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Biology Grade 9 — Chapter 7

Metabolism

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Independent practice MCQs from the supplied Class 9 Biology notes pack. Total: 50 questions.

A. Important / Main Topics

1. The sum of all chemical reactions within a cell is called:

(A) Metabolism
(B) Catabolism
(C) Anabolism
(D) Digestion

Correct Answer: A

Explanation: Metabolism is the sum of all chemical reactions within a cell.

2. Which of the following is a catabolic process?

(A) Photosynthesis
(B) Cellular respiration
(C) Glycogen synthesis
(D) Protein synthesis

Correct Answer: B

Explanation: Cellular respiration is a catabolic process (breaks down glucose).

3. Enzymes are:

(A) Carbohydrates
(B) Lipids
(C) Globular proteins
(D) Nucleic acids

Correct Answer: C

Explanation: Enzymes are biologically active globular proteins (few are RNA).

4. The molecules on which enzymes act are called:

(A) Products
(B) Cofactors
(C) Activators
(D) Substrates

Correct Answer: D

Explanation: Substrates are the molecules entering into chemical reactions that bind to enzymes.

5. The specific part of the enzyme where the substrate binds is called the:

(A) Active site
(B) Allosteric site
(C) Inhibitor site
(D) Cofactor site

Correct Answer: A

Explanation: The active site is where the substrate binds and takes part in the reaction.

6. The complex formed when the substrate binds to the enzyme is called the:

(A) Enzyme-Product complex
(B) Enzyme-Substrate complex
(C) Enzyme-Inhibitor complex
(D) Enzyme-Cofactor complex

Correct Answer: B

Explanation: The Enzyme-Substrate (ES) complex is formed when the substrate binds to the active site.

7. The optimum temperature for human enzymes is:

(A) 20–25°C
(B) 30–32°C
(C) 36–38°C
(D) 40–45°C

Correct Answer: C

Explanation: The optimum temperature for human enzymes is 36°C to 38°C.

8. What happens to an enzyme at very high temperature?

(A) It becomes more active
(B) It becomes inactive but can recover
(C) It changes into a substrate
(D) It denatures

Correct Answer: D

Explanation: It denatures — this correctly answers the question.

9. The optimum pH for pepsin is:

(A) 2.00
(B) 7.00
(C) 8.00
(D) 10.00

Correct Answer: A

Explanation: The optimum pH for pepsin is 2.00.

10. The optimum pH for trypsin is:

(A) 2.00
(B) 8.00
(C) 7.00
(D) 10.00

Correct Answer: B

Explanation: The optimum pH for trypsin is 8.00.

11. The phenomenon where enzymes are not able to perform their role due to interfering chemicals is called:

(A) Enzyme activation
(B) Enzyme denaturation
(C) Enzyme inhibition
(D) Enzyme synthesis

Correct Answer: C

Explanation: Enzyme inhibition occurs when chemicals interfere with enzyme.

12. The chemical substance that inhibits an enzyme is called an:

(A) Activator
(B) Cofactor
(C) Substrate
(D) Inhibitor

Correct Answer: D

Explanation: An inhibitor is a chemical substance that inhibits enzyme action.

13. ATP stands for:

(A) Adenosine Triphosphate
(B) Adenosine Diphosphate
(C) Adenine Triphosphate
(D) Adenosine Monophosphate

Correct Answer: A

Explanation: ATP stands for Adenosine Triphosphate.

14. ATP is commonly called the:

(A) Building block of proteins
(B) Energy currency of the cell
(C) Genetic material
(D) Structural component of cell walls

Correct Answer: B

Explanation: ATP is called the energy currency of the cell.

15. The conversion of ATP to ADP and inorganic phosphate is called:

(A) Condensation
(B) Oxidation
(C) Hydrolysis
(D) Reduction

Correct Answer: C

Explanation: ATP is converted to ADP and inorganic phosphate by hydrolysis.

16. Which of the following is an anabolic process?

(A) Digestion
(B) Cellular respiration
(C) Glycolysis
(D) Photosynthesis

Correct Answer: D

Explanation: Photosynthesis is an anabolic process (builds glucose from CO□ and H□O).

17. In which type of metabolism is energy released?

(A) Catabolism
(B) Anabolism
(C) Both
(D) Neither

Correct Answer: A

Explanation: Energy is usually released in catabolism.

18. In which type of metabolism is energy utilized?

(A) Catabolism
(B) Anabolism
(C) Both
(D) Neither

Correct Answer: B

Explanation: Energy is usually utilized in anabolism.

19. The word metabolism means:

(A) To build
(B) To break
(C) To change
(D) To release

Correct Answer: C

Explanation: The word metabolism means to change.

20. Digestion is an example of:

(A) Anabolism
(B) Both
(C) Neither
(D) Catabolism

Correct Answer: D

Explanation: Digestion is a catabolic process (breaks down food).

21. The condensation of glucose molecules to form glycogen is an example of:

(A) Anabolism
(B) Catabolism
(C) Digestion
(D) Respiration

Correct Answer: A

Explanation: Glycogen synthesis is an anabolic process.

22. Which of the following is a biochemical reaction?

(A) Rusting of iron
(B) Digestion of food
(C) Burning of wood
(D) Melting of ice

Correct Answer: B

Explanation: Digestion of food is a biochemical reaction (occurs in living organisms).

23. The energy released in catabolism is used in:

(A) Digestion
(B) Respiration
(C) Anabolism
(D) Excretion

Correct Answer: C

Explanation: The energy released in catabolism is utilized in anabolism.

24. Which of the following is NOT a characteristic of enzymes?

(A) They increase the rate of reaction
(B) They are specific
(C) They lower activation energy
(D) They are required in large quantities

Correct Answer: D

Explanation: Enzymes are required in small quantities because they are reusable.

25. Which of the following is an example of an intracellular enzyme?

(A) Glycolysis enzymes
(B) Pepsin
(C) Amylase in saliva
(D) Trypsin

Correct Answer: A

Explanation: Glycolysis enzymes work in the cytoplasm (intracellular). Pepsin, salivary amylase, and trypsin are extracellular.

B. Less Important / Secondary Topics

26. Enzymes that are RNA in nature are called:

(A) Ribozymes
(B) Coenzymes
(C) Prosthetic groups
(D) Activators

Correct Answer: A

Explanation: Few enzymes are RNA in nature called ribozymes.

27. The activity of salivary amylase is increased by the presence of:

(A) Zinc ions

(B) Chloride ions
(C) Iron ions
(D) Copper ions

Correct Answer: B

Explanation: The activity of salivary amylase is increased by the presence of Chloride ions.

28. A tightly and permanently attached organic cofactor is called a:

(A) Coenzyme
(B) Activator
(C) Prosthetic group
(D) Substrate

Correct Answer: C

Explanation: A prosthetic group is an organic molecule tightly and permanently attached to the enzyme.

29. NAD and coenzyme A are examples of:

(A) Prosthetic groups
(B) Activators
(C) Substrates
(D) Coenzymes

Correct Answer: D

Explanation: NAD and coenzyme A are coenzymes (detachable organic molecules).

30. The minimum amount of extra energy required to start a reaction is called:

(A) Activation energy
(B) Free energy
(C) Kinetic energy
(D) Potential energy

Correct Answer: A

Explanation: The energy of activation is the minimum extra energy required to start a reaction.

31. A series of connected chemical reactions where multiple intermediate molecules are produced is called a:

(A) Reaction chain
(B) Metabolic pathway
(C) Cofactor cycle
(D) Enzyme complex

Correct Answer: B

Explanation: A metabolic pathway is a series of connected chemical reactions with intermediate molecules.

32. In competitive inhibition, the inhibitor:

(A) Binds to the allosteric site
(B) Denatures the enzyme permanently
(C) Resembles the substrate and binds to the active site
(D) Increases the reaction rate

Correct Answer: C

Explanation: In competitive inhibition, the inhibitor Resembles the substrate and binds to the active site.

33. Competitive inhibition can be reversed by:

(A) Decreasing substrate concentration
(B) Adding more inhibitor
(C) Changing the pH
(D) Increasing substrate concentration

Correct Answer: D

Explanation: Competitive inhibition can be reversed if the concentration of the actual substrate is increased.

34. In non-competitive inhibition, the inhibitor binds to the:

(A) Allosteric site
(B) Active site
(C) Substrate
(D) Product

Correct Answer: A

Explanation: In non-competitive inhibition, the inhibitor binds to the Allosteric site.

35. Which of the following is an internal source of enzyme inhibition?

(A) Cyanide
(B) Accumulated products
(C) Antibiotics
(D) Poisons

Correct Answer: B

Explanation: Accumulated products — this correctly answers the question.

36. A student adds a competitive inhibitor to an enzyme-catalyzed reaction. Which of the following would be the most effective way to restore the reaction rate?

(A) Add more inhibitor
(B) Decrease the temperature
(C) Increase the substrate concentration
(D) Change the pH

Correct Answer: C

Explanation: Competitive inhibition is temporary and can be reversed if the concentration of the actual substrate is increased than the concentration of inhibitor molecules.

37. A non-competitive inhibitor binds to an enzyme. What happens to the enzyme's active site?

(A) It remains unchanged
(B) It becomes more active
(C) It is converted into a product
(D) It is altered, preventing the substrate from binding

Correct Answer: D

Explanation: Non-competitive inhibitors alter the globular shape of the enzyme and damage the active site, so the substrate cannot bind.

38. Which of the following best explains why enzymes are specific?

(A) Their active site has a specific shape and charge that complements only certain substrates
(B) They have a rigid structure that cannot change
(C) They are found only in specific organs
(D) They require cofactors

Correct Answer: A

Explanation: Enzymes are specific because the active site is a charge-bearing cavity having a specific shape that complements only specific substrates.

39. Which of the following is a living characteristic of ATP?

(A) It can be crystallized
(B) It stores and releases energy
(C) It lacks cellular structure
(D) It does not respire

Correct Answer: B

Explanation: ATP is an energy-rich compound that can store and release energy and can be used much like money.

40. The structure of ATP includes all of the following EXCEPT:

(A) Adenine
(B) Ribose
(C) Deoxyribose
(D) Three phosphate groups

Correct Answer: C

Explanation: The structure of ATP includes all of the following EXCEPT Deoxyribose.

41. Which of the following correctly describes the ATP-ADP cycle?

(A) ATP → ADP + Pi (condensation); ADP + Pi → ATP (hydrolysis)
(B) ATP → AMP + Pi (hydrolysis); AMP + Pi → ATP (condensation)
(C) ATP → Adenine + Ribose (hydrolysis)
(D) ATP → ADP + Pi + Energy (hydrolysis); ADP + Pi + Energy → ATP (condensation)

Correct Answer: D

Explanation: ATP is converted to ADP and inorganic phosphate by hydrolysis (releasing energy). ADP and phosphate are converted back to ATP by condensation (storing energy).

42. Which of the following is a function of ATP in cells?

(A) Powering muscle contraction
(B) Storing genetic information
(C) Forming cell walls
(D) Synthesizing lipids

Correct Answer: A

Explanation: Powering muscle contraction — this correctly answers the question.

43. Which of the following correctly matches a factor with its effect on enzyme activity?

(A) High temperature — increases activity indefinitely
(B) Extreme pH — denatures the enzyme
(C) Low temperature — permanently denatures the enzyme
(D) Substrate concentration — always increases the rate indefinitely

Correct Answer: B

Explanation: Extreme pH — denatures the enzyme — this correctly answers the question.

44. A cell is placed in a solution with a pH of 2.0. Which enzyme would be most active in this environment?

(A) Trypsin
(B) Salivary amylase
(C) Pepsin
(D) Catalase

Correct Answer: C

Explanation: Pepsin — this correctly answers the question.

45. Which of the following best explains why enzymes are reusable?

(A) They are consumed in the reaction
(B) They are produced in large quantities
(C) They are not specific
(D) They remain unchanged at the end of the reaction

Correct Answer: D

Explanation: The structure of enzymes may slightly change during a reaction, but they regain their actual shape, so they remain unchanged at the end and can be used repeatedly.

46. In the mechanism of enzyme action, what happens after the Enzyme-Product (EP) complex forms?

(A) The EP complex breaks up into products and the enzyme
(B) The enzyme is destroyed
(C) The substrate re-binds to the enzyme
(D) The enzyme becomes a substrate

Correct Answer: A

Explanation: Finally, the EP complex breaks up into products and the enzyme, and the enzyme is available again if needed for the same reaction.

47. Which of the following is a characteristic of a coenzyme?

(A) It is tightly bound to the enzyme
(B) It is a detachable organic molecule
(C) It is an inorganic ion
(D) It is a protein

Correct Answer: B

Explanation: If the cofactor is a detachable organic molecule, it is called a coenzyme.

48. Which of the following best explains why the reaction rate plateaus at high substrate concentration?

(A) The enzyme denatures
(B) The substrate becomes inactive
(C) All active sites are occupied
(D) The pH changes

Correct Answer: C

Explanation: At high substrate concentration, all active sites of the enzyme molecules are occupied, so adding more substrate has no effect.

49. Which of the following is an example of an external source of enzyme inhibition?

(A) Accumulated products
(B) Substrate
(C) Cofactor
(D) Cyanide

Correct Answer: D

Explanation: Cyanide — this correctly answers the question.

50. Which of the following statements about ATP is correct?

(A) It is a short-term energy carrier
(B) It is a long-term energy storage molecule
(C) It is a structural component of cell walls
(D) It is a genetic material

Correct Answer: A

Explanation: ATP is a short-term energy carrier; long-term energy is stored in molecules like glycogen, starch, and fats. Answer.