

Solutions

S1. Ans.(a)

Some lipids have phosphorous and a phosphorylated organic compound in them. These are phospholipids. They are found in cell membrane. Lecithin is one example. Option (b) is incorrect as glycerides are another group of lipids in which both glycerol and fatty acids are present. Option (c) and (d) are incorrect as carbohydrates and amino acids are separate groups of biomolecules.

S2. Ans.(d)

The correct answer is option (d) as the cofactor of the enzyme carboxypeptidase is zinc. Niacin is associated with coenzyme NAD and NADP. Option (c) is incorrect as haem is the prosthetic group in peroxidase and catalase

S3. Ans.(b)

Correct answer is option (b) because malonate shows close structural similarity with the substrate and it competes with the substrate for the substrate binding site of the enzyme succinic dehydrogenase.

Option (a), (c) and (d) are incorrect as enzyme activation, co-factor inhibition are not showing structural similarity with substrate.

S4. Ans.(d)

Correct answer is option (d)

A.	GLUT-4	IV.	Enables glucose transport into cells
B.	Insulin	I.	Hormone
C.	Trypsin	II.	Enzyme
D.	Collagen	III.	Intercellular ground substance

S5. Ans.(b)

The correct answer is option (b) as

A. Lipase – Digests ester bond found in lipids.

B. Nuclease – Helps in digestion of phosphodiester bonds found in nucleic acids.

C. Protease – Helps in digestion of peptide bond found in proteins.

D. Amylase – Digests/breaks the glycosidic bonds found in carbohydrates i.e., digest starch into smaller molecules, ultimately yielding maltose, which in turn is cleaved into two glucose molecules by maltase.

S6. Ans.(d)

The correct answer is option (d) which is E, A, D, C, B.

The catalytic cycle of an enzyme action can be described in the following steps.

(1) The binding of the substrate induces the enzyme to alter its shape, fitting more tightly around the substrate.

(2) 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.

(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) First, the substrate binds to the active site of the enzyme, fitting into the active site.

Options (a), (b) and (c) are incorrect as the steps mentioned are in the wrong sequence.

S7. Ans.(b)

Option (b) is the correct answer because cellulose does not contain complex helices and hence cannot hold iodine molecules.

S8. Ans.(c)

The correct answer is option (c) as a protein is imagined as a line, the left end represented by the first amino acid and the right end is represented by the last amino acid. The first amino acid is also called N-terminal amino acid. The last amino acid is called the C-terminal amino acid.

S9. Ans.(d)

Low temperatures can slow down enzyme activity but do not typically denature the enzyme, essentially preserving it in an inactive state. High temperatures, on the other hand, can cause the enzyme (which is a protein) to denature, or lose its structure, which leads to a loss of enzymatic activity.

A competitive inhibitor is a substance that binds to the active site of an enzyme, preventing the substrate from binding and thus inhibiting the enzyme's activity. Because it competes with the substrate for the same active site, a competitive inhibitor often has a structure that closely resembles that of the substrate.

S10. Ans.(a)

A symport is the transport of two types of molecules across the membrane in same direction. Antiport is the transport of two different molecules in opposite directions. Uniport is transport of a molecule across the membrane independent of other molecule.

S11. Ans.(b)

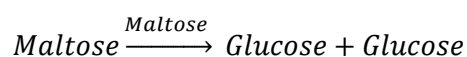
is the correct answer as adenine is a purine, anthocyanin is a pigment, chitin is a homopolysaccharide and codeine is an alkaloid.

S12. Ans.(d)

Is the correct answer because primary proteins are heteropolymers containing strings of amino acids linked by peptide bonds.

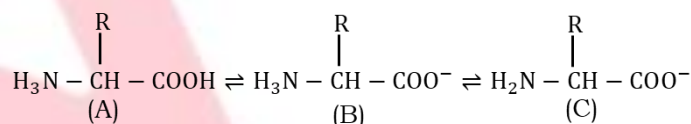
S13. Ans.(b)

Is the correct answer because maltose is a disaccharide which on hydrolysis gives two molecules of glucose.



S14. Ans.(d)

A particular property amino acids is the ionizable nature of $-\text{NH}_2$ $-\text{COOH}$ groups. Hence, In solutions of different pH, the structure of amino acid changes. Amino acid exists as a dipolar ion called a zwitterion at a particular pH called isoelectric point.



S15. Ans.(c)

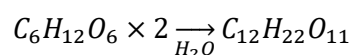
Is the correct answer because peroxidase is the enzymes that catalyzes the breakdown of hydrogen peroxide to water and oxygen; haem is the prosthetic group of this enzyme.

S16. Ans.(c)

Option c is the correct answer because statements (C), (D) and (E) correct as oil have lower melting point and hence remain oil winter. Lipids are generally insoluble in water but soluble in some organic solvents.

S17. Ans.(c)

Option c is correct because maltose is a disaccharide formed by dehydration process i.e., synthesis by elimination of one water molecule to form a glycosidic bond in between two glucose molecules. So its molecular formula is



S18. Ans.(d)

Option (d) is the correct answer as glycogen is a polysaccharide and is a storage product in animals.

Globulins form antibodies which are also known as immunoglobulins.

Steroids form hormones like testosterone.

Thrombin is a biocatalyst which converts soluble fibrinogen to insoluble fibrin

S19. Ans.(a)

Amino acid and glucose are not Secondary metabolites.

S20. Ans.(d)

Protein has peptide bond;

- Unsaturated fatty acid has C=C bond.
- Nucleic acid has phosphodiester bond.
- Polysaccharide has glycosidic bond.

S21. Ans.(c)

Drug-Vinblastine, Curcumin (Secondary Metabolite)

S22. Ans.(b)

- Lipids having only single bonds are called saturated fatty acids.
- Lecithin is a phospholipid; Trihydroxypropane is glycerol.
- Palmitic fatty acid has 16 carbon atoms including carboxyl carbon.
- Arachidonic acid has 20 carbon atom.

S23. Ans.(b)

- Lysine is a basic amino acid. Valine is an non- essential amino acid.
- Glutamic acid is an amino acid that is acidic. Aromatic amino acid is tyrosine

S24. Ans.(d)

- Secondary metabolites is ricin
- Malonate is a competitive inhibitor of Succinic dehydrogenase catalytic activity.
- Chitin is found in cell walls of fungi And exoskeletons of arthropods.

- Collagen is a proteinaceous material with peptide linkages.

S25. Ans.(a)

RuBisCO is the most prevalent protein in the biosphere whereas collagen is the most abundant protein in animals.

S26. Ans.(c)

- Inulin is a fructose polymer bound together by glycosidic linkages.
- Insulin is a 51-amino-acid protein that Functions as a hormone. Peptide bonds bind these amino acids together.

S27. Ans.(a)

Amino acids, include glycine. It is the most common amino acid with hydrogen serving as the R-group.

S28. Ans.(d)

Chitin is a polysaccharide, made up of units of N-acetylglucosamine, asparagine is an amide, Absciscic acid is an essential carotenoid derived plant hormone and aquaporin is an example of polypeptide.

S29. Ans.(d)

- GLUT-IV is an insulin-dependent glucose transporter that is responsible for the majority of glucose transfer into muscle and adipose cells.
- GLUT-I, on the other hand, is insulin-Independent and found in a variety of tissues.

S30. Ans.(c)

Concanavalin A is a lectin which is a secondary metabolite. It has the ability to agglutinate red blood cells (RBCs).

S31. Ans.(b)

- A prosthetic group is a coenzyme or metal ion that is strongly attached (covalently) to an enzyme protein.
- Holoenzyme is a complete catalytically Active enzyme with a bonded prosthetic group.

S32. Ans.(d)

- Carbonyl functional groups ($-C=O$) and a number of hydroxyl functional groups ($C-OH$) are found in all carbohydrates (sugar).
- Sugar is named aldose if the carbonyl group is aldehyde.
- Ketose if the carbonyl group is ketone.

S33. Ans.(b)

Non-protein components bind to the enzyme causing it to become active.

Apo-enzyme is the protein part of enzyme. Co-factor + Apoenzyme = Enzyme There are three sorts of co-factors:

- Organic and securely linked to the apoenzyme is the prosthetic group. Haem is a prosthetic group in peroxidase and catalase, for example.
- Organic molecules that are weakly linked to an apoenzyme are known as co-enzymes. Vitamins are an important component of many coenzymes. Niacin is found in NAD and NADP, for example.
- Metal ions create co-ordination bonds with side chains at the active site and one or more co-ordination bonds with the substrate at the same time.

S34. Ans.(d)

Nucleic acids are nucleotide polymers; proteins are amino acid polymers; polysaccharides are monosaccharide polymers; lipids are fatty acid and alcohol esters.

S35. Ans.(d)

One glycerol molecule and three fatty acid molecules make up a fat molecule.

S36. Ans.(d)

Diagrammatic factual question

S37. Ans.(b)

- Three-dimensional folding of proteins refers to bringing amino acids that are widely apart in the polypeptide

sequence together within a protein's fully folded structure.

- In proteins, many interactions hold the interacting segments together.
- The weakest contacts are hydrophobic interactions, H bonds and electrostatic interactions, which stabilise the tertiary structure of proteins.
- Ester bonds are covalent bonds that are least likely to be found there

S38. Ans.(d)

The RNAs that serve as enzymes are known as ribozymes. Ligases, deoxyribonucleases and lysozymes are preproteinaceous enzymes, means that they are made up of proteins.

S39. Ans.(d)

Glycine's chemical formula is



S40. Ans.(b)

K_m is increased as inhibitor interferes with the binding of substrate and this inhibition can be overcome by increasing the substrate concentration

S41. Ans.(b)

- Chitin is a heteropolysaccharide that is found in the exoskeleton of arthropods.
- The basic unit is N-acetyl glucosamine which is linked together by $\beta(1-4)$ linkage.

S42. Ans.(c)

- The addition of a large amount of succinate reverses the malonate-induced inhibition of succinic dehydrogenase.
- The structure of malonate is very similar to that of the substrate succinate.

S43. Ans.(c)

Sucrose does not contain a free aldehydic group. As a result, it has no effect on Tollen's reagent.

S44. Ans.(a)

Organic molecules that are weakly linked to an apoenzyme are known as co-enzymes.

- Vitamins are an important component of many coenzymes. Niacin is found in NAD and NADP, for example.

S45. Ans.(d)

Transition state structure is formed during enzymatic reaction.

- The substrate binds to the active site of the enzymes forms an enzyme-substrate complex (ES complex).
- This structure is transient and unstable.

S46. Ans.(d)

Glycerol and fatty acids are the two types of molecules that make up fat.

- Three fatty acid molecules form an ester bond with glycerol to form a fat.
- The carbon skeleton of a fatty acid is normally 16 or 18 carbon atoms long.
- Saturated and unsaturated fatty acids exist.

