

Chemical Compounds Of Life

Activity 2 - Enzymes

What Are Enzymes and How do They Work?

Enzymes are proteins that act as *catalysts* in living cells. As catalysts, they increase the rate of chemical reactions, allowing the reactions to proceed rapidly then they would otherwise occur only very slowly.

Enzymes are highly specific in their catalytic activity. The specificity of enzyme action is the result of a "*lock and key*" arrangement in which the enzyme and the substance it reacts with (the substrate) join together to form an enzyme-substrate complex. In this case the place of reaction, called the active site, is fixed. The "*induced-fit*" hypothesis suggests that the *active site*, is not a fixed arrangement but is flexible, to allow for a better fit.

When a reaction is completed, the enzyme and the newly formed reaction products separate, leaving the enzyme unchanged. Enzymes are highly efficient catalysts. Only small quantities are needed to catalyze the reaction of relatively large amounts of materials. Each enzyme has an optimum range of temperature and pH at which it operates most efficiently.

1. The substance with which an enzyme reacts is its _____.

2. Is an enzyme "used up" by the reaction it catalyzes? Explain.

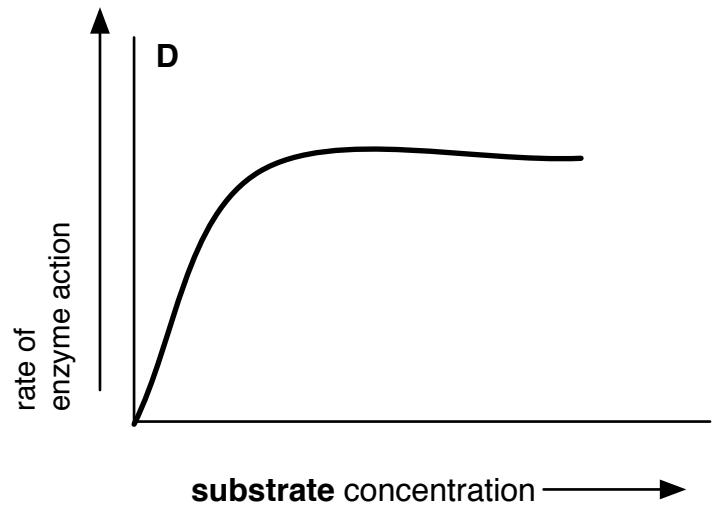
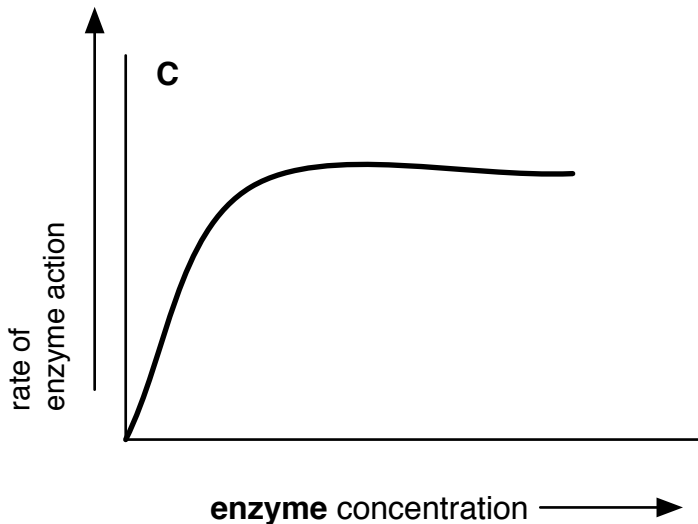
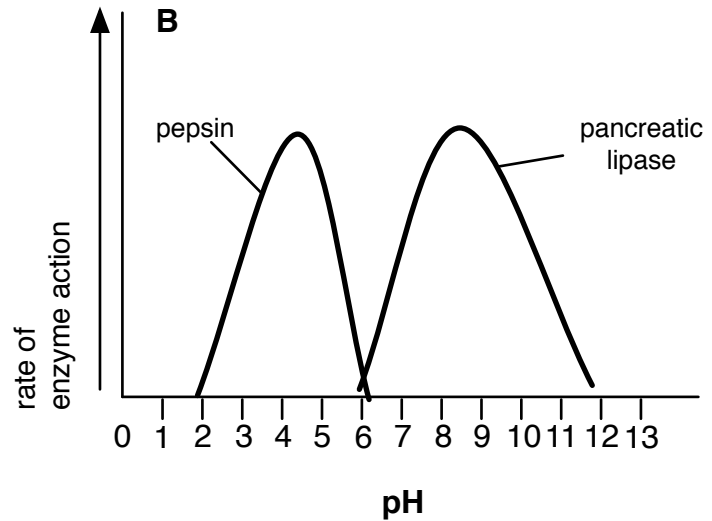
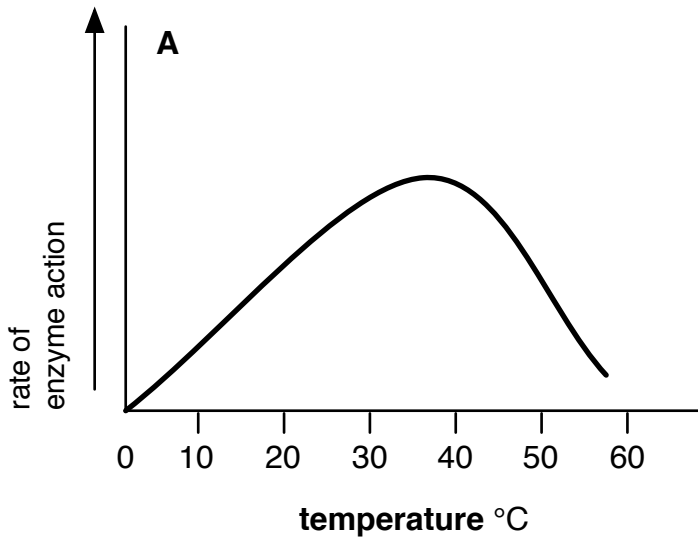
3. In what way does an enzyme affect the reaction it catalyzes? How does the enzyme produce this effect?

4. What is the active site of an enzyme?

5. What is meant by enzyme specificity?

6. Could life as we know it exist without enzymes? Explain.

Factors That Affect Rate of Enzyme Action



7. According to graph **A**, at what temperature is enzyme activity the greatest?

8. According to graph **B**, what is the optimum pH for pepsin? As pH increases above that point, what happens to enzyme activity?

9. According to graph **C**, how does increasing enzyme concentration affect the rate of enzyme action when the substrate concentration remains constant?

10. According to graph **D**, how does increasing substrate concentration affect the rate of enzyme action when enzyme concentration remains constant?