

FILL IN Packet : DUE 10/21/11

GO 15 T-Chart

GRAPHIC ORGANIZER

Compare and Contrast

Ionic Bonds

Covalent Bonds

How are they the same?

- 1.
- 2.
- 3.
- 4.
- 5.

- 1.
- 2.
- 3.
- 4.
- 5.




How are they different?

- 1.
- 2.
- 3.
- 4.
- 5.

- 1.
- 2.
- 3.
- 4.
- 5.

2.4 Chemical Reactions and Enzymes

Lesson Objectives

-  Explain how chemical reactions affect chemical bonds.
-  Describe how energy changes affect how easily a chemical reaction will occur.
-  Explain why enzymes are important to living things.

Lesson Summary

Chemical Reactions Everything that happens in an organism is based on chemical reactions. A **chemical reaction** is a process that changes one set of chemicals into another set of chemicals.

- The elements or compounds that enter into the reaction are the **reactants**.
- The elements or compounds produced by the reaction are the **products**.
- Chemical reactions involve changes in the chemical bonds that join atoms in compounds.

Energy in Reactions Some chemical reactions release energy; others absorb energy.

- Chemical reactions that release energy often occur on their own.
- Chemical reactions that absorb energy require a source of energy. The energy needed to get a reaction started is called the **activation energy**.

Enzymes An **enzyme** is a protein that acts as biological catalyst. A **catalyst** is a substance that speeds up the rate of a chemical reaction. Catalysts work by lowering a reaction's activation energy.

- In an enzyme-catalyzed reaction, the reactants are known as **substrates**. Substrates bind to a part of an enzyme called the active site and remain bound to the enzyme until the reaction is complete, when the products are released.
- Temperature, pH, and regulatory molecules can affect the activity of enzymes.

Chemical Reactions

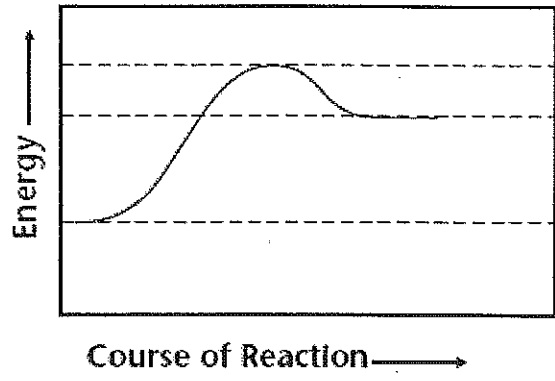
1. What is a chemical reaction?

2. Complete the table about chemicals in a chemical reaction.

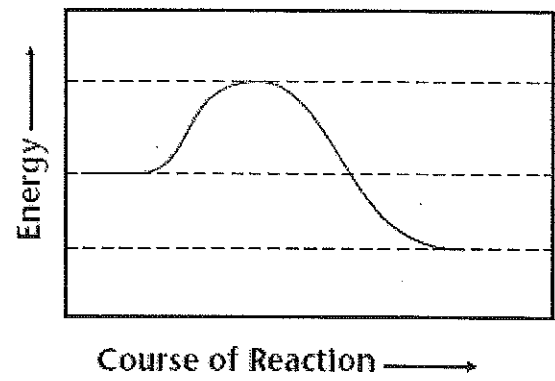
Chemicals in a Chemical Reaction	
Chemicals	Definition
Reactants	
Products	

Energy in Reactions

3. **THINK VISUALLY** The graphs below show the amount of energy present during two chemical reactions. One of the reactions is an energy-absorbing reaction, the other is an energy-releasing reaction. Label the type of reaction for each, label the energy level for the reactants and products, then draw an arrow on each to show the energy of activation.



Type of reaction: _____



Type of reaction: _____

4. What is released or absorbed whenever chemical bonds form or are broken?

5. What is the energy of activation?

6. Of the two reactions shown, which one is more likely to start spontaneously and why?

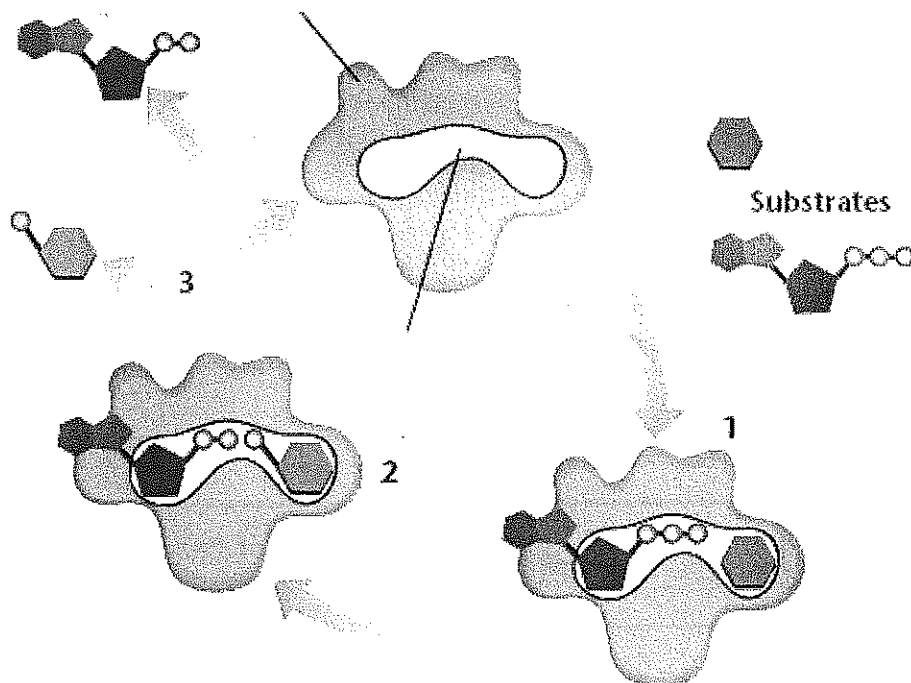
Enzymes

7. How does the addition of a catalyst affect the energy of activation of a chemical reaction?

8. What type of catalysts affect biochemical reactions?

9. What makes proteins the ideal types of compounds to act as enzymes?

Use the diagram to answer Questions 10–11.



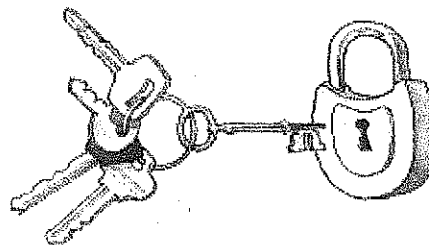
10. **THINK VISUALLY** Label the enzyme, the active site, and the products in the diagram.

11. Write what is happening at each numbered part of the diagram.

- (1) _____
- (2) _____
- (3) _____

For Questions 12–13, refer to the Visual Analogy comparing the action of enzymes to a lock and key.

12. **VISUAL ANALOGY** How is a substrate and its enzyme like a lock and its key?






13. What is being unlocked in this analogy?

Apply the Big idea

14. In terms of an organism and how it interacts with its environment, what is the benefit of having controls on the chemical reactions that take place in its body?

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BUILD Vocabulary

- A. The chart below shows key terms from the lesson with their definitions. Complete the chart by writing a strategy to help you remember the meaning of each term. One has been done for you.

Term	Definition	How I'm Going to Remember the Meaning
Activation energy	Energy needed to get a reaction started	
Catalyst	Substance that speeds up the rate of a chemical reaction	
Chemical reaction	A process that changes or transforms one set of chemicals into another	
Enzyme	A protein that acts as a biological catalyst to speed up a chemical reaction	
Product	An element or compound produced by a chemical reaction	
Reactant	An element or compound that enters into a chemical reaction	<i>The word act is found in the word reactant, and during a reaction, the reactants act together to form the products.</i>

- B. As you work through this lesson, you may find these terms in the activities. When you need to write a key term or a definition, **highlight** the term or the definition.

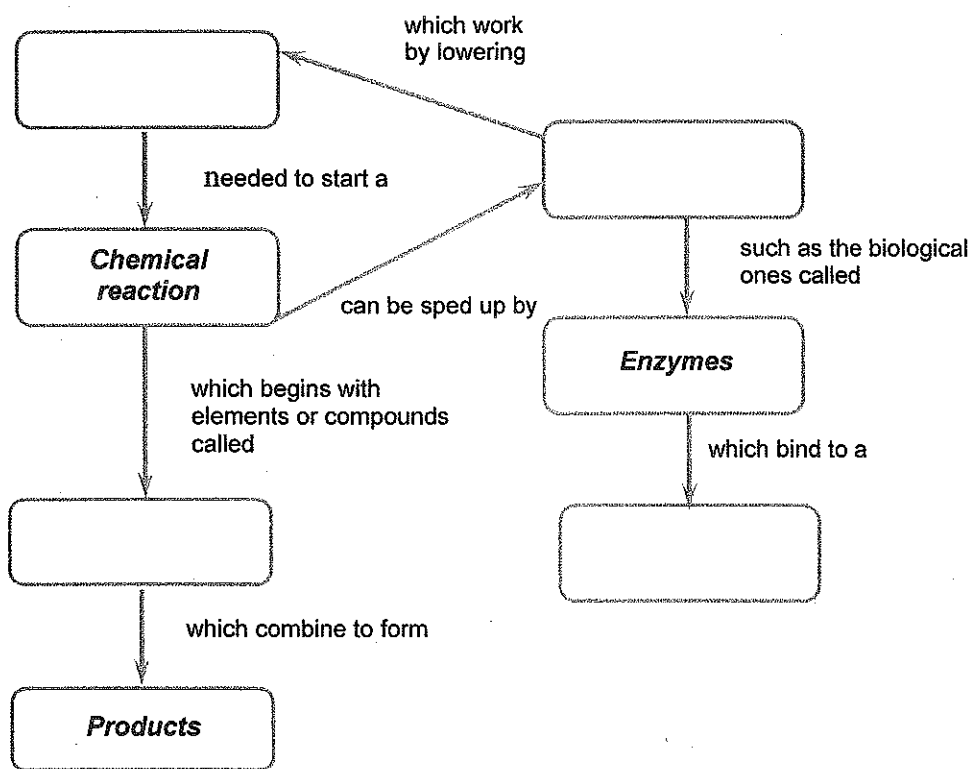
BUILD Understanding

Concept Map A concept map can help you organize information and show how ideas are connected.

The concept map below shows the relationship between vocabulary terms in this lesson. The terms and phrases that go in the concept map are listed in the box below.

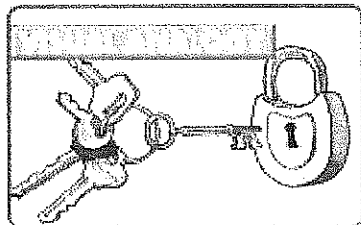
As you read the lesson, complete the concept map. Some terms have been placed in the concept map for you.

activation energy chemical reaction products substrate
 catalysts enzymes reactants



BUILD Connections

Lock and Key An analogy takes two things that seem to be different and shows how they can be similar.



1. How does the analogy of a lock and key to an enzyme and its substrate help you to understand how enzymes function in the body?

2. Find a partner. Using the analogy, explain to your partner what the expression “enzymes are specific” means.
