the correct Haworth structure of glucose?

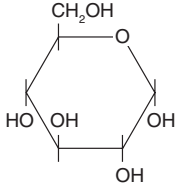
(a) 

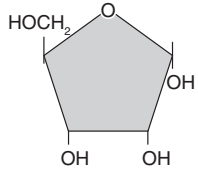
(b) 

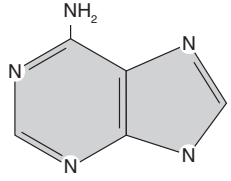
(c) 

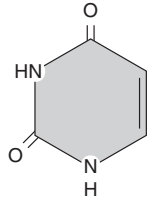
(d) All of these

25. Which is the correct representation of ribose?

(a) 

(b) 

(c) 

(d) 

26. Which of the following is a stored form of energy in plant?
(a) Starch (b) Cellulose (c) Glycogen (d) Chitin

27. Lipids are
(a) Compounds of carbon, hydrogen and oxygen
(b) Compounds of glycerol and fatty acid
(c) Insoluble in water
(d) All of these

28. Lipids may be
(a) Fatty acid (b) Glycerol
(c) Compound respectively of both (d) All of these

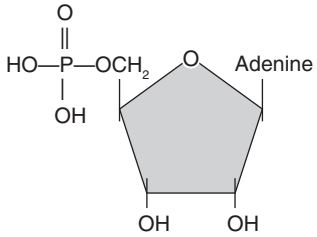
29. What is the number of carbon atoms which the palmitic and arachidonic acid contain (including carboxyl carbon)?
(a) 16, 19 (b) 15, 19 (c) 16, 20 (d) 18, 20

30. Fats or oils are
(a) Monoglycerides (b) Diglycerides (c) Triglycerides (d) Any of the above

31. Which of following is an example of phospholipid?
(a) Palmitic acid (b) Arachidonic acid
(c) Lecithin (d) Glycerol

32. Which of the following is correct about lipids?
(a) On the basis on melting points they are divided into fats and oils.
(b) Neural tissues are made up of simple lipids only.
(c) Phospholipids never forms a part of cell membrane.
(d) Lipids are strictly macromolecule.

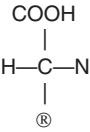
33. Select the incorrect matching regarding the following diagram:



(a) Purine – Its metabolism forms uric acid
(b) Uracil – It is exclusively found in RNA only
(c) Adenylic acid – Monomer of both RNA and DNA
(d) Cholesterol – Forms a part of cell membrane

34. Which of the following is correct about amino acid?
(a) It is a compound containing amino and acidic group (–COOH).
(b) It is a substitute and is methane.
(c) It is based on the nature of 'R' group they are of many types.
(d) All the above

35. How many amino-acids are used to form protein?
(a) 18 (b) 20 (c) 21 (d) 22

36.  is a structure of α–amino acid. Based on different ® groups the following amino acids are formed. Select the correct amino acid according to different ® group.
(a) R→H (glycine),
(b) R→CH_3 (alanine),
(c) R→CH_2OH (serine)
(d) All the above

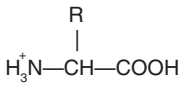
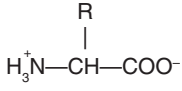
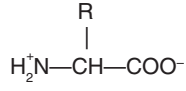
37. The chemical and physical property of amino acid is based on
(a) $–NH_2$ group (b) –COOH group
(c) –R group (d) All of these

38. Match the column:

Column I		**Column II**
A. Acidic	–	1. Valine
B. Basic	–	2. Lysine
C. Neural	–	3. Glutamic acid
D. Aromatic	–	4. Tyrosine, phenylalanine, tryptophan

(a) A–3, B–2, C–1, D–4 (b) A–2, B–3, C–4, D–1
(c) A–4, B–1, C–2, D–3 (d) A–1, B–2, C–2, D–4

39. Which of the following is a Zwitter-ionic form of amino acid?

(a)  (b)  (c)  (d) All of these

Proteins

40. Protein is
(a) Homopolymer (b) Heteropolymer (c) Polypeptide (d) Both (b) and (c)

41. Essential amino acids are those which are
(a) Not synthesized by our body (b) Not required by our body
(c) Synthesized by our body (d) Only used to form proteins

42. The most abundant protein in animal world is
(a) RuBisCO (b) Collagen (c) Elastin (d) Albumin

43. The most abundant protein in whole biosphere is
(a) RuBisCO (b) Collagen (c) Elastin (d) Albumin

44. Protein acts as a
(a) Enzyme (b) Receptor (c) Antibody (d) All of these

45. Match the column:

Column I		**Column II**
A. Collagen	–	1. Hormone
B. Trypsin	–	2. Enzyme
C. Insulin	–	3. Fight Infectious agent
D. Receptor	–	4. Enable glucose transport into cells
E. GLUT–4	–	5. Sensory reception (smell, taste hormone)
F. Antibody	–	6. Intercellular ground substance

(a) A–3, B–2, C–4, D–1, E–6, F–5 (b) A–6, B–2, C–1, D–5, E–4, F–3
(c) A–1, B–4, C–2, D–5, E–3, F–6 (d) A–2, B–4, C–5, D–3, E–1, F–6

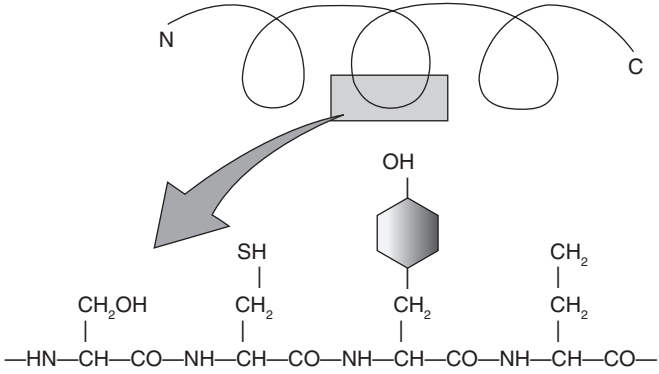
46. The macromolecular fraction is comprised by which of the following?
(a) Polynucleotides (b) Polypeptides (c) Polysaccharides (d) All of these

47. Protein is described by biologists at _____ levels.
(a) 1 (b) 2 (c) 3 (d) 4

48. Sequence or positional information of amino acid is given by the
(a) 2° structure (b) 1° structure
(c) Tertiary structure (d) Quaternary structure

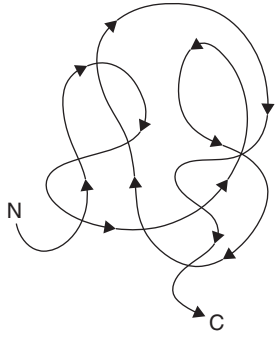
49. In the primary structure of protein
(a) Left end represents → 1st amino acid (C-terminal amino acid)
(b) Right end represents → Last amino acid (N terminal amino acid)
(c) Left end represents → 1st amino acid (N-terminal amino acid)
(d) Right end represents → 1st amino acid (C-terminal amino acid)

50.



Name the used amino acid in the above diagram.
(a) Serine–Cysteine–Tyrosine–Glutamic acid
(b) Serine–Methionin–Tryptophan–Glutamic acid
(c) Serine–Methionin–Tyrosine–Aspartic acid
(d) Serine–Cysteine–Tyrosine–Aspartic acid

51. Which of the following is correct about secondary structure?



(a) Helix is a primary structure.
(b) In proteins only left handed helices are observed.
(c) In proteins only right handed helices are observed.
(d) None of these

52. Which structure is absolutely necessary for the many biological activities of proteins?
(a) 1° (b) 3° (c) 2° (d) 4°

53. When an assembly of more than one polypeptide occurs then it is known as _____ structure of protein.
(a) 1° (b) 2° (c) 3° (d) 4°

54. Which of the following is correct about human Haemoglobin (Hb)?
(a) Made up to 2-α and 2-β subunits (b) Present in RBC
(c) Use to carry O_2 and CO_2 (d) All of these

55. Select the incorrect statement from the following:
(a) Most of the enzymes are protein.
(b) 'Hb' is an example of quaternary structure of protein.
(c) In the primary structure of protein, the left hand is N-terminal and the right hand is C-terminal.
(d) In protein or polypeptide, the amino acids are linked by glycosidic bond.

56. Which of the following possess heterocyclic ring?
(a) Adenine (b) Guanine and Cytosine
(c) Thymine and Uracil (d) All of these

57. Identify the nucleoside from the following:
A. Adenosine
B. Uridylic acid
C. Uridine
D. Cytidylic acid
(a) A and B only (b) A and C only (c) C and D only (d) B and C only

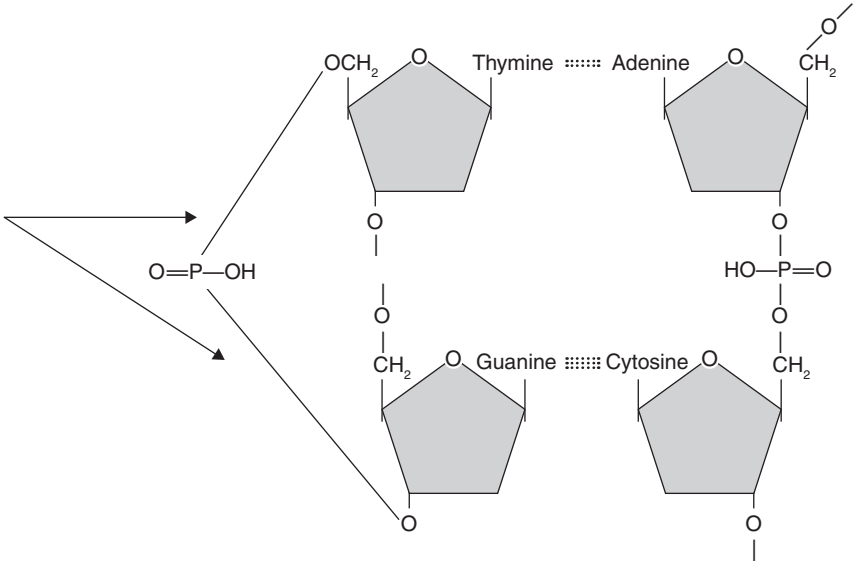
58. Which of the following acts as a genetic material?
(a) DNA and RNA (b) Uridylic acid (c) Adenylic acid (d) Guanylic acid

59. Sugar + Nitrogen bases form
(a) Nucleoside (b) Nucleotide (c) Peptide (d) Glycoside

60. Sugar + Nitrogen bases + Phosphate forms
(a) Nucleoside (b) Nucleotide (c) Peptide (d) Glycoside

61. How many Nitrogen atoms are present in adenine?
(a) 3 (b) 4 (c) 5 (d) 6

62.



The linkage represented by arrow is
(a) Peptide linkage (b) Phosphodiester linkage
(c) Glycosidic linkage (d) N-glycosidic linkage

63. DNA and RNA are
(a) Polypeptides (b) Polynucleotides
(c) Polysaccharides (d) All of these

64. How much percentage of total cellular mass is formed by nucleic acid?
(a) 3 (b) 2 (c) 5 to 7 (d) 10 to 15

65. Which of the following are purines?
(a) Adenine (b) Guanine
(c) Cytosine (d) Both (a) and (b)

66. Which of the following are pyramidine (substituted)?
(a) Cytosine (b) Thymine
(c) Uracil (d) All of these

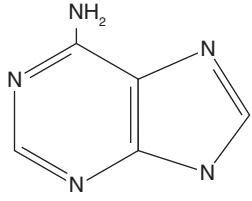
67. DNA contains
(a) Ribose (b) 3' deoxyribose
(c) 5' deoxyribose (d) 2' deoxyribose

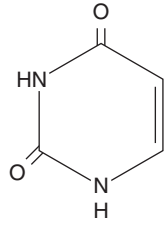
68. The bond present between two nucleotides is known as
(a) Phosphoester linkage (b) Phosphodiester linkage
(c) Glycosidic linkage (d) Peptide linkage

69. The Watson-Crick Structure of DNA is
(a) 1° structure (b) 2° structure
(c) 3° structure (d) 4° Structure

70. Which of the following is correct about DNA?
(a) Double helical structure in which two strands of polynucleotide runs antiparallel.
(b) Backbone is formed by Sugar–Phosphate–Sugar chain.
(c) N_2-bases projected more or less perpendicular to back bone and faces inside.
(d) All of these

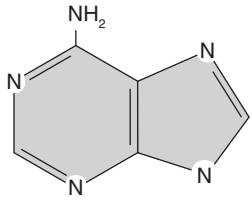
71.

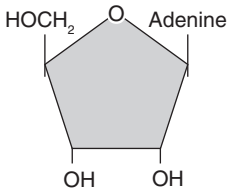


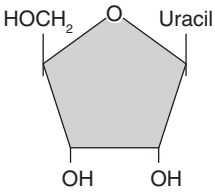


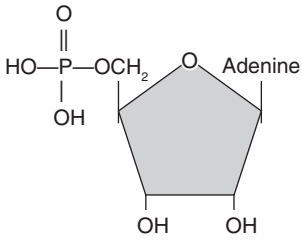
The diagrams represent the nitrogenous bases. Identify the correct combination.
(a) A→Adenine; B→Thymine (b) A→Guanine; B→Uracil
(c) A→Adenine; B→Uracil (d) A→Guanine; B→Thymine

72. Which one of the following is the diagrammatic representation of a nucleotide?

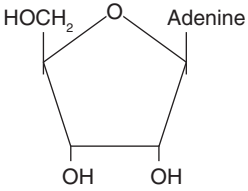
(a) 

(b) 

(c) 

(d) 

73. Which one is correct about the following diagram?



(a) It is a nucleotide.
(b) It contains pyrimidine nitrogen base.
(c) It is used to form DNA.
(d) It is used to form RNA.

74. Which one is correct about DNA?
(a) DNA exist as double helix.
(b) Two strands of polynucleotide in DNA are antiparallel.
(c) The nitrogen bases are projected more or less perpendicular to this backbone but face inside.
(d) All the above

75. At each step of an ascent in a B-DNA double helical structure, the strand turns _____.
(a) 36° (b) 72° (c) 90° (d) 18°

76. One full turn of B-DNA helix strand would involve how many base pairs?
(a) 12 (b) 8 (c) 10 (d) 20

77. Select the incorrect statement from the following:
(a) N_2-bases (A, G, C, T, U) have heterocyclic rings.
(b) In most of the organisms, the DNA is genetic material.
(c) Adenylic acid is nucleoside.
(d) The rise per base pair in B-DNA is 3.4A°.

78. There are _____ hydrogen bond between A and T, and _____ hydrogen bond between G and C.
(a) 2, 2 (b) 3, 3 (c) 2, 3 (d) 3, 2

79. Plants produce an enormous diversity of substances that have no apparent roles in growth and development processes and are classified under the heading of
(a) Primary metabolites (b) Secondary metabolites
(c) Necessary metabolites (d) Tertiary metabolites

80. Which one of the following is a secondary metabolite?
(a) Amino acid (b) Sugar
(c) Flavonoides and antibiotics (d) Protein

81. Which one of the following statement is incorrect?
(a) Primary metabolites have identifiable functions.
(b) Some secondary metabolites have ecological importance.
(c) Secondary metabolites like rubber, drugs, spices, scents and pigments are useful to human welfare.
(d) Secondary metabolites are not found in fungi, microbes and plants.

82. Which of the following are pigments?
(a) Morphine (b) Vinblastine
(c) Carotenoids and anthocyanin (d) Ricin

83. Which one of the following is not a polymeric substance?
(a) Rubber (b) Morphine (c) Protein (d) Cellulose

84. Which of the following secondary metabolites are used as drugs?
(a) Abrin + Ricin (b) Vinblastin + Curcumin
(c) Anthocyanins (d) Monoterpenes

85. Which one of the following is a secondary metabolite?
(a) Lemon oil grass (b) Sucrose (c) Lactose (d) Glycine

86. Match the Column

Column I (Category)		**Column II (Secondary Metabolites)**
A. Pigments	–	1. Concanavalin A
B. Terpenoids	–	2. Monoterpenes, Diterpenes
C. Alkaloids	–	3. Morphine, Codeine
D. Lectins	–	4. Carotenoids, Anthocyanine
E. Toxins	–	5. Abrin and Ricin
F. Drugs	–	6. Vinblastin, Curcumin

(a) A–1, B–2, C–6, D–4, E–5, F–6 (b) A–4, B–2, C–3, D–1, E–5, F–6
(c) A–3, B–4, C–6, D–5, E–1, F–2 (d) A–2, B–1, C–4, D–6, E–5, F–6

87. Which one of the following are secondary metabolites?
(a) Flavonoids and rubber
(b) Antibiotics, coloured pigments and essential oils
(c) Scents, gums, spices
(d) All the above

88. Select the incorrect statement from the following:
(a) All biomolecules have turnover in cell.
(b) Metabolic reaction does not occur in isolation.
(c) Metabolic pathways are either linear or circular.
(d) Metabolites flow is a steady state of body constituent.

89. Select the incorrect statement from the following:
(a) Acetic acid becoming cholesterol is an example of biosynthetic or anabolic pathway.
(b) Glucose becoming lactic acid in our skeletal muscles is an example of degradation or catabolic pathway.
(c) The flow of metabolite through metabolic pathway does not have a definite rate and direction.
(d) Anabolic pathway requires energy whereas catabolic pathway releases energy.

90. Bond energy, which is stored in our body in the form of ATP is utilized in
(a) Biosynthetic phase (b) Osmotic work
(c) Mechanical work (d) All of these

91. Living state is
(a) Non-equilibrium, non-steady state (b) Equilibrium, steady state
(c) Non-equilibrium, steady state (d) Equilibrium, non-steady state

92. Select the correct statement from the following:
(A) Biomolecules are in metabolic flux in living state.
(B) Living process is a constant effort to prevent falling into equilibrium.
(C) Metabolism provides a mechanism for the production of energy.
(D) Living state and metabolism is synonymous.
(a) All except A (b) All except B (c) All except D (d) All of these

93. In how many metabolic steps the degradation of glucose to lactic acid occurs?
(a) 8 (b) 9 (c) 10 (d) 2

94. How do living organisms derive their energy? What strategies have they evolved? How do they store this energy and in what form? How do they convert this energy into work? These aspects are studied under a sub-discipline called
(a) Biowar (b) Bioinformatics (c) Bioenergetics (d) Biosynthesis

95. Almost all enzymes are
(a) Proteins (b) Nucleic acid (c) Carbohydrates (d) Vitamins

96. There are some nucleic acids that behaves like enzymes and are called
(a) DNase (b) RNase (c) Endonuclease (d) Ribozymes

97. _____ of an enzyme is a crevices or pocket into which substrate fit.
(a) Inactive site (b) Active site (c) Allosteric site (d) Any of these

98. Select the incorrect statement from the following:
(a) Active enzyme has tertiary structure having many active sites (substrate binding sites).
(b) Enzymes are biocatalyst.
(c) Enzymes occur in viruses.
(d) Enzymes are mainly protein in nature.

99. Select the correct statement from the following:
(a) Inorganic catalysts work efficiently at high temperature and high pressure while enzymes get damaged at high temperature (above 40°C).
(b) Ribozymes are nucleic acids behaving like enzyme.
(c) Thermophilic organisms living in hot vents and sulphur springs have enzymes that are stable and retain their catalytic power even at high temperatures (80–90°C).
(d) All of these

100. Select the incorrect statement from the following:
(a) A physical change simply refers to a change in shape without breaking of bonds.
(b) Change is a state of matter and it is also a physical change.
(c) Hydrolysis of starch into glucose is an inorganic chemical reaction.
(d) Catalyzed reactions proceed at rates vastly higher than that of uncatalyzed ones.

101. $CO_2 + H_2O \Leftarrow H_2CO_3$
Carbonic acid
Which one of the following statement is incorrect about the above reaction?
(a) In the absence of enzyme, the rate of H_2CO_3 formation is about 200 molecules per hour.
(b) When carbonic anhydrase catalyses the same reaction, there is no change in the rate of H_2CO_3 formation.
(c) The reaction catalyzed by the enzyme shows dramatically higher decrease speed about 600,000 molecules being formed every second (rate becomes 10 million times more).
(d) The enzymes carbonic anhydrase occurs in abundance of RBC's.

102. Fill in the blanks in the below statements:
A. A multistep chemical reaction, when each of the steps is catalyzed by the same enzyme complex or different enzymes is called a _____ 1 _____ pathway.
B. In our skeletal muscle, under anaerobic conditions, _____ 2 _____ is formed.
C. In yeast, during fermentation, the gylcolytic pathway leads to the production of _____ 3 _____.

(a)	1-metabolic pathway	2-acetic acid	3-ethanol
(b)	1-glycolytic pathway	2-lactic acid	3-ethanol
(c)	1-glycolytic pathway	2-ethanol	3-ethanol
(d)	1-metabolic pathway	2-lactic acid	3-ethanol

103. There could be many more altered structural states (like transition state) between the stable substrate and the product in enzymatic reaction. These structural states are
(a) Stable
(b) Unstable
(c) Metastable
(d) Of lower energy than both substrate and product

104. Which one of the following statements about enzymes is true?
1. Enzymes are proteins whose three dimensional shape is key to their functions.
2. Enzymes speed up reactions by lowering the activation energy.
3. Enzymes are highly specific for reactions.
4. Enzyme activity is affected by the change in temperature and pH.
(a) All except 2 (b) All except 1 (c) All except 3 (d) All of these

105. Which of the following is a unique feature about the enzyme?
(a) They are not consumed by the enzyme-mediated reaction.
(b) They are not altered by the enzyme-mediated reaction.
(c) They lower the activation energy.
(d) All of these

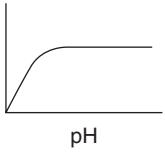
106. The catalytic cycle of an enzyme action can be described in the following steps. Arrange them in sequence accordingly.
1. The binding of the substrate induces the enzyme to alter its shape, fitting more tightly around the substrate.
2. The substrate binds to the active site of the enzyme, fitting into the active site.
3. The enzyme releases the products of the reaction and the free enzyme is ready to bind to another molecule of the substrate and run through the catalytic cycle once again.
4. The active site of the enzyme, now in close proximity of the substrate breaks the chemical bonds of the substrate and the new enzyme product complex is formed.

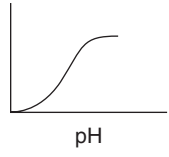
(a) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$ (b) $2 \rightarrow 1 \rightarrow 4 \rightarrow 3$
(c) $1 \rightarrow 2 \rightarrow 4 \rightarrow 3$ (d) $2 \rightarrow 1 \rightarrow 3 \rightarrow 4$

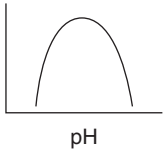
107. The activation energy for given reaction is (i.e., reactant $\rightarrow$ product):
(a) Energy of transition state – Energy of substrate
(b) Energy of transition state – Energy of product
(c) Threshold energy – Energy of transition state
(d) All are correct

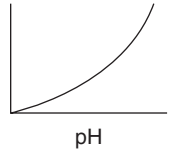
108. Which one is correct?
(a) $E + S \rightarrow ES \rightarrow EP \rightarrow EP$ (b) $E + S \rightarrow ES \rightarrow EP \rightarrow E + P$
(c) $E + S \rightarrow ES \rightarrow EP \rightarrow E - P$ (d) $E + S \rightarrow ES \rightarrow EP \rightarrow E - P$

109. Which one of the graphs shows the effect of pH on the enzymatic activity (EA)?

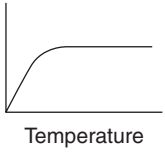
(a) 

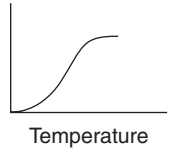
(b) 

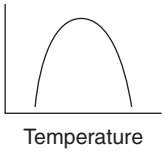
(c) 

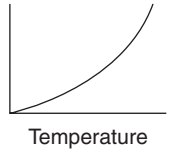
(d) 

110. Which one of the graphs shows the effect of temperature on the enzymatic activity?

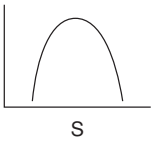
(a) 

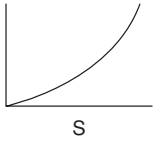
(b) 

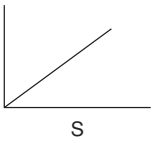
(c) 

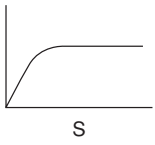
(d) 

111. Which one of the following graphs show the relationship between the of an (EA) and substrate conc.(S)?

(a) 

(b) 

(c) 

(d) 

112. Each enzyme shows its highest activity at particular temperature and pH called the **(1)** temperature and **(2)** pH.

(a) optimum, optimum
(b) minimum, minimum
(c) maximum, maximum
(d) minimum, maximum

113. Select the correct statement:

(a) Low temperature preserves the enzyme in a temporarily inactive state.
(b) Higher temperature destroys enzymatic activity because proteins are denatured by heat.
(c) The activity of enzymes declines both below and above the optimum value.
(d) All of these

114. Select the correct statement:

(a) Increase in substrate concentration, increases the velocity of enzymatic reaction at first then it reaches maximum and further increment does not occur.
(b) In competitive inhibition, the inhibitor closely resembles the substrate in its molecular structure.
(c) Competitive inhibition are often used in the control of bacterial pathogens.
(d) All of these

115. The activity of an enzyme is also sensitive to the presence of specific chemicals that bind to the enzyme. When the binding of the chemical shuts off enzyme activity, the process is called _____ and the chemical is called an _____ .

(a) activation, activator
(b) inhibition, inhibitor
(c) Inhibition, promoter
(d) activation, inhibitor

116. Inhibition of succinate dehydrogenase by malonate is an example of

(a) Non-competitive inhibition
(b) Negative feed back
(c) Allosteric inhibition
(d) Competitive inhibition

Enzymes

117. Enzymes are divided into
(a) 6 classes, each with 4–13 subclasses and named accordingly by a four-digit number.
(b) 7 classes, each with 3–13 subclasses and named accordingly by a four-digit number.
(c) 7 classes, each with 4–13 subclasses and named accordingly by a three-digit number.
(d) 6 classes, each with 4–20 subclasses and named accordingly by a four-digit number.

118. Enzymes which catalyse oxidoreduction between two substrate belongs to the class
(a) Oxidoreductase (b) Transferase (c) Hydrolase (d) Ligase

119. Enzymes which catalyse transfer of group other than hydrogen belongs to the class
(a) Oxidoreductase (b) Transferase (c) Hydrolase (d) Ligase

120. Enzymes which catalyse hydrolysis of ester, ether, peptide, glycosidic bond belongs to the class
(a) Oxidoreductase (b) Transferase (c) Hydrolase (d) Ligase

121. Enzymes that catalyse removal of groups from substrates by mechanisms other than hydrolysis leaving double bonds is known as
(a) Oxidoreductase (b) Transferase (c) Hydrolase (d) Lyase

122. Enzymes which catalyse the inter-conversion of optical, geometric or positional isomers belongs to the class of class
(a) Isomerase (b) Transferase (c) Hydrolase (d) Ligase

123. Enzymes catalysing the linking together of two compounds, for example enzymes which catalyse the joining of C-O, C-S, C-N, P-O, etc., bonds, belongs to the class of
(a) Isomerases (b) Transferases (c) Hydrolases (d) Ligases

124. How many types of cofacter can be identified?
(a) 1 (b) 2 (c) 3 (d) 4

125. The suffix '–' added to substrate for naming the enzyme is
(a) –ase (b) –in (c) –zyme (d) –ose

126. Ptylin is an example of
(a) Oxidoreductase (b) Transferase (c) Hydrolase (d) Ligase

127. When Apoenzyme is separated from its metal component, its activity is
(a) Decreased (b) Increased
(c) Lost (d) Remains unaffected

128. Cofactors are
(a) Prosthetic groups (b) Co-enzymes
(c) Metallic ions (d) All of these

129. Which of the following combinations is correct?
(a) Metal ions loosely attached with Apoenzyme–Activators.
(b) Non-protein organic part attached tightly to the Apoenzyme–Prosthetic group.
(c) Non-protein organic part attached loosely to the Apoenzyme–Coenzyme.
(d) All of these

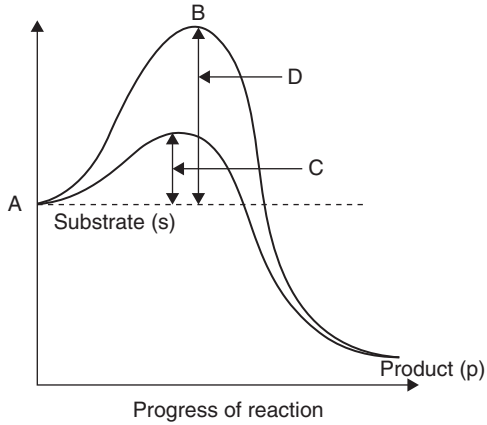
130. Which one of the following is not a cofactor?
(a) Coenzyme (b) Metal ions (c) Prosthetic group (d) Apoenzyme

131. Haem is a prosthetic group of _____ enzyme
(a) Peroxidase (b) Catalase (c) Both (a) and (b) (d) None of these

132. Zn is an activator of _____ enzyme.
(a) Carbonic anhydrase (b) Carboxypeptidase
(c) Carboxylases (d) All of these

133. Which of the following statement is correct?
(1) Catalytic activity is lost when the co-factor is removed from the enzyme.
(2) Coenzyme nicotinamide adenine dinucleotide (NAD) and NADP contains the vitamin niacin.
(3) Biomacromolecules have a hierarchy of structures such as primary, secondary, tertiary and quaternary.
(4) Enzymes lower the activation energy of reactions and enhance greatly the rate of the reactions.
(5) Nucleic acids carry hereditary information and are passed on from parental generation to progeny.
(a) 1 and 5 only (b) 2 and 3 only (c) 2 and 5 only (d) All of these

134. The figure given below shows the conversion of a substrate into product by an enzyme. In which one of the options (a to d) the components of reaction labelled as A, B, C and D are identified correctly?



A	B	C	D
(a) Potential energy	Transition state	Activation energy with enzyme	Activation energy without enzyme
(b) Transition state	Potential energy	Activation energy without enzyme	Activation energy with enzyme
(c) Potential energy	Transition state	Activation energy without enzyme	Activation energy with enzyme
(d) Activation energy with enzyme	Transition state	Activation energy without enzyme	Potential energy

ASSERTION AND REASON QUESTIONS

*Read the **assertion** and **reason** carefully to mark the correct option out of the options given below:*

(a) If both the assertion and the reason are true and the reason is a correct explanation of the assertion.
(b) If both the assertion and reason are true but the reason is not a correct explanation of the assertion.
(c) If the assertion is true but the reason is false.
(d) If both the assertion and reason are false.

135. **Assertion:** Arachidonic acid is an unsaturated fatty acid.
Reason: There are one or more double bonds which are present between the carbon atoms in unsaturated fatty acids.

136. **Assertion:** Amino acids are amphoteric in their function.
Reason: All amino acids are necessary for our body.

137. **Assertion:** Coenzyme is a nonprotein group without which enzymes are inactive or incomplete.
Reason: Coenzymes not only provide a point of attachment for the chemical group being transformed but also influence the properties of the group.

138. **Assertion:** Activity of an enzyme is pH dependent.
Reason: Change in pH, affects the solubility of the enzyme in water.

139. **Assertion:** The coenzymes or metal ions that is very tightly bound to enzyme protein is called prosthetic group.
Reason: A complete, catalytically active enzyme together with its bound prosthetic group is called apoenzyme.

140. **Assertion:** Enzymes are proteins which catalyse the biochemical reactions.
Reason: The enzymes itself is unchanged in the reaction, its presence allows the reaction to take place.

141. **Assertion:** Simple carbohydrates having free aldose or ketose group are called reducing sugars.
Reason: They can reduce cupric ion to cuprous state.

142. **Assertion:** Protein amino acids possess an amino group attached to a carbon (α amino acid).
Reason: Proline and hydroxyproline have NH (imino group) so they are imino acids.

143. **Assertion:** Linolenic acid is the precursor of arachidonic acid.
Reason: Ascorbic acid is a sugar acid having NH_2 group.

144. **Assertion:** Protein is a heteropolymer.
Reason: Protein is made up of amino acid.

145. **Assertion:** Watson–Crick model of DNA is the secondary structure of DNA.
Reason: It contains covalent as well as hydrogen bond.

146. **Assertion:** The total number of amino acids involved in protein synthesis in plants is 20.
Reason: Only 20 amino acids have been discovered so far.

147. **Assertion:** In human body 'collagen' is the most abundant protein.
Reason: Scleroproteins occurs in hard parts of animals body for providing support and protection.

148. **Assertion:** Living state is a non–equilibrium steady state to be able to perform work.
Reason: System at equilibrium cannot perform work.

149. **Assertion:** ATP is energy currency of cell.
Reason: ATP is formed in catabolic pathway.

150. **Assertion:** There are two hydrogen bond exist between A&T.
Reason: There are three hydrogen bond exist between G&C.

151. **Assertion:** The distance between adjacent base pair in B- DNA is 3.4 A°.
Reason: One full turn of helical strand of B-DNA contain 10 bp and the length of this pitch is 34 A°.

152. **Assertion:** In proteins only left handed helix are observed exists in nature.
Reason: Protein found only in secondary structure.

153. **Assertion:** Tertiary structure is necessary for the many biological activities of proteins.
Reason: Tertiary structure in 3-dimentional view of protein.

154. **Assertion:** DNA is called deoxyribonucleic acid.
Reason: DNA is nucleic acid containing deoxyribose sugar.

155. **Assertion:** RuBisCO is most abundant protein in the whole biosphere.
Reason: RuBisCO is present in all animal cells.

156. **Assertion:** Starch forms complex with $I_{2.}$
Reason: Starch forms secondary helical structure.

157. **Assertion:** Cellulose is homo polymer.
Reason: Cellulose formed of only one type of monosaccharide viz. glucose

158. **Assertion:** Co-factor play sepical role in the catalytic activity of enzyme.
Reason: Catalytic activity is lost when co-factor is removed.

159. **Assertion:** Living organism contain only biomolecules
Reason: Biomolecules are made up of carbon atoms only

160. **Assertion:** DNA and RNA consists of nucleotides only
Reason: Nucleotides are monomer of Nucleic acid

161. **Assertion:** Biomacromolecules are those which are found in acid soluble fraction
Reason: Biomacromolecules gave molecular weight less than 1000 dalton.

162. **Assertion:** Starch with I_2 gives blue colour because of starch I_2 complex.
Reason: Starch Can hold I_2 in their helical portion

163. **Assertion:** Cellulose doesn't give colour with I_2
Reason: Cellulose doesn't contain helix which can hold I_2

164. **Assertion:** In polysaccharide chain the right end is reducing
Reason: The right end contain free anomeric -OH group.

165. **Assertion:** Chitin is homopolymer.
Reason: Chitin is made up of only one type of monomer i.e. N-acetylglucosamine.

166. **Assertion:** The first amino acid in primary structure protein is called as N-terminal amino acid.
Reason: NH_2 group of first amino acid is free, not bound to form peptide bond.

167. **Assertion:** Oil containing PUFA are good for health.
Reason: They reduce blood cholesterol level. Thus, decreases chance of heart diseases.

168. **Assertion:** A B-DNA structure proposed by Watson and Crick is secondary structure.
Reason: B- DNA contains hydrogen bond in addition to covalent bond.

169. **Assertion:** Conversion of glucose to lactic acid in our skeletal muscle is catabolic pathways.
Reason: In this metabolic pathway complex structure is degraded to simpler one.

170. **Assertion:** All enzymes are protein.
Reason: RNA can't act as enzyme .

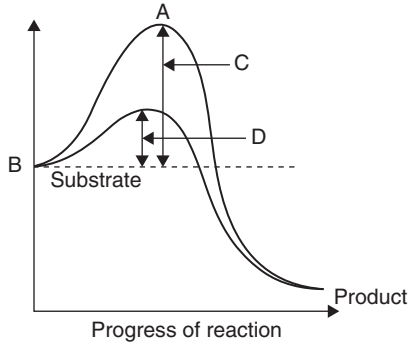
171. **Assertion:** Enzymes isolated from thermophilic organisms are thermally stable.
Reason: They retain their catalytic power even at higher temperature.

172. **Assertion:** Enzyme increases the rate of biochemical reactions.
Reason: Enzymes lower down the energy of activation.

PREVIOUS YEAR QUESTIONS

1. The figure given below shows the conversion of a substrate into product by an enzyme. In which one of the four options (a to d) the components of reaction labelled as A, B, C and D are identified correctly?

[AIPMT MAINS 2010]



(a) A: Potential energy, B: Transition state, C: Activation energy with enzyme, D: Activation energy without enzyme
(b) A: Transition state, B: Potential energy, C: Activation energy without enzyme, D: Activation energy with enzyme
(c) A: Potential energy, B: Transition state, C: Activation energy with enzyme, D: Activation energy without enzyme
(d) A: Activation energy with enzyme, B: Transition state, C: Activation energy without enzyme, D: Potential energy

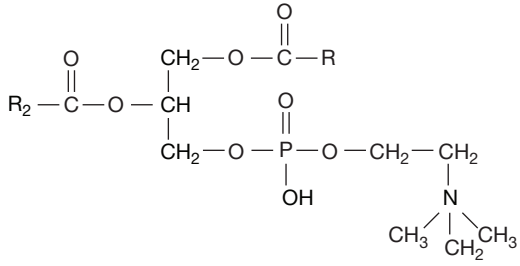
2. Three of the following statements about enzymes are correct and one is wrong. Which one is wrong?

[AIPMT MAINS 2010]

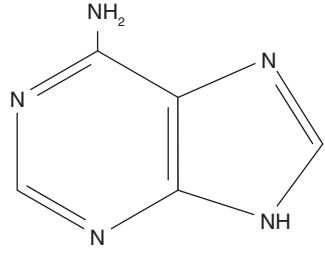
(a) Enzymes require optimum pH for maximal activity.
(b) Enzymes are denatured at high temperature but in certain exceptional organisms they are effective even at temperatures from 80°–90°C.
(c) Enzymes are highly specific.
(d) Most of the enzymes are proteins but some are lipids.

3. Which one of the following structural formulae of two organic compounds is correctly identified along with its related function?

[AIPMT PRE 2011]



(A)



(B)

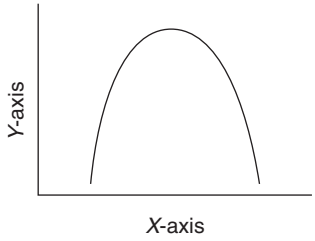
(a) A: Triglyceride — Major source of energy
(b) B: Uracil — A component of DNA
(c) A: Lecithin — A component of cell membrane
(d) B: Adenine — A nucleotide that makes up nucleic acids

4. Select the correct option with respect to mitosis.

[AIPMT PRE 2011]

(a) Chromatids start moving towards opposite poles in telophase.
(b) Golgi complex and endoplasmic reticulum are still visible at the end of prophase.
(c) Chromosomes move to the spindle equator and get aligned along the equatorial plate in metaphase.
(d) Chromatids separate but remains at the centre of the cell in anaphase.

5. The curve given below shows enzymatic activity with relation to three conditions (pH, temperature and substrate concentration)



What do the two axes (X and Y) represent?

[AIPMT PRE 2011]

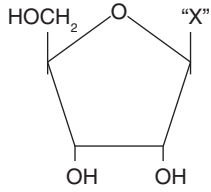
	X-axis	**Y-axis**
(a)	Temperature	Enzyme activity
(b)	Substrate concentration	Enzymatic activity
(c)	Enzymatic activity	Temperature
(d)	Enzymatic activity	pH

6. Which one of the following biomolecules is correctly characterized?

[AIPMT MAINS 2012]

(a) Palmitic acid - An unsaturated fatty acid with 18 carbon atoms.
(b) Adenylic acid - Adenosine with a glucose phosphate molecule.
(c) Alanine amino acid - Contains an amino group and an acidic group anywhere in the molecule.
(d) Lecithin - A phosphorylated glyceride found in cell membrane.

7. Given below is the diagrammatic representation of one of the categories of small molecular weight organic compounds in the living tissues. Identify the category shown and the one blank component 'X' in it.



[AIPMT PRE 2012]

	Category	**Component**
(a)	Cholesterol	Guanin
(b)	Amino acid	NH_2
(c)	Nucleotide	Adenine
(d)	Nucleoside	Uracil

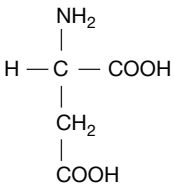
8. Which one is the most abundant protein in the animal world?

[AIPMT PRE 2012]

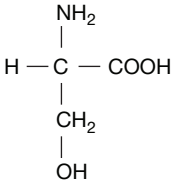
(a) Trypsin (b) Haemoglobin
(c) Collagen (d) Insulin

9. Which one out of A to D given below correctly represents the structural formula of the basic amino acid?

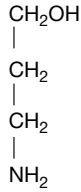
(A)



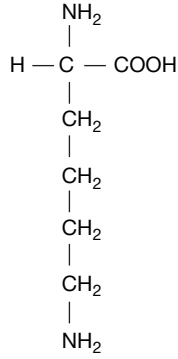
(B)



(C)



(D)



[AIPMT PRE 2012]

Options:

(a) C (b) D (c) A (d) B

10. The transition state structure of the substrate formed during an enzymatic reaction is

[AIPMT AIPMT 2013]

(a) Transient but stable
(b) Permanent but unstable
(c) Transient and unstable
(d) Permanent and stable

11. A phosphoglyceride is always made up of

[AIPMT AIPMT 2013]

(a) Only a saturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached.
(b) Only an unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached.
(c) A saturated or unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached.
(d) A saturated or unsaturated fatty acid esterified to a phosphate group which is also attached to a glycerol molecule.

12. Macromolecule chitin is

[AIPMT 2013]

(a) Nitrogen containing polysaccharide
(b) Phosphorus containing polysaccharide
(c) Sulphur containing polysaccharide
(d) Simple polysaccharide

13. The essential chemical components of many coenzymes are

[AIPMT 2013]

(a) Proteins
(b) Nucleic acids
(c) Carbohydrates
(d) Vitamins

14. Select the option which is not correct with respect to enzyme action [AIPMT 2014]

(a) Substrate binds with enzyme at its active site
(b) Addition of lot of succinate does not reverse the inhibition of Succinic dehydrogenase by malonate
(c) A non – competitive inhibitor binds the enzyme at a site distinct from that which binds the substrate
(d) Malonate is a competitive inhibitor of Succinic dehydrogenase

15. Which one of the following is non reducing carbohydrate? [AIPMT 2014]

(a) Maltose (b) Sucrose
(c) Lactose (d) Ribulose 5 – phosphate

16. Which one of the following statement is incorrect? [AIPMT 2015]

(a) A competitive inhibitor reacts reversibly with the enzyme to form an enzyme inhibitor complex
(b) In competitive inhibition, the inhibitor molecule is not chemically change by the enzyme
(c) The competitive inhibitor does not affect the rate of breakdown of the enzyme subtract complex
(d) The present of the competitive inhibitor decreases the K_m of the enzyme for the substrate.

17. The chitinous exoskeleton of arthropods is formed by the polymerization of: [RE-AIPMT 2015]

(a) D – glucosamine (b) N – acetyl glucosamine
(c) Lipoglycans (d) Keratin sulphate and chondroitin sulphate

18. Which of the following biomolecules does have a phosphodiester bond? [RE-AIPMT 2015]

(a) Monosaccharides in a polysaccharide (b) Amino acids in a polypeptide
(c) Nucleis acids in a nucleotide (d) Fatty acids in a diglycerides

19. One of the major components of cell wall of most fungi is: [NEET - I, 2016]

(a) Chitin (b) Peptidoglacan
(c) Cellulose (d) Hemicellulose

20. Which one of the following statements is wrong? [NEET - I, 2016]

(a) Sucrose is a disaccharide
(b) Cellulose is a polysaccharide
(c) Uracil is a pyrimidine
(d) Glycine is a sulphur containing amino acid

21. A typical molecule is made up of: [NEET - I, 2016]

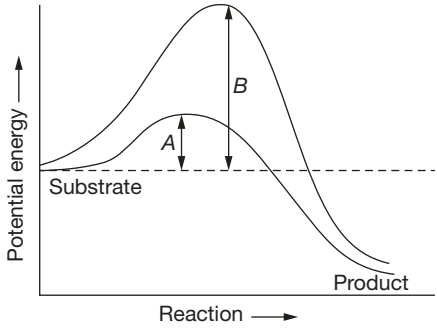
(a) Three glycerol molecules and one fatty acid molecule
(b) One glycerol and three fatty acid molecules
(c) One glycerol and one fatty acid molecule
(d) Three glycerol and three fatty acid molecules

22. A non-proteinaceous enzyme is [NEET - II, 2016]

(a) Ribozyme (b) Ligase
(c) Deoxyribonuclease (d) Lysozyme

23. Which of the following is the least likely to be involved in stabilizing the three-dimensional folding of most proteins? [NEET - II, 2016]
(a) Electrostatic interaction
(b) Hydrophobic interaction
(c) Ester bonds
(d) Hydrogen bonds

24. Which of the following describes the given graph correctly? [NEET - II, 2016]



(a) Exothermic reaction with energy A in presence of enzyme and B in absence of enzyme
(b) Endothermic reaction with energy A in absence of enzyme and B in presence of enzyme
(c) Exothermic reaction with energy A in absence of enzyme and B in presence of enzyme
(d) Endothermic reaction with energy A in presence of enzyme and B in absence of enzyme

NCERT EXEMPLAR QUESTIONS

1. lt is said that the elemental composition of living organisms and that of inanimate objects (like earth's crust) are similar in the sense that all the major elements are present in both. Then what would be the difference between these two groups? Choose a correct answer from among the following:
(a) Living organisms have more gold in them than inanimate objects.
(b) Living organisms have more water in their body than inanimate objects.
(c) Living organisms have more carbon, oxygen and hydrogen per unit mass than inanimate objects.
(d) Living organisms have more calcium in them than inanimate objects.

2. Many elements are found in living organisms either free or in the form of compounds. One of the following is not found in living organisms.
(a) Silicon (b) Magnesium
(c) Iron (d) Sodium

3. Amino acids, as the name suggests, have both an amino group and a carboxyl group in their structure. In addition, all naturally occurring amino acids (those which are found in proteins) are called L–amino acids. From this, can you guess from which compound can the simplest amino acid be made?
(a) Formic acid (b) Methane
(c) Phenol (d) Glycine

4. Many organic substances are negatively charged, for e.g., acetic acid, while others are positively charged for e.g., ammonium ion. An amino acid under certain conditions would have both positive and negative charges simultaneously in the same molecule. Such a form of amino acid is called
(a) Positively charged form (b) Negatively charged form
(c) Neutral form (d) Zwitterionic form

5. Sugars are technically called carbohydrates referring to the fact that their formulae are only multiple of $C(H_2O)$. Hexoses therefore have six carbons, twelve hydrogen's and six oxygen atoms. Glucose is a hexose. Choose another hexose from among the following.
(a) Fructose (b) Erythrose
(c) Ribulose (d) Ribose

6. When you take cells or tissue pieces and grind them with an acid in a mortar and pestle, all the small biomolecules dissolves in the acid. Proteins, polysaccharides and nucleic acids are insoluble in mineral acid and get precipitated. The acid soluble compounds include amino acids, nucleosides, small sugars, etc. When one adds a phosphate group to a nucleoside one gets another acid soluble biomolecule called
(a) Nitrogen base (b) Adenine
(c) Sugar phosphate (d) Nucleotide

7. When we homogenize any tissue in an acid, the acid soluble pool represents
(a) Cytoplasm (b) Cell membrane
(c) Nucleus (d) Mitochondria

8. The most abundant chemical in living organisms could be
(a) Protein (b) Water
(c) Sugar (d) Nucleic acid

9. A homopolymer has only one type of building block called monomer repeated '*n*' number of times. A heteropolymer has more than one type of monomers. Proteins are heteropolymers made of amino acids. While a nucleic acid like DNA or RNA is made of only 4 types of nucleotide monomers, proteins are made of
(a) 20 types of monomers (b) 40 types of monomers
(c) 3 types of monomers (d) Only one type of monomer

10. Proteins perform many physiological functions. For example, some functions as enzymes. One of the following represents an additional function that some proteins discharge
(a) Antibiotics (b) Pigments conferring colour to skin
(c) Pigments making colours of flowers (d) Hormones

11. Glycogen is a homopolymer made of
(a) Glucose units (b) Galactose units
(c) Ribose units (d) Amino units

12. The number of 'ends' in a glycogen molecule would be
(a) Equal to the number of branches plus one.
(b) Equal to the number of branch points.
(c) One
(d) Two, one on the left side and another on the right side.

13. The primary structure of a protein molecule has two ends.
(a) Two ends (b) One end
(c) Three ends (d) No ends

14. Enzymes are biocatalysts. They catalyse biochemical, reactions. In general they reduce the activation energy of reactions. Many physicochemical processes are enzyme mediated. Some examples of enzyme mediated reactions are given below. Tick the wrong entry.
(a) Dissolving CO_2 in water
(b) Unwinding the two strands of DNA
(c) Hydrolysis of sucrose
(d) Formation of peptide bond

Answer Keys

Practice Questions

1. (d)	2. (d)	3. (a)	4. (b)	5. (d)	6. (d)	7. (c)	8. (c)	9. (b)	10. (c)
11. (a)	12. (a)	13. (b)	14. (d)	15. (b)	16. (d)	17. (c)	18. (b)	19. (d)	20. (c)
21. (d)	22. (c)	23. (b)	24. (c)	25. (b)	26. (a)	27. (d)	28. (d)	29. (c)	30. (d)
31. (c)	32. (a)	33. (c)	34. (d)	35. (b)	36. (d)	37. (d)	38. (a)	39. (b)	40. (d)
41. (a)	42. (b)	43. (a)	44. (d)	45. (b)	46. (d)	47. (d)	48. (b)	49. (c)	50. (a)
51. (c)	52. (b)	53. (d)	54. (d)	55. (d)	56. (d)	57. (b)	58. (a)	59. (a)	60. (b)
61. (c)	62. (b)	63. (b)	64. (c)	65. (d)	66. (d)	67. (d)	68. (b)	69. (b)	70. (d)
71. (c)	72. (d)	73. (d)	74. (d)	75. (a)	76. (c)	77. (c)	78. (c)	79. (b)	80. (c)
81. (d)	82. (c)	83. (b)	84. (b)	85. (a)	86. (b)	87. (d)	88. (d)	89. (c)	90. (d)
91. (c)	92. (d)	93. (c)	94. (c)	95. (a)	96. (d)	97. (b)	98. (c)	99. (d)	100. (c)
101. (b)	102. (d)	103. (b)	104. (d)	105. (d)	106. (b)	107. (a)	108. (b)	109. (c)	110. (c)
111. (d)	112. (a)	113. (d)	114. (d)	115. (b)	116. (d)	117. (a)	118. (a)	119. (b)	120. (c)
121. (d)	122. (a)	123. (d)	124. (c)	125. (a)	126. (c)	127. (c)	128. (d)	129. (d)	130. (d)
131. (c)	132. (d)	133. (d)	134. (a)						

Assertion and Reason Questions

135. (a)	136. (b)	137. (a)	138. (a)	139. (c)	140. (b)	141. (a)	142. (b)	143. (c)	144. (b)
145. (a)	146. (c)	147. (b)	148. (a)	149. (b)	150. (b)	151. (a)	152. (d)	153. (b)	154. (a)
155. (c)	156. (a)	157. (a)	158. (a)	159. (d)	160. (a)	161. (d)	162. (a)	163. (a)	164. (a)
165. (a)	166. (a)	167. (a)	168. (a)	169. (a)	170. (d)	171. (a)	172. (a)		

Previous Year Questions

1. (b)	2. (d)	3. (c)	4. (c)	5. (a)	6. (d)	7. (d)	8. (c)	9. (b)	10. (c)
11. (c)	12. (a)	13. (d)	14. (b)	15. (b)	16. (d)	17. (b)	18. (c)	19. (a)	20. (d)
21. (b)	22. (a)	23. (c)	24. (a)						

NCERT Exemplar Questions

1. (c)	2. (a)	3. (b)	4. (d)	5. (a)	6. (d)	7. (a)	8. (b)	9. (a)	10. (d)
11. (a)	12. (a)	13. (a)	14. (a)						