Enzymes Practice

Use this key to check answers and read the explanations.

1. A diagram shows an enzyme binding the starting molecule M before converting it to N. What is M called in this diagram?

A. The substrate
B. The product
C. The active site
D. The catalyst

Correct answer: A. The substrate
The substrate is the starting molecule acted on by the enzyme. The diagram labels its product N.

2. Which part of an enzyme is the site where the substrate binds and the reaction takes place?

A. The entire cell membrane
B. Its product
C. Its active site
D. The substrate itself

Correct answer: C. Its active site
The active site is the region of the enzyme that binds the substrate and facilitates the reaction.

3. On a classroom energy diagram, which quantity is the gap from the starting energy level to the top of the hill?

A. The total mass of the product
B. Activation energy
C. The number of substrate molecules
D. The amount of enzyme used up

Correct answer: B. Activation energy
The top of the hill represents the transition state. The difference from the starting level to that top is the activation barrier.

4. An enzyme releases a product after completing one reaction. What usually happens to that enzyme molecule in this model?

A. It must permanently stop binding substrates.
B. It becomes the product it just released.
C. It is counted as an extra product.
D. It can act on another substrate.

Correct answer: D. It can act on another substrate.
An enzyme is not consumed by the reaction it catalyzes. After releasing the product, it can go through another cycle.

5. Why might two starting molecules of the same size differ in how well they fit an enzyme’s active site?

A. Every molecule of that size must fit equally well.
B. The site depends on chemical properties and shape as well as size.
C. Only the molecule’s starting color determines if it fits.
D. An enzyme recognizes all molecules before releasing any product.

Correct answer: B. The site depends on chemical properties and shape as well as size.
Size alone says little about the arrangement of the substrate and its interactions with the active site.

6. A figure shows an active site making a small shape adjustment as a substrate binds. Which idea does this illustrate?

A. Induced fit
B. A permanently rigid fit
C. Enzyme consumption
D. The product setting the substrate’s mass

Correct answer: A. Induced fit
Induced fit describes a change in the binding arrangement when enzyme and substrate interact.

7. Two paths on a fictional energy diagram start at 20 energy units. The taller peak is 70 and the shorter is 45. How much lower is the shorter path’s activation barrier?

A. 50 energy units
B. 20 energy units
C. 45 energy units
D. 25 energy units

Correct answer: D. 25 energy units
The barriers are 70 − 20 = 50 and 45 − 20 = 25. Their difference is 25 units.

8. In a short fictional chart interval, the amount of product rises by 18 units in 3 minutes. What is the average rate over the interval?

A. 21 units per minute
B. 15 units per minute
C. 6 units per minute
D. 54 units per minute

Correct answer: C. 6 units per minute
Divide the change of 18 product units by three minutes to get six units per minute.

9. In a classroom diagram, the first enzyme helps change A to B. The second helps change B to C. What is B’s role?

A. Product of the first step and substrate for the second
B. Substrate for the first step and product of the second
C. The same enzyme for both steps
D. A substance outside both steps

Correct answer: A. Product of the first step and substrate for the second
The first step produces B, and the next step uses B as its starting material. A pathway can pass a product forward this way.

10. A fictional chart keeps enzyme amount fixed. As the amount of substrate rises, the rate first rises and then levels off. What can explain that pattern?

A. At the plateau the substrate and product must have the same energy.
B. At the plateau the reaction has to produce new enzyme molecules.
C. At the plateau the active sites have never bound substrate.
D. At the plateau the available enzyme molecules are mostly occupied.

Correct answer: D. At the plateau the available enzyme molecules are mostly occupied.
At high substrate levels, the available enzyme molecules spend most of their time occupied. Adding substrate then has little effect on the rate.

11. An enzyme lowers the peak in a fictional reaction from 85 to 55 energy units. Both paths begin at 25 and end at 10. Which values changed?

A. The activation barrier stayed the same, and the end moved 30 lower.
B. The activation barrier fell by 15, and the end is still 30 below the start.
C. The activation barrier fell by 30, and the end is still 15 below the start.
D. The activation barrier rose by 30, and the end moved above the start.

Correct answer: C. The activation barrier fell by 30, and the end is still 15 below the start.
The activation barriers are 60 and 30. Both paths have the same 15-unit difference between the start and end.

12. A fictional record shows product totals of 4, 16, and 22 at minutes 0, 2, and 4. Which statement compares the average rates in the two intervals?

A. The first interval averages 3 units per minute and the second 6.
B. The first interval averages 6 units per minute and the second 3.
C. Both intervals average 6 units per minute.
D. The first interval averages 8 units per minute and the second 11.

Correct answer: B. The first interval averages 6 units per minute and the second 3.
The totals increase by 12 in the first two minutes and by six in the next two. Dividing each increase by two gives 6 and 3 units per minute.

13. In a simplified pathway chart, an early step makes five units of B per minute. The next removes two units of B per minute, and these are the only changes to B. What happens after four minutes at those rates?

A. The amount of B stays the same.
B. The amount of B increases by 20 units.
C. The amount of B decreases by 8 units.
D. The amount of B increases by 12 units.

Correct answer: D. The amount of B increases by 12 units.
The difference is three extra units of B per minute. After four minutes the increase is 12 units.

14. Two model enzymes both level off at 12 product units per minute. The graph shows complete agreement only on that plateau. What can you infer from the plateau alone?

A. Their maximum plotted rates match. Their rates at lower substrate amounts could differ.
B. Their rates must match at every substrate amount.
C. One enzyme must be using a different starting molecule.
D. The two model enzymes must have identical active sites.

Correct answer: A. Their maximum plotted rates match. Their rates at lower substrate amounts could differ.
The plateau describes the highest rates displayed by the two curves. Equal plateau heights do not determine how the curves rise to those heights.

15. Two fictional diagrams show the same reversible reaction at the same temperature. One has a catalyst. What difference would you expect if both begin with the same amounts?

A. The catalyst changes the final equilibrium constant.
B. The catalyst makes the final mixture contain only product.
C. The catalyst can reach the same equilibrium mixture sooner.
D. The catalyst stops the reverse reaction at equilibrium.

Correct answer: C. The catalyst can reach the same equilibrium mixture sooner.
A catalyst speeds the forward and reverse reactions. It can shorten the time needed to reach the same balance without changing the equilibrium mixture.