

# Enzymes MCQ

1. The best thing that describes the specificity of enzymes is :

- a )  $k_m$
- b )  $k_m / k_1 + k_2$
- c )  $k_{-1} + k_{-2} / k_m$
- d) none of above

2. The induced fit model when :

- a ) the substrate binds to the enzyme
- b ) the substrate is at proximity to enzyme
- c ) the change occurs in the active site after the binding of substrate
- d ) the change in the active site before binding of the substrate

3. The inhibitor that reacts with the ES complex but not directly to enzyme :

- a-uncompetitive
- b-noncompetitive
- c-competitive
- d-allosteric

4. Which one of the following describes the action of aspirin?

- a) adding a sulphate to active site
- b) blocking the active site
- c) applying a conformational change to the enzyme
- d) feedback inhibition

5) can affect the catalytic activity of the enzyme. Which of the following statements concerning that effect is correct?

- a. An increase in temperature can stop the reaction by denaturing the enzyme
- b. An increase in temperature can increase the reaction rate by increasing the speed at which molecules move
- c. An increase in temperature to the optimum temperature maximizes reaction rate
- d. More than one correct response
- e. No correct response

6) One of the regulatory mechanisms of enzymatic activity is the covalent modification, which statement is false about such a mechanism?

- a. It is reversible
- b. It is slower than allosteric regulation
- c. It is irreversible
- d. Phosphorylation is a common covalent modification
- e. It is requiring the activity of two enzymes

7- In enzyme chemistry, the active site concept means that?

- a. There may be a covalent bond between enzyme and substrate
- b. Functional groups on the enzyme participate directly in the reaction
- c. All enzymes are having the flexible model of the active site
- d. For all enzymes, no catalysis in the absence of cofactors
- e. All enzymes are having the rigid model of the active site

8-A plot of enzyme activity (y-axis) versus substrate concentration (x-axis) with other variables constant is a?:

- a. Straight line with an upward slope.
- b. Line parallel to the y-axis
- c. An upward line slope followed by a downward slope.
- d. Straight horizontal line.
- e. Line with an upward slope and a long flat top.

9- If one continues to increase the temperature in an enzyme-catalysed reaction, the rate of the reaction?

- a. Does not change.
- b. Increases and then levels off.
- c. Decreases and then levels off.
- d. Increases and then decreases rapidly.
- e. Decreases and then increases rapidly.

10-Different isoenzymes of an enzyme have the same?

- a. Amino acid sequence
- b. Michaelis constant
- c. Catalytic function
- d. Tissues origin
- e. Effect of activators and inhibitors

11-If the substrate concentration is much below the  $K_m$  of the enzyme, the velocity of the reaction is?

- a. Directly proportional to substrate concentration
- b. Not affected by enzyme concentration
- c. Nearly equal to  $V_{max}$
- d. Inversely proportional to substrate concentration
- e. Nearly equals to  $\frac{1}{2} V_{max}$

12-Why does pH affect enzyme activity?

- a. Changes in pH affect the concentration of the coenzyme
- b. Changes in pH affect the concentration of enzyme
- c. Changes in pH affect the concentration of substrate
- d. Changes in pH affect the enzyme optimum temperature
- e. Changes in pH affect the shape of the enzyme active site

13-For Ligases enzymes?

- a. They catalyse oxidation/reduction reactions
- b. They transfer a functional group
- c. They catalyse the hydrolysis of various bonds
- d. They catalyse isomerization changes within a single molecule
- e. They join two molecules with covalent bonds

14-The "lock and key" model of enzyme action illustrates that a particular enzyme molecule?

- a. Forms a permanent enzyme- substrate complex
- b. May be destroyed and resynthesized several times
- c. Interacts with a specific type of substrate molecule
- d. Reacts at identical rates under all conditions
- e. Can allow the binding of substrate molecule whatever its shape

15-An uncatalysed reaction requires ?

- a. A higher activation energy
- b. A lower activation energy
- c. A Balanced activation energy
- d. No activation energy
- e. A similar activation energy as the catalyzed reaction

16-Active site of an enzyme is ?

- a. A particular gland that secretes a particular enzyme
- b. A portion of the substrate molecule to which the enzyme molecule attaches
- c. A portion of the enzyme in which the substrate molecule fits
- d. An organ in the body where the enzyme works
- e. A portion of the cell in which the enzyme catalysed reaction takes place

17-According to the induced fit model of enzyme function, which of the following is CORRECT?

- a. The active site is not flexible.
- b. Some enzymes become denatured when activators bind to the substrate.
- c. The binding of the substrate depends on the shape of the active site.
- d. The binding of the substrate changes the shape of the enzyme slightly.
- e. The active site creates an environment ideal for the reaction.

18-Which of the following is not a way in which enzymes stabilize a transition state?

- a. Covalent catalysis
- b. Metal ion catalysis
- c. General acid-base catalysis
- d. Environmental temperature increase
- e. Catalysis by approximation

19-Energy of activation?

- a. Increases enzymatic activity
- b. Decreases enzymatic activity
- c. C. Minimum amount of energy for the reaction to occur
- d. Maximum amount of energy for the reaction to occur
- e. Not needed for the reaction to occur

20-If one continues to increase the temperature in an enzyme-catalysed reaction, the rate of the reaction?

- a. Does not change.
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- c. Decreases and then levels off.
- d. Increases and then decreases rapidly.
- e. Decreases and then increases rapidly

21 The enzyme activity in the Y axis substrate in X ,if we increase the substrate?

- a) Straight horizontally
- b) zero -order reaction
- c) first-order reaction
- d) none of above



22-Which of the following is true of enzymes that are regulated by allosteric regulators ?

- a)They are usually multimeric enzymes
- b)has just positive allosteric
- c)has just negative allosteric
- d)no conformational change

23-The affinity of enzyme for substance , when the enzyme has  $k_m=0.5m$  will be .....than the affinity of an enzyme for its substance when the enzyme has an  $k_m =0.5$  ?

- a)lesser
- b)higher
- c)doesn't affect it
- d)will be equal

24-When the rate of enzymatic reaction is controlled by amount of enzyme present , which of the following factors controls the enzyme level ?

- a)negative feedback back inhibition
- b)rate of transcription and protein synthesis
- c)competitive
- d)non competitive

25-If the absolute concentration of enzyme is unknown , which of the following values is determined experimentally ?

- a) $K_m$
- b) $V_{max}$
- c) $K_m$  and  $v_{max}$
- d)none of above

26- Which type of regulation occurs in the slowest time frame?

- a)new synthesis of enzyme through gene induction
- b)covalent
- c)allosteric
- d)compartmentiton

27- Selective qualities of enzyme are recognised as its ?

- a)sensitivity
- b)specificity
- c)intracellular
- d)extracellular

28.  $K_m$  is

- a) Substrate concentration
- b) enzyme concentration
- c) site of action
- d) none of these

29- Which of the following can reduce rate of reaction

- a) Increase in Substrate concentration
- b) Increase in enzyme concentration
- c) Increase temp. to optimum .
- d) Increase pH to optimum
- e) increase product concentration

30- Type of inhibition where the inhibitor can bind on E or ES complex?

- a) Non-competitive inhibition
- b) competitive
- c) allosteric
- d) feedback inhibition

31. Non steroidal anti inflammatory drugs, such as aspirin act by inhibiting the activity of the enzyme:

- (A) Lipoxygenase (B) Cyclooxygenase
- (C) Phospholipase A2 (D) Lipoprotein lipase

32. From arachidonate, synthesis of prostaglandins is catalysed by

- (A) Cyclooxygenase
- (B) Lipoxygenase
- (C) Thromboxane synthase
- (D) Isomerase

33. A Holoenzyme is

- (A) Functional unit
- (B) Apo enzyme
- (C) Coenzyme
- (D) All of these

34. Gaucher's disease is due to the deficiency of the enzyme:

- (A)  $\alpha$ -Fucosidase (B)  $\beta$ -Galactosidase
- (C)  $\beta$ -Glucosidase (D) Sphingomyelinase

35. Example of an extracellular enzyme is

- (A) Lactate dehydrogenase
- (B) Cytochrome oxidase
- (C) Pancreatic lipase
- (D) Hexokinase

36. Enzymes, which are produced in inactive form in the living cells, are called

- (A) Papain (B) Lysozymes
- (C) Apoenzymes (D) Proenzymes

37. An example of ligases is

- (A) Succinate thiokinase
- (B) Alanine racemase
- (C) Fumarase
- (D) Aldolase

38. An example of lyases is

- (A) Glutamine synthetase
- (B) Fumarase
- (C) Cholinesterase
- (D) Amylase

39. The enzyme which can add water to a carbon-carbon double bond or remove water to create a double bond without breaking the bond is

- (A) Hydratase
- (B) Hydroxylase
- (C) Hydrolase
- (D) Esterase

40. Fischer's 'lock and key' model of the enzyme action implies that

- (A) The active site is complementary in shape to that of substance only after interaction.
- (B) The active site is complementary in shape to that of substance
- (C) Substrates change conformation prior to active site interaction
- (D) The active site is flexible and adjusts to substrate

41. From the Lineweaver-Burk plot of Michaelis-Menten equation,  $K_m$  and  $V_{max}$  can be determined when  $V$  is the reaction velocity at substrate concentration  $S$ , the X-axis experimental data are expressed as

- (A)  $1/V$
- (B)  $V$
- (C)  $1/S$
- (D)  $S$

42. A sigmoidal plot of substrate concentration ( $[S]$ ) versus reaction velocity ( $V$ ) may indicate

- (A) Michaelis-Menten kinetics
- (B) Co-operative binding
- (C) Competitive inhibition
- (D) Non-competitive inhibition

43. The  $K_m$  of the enzyme giving the kinetic data as below is

- (A)  $-0.50$
- (B)  $-0.25$
- (C)  $+0.25$
- (D)  $+0.33$

44. An inducer is absent in the type of enzyme:

- (A) Allosteric enzyme
- (B) Constitutive enzyme
- (C) Co-operative enzyme
- (D) Isoenzymic enzyme

45. A demonstrable inducer is absent in

- (A) Allosteric enzyme
- (B) Constitutive enzyme
- (C) Inhibited enzyme
- (D) Co-operative enzyme

46. In reversible non-competitive enzyme activity inhibition

- (A)  $V_{max}$  is increased
- (B)  $K_m$  is increased
- (C)  $K_m$  is decreased
- (D) Concentration of active enzyme is reduced

47. In reversible non-competitive enzyme activity inhibition

- (A) Inhibitor bears structural resemblance to substrate
- (B) Inhibitor lowers the maximum velocity attainable with a given amount of enzyme
- (C)  $K_m$  is increased
- (D)  $K_m$  is decreased



48. An enzyme which uses hydrogen acceptor as substrate is

- (A) Xanthine oxidase
- (B) Aldehyde oxidase
- (C) Catalase
- (D) Tryptophan oxygenase

49. The pH optima of most of the enzymes is

- (A) Between 2 and 4
- (B) Between 5 and 9
- (C) Between 8 and 12
- (D) Above 12

50. Coenzymes are

- (A) Heat stable, dialyzable, non protein organic molecules
- (B) Soluble, colloidal, protein molecules
- (C) Structural analogue of enzymes
- (D) Different forms of enzymes

51. An example of hydrogen transferring coenzyme is

- (A) CoA
- (B) NAD<sup>+</sup>
- (C) Biotin
- (D) TPP

52. Isoenzymes are

- (A) Chemically, immunologically and electrophoretically different forms of an enzyme
- (B) Different forms of an enzyme similar in all properties
- (C) Catalysing different reactions
- (D) Having the same quaternary structures like the enzymes

53. Isoenzymes can be characterized by

- (A) Proteins lacking enzymatic activity that are necessary for the activation of enzymes
- (B) Proteolytic enzymes activated by hydrolysis
- (C) Enzymes with identical primary structure
- (D) Similar enzymes that catalyse different reaction

54. The isoenzymes of LDH

- (A) Differ only in a single amino acid
- (B) Differ in catalytic activity
- (C) Exist in 5 forms depending on M and H monomer contents
- (D) Occur as monomers

55.LDH1 and LDH2 are elevated in

- (A) Myocardial infarction
- (B) Liver disease
- (C) Kidney disease
- (D) Brain disease

56.The CK isoenzymes present in cardiac muscle is

- (A) BB and MB
- (B) MM and MB
- (C) BB only
- (D) MB only

57. In acute pancreatitis, the enzyme raised in first five days is

- (A) Serum amylase
- (B) Serum lactic dehydrogenase
- (C) Urinary lipase
- (D) Urinary amylase

58.Phosphofructokinase key enzyme in glycolysis is inhibited by

- (A) Citrate and ATP (B) AMP
- (C) ADP (D) TMP

59. All the enzymes of glycolysis pathway are found in

- (A) Extramitochondrial soluble fraction of the cell
- (B) Mitochondria
- (C) Nucleus
- (D) Endoplasmic reticulum

60. Most major metabolic pathways are considered mainly either anabolic or catabolic. Which of the following pathway is most correctly considered to be amphibolic?

- (A) Citric acid cycle
- (B) Gluconeogenesis
- (C) Lipolysis
- (D) Glycolysis

61. The enzymes of the citric acid cycle are located in

- (A) Mitochondrial matrix
- (B) Extramitochondrial soluble fraction of the cell
- (C) Nucleus
- (D) Endoplasmic reticulum

62. Allosteric activator of glycogen synthase is

- (A) Glucose
- (B) Glucose-6-Phosphate
- (C) UTP
- (D) Glucose-1-phosphate

63. HMG-CoA is converted to mevalonate by reduction catalysed by

- (A) HMG-CoA synthetase
- (B) HMG-CoA reductase
- (C) Mevalonate kinase
- (D) Thiolase

64. In the biosynthesis of cholesterol, the rate limiting enzyme is

- (A) Mevalonate kinase
- (B) HMG-CoA synthetase
- (C) HMG-CoA reductase
- (D) Cis-prenyl transferase

65. There are different mechanisms for regulating enzyme activity including the allosteric one. Which of the following would usually be found in such a mechanism? Select one:

- a. The need for cofactors
- b. The enzyme is a monomeric molecule
- c. Both activating and inhibitory activity by one modulator
- d. Feedback inhibition by the reaction end product is not existing
- e. Cooperativity

66. Neimann-Pick disease is due to the deficiency of the enzyme:

- (A) Hexosaminidase A and B
- (B) Ceramidase
- (C) Ceramide lactosidase
- (D) Sphingomyelinase

67. Activation or inactivation of certain key regulatory enzymes is accomplished by covalent modification of the amino acid:

- (A) Tyrosine
- (B) Phenylalanine
- (C) Lysine
- (D) Serine

68. In competitive enzyme activity inhibition

- (A) The structure of inhibitor generally resembles that of the substrate
- (B) Inhibitor decreases apparent  $K_m$
- (C)  $K_m$  remains unaffected
- (E) Inhibitor decreases  $V_{max}$  without affecting  $K_m$

69. An example of group transfer ing coenzyme is

- (A) NAD<sup>+</sup>
- (B) NADP<sup>+</sup>
- (C) FAD
- (D) CoA

70. One of the enzymes regulating glycolysis is

- (A) Phosphofructokinase
- (B) Glyceraldehyde-3-phosphate dehydrogenase
- (C) Phosphotriose isomerase
- (D) Phosphohexose isomerase

71. The hormone activating the glycogen synthase activity is

- (A) Insulin
- (B) Glucagon
- (C) Epinephrine
- (D) ACTH

72. The kinetic effect of purely competitive inhibitor of an enzyme

- (A) Increases  $K_m$  without affecting  $V_{max}$
- (B) Decreases  $K_m$  without affecting  $V_{max}$
- (C) Increases  $V_{max}$  without affecting  $K_m$
- (D) Decreases  $V_{max}$  without affecting  $K_m$

73. Covalent modifications that increase the activity of allosterically regulated enzymes do so by?

- a. Adding phosphate groups to essential amino acids in the active site
- b. Causing the enzyme to fold into a more active configuration
- C. The involvement of the main source of cellular energy
- d. Increasing the amount of total enzyme present
- e. Increasing the rate of enzyme degradation

74. Upon adding an inhibitor to an enzyme-catalyzed reaction, the rate of reaction is markedly decreased, then, the rate does not show any increase upon increasing the substrate concentration. What is your conclusion about the inhibitor?

- a. That it is a kinase
- b. That it is a competitive or noncompetitive inhibitor
- C. That it binds the enzyme's active site only
- d. That it is an inorganic or competitive inhibitor
- e. That it is a noncompetitive or uncompetitive inhibitor



75. Why does the rate of an enzyme-catalysed reaction increase as temperature is raised from 0 to 37 °C?:

- a. Enzyme and substrate molecules have more kinetic energy to get the transition state
- b. The shape of the active site changes to be suitable for binding substrate
- c. The shape of the substrate binding site changes at high temperature
- d. Enzymes are denatured at high temperature
- e. Enzyme substrate complex will take longer time to be in the transition state

76. Action of glycogen synthase is inhibited by

- (A) Insulin
- (B) Glucose
- (C) Mg<sup>2+</sup>
- (D) Cyclic AMP

77. Which one of the following statements is not true about enzyme ?

- a) molecules that catalyse the reaction
- b) enzymes are named for the product formed
- c) their shape is affected by their function
- d) can be intracellular and extracellular

78. pepsin, an enzyme found in the stomach acts best at pH = 2, but it's not active at pH = 7, why ?

- a) the optimal pH helps to maintain the tertiary structure of the enzyme
- b) because it is active in all forms
- c) can't digest proteins
- d) digestion of lipids

79. Which of the following statements concerning enzyme active site is incorrect ?

- a) for binding of substrate
- b) for binding of inhibitors in competitive
- c) consecutive correct responses
- d) it can be affected by substrate concentration