

Chapter 5 Chemical Reactions

Study Guide

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 2. **Exothermic Reaction**
 3. *How are endothermic reactions different from exothermic reactions?*
 - b. Chemical Reactions on a Small Scale
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 - a. Getting Reactions Started
 - i. **Activation Energy**

ii. Energy and Types of Reactions

1. *Why do exothermic reactions need activation energy?*

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ii. Temperature

iii. Surface Area

iv. **Catalysts**

1. **Enzymes**

v. **Inhibitors**

4. Fire and Fire Safety

a. Understanding Fire

i. **Combustion**

ii. **Fuel**

iii. The Fire Triangle

1. *What is necessary to start a fire?*

iv. Controlling Fire

b. Home Fire Safety

i. Common Sources of Fires

ii. Fighting Fires

iii. Preventing Trouble

SECTION 5-1**REVIEW AND REINFORCE**

Observing Chemical Reactions

◆ Understanding Main Ideas

To complete the following table, describe changes in properties that you might notice during each chemical change.

Event	Observable Changes
Toasting a marshmallow	
Burning a log	
Exploding fireworks	

◆ Building Vocabulary

Answer the following questions in the spaces provided.

1. What is a precipitate?

2. Compare and contrast endothermic and exothermic reactions.

SECTION 5-2**REVIEW AND REINFORCE**

Writing Chemical Equations

◆ Understanding Main Ideas

Balance the equations on the lines below. State whether the reaction is a synthesis, decomposition, or replacement.

Given Equation	Balanced Equation	Type of Reaction
$\text{FeS} + \text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2\text{S}$	_____	_____
$\text{Na} + \text{F}_2 \rightarrow \text{NaF}$	_____	_____
$\text{HgO} \rightarrow \text{Hg} + \text{O}_2$	_____	_____

Answer the following questions on a separate sheet of paper.

- Describe in words the chemical reaction represented by the equation:
 $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- Use the principle of conservation of mass to explain why the equation above is balanced.

◆ Building Vocabulary

Match each term with its definition by writing the letter of the correct definition on the line beside the term.

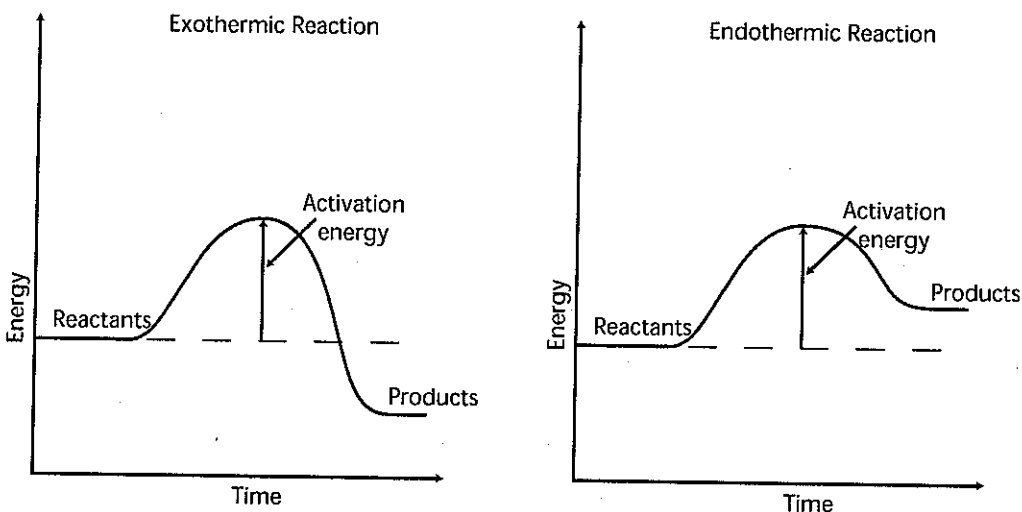
- | | |
|-------------------------------|---|
| _____ 3. chemical equation | a. materials present after a reaction |
| _____ 4. chemical formula | b. reaction in which substances combine to form a more complex compound |
| _____ 5. decomposition | c. a combination of symbols that identifies the elements in a compound |
| _____ 6. coefficient | d. uses symbols to show chemical reactions |
| _____ 7. products | e. reaction in which one element replaces another in a compound |
| _____ 8. reactants | f. number that tells the ratio of atoms in a formula |
| _____ 9. conservation of mass | g. materials present before a reaction |
| _____ 10. synthesis | h. number that tells how many molecules are involved in a chemical reaction |
| _____ 11. replacement | i. reaction in which compounds are broken down into simpler products |
| _____ 12. subscript | j. matter is not created or destroyed during a chemical reaction |

SECTION 5-3 REVIEW AND REINFORCE

Controlling Chemical Reactions

◆ Understanding Main Ideas

Use the figures below to answer the following questions. Write your answers on the back of this page or on a separate sheet of paper.



1. Use what you know about endothermic and exothermic reactions to explain the differences in the graphs above.
2. Why is the activation energy pictured as a hill in the two diagrams?
3. Explain how adding heat to the reactions shown in the diagram would change the rate of these chemical reactions. Name two other ways to change the rate of a chemical reaction.

◆ Building Vocabulary

Write a definition for each of the following terms in the spaces provided.

4. concentration

5. enzyme

6. inhibitor

Name: _____

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Choose the letter of the correct answer.

- In chemical reactions, what does the principle of conservation of mass mean?
[A] The total mass of the reactants is less than the total mass of the products.
[B] Matter is not changed.
[C] Matter is not created or destroyed.
[D] The total mass of the reactants is greater than the total mass of the products.
- The chemical reaction between copper oxide and carbon that produces copper and carbon dioxide ($\text{CuO} + \text{C} \rightarrow \text{Cu} + \text{CO}_2$) is an example of
[A] synthesis. [B] decomposition. [C] precipitation. [D] replacement.
- What is the best form of fire safety?
[A] a water hose [B] an extinguisher [C] the fire department [D] fire prevention
- Which of the following is a balanced chemical equation?
[A] $\text{SO}_2 + \text{O}_2 + 2 \text{H}_2\text{O} \rightarrow 4 \text{H}_2\text{SO}_4$ [B] $\text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O} + \text{O}_2$
[C] $2 \text{Mg} + \text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$ [D] $2 \text{Fe}_2\text{O}_3 + 3 \text{C} \rightarrow 4 \text{Fe} + 3 \text{CO}_2$
- Water vapor in the air turns to liquid water in the form of rain. This is an example of a
[A] chemical equation. [B] chemical change.
[C] physical change. [D] chemical formula.
- The force that holds atoms together is called
[A] heat. [B] conservation of matter. [C] a chemical bond. [D] a chemical change.
- Chemicals that act as biological catalysts by speeding up reactions in living things are
[A] inhibitors. [B] enzymes. [C] reactants. [D] fuels.
- In an equation, numbers often appear in front of a chemical formula. These numbers tell you the
[A] number of molecules or atoms of each substance in the reaction.
[B] number of elements in the reaction.
[C] number of molecules in each atom in the reaction.
[D] number of atoms in each molecule in the reaction.

Choose the letter of the correct answer.

9. In a chemical reaction

[A] energy is always absorbed.

[B] there is no change in energy.

[C] energy is always released.

[D] energy is either absorbed or released.

10. A rapid reaction between oxygen and a fuel is known as

[A] activation.

[B] heat.

[C] combustion.

[D] decomposition.

Fill in the word or phrase that best completes the statement(s).

11. A fuel is a material that will release _____ when it burns.

12. Hydrogen gas and oxygen gas can explode in a violent, exothermic reaction if ignited by a spark. In this case, the spark supplies the _____ for the reaction.

13. A subscript shows the number of _____ of an element in a molecule.

14. The principle of _____ states that during a chemical reaction, matter is not created or destroyed.

15. The reaction between magnesium carbonate and hydrochloric acid to form magnesium chloride and carbonic acid ($\text{MgCO}_3 + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2\text{CO}_3$) may be classified as a _____ reaction.

16. A reaction that _____ energy in the form of heat is an exothermic reaction.

17. Rust forms when iron metal combines with oxygen in the air to produce iron oxide ($\text{Fe} + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3$). This reaction is an example of a _____ reaction.

18. A material used to increase the rate of a chemical reaction is called a(n) _____.

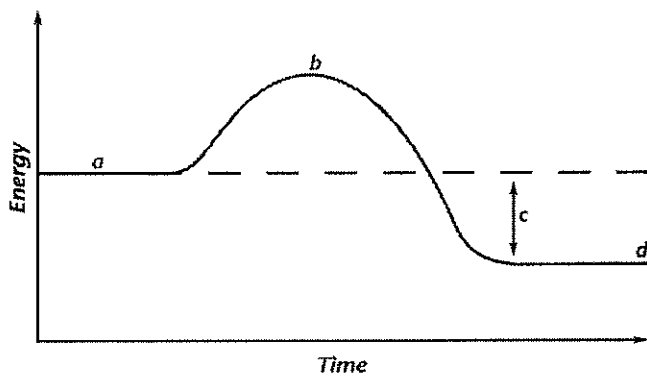
19. When added to a fire, water _____ and prevents the fuel from coming in contact with oxygen.

If the statement is true, write true. If it is false, change the underlined word or words to make the statement true.

20. In a chemical reaction, chemical bonds are formed or broken.

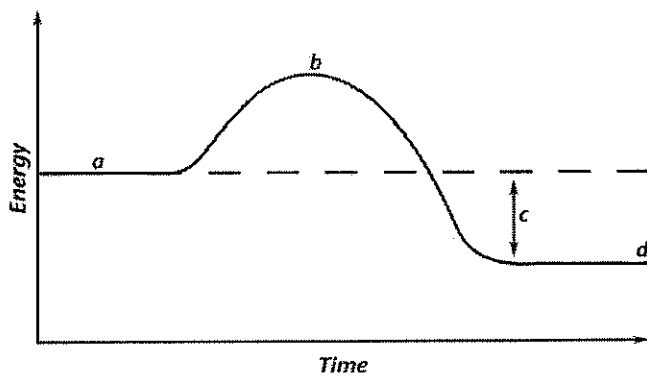
21. Chemical reactions that absorb energy are said to be exothermic.

Use the diagram to answer the question(s).



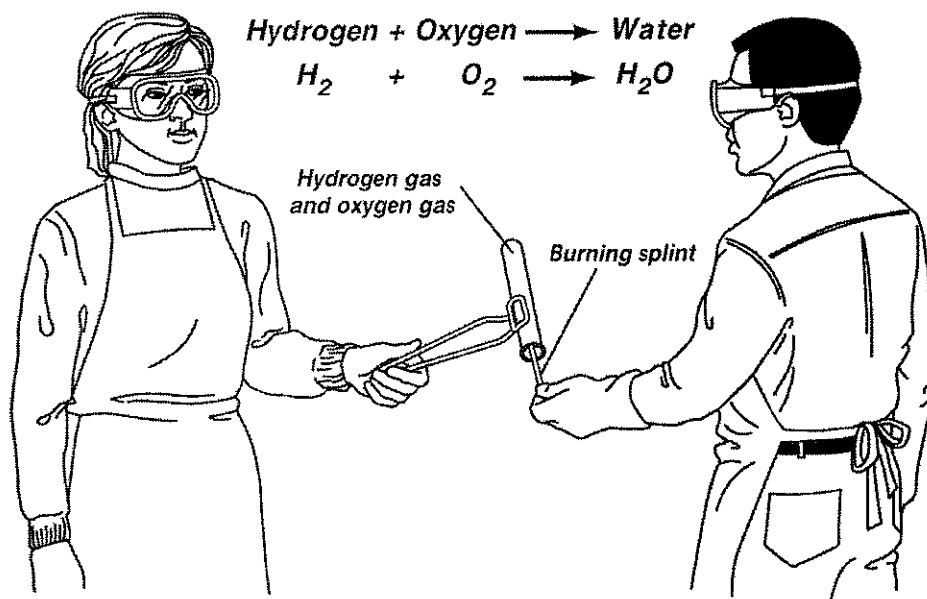
22. Which point in the diagram (a, b, c, or d) indicates the energy level of the products?

Use the diagram to answer the question(s).



23. For the reaction represented by this diagram, has heat been absorbed or released? What point in the diagram (a, b, c, or d) shows this change?

Use the diagram to answer the question(s).



24. Identify the reactant(s) and product(s) of the reaction.
25. Where does the water come from in the reaction?
26. What is the purpose of the burning splint in the reaction?
27. How would the mass of water formed in the reaction compare to the mass of oxygen that reacts?

Write an answer to the following question(s).

28. Explain each of the following in terms of factors that affect the rate of a chemical reaction:
 - A) Chemical reactions in living things would not be possible without the enzymes found in cells.
 - B) Wood burns at a steady rate, but sawdust may explode if a spark ignites it.
29. How is it possible to detect when a chemical reaction has taken place? Give an example.
30. Describe the difference between a synthesis reaction and a decomposition reaction.