

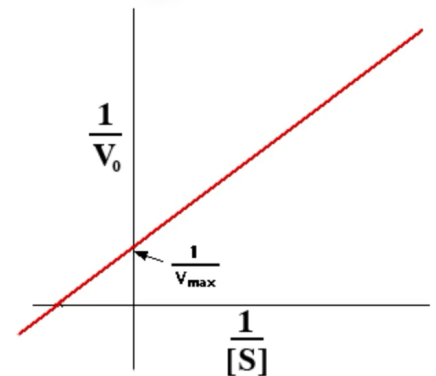
Enzymes Test Bank ..

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رحم الله كل روح غالية تحت الثرى ..

Q1 . How can the Michaelis-Menten constant, k_m , be derived from this Lineweaver-Burk plot?

- A. $K_m = (-1) * (x\text{-intercept})$
- B. $K_m = \text{slope}$
- C. $K_m = \text{slope} * (1/ y\text{-intercept})$
- D. $1/ (x\text{-intercept})$



Q2. What is meant by induced fit of an enzyme

- A. The shape of the active site is nearly perfect for specifically binding the enzyme's substrate or substrates.
- B. The substrate can be altered so that it is induced to fit into the enzyme's active site.
- C. The presence of the substrate in solution induces the enzyme to slightly change its structure.
- D. The enzyme changes its shape slightly as the substrate binds to It.

Q3 . Enzyme activity is affected by pH because ____?

- A. the binding of hydrogen ions to the enzyme absorbs energy and thus there may not be enough energy to overcome the activation energy barrier
- B. high or low pH may disrupt hydrogen bonding or ionic interactions and thus change the shape of the active site
- C. changes in pH can cause loss of cofactors from the enzyme
- D. low pH will denature all enzymes

Q4. Succinylcholine is structurally almost identical to acetylcholine. If succinylcholine is added to a mixture that contains acetylcholine and the enzyme that hydrolyzes acetylcholine (but not succinylcholine), the rate of acetylcholine hydrolysis is decreased. Subsequent addition of more acetylcholine restores the original rate of acetylcholine hydrolysis. Which of the following correctly explains this observation?

- A. The active site must have the wrong configuration to permit succinylcholine binding.
 - B. Succinylcholine must be a noncompetitive inhibitor.
 - C. Succinylcholine must be a competitive inhibitor with acetylcholine
 - D. The presence of succinylcholine changes the conditions in the solution, resulting in a denaturation of the enzyme.
- Succinylcholine must be an allosteric regulator for this enzyme.

Q5. Which of the following statements correctly describe(s) the role or roles of heat in biological reactions?

- A. Heat from the environment is necessary for substrates to get over the activation energy barrier.
- B. The kinetic energy of the substrates is increased as the amount of heat in the system is increased.
- C. Increasing the amount of heat in a system will always increase the rate of enzyme-catalyzed reactions.
- D. The first and second choices are correct.

Q6. Which of the following statements about enzymes is INCORRECT?

- A. An enzyme lowers the activation energy of a chemical reaction.
- B. An enzyme is very specific in terms of the substrate to which it binds.
- C. An enzyme is consumed during the reaction it catalyzes.
- D. Most enzymes are proteins.

Q7. A plot of reaction rate (velocity) against temperature for an enzyme indicates little activity at 10°C and 45°C, with peak activity at 35°C. The most reasonable explanation for the low velocity at 10°C is that ..

- A. the enzyme was denatured
- B. the cofactors required by the enzyme system lack the thermal energy required to activate the enzyme
- C. the hydrogen bonds that define the structure of the enzyme's active site are unstable
- D. there is too little activation energy available

Q8. Which of the following statements about enzymes is/are true

- A. Enzymes speed up the rate of the reaction without changing the ΔG for the reaction.
- B. Enzymes increase the rate of a reaction by raising the activation energy for reactions.
- C. The more heat that is added to a reaction, the faster the enzymes will function.
- D. Enzymes react with their substrate (form chemical bonds), forming an enzyme-substrate complex, which irreversibly alters the enzyme.

Q9. What do the sign and magnitude of the ΔG of a reaction tell us about the speed of the reaction?

- A. The more negative the ΔG , the faster the reaction is.
- B. The sign does not matter, but the smaller the magnitude of ΔG , the faster the reaction.
- C. The sign does not matter, but the larger the magnitude of ΔG , the faster the reaction.
- D. Neither the sign nor the magnitude of ΔG has anything to do with the speed of a reaction.

Q10. Pepstatin binds to the enzyme pepsin. The substrate is still able to bind to the active site, but the reaction is blocked.

What is this an example of?

- A. Noncompetitive inhibition
- B. Competitive inhibition
- C. Compartmentalisation
- D. Allosteric activation

Q11. How do noncompetitive inhibitors interact with enzymes?

- A. They bind to a location other than the active site, stopping the enzyme from functioning.
- B. They bind to the active site, preventing the substrate from binding.
- C. They bind to a location other than the active site, enhancing the enzyme's activity.
- D. They bind to the active site, causing more substrate to bind.

Q12. Most toxins and poisons like cyanide, nerve gas etc. are non-competitive, irreversible inhibitors of key enzymes and are, therefore, lethal.

Which type of molecular interaction is likely responsible for their irreversible binding with the enzyme molecules?

- A. Van der waals
- B. Hydrogen bonding
- C. Strong ionic interactions
- D. Covalent bonding

Q13. Considering that compartmentalization can help in regulating enzyme activity, which of the following scenarios best illustrates this concept?

- A. Glycolytic enzymes distributed evenly throughout the cytosol to maximize energy production.
- B. Enzymes responsible for DNA replication stored in the cytoplasm for rapid access.
- C. Enzymes involved in the Krebs cycle confined within the mitochondria to ensure efficient ATP production.
- D. Proteins involved in protein synthesis localized in the nucleus to improve access to genetic material.

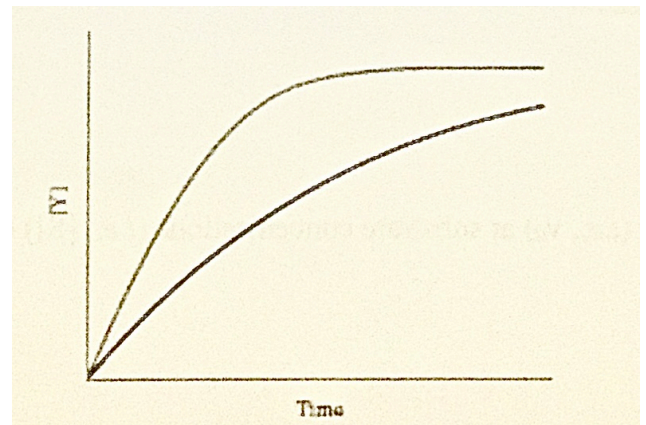
Q14. Removal of phosphoryl groups is catalyzed by _____

- A. Ligases
- B. Oxidoreductases
- C. Protein phosphatases
- D. Protein kinase

Q15. Enzyme complexing, such as seen in pyruvate dehydrogenase, often leads to reduced diffusion distances for intermediates. Which of the following is a direct consequence of this reduction in diffusion?

- A. A decrease in the overall rate of the enzymatic reaction.
- B. An increase in the likelihood of enzyme inhibition by intermediates.
- C. A reduction in the time needed for intermediates to reach the next enzyme in the pathway.
- D. An increase in the energy required to transfer intermediates between enzymes.

Q16. You have successfully isolated two isozymes from separate species of bacteria that catalyze the same reaction, production of Y from substrate X. The isozymes have identical max values, but different K_m values. Isozyme #1 has a K_m of 2.50 μM , while Isozyme #2 exhibits a K_m of 0.35 μM . The plot below shows the kinetics of reactions carried out under identical enzyme concentrations. Identify which curve corresponds to which isozyme?



- A. upper curve is for Isoenzyme #2.
- B. Upper curve for isoenzyme #1.
- C. Both curves correspond to Isozyme #1, as they have the same V_{max} .
- D. Both curves correspond to Isozyme #2, as they have different K_m values but the same V_{max} .

Q17. You are studying two isozymes that catalyze the same reaction in the liver and muscle tissues. Isozyme A is predominantly found in the liver and has a low K_m , while Isozyme B is primarily found in muscle tissue and has a high K_m . Given this information, which of the following scenarios is most likely true?

- A. Isozyme A is more active at low substrate concentrations in the liver, allowing efficient metabolism even when substrate levels are low.
- B. Isozyme B is more active at low substrate concentrations in muscle tissue, ensuring rapid response to changes in substrate availability.
- C. Isozyme A and Isozyme B both have the same activity regardless of substrate concentration, ensuring uniform metabolic rates in both tissues.
- D. Isozyme B is more sensitive to substrate inhibition in muscle tissue, preventing excessive metabolism when substrate levels are high.

Q18. Which LDH isozyme is most commonly associated with skeletal muscle and liver?

- A. H₄
- B. H₃M
- C. H_M3
- D. M₄

Q19 . In the regulation of glucose metabolism, consider the following scenario: During fasting, blood glucose levels drop, leading to a decrease in insulin and an increase in glucagon. Given this hormonal change, which of the following statements correctly describes the impact on hexokinase and glucokinase activity and their implications for glucose storage in the liver?

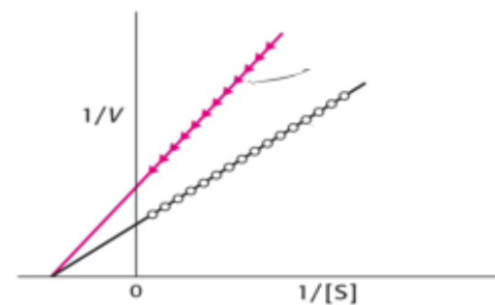
- A) During fasting, the decrease in insulin leads to reduced glucokinase activity, preventing glucose conversion to glycogen. At the same time, the increase in glucagon does not affect hexokinase activity, allowing glucose uptake by peripheral tissues like muscle.
- B) Hexokinase activity decreases due to high glucose-6-phosphate levels, but glucokinase remains active in the liver despite low insulin, leading to increased glucose storage as glycogen.

C) The increase in glucagon inhibits glucokinase activity in the liver, reducing glycogen synthesis, while hexokinase activity remains unaffected, leading to a decreased glucose uptake by liver cells.

D) During fasting, both glucokinase and hexokinase are inhibited due to low glucose-6-phosphate levels, leading to decreased glucose uptake and storage in both liver and peripheral tissues.

Q20. What type of inhibition is shown in graph?

- A. Competitive
- B. Non - competitive
- C. Uncompetitive
- D. Mixed inhibition

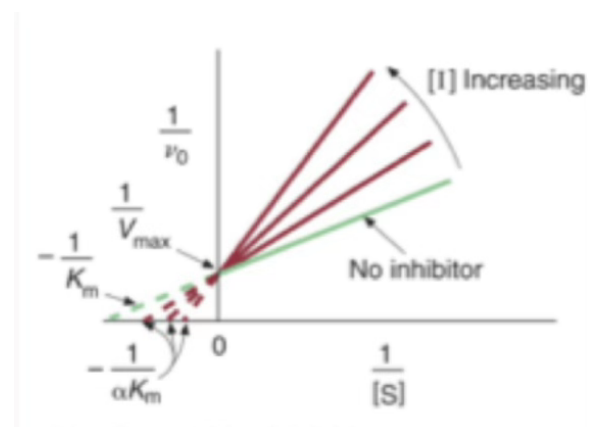


Q21. Which of the following changes occurs when a competitive inhibitor is added to first order enzymatic reaction?

- A. Both the K_m and V_{max} change
- B. K_m decreases but V_{max} stays the same
- C. K_m increases but V_{max} Stays the same
- D. V_{max} decreases but K_m stays the same

Q22. The following line weaver-Burk plot is an example of ..?

- A. Competitive inhibition
- B. Non - competitive inhibition
- C. Mixed inhibition
- D. Uncompetitive inhibition



Q23. A noncompetitive inhibitor has a structure that ..?

- A. Does not interfere with enzyme substrate complex
- B. Does not resemble substrate structure
- C. Resembles active site of enzyme
- D. Can bind to active site of enzyme

Answers key

1. C
2. D
3. B
4. C
5. D
6. C
7. C
8. A
9. D
10. A
11. A
12. D
13. C
14. C
15. C
16. A
17. A
18. D
19. C
20. B
21. C
22. A
23. B

لله ما اخذ ولله م اعطى.

يارب ارحم من استوفيت اجله واخذته من بين اهله وانت وحدك
تعلم ألم فقده ، اللهم ارحم موتانا واغفر لهم واجمعنا بهم في
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