

Biomolecules — NEET Biology PYQ (2005-2021)

Class 11 Biology · 41 real NEET & AIPMT questions, year-tagged · answers checked by RankUp

NEET 2021

1. Which of the following are not secondary metabolites in plants ?

- (A) Morphine, codeine
- (B) Amino acids, glucose
- (C) Vinblastin, curcumin
- (D) Rubber, gums

NEET 2021

2. Match List - I with List - II.

List - I | List - II

(a) Protein | (i) C = C double bonds

(b) Unsaturated fatty acid | (ii) Phosphodiester bonds

(c) Nucleic acid | (iii) Glycosidic bonds

(d) Polysaccharide | (iv) Peptide bonds

Choose the correct answer from the options given below.

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

NEET 2021

3. Identify the incorrect pair.

- (A) Alkaloids - Codeine
- (B) Toxin - Abrin
- (C) Lectins - Concanavalin A
- (D) Drugs - Ricin

NEET 2021

4. Following are the statements with reference to 'lipids'.

(a) Lipids having only single bonds are called unsaturated fatty acids.

(b) Lecithin is a phospholipid.

(c) Trihydroxy propane is glycerol.

(d) Palmitic acid has 20 carbon atoms including carboxyl carbon.

(e) Arachidonic acid has 16 carbon atoms.

Choose the correct answer from the options given below.

- (A) (a) and (b) only
- (B) (c) and (d) only
- (C) (b) and (c) only
- (D) (b) and (e) only

NEET 2020 · Q11

5. 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 · Q30

6. 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) (a)-ii, (b)-iv, (c)-iii, (d)-i

(B) (a)-iii, (b)-i, (c)-iv, (d)-ii

(C) (a)-iii, (b)-iv, (c)-i, (d)-ii

(D) (a)-ii, (b)-iii, (c)-i, (d)-iv

NEET 2020 · Q41

7. 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 · Q79

8. Identify the basic amino acid from the following.

(A) Tyrosine

(B) Glutamic Acid

(C) Lysine

(D) Valine

NEET 2020 · Q82

9. Which one of the following is the most abundant protein in the animals?

(A) Haemoglobin

(B) Collagen

(C) Lectin

(D) Insulin

NEET 2019 · Q112

10. Concanavalin A is :

(A) an alkaloid

(B) an essential oil

(C) a lectin

(D) a pigment

NEET 2018 · Q117

11. The two functional groups characteristic of sugars are

(A) carbonyl and phosphate

(B) carbonyl and methyl

(C) hydroxyl and methyl

(D) carbonyl and hydroxyl

NEET 2017 · Q54

12. Which of the following are not polymeric?

(A) Nucleic acids

(B) Proteins

(C) Polysaccharides

(D) Lipids

NEET 2017 (Gujarati paper) · Q52

13. Which 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 inhibition protein.
- (B) Competitive inhibition is seen when the substrate and the inhibitor compete.
- (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

NEET 2017 (Gujarati paper) · Q57

14. A fat molecule is formed from:

- (A) One glycerol molecule and one fatty acid molecule.
- (B) Three glycerol molecules and three fatty acid molecules.
- (C) One glycerol molecule and three fatty acid molecules.
- (D) Three glycerol molecules and one fatty acid molecule.

NEET 2017 (Gujarati paper) · Q127

15. Which of the following enzymes is not protein?

- (A) Polymerase
- (B) Ligase
- (C) Lysozyme
- (D) Ribozyme

NEET 2016 Phase 2 · Q103

16. A non-proteinaceous enzyme is

- (A) lysozyme
- (B) ribozyme
- (C) ligase
- (D) deoxyribonuclease

NEET 2016 Phase 2 · Q143

17. Which of the following is the least likely to be involved in stabilizing the three-dimensional folding of most proteins?

- (A) Hydrogen bonds
- (B) Electrostatic interaction
- (C) Hydrophobic interaction
- (D) Ester bonds

NEET 2016 Phase 1 · Q153

18. Which one of the following statements is wrong?

- (A) Sucrose is a disaccharide.
- (B) Cellulose is a polysaccharide.
- (C) Uracil is a pyrimidine.
- (D) Glycine is a sulphur containing amino acid.

NEET 2016 Phase 1 · Q180

19. A typical fat molecule is made up of:

- (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

AIPMT 2015

20. Which one of the following statements is incorrect?

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

AIPMT 2014

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

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

AIPMT 2014

22. Which one of the following is a non-reducing carbohydrate?

- (A) Sucrose
- (B) Lactose
- (C) Ribose 5-phosphate
- (D) Maltose

NEET 2013

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

- (A) Transient but stable
- (B) Permanent but unstable
- (C) Transient and unstable
- (D) Permanent and stable

NEET 2013

24. A phosphoglyceride is always made up of

- (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

NEET 2013

25. The most abundant intracellular cation is

- (A) Na^+
- (B) Ca^{2+}
- (C) H^+
- (D) K^+

NEET 2013

26. Macromolecule chitin is

- (A) nitrogen containing polysaccharide
- (B) phosphorus containing polysaccharide
- (C) sulphur containing polysaccharide
- (D) simple polysaccharide

NEET 2013

27. The essential chemical components of many coenzymes are

- (A) Proteins
- (B) Nucleic acids
- (C) Carbohydrates
- (D) Vitamins

28. For its activity, carboxypeptidase requires

- (A) Zinc
- (B) Iron
- (C) Niacin
- (D) Copper

29. Which one of the following biomolecules is correctly characterised ?

- (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

30. Which one of the structures given below correctly represents the structural formula of the basic amino acid?

- (A) $\text{HOCH}_2\text{--CH}_2\text{--CH}_2\text{--NH}_2$
- (B) $\text{H}_2\text{N--CH(COOH)--CH}_2\text{--CH}_2\text{--CH}_2\text{--CH}_2\text{--NH}_2$
- (C) $\text{H}_2\text{N--CH(COOH)--CH}_2\text{--CH}_2\text{--COOH}$
- (D) $\text{H}_2\text{N--CH(COOH)--CH}_2\text{--OH}$

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

- (A) Insulin
- (B) Trypsin
- (C) Haemoglobin
- (D) Collagen

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

- (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 80°-90°C
- (C) Enzymes are highly specific
- (D) Most enzymes are proteins but some are lipids

33. A competitive inhibitor of succinic dehydrogenase is

- (A) Malate
- (B) Malonate
- (C) Oxaloacetate
- (D) α -ketoglutarate

34. Carbohydrates are commonly found as starch in plant storage organs. Which of the following five properties of starch (a - e) make it useful as a storage material?

- a. Easily translocated**
- b. Chemically non-reactive**
- c. Easily digested by animals**
- d. Osmotically inactive**
- e. Synthesized during photosynthesis**

The useful properties are

- (A) Both a & e
- (B) Both b & c
- (C) Both b & d
- (D) a, c & e

AIPMT 2007 Prelims · Q136

35. 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

AIPMT 2006 Prelims · Q137

36. An organic substance bound to an enzyme and essential for its activity is called :

- (A) coenzyme
- (B) holoenzyme
- (C) apoenzyme
- (D) isoenzyme

AIPMT 2005 Prelims · Q133

37. Nucleotide are building blocks of nucleic acids, nucleotide is a composite molecule formed by :

- (A) (base-sugar-phosphate)_n
- (B) base-sugar-OH
- (C) base-sugar-phosphate
- (D) sugar-phosphate

AIPMT 2005 Prelims · Q137

38. Which of the following is the simplest amino acid ?

- (A) Tyrosine
- (B) Asparagine
- (C) Glycine
- (D) Alanine

AIPMT 2005 Prelims · Q140

39. Enzymes, vitamins and hormones can be classified into a single category of biological chemicals, because all of these :

- (A) enhance oxidative metabolism
- (B) are conjugated proteins
- (C) are exclusively synthesized in the body of a living organism as at present
- (D) help in regulating metabolism

AIPMT 2005 Prelims · Q179

40. Which of the following statements regarding enzyme inhibition is correct ?

- (A) Non-competitive inhibition of an enzyme can be overcome by adding large amount of substrate
- (B) Competitive inhibition is seen when a substrate competes with an enzyme for binding to an inhibitor protein
- (C) Competitive inhibition is seen when the substrate and the inhibitor compete
- (D) Non-competitive inhibitors often bind to the enzyme irreversibly

AIPMT 2005 Prelims · Q181

41. The catalytic efficiency of two different enzymes can be compared by the :

- (A) the K_m value
- (B) the pH optimum value
- (C) formation of the product
- (D) molecular size of the enzyme

Answer key and explanations

1. Answer: (B) Amino acids, glucose

Amino acids and glucose are primary metabolites used in basic metabolism like respiration and protein synthesis. Morphine and codeine (alkaloids), vinblastin and curcumin (drugs) and rubber and gums are secondary metabolites.

2. Answer: (A) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)

Amino acids in proteins are linked by peptide bonds, unsaturated fatty acids have C = C double bonds, nucleotides in nucleic acids are joined by phosphodiester bonds, and sugars in polysaccharides by glycosidic bonds. Hence (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii).

3. Answer: (D) Drugs - Ricin

Ricin, like abrin, is a toxin, so pairing it with drugs is incorrect. Codeine is an alkaloid, abrin a toxin and concanavalin A a lectin, so those pairs are correct.

4. Answer: (C) (b) and (c) only

Lecithin is a phospholipid and glycerol is trihydroxy propane, so (b) and (c) are true. Fatty acids with only single bonds are saturated, palmitic acid has 16 carbons and arachidonic acid has 20, so (a), (d) and (e) are false.

5. Answer: (D) Inulin, insulin

Inulin is a polymer of fructose units linked by glycosidic bonds, and insulin is a protein whose amino acids are linked by peptide bonds. Cholesterol is a steroid with neither bond, glycerol is a simple alcohol, and lecithin is a phospholipid, so the other pairs fail.

6. Answer: (A) (a)-ii, (b)-iv, (c)-iii, (d)-i

Malonate is a competitive inhibitor of succinate dehydrogenase, collagen is a protein with peptide bonds, chitin is the fungal cell-wall material, and ricin is a toxin listed as a secondary metabolite. Hence malonate, collagen, chitin, ricin is correct.

7. Answer: (C) Defence action

Alkaloids such as nicotine, strychnine and caffeine are secondary metabolites that protect plants by making them toxic or unpalatable to herbivores. They have no nutritive role and are not growth or reproductive substances.

8. Answer: (C) Lysine

Lysine has an extra amino group in its R group, making it a basic amino acid. Glutamic acid is acidic, while tyrosine (aromatic) and valine are neutral.

9. Answer: (B) Collagen

Collagen is the most abundant protein in the animal world. RuBisCO is the most abundant protein in the whole biosphere, and haemoglobin, lectin and insulin are present in far smaller amounts.

10. Answer: (C) a lectin

Concanavalin A is a lectin, a carbohydrate-binding protein from jack bean, listed among secondary metabolites. Alkaloids such as morphine and essential oils such as lemongrass oil are different classes.

11. Answer: (D) carbonyl and hydroxyl

Sugars are polyhydroxy aldehydes or ketones, so they carry several hydroxyl groups and one carbonyl group (aldehyde or keto). Phosphate occurs only in sugar phosphates and nucleotides, and a methyl group is not characteristic of sugars.

12. Answer: (D) Lipids

Lipids are small molecules (molecular weight below about 800 Da) built from fatty acids and glycerol, not repeating monomers, so they are not true polymers; they only appear in the acid-insoluble fraction because they form membrane vesicles. Nucleic acids, proteins and polysaccharides are polymers of nucleotides, amino acids and monosaccharides.

13. Answer: (B) Competitive inhibition is seen when the substrate and the inhibitor compete.

In competitive inhibition a substrate-like inhibitor and the substrate compete for the same active site. It is competitive (not non-competitive) inhibition that can be overcome by raising substrate concentration, and non-competitive inhibitors typically bind reversibly at an allosteric site.

14. Answer: (C) One glycerol molecule and three fatty acid molecules.

A fat (triglyceride) is formed by esterification of the three hydroxyl groups of one glycerol with three fatty acids. One glycerol with one fatty acid gives only a monoglyceride.

15. Answer: (D) Ribozyme

Ribozymes are catalytic RNA molecules (for example the peptidyl transferase activity of rRNA), so they are not proteins. Polymerases, ligases and lysozyme are all protein enzymes.

16. Answer: (B) ribozyme

A ribozyme is an RNA molecule with catalytic activity, such as the 23S rRNA that acts as peptidyl transferase, so it is not a protein. Lysozyme, ligase and deoxyribonuclease are all protein enzymes.

17. Answer: (D) Ester bonds

The tertiary structure of proteins is held by hydrogen bonds, ionic (electrostatic) interactions, hydrophobic interactions and disulphide bridges. Ester bonds join fatty acids to glycerol in lipids and are not used to hold protein folds.

18. Answer: (D) Glycine is a sulphur containing amino acid.

Glycine is the simplest amino acid with H as its side chain and has no sulphur; the sulphur-containing amino acids are cysteine and methionine. The other statements are correct.

19. Answer: (B) One glycerol and three fatty acid molecules

A typical fat (triglyceride) is formed by esterification of one glycerol molecule with three fatty acid molecules. Monoglycerides have only one fatty acid, and fats never contain three glycerols.

20. Answer: (A) The presence of the competitive inhibitor decreases the K_m of the enzyme for the substrate

A competitive inhibitor competes with the substrate for the active site, so more substrate is needed to reach half V_{max} , i.e. the apparent K_m increases, not decreases. It binds reversibly and is not chemically changed by the enzyme.

21. Answer: (A) Addition of lot of succinate does not reverse the inhibition of succinic dehydrogenase by malonate

Malonate resembles succinate and is a competitive inhibitor of succinic dehydrogenase, so adding a large excess of succinate out-competes it and reverses the inhibition; the statement that it does not reverse the inhibition is therefore incorrect. The other statements (substrate binds at the active site, non-competitive inhibitors bind elsewhere, malonate is competitive) are all true.

22. Answer: (A) Sucrose

In sucrose the glycosidic bond joins C1 of glucose with C2 of fructose, so both reducing (carbonyl) groups are tied up and the sugar is non-reducing. Lactose and maltose each keep one free anomeric carbon and ribose 5-phosphate has a free aldehyde group, so they are reducing.

23. Answer: (C) Transient and unstable

The transition state of the substrate exists only very briefly at the top of the energy barrier and is a high-energy, unstable structure before it forms product. It is therefore both transient and unstable, not stable or permanent.

24. Answer: (C) A saturated or unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached

In a phosphoglyceride (e.g. lecithin), fatty acids, which may be saturated or unsaturated, are esterified to glycerol, and the glycerol also carries a phosphate group. The fatty acid is not esterified to the phosphate, and it need not be only saturated or only unsaturated.

25. Answer: (D) K^+

Potassium ion is the chief cation inside cells, while sodium ion is the chief cation of extracellular fluid. Calcium and hydrogen ions are present inside cells at far lower concentrations.

26. Answer: (A) nitrogen containing polysaccharide

Chitin is a homopolymer of N-acetylglucosamine, so it is a nitrogen-containing polysaccharide. It is a complex polysaccharide with amino sugar units, not a simple one, and it has no phosphorus or sulphur.

27. Answer: (D) Vitamins

Many coenzymes are derived from vitamins, e.g. NAD and NADP contain niacin and FAD contains riboflavin. Coenzymes are non-protein organic compounds, so proteins are not their components.

28. Answer: (A) Zinc

Carboxypeptidase is a metalloenzyme that needs zinc as its cofactor. Niacin is a vitamin forming the coenzymes NAD/NADP, not the cofactor of this enzyme.

29. Answer: (A) Lecithin - a phosphorylated glyceride found in cell membrane

Lecithin is a phospholipid, a glyceride carrying a phosphate group, and it is a major part of cell membranes. Palmitic acid is a saturated 16-carbon fatty acid, and adenylic acid contains ribose, not glucose.

30. Answer: (B) $H_2N-CH(COOH)-CH_2-CH_2-CH_2-CH_2-NH_2$

Lysine, $H_2N-CH(COOH)-(CH_2)_4-NH_2$, carries an extra amino group in its side chain, which makes it a basic amino acid. The structure with an extra $-COOH$ in the side chain is glutamic acid (acidic), the one with $-CH_2OH$ is serine (neutral), and $HOCH_2-CH_2-CH_2-NH_2$ is not an amino acid at all.

31. Answer: (D) Collagen

Collagen is the most abundant protein in the animal world. RuBisCO is the most abundant protein in the whole biosphere, but it is a plant protein; haemoglobin, insulin and trypsin are far less abundant.

32. Answer: (D) Most enzymes are proteins but some are lipids

Almost all enzymes are proteins, and the non-protein exceptions are RNA molecules (ribozymes), not lipids. Enzymes of thermophilic organisms in hot springs do stay active at 80-90°C, and enzymes do have an optimum pH and high specificity.

33. Answer: (B) Malonate

Malonate closely resembles succinate in structure, so it binds the active site of succinic dehydrogenase and competes with the substrate, the NCERT example of competitive inhibition. Malate and oxaloacetate are downstream Krebs cycle intermediates, not the classic inhibitor.

34. Answer: (C) Both b & d

Starch is a large, insoluble polymer, so it is chemically unreactive and exerts no osmotic effect, letting cells store a lot of it without drawing in water. It is not easily translocated (sugars like sucrose are), and being digestible by animals is irrelevant to the plant's storage needs.

35. Answer: (C) calcium and phosphorus

Oxygen, carbon, hydrogen, nitrogen, calcium and phosphorus together make up about 98-99% of body mass; calcium and phosphorus are abundant in bone and nucleic acids. Sulphur, sodium and magnesium are present only in much smaller amounts.

36. Answer: (A) coenzyme

An organic non-protein molecule that binds an enzyme and is needed for its activity is a coenzyme (a tightly bound one is called a prosthetic group). An apoenzyme is the protein part alone, and a holoenzyme is the complete active enzyme.

37. Answer: (C) base-sugar-phosphate

A nucleotide is a nitrogenous base joined to a pentose sugar (a nucleoside) plus a phosphate group. '(base-sugar-phosphate)_n' describes a polynucleotide chain, and 'base-sugar' alone is a nucleoside.

38. Answer: (C) Glycine

Glycine is the simplest amino acid because its R group is just a hydrogen atom. Alanine has a methyl group, and tyrosine and asparagine have larger side chains.

39. Answer: (D) help in regulating metabolism

What enzymes, vitamins (often as coenzymes) and hormones have in common is that they control the rate and direction of metabolism. They are not all proteins (many vitamins and steroid hormones are not), and vitamins are mostly obtained from food rather than made in the body.

40. Answer: (C) Competitive inhibition is seen when the substrate and the inhibitor compete

In competitive inhibition, a substrate-like inhibitor competes with the substrate for the enzyme's active site (for example malonate against succinate). Adding more substrate overcomes competitive inhibition, not non-competitive inhibition.

41. Answer: (A) the K_m value

K_m, the substrate concentration that gives half the maximum velocity, reflects an enzyme's affinity for its substrate: a lower K_m means higher affinity and efficiency. It is the standard value for comparing enzymes. pH optimum and molecular size say nothing about catalytic efficiency.

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