

Biomolecules

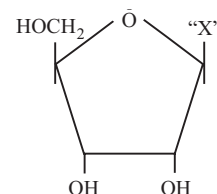
9.1 How to Analyse Chemical Composition?

- Identify the basic amino acid from the following.
 (a) Tyrosine (b) Glutamic Acid
 (c) Lysine (d) Valine (NEET 2020)
- The two functional groups characteristic of sugars are
 (a) hydroxyl and methyl
 (b) carbonyl and methyl
 (c) carbonyl and phosphate
 (d) carbonyl and hydroxyl. (NEET 2018)
- A typical fat molecule is made up of
 (a) one glycerol and one fatty acid molecule
 (b) three glycerol and three fatty acid molecules
 (c) three glycerol molecules and one fatty acid molecule
 (d) one glycerol and three fatty acid molecules. (NEET-I 2016)
- A phosphoglyceride is always made up of
 (a) a saturated or unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached
 (b) a saturated or unsaturated fatty acid esterified to a phosphate group which is also attached to a glycerol molecule
 (c) only a saturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached
 (d) only an unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached. (NEET 2013)
- Uridine, present only in RNA is a
 (a) nucleoside (b) nucleotide
 (c) purine (d) pyrimidine. (Karnataka NEET 2013)
- Which one out of A – D given below correctly represents the structural formula of the basic amino acid?

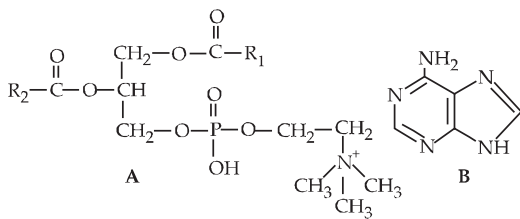
A	B	C	D
$ \begin{array}{c} \text{NH}_2 \\ \\ \text{H}-\text{C}-\text{COOH} \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{C} \\ // \quad \backslash \\ \text{O} \quad \text{OH} \end{array} $	$ \begin{array}{c} \text{NH}_2 \\ \\ \text{H}-\text{C}-\text{COOH} \\ \\ \text{CH}_2 \\ \\ \text{OH} \end{array} $	$ \begin{array}{c} \text{CH}_2\text{OH} \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{NH}_2 \end{array} $	$ \begin{array}{c} \text{NH}_2 \\ \\ \text{H}-\text{C}-\text{COOH} \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{CH}_2 \\ \\ \text{NH}_2 \end{array} $

- (a) C (b) D
(c) A (d) B (2012)

7. The given diagrammatic representation shows 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.



- | Category | Component |
|-----------------|-----------------|
| (a) Cholesterol | Guanine |
| (b) Amino acid | NH ₂ |
| (c) Nucleotide | Adenine |
| (d) Nucleoside | Uracil |
- (2012)
- Which one of the following biomolecules is correctly characterized?
 (a) Lecithin-a phosphorylated glyceride found in cell membrane.
 (b) Palmitic acid - an unsaturated fatty acid with 18 carbon atoms.
 (c) Adenylic acid - adenosine with a glucose phosphate molecule.
 (d) Alanine amino acid - contains an amino group and an acidic group anywhere in the molecule. (Mains 2012)
 - Which one of the following structural formulae of two organic compounds is correctly identified along with its related function?



- (a) B : Adenine - A nucleotide that makes up nucleic acids
 (b) A : Triglyceride - Major source of energy
 (c) B : Uracil - A component of DNA
 (d) A : Lecithin - A component of cell membrane (2011)

10. About 98 percent of the mass of every living organism is composed of just six elements including carbon, hydrogen, nitrogen, oxygen and
 (a) sulphur and magnesium
 (b) magnesium and sodium
 (c) calcium and phosphorus
 (d) phosphorus and sulphur. (2007)
11. Which of the following is the simplest amino acid?
 (a) Alanine (b) Asparagine
 (c) Glycine (d) Tyrosine (2005)
12. The major role of minor elements inside living organisms is to act as
 (a) co-factors of enzymes
 (b) building blocks of important amino acids
 (c) constituent of hormones
 (d) binder of cell structure. (2003)
13. Lipids are insoluble in water because lipid molecules are
 (a) hydrophilic (b) hydrophobic
 (c) neutral (d) zwitter ions. (2002)
14. Spoilage of oil can be detected by which fatty acid?
 (a) Oleic acid (b) Linolenic acid
 (c) Linoleic acid (d) Erucic acid. (2001)
15. Essential amino acid is
 (a) phenylalanine (b) glycine
 (c) aspartic acid (d) serine. (2000)
16. What are the most diverse molecules in the cell?
 (a) Lipids (b) Mineral salts
 (c) Proteins (d) Carbohydrates (1996)
17. The four elements that make up 99% of all elements found in a living system are
 (a) C, H, O and P (b) C, N, O and P
 (c) H, O, C and N (d) C, H, O and S. (1994)
18. Amino acids are mostly synthesised from
 (a) mineral salts (b) fatty acids
 (c) volatile acids (d) α -ketoglutaric acid. (1992)
19. Living cell contains 60 – 95% water. Water present in human body is

- (a) 60 – 65% (b) 50 – 55%
 (c) 75 – 80% (d) 65 – 70%. (1992)

9.2 Primary and Secondary Metabolites

20. Secondary metabolites such as nicotine, strychnine and caffeine are produced by plants for their
 (a) nutritive value (b) growth response
 (c) defence action (d) effect on reproduction. (NEET 2020)
21. Concanavalin A is
 (a) a pigment (b) an alkaloid
 (c) an essential oil (d) a lectin. (NEET 2019)

9.4 Proteins

22. Which one of the following is the most abundant protein in the animals?
 (a) Haemoglobin (b) Collagen
 (c) Lectin (d) Insulin (NEET 2020)
23. Which of the following glucose transporters is insulin-dependent?
 (a) GLUT IV (b) GLUT I
 (c) GLUT II (d) GLUT III (NEET 2019)
24. Which one is the most abundant protein in the animal world?
 (a) Trypsin (b) Haemoglobin
 (c) Collagen (d) Insulin (2012)
25. Which of the following have carbohydrate as prosthetic group?
 (a) Glycoprotein (b) Chromoprotein
 (c) Lipoprotein (d) Nucleoprotein (2000)

9.5 Polysaccharides

26. Which one of the following statements is wrong?
 (a) Uracil is a pyrimidine.
 (b) Glycine is a sulphur containing amino acid.
 (c) Sucrose is a disaccharide.
 (d) Cellulose is a polysaccharide. (NEET-I 2016)
27. The chitinous exoskeleton of arthropods is formed by the polymerisation of
 (a) N - acetyl glucosamine
 (b) lipoglycans
 (c) keratin sulphate and chondroitin sulphate
 (d) D - glucosamine. (2015)
28. Which one of the following is a non - reducing carbohydrate?
 (a) Maltose (b) Sucrose
 (c) Lactose (d) Ribose 5-phosphate (2014)
29. Macromolecule chitin is
 (a) sulphur containing polysaccharide
 (b) simple polysaccharide
 (c) nitrogen containing polysaccharide
 (d) phosphorus containing polysaccharide. (NEET 2013)

30. Carbohydrates are commonly found as starch in plants storage organs. Which of the following five properties of starch (1-5) make it useful as a storage material?
- (1) Easily translocated
 - (2) Chemically non-reactive
 - (3) Easily digested by animals
 - (4) Osmotically inactive
 - (5) Synthesized during photosynthesis
- The useful properties are
- (a) (1), (3) and (5)
 - (b) (1) and (5)
 - (c) (2) and (3)
 - (d) (2) and (4). (2008)
31. Cellulose is the major component of cell walls of
- (a) *Pseudomonas*
 - (b) *Saccharomyces*
 - (c) *Pythium*
 - (d) *Xanthomonas*. (2008)
32. Carbohydrates, the most abundant biomolecule on earth, are produced by
- (a) some bacteria, algae and green plant cells
 - (b) fungi, algae and green plant cells
 - (c) all bacteria, fungi and algae
 - (d) viruses, fungi and bacteria. (2005)
33. Which of the following is a reducing sugar?
- (a) Galactose
 - (b) Gluconic acid
 - (c) β -methyl galactoside
 - (d) Sucrose (2002)
34. Cellulose, the most important constituent of plant cell wall is made up of
- (a) branched chain of glucose molecules linked by β -1, 4 glycosidic bond in straight chain and α -1, 6 glycosidic bond at the site of branching
 - (b) unbranched chain of glucose molecules linked by β -1, 4 glycosidic bond
 - (c) branched chain of glucose molecules linked by α -1, 6 glycosidic bond at the site of branching
 - (d) unbranched chain of glucose molecules linked by α -1, 4 glycosidic bond. (1998)
35. Lactose is composed of
- (a) glucose + galactose
 - (b) fructose + galactose
 - (c) glucose + fructose
 - (d) glucose + glucose. (1998)
36. In which of the following groups are all polysaccharides?
- (a) Sucrose, glucose and fructose
 - (b) Maltose, lactose and fructose
 - (c) Glycogen, sucrose and maltose
 - (d) Glycogen, cellulose and starch (1996)
37. Glycogen is a polymer of
- (a) galactose
 - (b) glucose
 - (c) fructose
 - (d) sucrose. (1993)

9.6 Nucleic Acids

38. Which of the following are not polymeric?
- (a) Proteins
 - (b) Polysaccharides
 - (c) Lipids
 - (d) Nucleic acids (NEET 2017)
39. Nucleotides are building blocks of nucleic acids. Each nucleotide is a composite molecule formed by
- (a) base-sugar-phosphate
 - (b) base-sugar-OH
 - (c) (base-sugar-phosphate)_n
 - (d) sugar-phosphate. (2005)
40. Which purine base is found in RNA?
- (a) Thymine
 - (b) Uracil
 - (c) Cytosine
 - (d) Guanine (1996)
41. Which of the following nucleotide sequences contains 4 pyrimidine bases?
- (a) GATCAATGC
 - (b) GCUAGACAA
 - (c) UAGCGUAA
 - (d) Both (b) and (c) (1994)
42. In RNA, thymine is replaced by
- (a) adenine
 - (b) guanine
 - (c) cytosine
 - (d) uracil. (1992)
43. Adenine is
- (a) purine
 - (b) pyrimidine
 - (c) nucleoside
 - (d) nucleotide. (1992)
44. A nucleotide is formed of
- (a) purine, pyrimidine and phosphate
 - (b) purine, sugar and phosphate
 - (c) nitrogen base, sugar and phosphate
 - (d) pyrimidine, sugar and phosphate. (1991)
45. DNA is composed of repeating units of
- (a) ribonucleosides
 - (b) deoxyribonucleosides
 - (c) ribonucleotides
 - (d) deoxyribonucleotides. (1991)
46. The basic unit of nucleic acid is
- (a) pentose sugar
 - (b) nucleoid
 - (c) nucleoside
 - (d) nucleotide. (1991)
47. RNA does not possess
- (a) uracil
 - (b) thymine
 - (c) adenine
 - (d) cytosine. (1988)

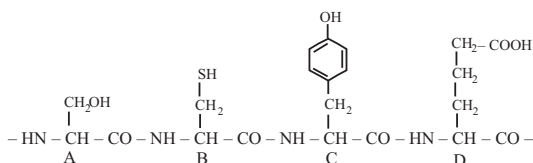
9.7 Structure of Proteins

48. "Ramachandran plot" is used to confirm the structure of
- (a) RNA
 - (b) proteins
 - (c) triacylglycerides
 - (d) DNA. (Odisha NEET 2019)
49. Which of the following is the least likely to be involved in stabilising the three-dimensional folding of most proteins?

- (a) Hydrogen bonds
- (b) Electrostatic interaction
- (c) Hydrophobic interaction
- (d) Ester bonds

(NEET-II 2016)

50. The figure shows a hypothetical tetrapeptide portion of a protein with parts labelled A-D. Which one of the following options is correct?



- (a) D is the acidic amino acid-glutamic acid.
- (b) C is an aromatic amino acid-tryptophan.
- (c) A is the C-terminal amino acid and D is N-terminal amino acid.
- (d) A is a sulphur containing amino acid methionine.

(Karnataka NEET 2013)

9.8 Nature of Bond Linking Monomers in a Polymer

51. Identify the substances having glycosidic bond and peptide bond, respectively in their structure.

- (a) Chitin, cholesterol
- (b) Glycerol, trypsin
- (c) Cellulose, lecithin
- (d) Inulin, insulin

(NEET 2020)

52. Which of the following biomolecules does have a phosphodiester bond?

- (a) Amino acids in a polypeptide
- (b) Nucleic acids in a nucleotide
- (c) Fatty acids in a diglyceride
- (d) Monosaccharides in a polysaccharide

(2015)

53. Which is wrong about nucleic acids?

- (a) DNA is single stranded in some viruses.
- (b) RNA is double stranded occasionally.
- (c) Length of one helix is 45 Å in B-DNA.
- (d) One turn of Z-DNA has 12 bases.

(1993)

54. A segment of DNA has 120 adenine and 120 cytosine bases. The total number of nucleotides present in the segment is

- (a) 120
- (b) 240
- (c) 60
- (d) 480.

(1991)

55. Which is not consistent with double helical structure of DNA?

- (a) $A = T, C = G$
- (b) Density of DNA decreases on heating.
- (c) $A + T/C + G$ is not constant.
- (d) Both (a) and (b)

(1990)

56. In double helix of DNA, the two DNA strands are

- (a) coiled around a common axis
- (b) coiled around each other

- (c) coiled differently
- (d) coiled over protein sheath.

(1988)

9.10 Metabolic Basis for Living

57. ATP is

- (a) nucleotide
- (b) nucleoside
- (c) nucleic acid
- (d) vitamin.

(2000)

9.12 Enzymes

58. Match the following.

- | | |
|-------------------------------------|---------------|
| (A) Inhibitor of catalytic activity | (i) Ricin |
| (B) Possess peptide bonds | (ii) Malonate |
| (C) Cell wall material in fungi | (iii) Chitin |
| (D) Secondary metabolite | (iv) Collagen |

Choose the correct option from the following:

- | (A) | (B) | (C) | (D) |
|-----------|-------|-------|------|
| (a) (ii) | (iv) | (iii) | (i) |
| (b) (iii) | (i) | (iv) | (ii) |
| (c) (iii) | (iv) | (i) | (ii) |
| (d) (ii) | (iii) | (i) | (iv) |

(NEET 2020)

59. Consider the following statements.

- (A) Coenzyme or metal ion that is tightly bound to enzyme protein is called prosthetic group.
- (B) A complete catalytic active enzyme with its bound prosthetic group is called apoenzyme.

Select the correct option.

- (a) (A) is false but (B) is true.
- (b) Both (A) and (B) are true.
- (c) (A) is true but (B) is false.
- (d) Both (A) and (B) are false.

(NEET 2019)

60. Prosthetic groups differ from co-enzymes in that

- (a) they require metal ions for their activity
- (b) they (prosthetic groups) are tightly bound to apoenzymes
- (c) their association with apoenzymes is transient
- (d) they can serve as co-factors in a number of enzyme-catalyzed reactions.

(Odisha NEET 2019)

61. Which of the following statements is correct with reference to enzymes?

- (a) Holoenzyme = Apoenzyme + Coenzyme
- (b) Coenzyme = Apoenzyme + Holoenzyme
- (c) Holoenzyme = Coenzyme + Co-factor
- (d) Apoenzyme = Holoenzyme + Coenzyme

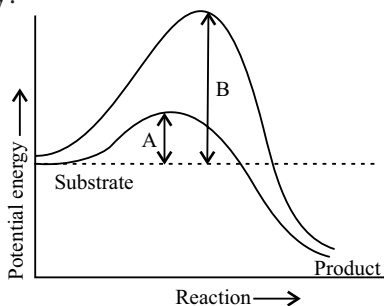
(NEET 2017)

62. A non-proteinaceous enzyme is

- (a) lysozyme
- (b) ribozyme
- (c) ligase
- (d) deoxyribonuclease.

(NEET-II 2016)

63. Which of the following describes the given graph correctly?



- Endothermic reaction with energy A in presence of enzyme and B in absence of enzyme.
- Exothermic reaction with energy A in presence of enzyme and B in absence of enzyme.
- Endothermic reaction with energy A in absence of enzyme and B in presence of enzyme.
- Exothermic reaction with energy A in absence of enzyme and B in presence of enzyme.

(NEET-II 2016)

64. Which one of the following statements is incorrect?

- The competitive inhibitor does not affect the rate of breakdown of the enzyme-substrate complex.
- The presence of the competitive inhibitor decreases the K_m of the enzyme for the substrate.
- A competitive inhibitor reacts reversibly with the enzyme to form an enzyme-inhibitor complex.
- In competitive inhibition, the inhibitor molecule is not chemically changed by the enzyme.

(2015 Cancelled)

65. Select the option which is not correct with respect to enzyme action.

- Substrate binds with enzyme at its active site.
- Addition of lot of succinate does not reverse the inhibition of succinic dehydrogenase by malonate.
- A non-competitive inhibitor binds the enzyme at a site distinct from that which binds the substrate.
- Malonate is a competitive inhibitor of succinic dehydrogenase.

(2014)

66. Transition state structure of the substrate formed during an enzymatic reaction is

- transient and unstable
- permanent and stable
- transient but stable
- permanent but unstable.

(NEET 2013)

67. The essential chemical components of many coenzymes are

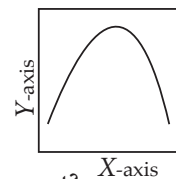
- carbohydrates
- vitamins
- proteins
- nucleic acids.

(NEET 2013)

68. Which of the following statements about enzymes is wrong?

- Enzymes are denatured at high temperatures.
- Enzymes are mostly proteins but some are lipids also.
- Enzymes are highly specific.
- Enzymes require optimum pH and temperature for maximum activity. (Karnataka NEET 2013)

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



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

X-axis **Y-axis**

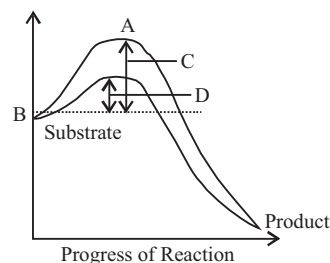
- Enzymatic activity pH
- Temperature Enzyme activity
- Substrate concentration Enzymatic activity
- Enzymatic activity Temperature (2011)

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

- Enzymes require optimum pH for maximal activity.
- Enzymes are denatured at high temperature but in certain exceptional organisms they are effective even at temperatures $80^\circ - 90^\circ\text{C}$.
- Enzymes are highly specific.
- Most enzymes are proteins but some are lipids.

(Mains 2010)

71. The figure given below shows the conversion of a substrate into product by an enzyme. In which one of the four options (A-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 with enzyme | Activation energy without enzyme |
| (d) | Activation energy with enzyme | Transition state | Activation energy without enzyme | Potential energy |

(Mains 2010)

72. A competitive inhibitor of succinic dehydrogenase is
 (a) α -ketoglutarate (b) malate
 (c) malonate (d) oxaloacetate. (2008)
73. Modern detergents contain enzyme preparations of
 (a) thermoacidophiles
 (b) thermophiles
 (c) acidophiles
 (d) alkaliphiles. (2008)
74. An organic substance bound to an enzyme and essential for its activity is called
 (a) isoenzyme (b) coenzyme
 (c) holoenzyme (d) apoenzyme. (2006)
75. The catalytic efficiency of two different enzymes can be compared by the
 (a) formation of the product
 (b) pH of optimum value
 (c) K_m value
 (d) molecular size of the enzyme. (2005)
76. Which one of the following statements regarding enzyme inhibition is correct?
 (a) Competitive inhibition is seen when a substrate competes with an enzyme for binding to an inhibitor protein.
 (b) Competitive inhibition is seen when the substrate and the inhibitor compete for the active site on the enzyme.
 (c) Non-competitive inhibition of an enzyme can be overcome by adding large amount of substrate.
 (d) Non-competitive inhibitors often bind to the enzyme irreversibly. (2005)
77. Enzymes, vitamins and hormones can be classified into a single category of biological chemicals, because all of these
 (a) help in regulating metabolism
 (b) are exclusively synthesized in the body of a living organism as at present
 (c) are conjugated proteins
 (d) enhance oxidative metabolism. (2005)
78. In which one of the following enzymes, is copper necessarily associated as an activator?
 (a) Carbonic anhydrase
 (b) Tryptophanase
 (c) Lactic dehydrogenase
 (d) Tyrosinase (2004)
79. Role of an enzyme in reactions is to/as
 (a) decrease activation energy
 (b) increase activation energy
 (c) inorganic catalyst
 (d) none of the above. (2000)
80. Which factor is responsible for inhibition of enzymatic process during feedback?
 (a) Substrate (b) Enzymes
 (c) End product (d) Temperature (2000)
81. Enzymes are not found in
 (a) fungi (b) algae
 (c) virus (d) cyanobacteria. (2000)
82. Co-factor (prosthetic group) is a part of holoenzyme. It is
 (a) loosely attached organic part
 (b) loosely attached inorganic part
 (c) accessory non-protein substance attached firmly
 (d) none of these. (1997)
83. Which is a typical example of 'feedback inhibition'?
 (a) Cyanide and cytochrome reaction
 (b) Sulpha drugs and folic acid synthesizer bacteria
 (c) Allosteric inhibition of hexokinase by glucose 6-phosphate
 (d) Reaction between succinic dehydrogenase and succinic acid (1996)
84. Enzymes having slightly different molecular structure but performing identical activity are
 (a) holoenzymes (b) isoenzymes
 (c) apoenzymes (d) coenzymes. (1991)

ANSWER KEY

1. (c) 2. (d) 3. (d) 4. (a) 5. (a) 6. (b) 7. (d) 8. (a) 9. (d) 10. (d)
 11. (c) 12. (a) 13. (b) 14. (d) 15. (a) 16. (c) 17. (c) 18. (d) 19. (d) 20. (c)
 21. (d) 22. (b) 23. (a) 24. (c) 25. (a) 26. (b) 27. (a) 28. (b) 29. (c) 30. (d)
 31. (c) 32. (a) 33. (a) 34. (b) 35. (a) 36. (d) 37. (b) 38. (c) 39. (a) 40. (d)
 41. (a) 42. (d) 43. (a) 44. (c) 45. (d) 46. (d) 47. (b) 48. (b) 49. (d) 50. (*)
 51. (d) 52. (b) 53. (c) 54. (d) 55. (c) 56. (a) 57. (a) 58. (a) 59. (d) 60. (b)
 61. (a) 62. (b) 63. (b) 64. (b) 65. (b) 66. (a) 67. (b) 68. (b) 69. (b) 70. (d)
 71. (b) 72. (c,d) 73. (d) 74. (b) 75. (c) 76. (b) 77. (a) 78. (d) 79. (a) 80. (c)
 81. (c) 82. (c) 83. (c) 84. (b)