

Name _____

Date _____

Chemical Reactions

Section 1 Chemical Changes

Chapter
19
DRW

Predict Review the objectives of Section 1. Predict three topics that might be discussed.

1. _____
2. _____
3. _____

Review Vocabulary

Define chemical formula. Use your book for help.

chemical formula

New Vocabulary

Use your book to define the following key terms.

chemical reaction

reactants

products

chemical equation

coefficient

balanced chemical equation

mole

molar mass

Section 1 Chemical Changes (continued)

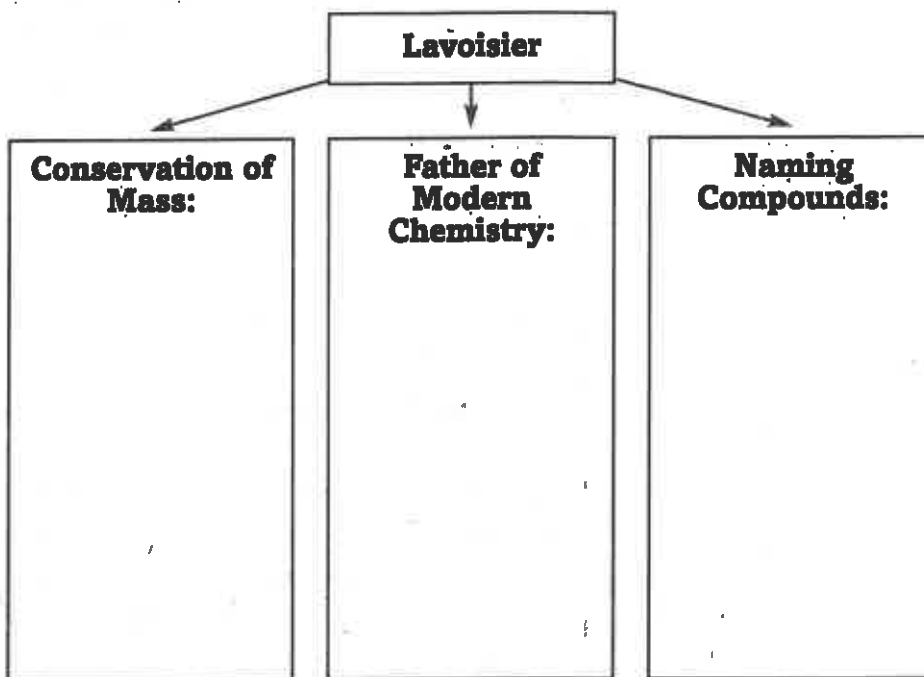
Main Idea

Lavoisier and the Conservation of Mass

I found this information on page _____

Details

Summarize the contributions of Lavoisier by filling out the organizer. Include information on his experiments, observations, and theories.



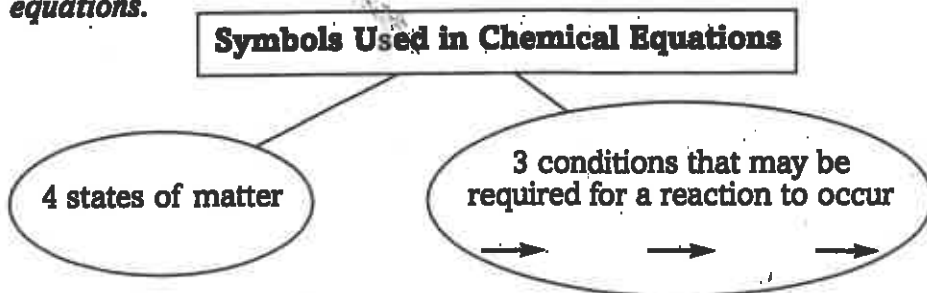
Identify the reactants and the products in the following chemical equations.

Chemical Equation	Reactants	Products
$\text{Zn} + \text{S} \rightarrow \text{ZnS}$		
$\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl} + \text{NaNO}_3$		
$\text{C}_{12}\text{H}_{22}\text{O}_{11} \rightarrow 12\text{C} + 11\text{H}_2\text{O}$		
$\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$		
$\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{H}_2\text{O} + \text{CO}_2 + \text{CaCl}_2$		

Writing Equations

I found this information on page _____

Complete the graphic organizer about symbols used in chemical equations.



Section 1 Chemical Changes (continued)

Main Idea

Writing Equations

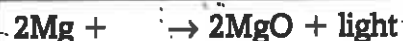
I found this information
on page _____.

Coefficients

I found this information
on page _____.

Details

Complete the following chemical formula and its translation.



Magnesium _____ oxygen
_____ magnesium oxide
and _____.

Analyze the role of coefficients in writing chemical equations.

Evaluate the student responses. The science teacher gave students the following equation to balance, and three students made responses as shown in the chart. State who is correct and give an explanation of what the meaning of the two wrong responses would be and why those solutions do not work.



Student Name	Student's Answer	Evaluation: Are they right or wrong? What does the student's answer mean?
Melinda	Put a 2 in front of the Mg.	
Barni	Put a 2 in front of the MgO.	
Ali	Put a 0.5 in front of the O ₂ .	

Section 1 Chemical Changes (continued)

Main Idea**Balancing Equations**

*I found this information
on page _____*

Details

Summarize information about balancing equations by completing the prompts.

Balancing an equation means _____

Coefficients are the numbers that show _____

Subscripts are numbers that show there is _____

Identify each number 3 below as a coefficient (C) or a subscript (S).

2 FeSO ₃		6 AlH ₃	
3 HCl		4 Al ₂ O ₃	
3 Na		3 H ₂	

Complete The number of atoms for each element on the left side of the equation has been filled in for you. Complete the right side of the equation.

Atoms	BaCl ₂	+	H ₂ SO ₄	→	BaSO ₄	+	HCl
Ba	1						
Cl	2						
H			2				
S			1				
O			4				

*I found this information
on page _____*

Evaluate whether the equation above is balanced. Give the total number of atoms on the left side and the total number on the right side.

Identify the coefficient for HCl that would balance the equation in the table above.

Section 1 Chemical Changes (continued)

Main Idea**Balancing Equations**

I found this information
on page _____

I found this information
on page _____

Details

Sequence and describe 4 steps involved in balancing a chemical equation. In the right column, write an example for each step.

1.	
2.	
3.	
4.	

Identify coefficients that balance each equation.

1. $\text{P(s)} + \text{O}_2\text{(g)} \rightarrow \text{P}_4\text{O}_{10}\text{(s)}$
2. $\text{KClO}_3\text{(s)} \rightarrow \text{KCl(s)} + \text{O}_2\text{(g)}$
3. $\text{H}_2\text{O(l)} \rightarrow \text{H}_2\text{(s)} + \text{O}_2\text{(g)}$
4. $\text{CH}_4\text{(s)} + \text{O}_2\text{(g)} \rightarrow \text{CO}_2\text{(g)} + \text{H}_2\text{O(g)}$
5. $\text{Al}_2\text{O}_3\text{(s)} \rightarrow \text{Al(s)} + \text{O}_2\text{(g)}$
6. $\text{MgSO}_4\text{(aq)} + \text{KCl(aq)} \rightarrow \text{MgCl}_2\text{(s)} + \text{K}_2\text{SO}_4\text{(aq)}$

CONNECT IT

Compare chemical equations and mathematical equations.

Chemical Reactions

Section 2 Classifying Chemical Reactions

Skim Section 2. Write two statements about what you plan to learn from the reading.

1. _____

2. _____

Review Vocabulary

Define states of matter.

states of matter

New Vocabulary

Read the definitions below. Then write the key term for each one in the left column.

a reaction in which a substance reacts with oxygen to produce heat and light

a reaction in which two or more substances combine to form another substance

a reaction in which one substance breaks down, or decomposes, into two or more substances

a reaction in which one element replaces another element in a compound

a reaction in which the positive ion of one compound replaces the positive ion of the other compound to form two new compounds

an insoluble compound that comes out of a solution during a double-displacement reaction

a loss of electrons during a chemical reaction

a gain of electrons during a chemical reaction

Section 2 Classifying Chemical Reactions (continued)

Main Idea

Types of Reactions

I found this information
on page _____.

Details

Describe each type of chemical reaction in words. Give the general form if it exists and an example for each.

I. Combustion Reaction

Description: _____

Example: _____

II. Synthesis Reaction

Description: _____

General form: _____

Example: _____

III. Decomposition Reaction

Description: _____

General form: _____

Example: _____

IV. Single-Displacement Reaction

Description: _____

General form: _____

Example: _____

V. Double-Displacement Reaction

Description: _____

General form: _____

Example: _____

VI. Oxidation-Reduction Reaction

Description: _____

Section 2 Classifying Chemical Reactions (continued)

Main Idea

Type of Reactions

I found this information on page _____

I found this information on page _____

Details

Analyze the activity series chart in your book to decide which metal will replace the other in a displacement reaction.

1. calcium

lead

2. tin

zinc

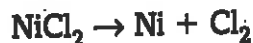
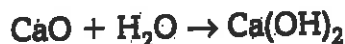
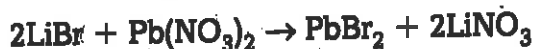
3. copper

aluminum

Classify each chemical reaction by writing the reaction type in the blank to the left.

- decomposition
- double displacement

- single displacement
- synthesis



Model a synthesis reaction and a decomposition reaction using the following elements. Balance the equations.

Calcium

Hydrogen

Oxygen

Synthesis _____

Decomposition _____

[energy will be required to cause the decomposition reaction]

CONNECT IT

Select an example of a chemical reaction that you have observed. Describe the reaction and try to write an equation for it.

Name _____

Date _____

Chemical Reactions

Section 3 Chemical Reactions and Energy

Preview Section 3 of this chapter. Read the headings and the illustration captions. Write three questions that come to mind.

1. _____
2. _____
3. _____

Review Vocabulary

Define chemical bond.

chemical bond

New Vocabulary

Use your book to define the following key terms.

exergonic reaction

exothermic reaction

endergonic reaction

endothermic reaction

Academic Vocabulary

Use a dictionary to define release.

release

Section 3 Chemical Reactions and Energy (continued)

Main Idea

Chemical Reactions— Energy Exchanges

*I found this information
on page _____*

More Energy Out, More Energy In

*I found this information
on page _____*

Details

Identify three pieces of information about chemical reactions and energy.

1. _____

2. _____

3. _____

Complete the following sentences about energy reactions.

All exothermic reactions are _____, but not all exergonic reactions are _____. _____ give off thermal energy, and _____ give off any type of energy.

All _____ reactions are endergonic, but not all _____ reactions are endothermic. _____ reactions absorb thermal energy, and _____ reactions absorb any type of energy.

Classify each reaction as endergonic or exergonic.

- | | |
|------------------------------|--|
| • combustion of fossil fuels | • glow sticks |
| • dissolving salt in water | • photosynthesis |
| • dynamite explosions | • rusting iron |
| • electroplating | • separating aluminum metal from its ore |
| • fireflies' light | |

Exergonic

--

Endergonic

--

Section 3 Chemical Reactions and Energy (continued)

Main Idea

**More Energy Out,
More Energy In**

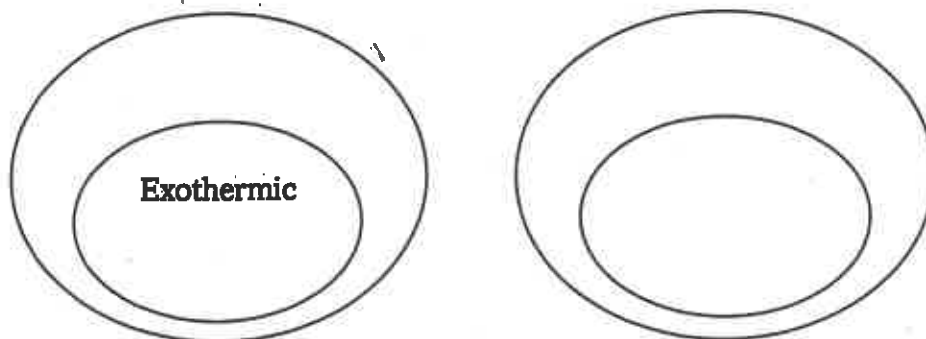
I found this information
on page _____

**Conservation of
Energy in
Chemical
Reactions**

I found this information
on page _____

Details

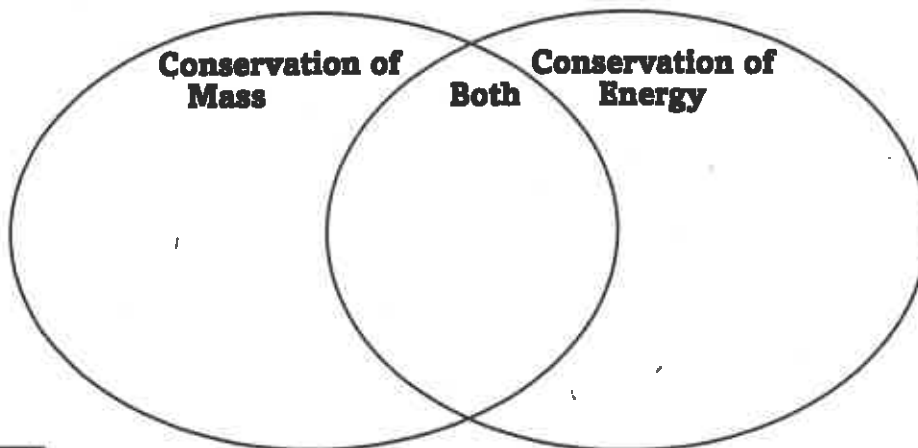
Model the exergonic/exothermic and endothermic/endergonic relationships by completing the Venn Diagram below. The first step has been done for you.



Compare and contrast the conservation of mass and the conservation of energy in the equation below. Fill the Venn diagram using phrases from the bank below the equation.



- Balanced equation
- Chemical energy is released as thermal energy.
- New compounds are created.
- Matter is not created or destroyed.
- Light is a product.



CONNECT IT

Use what you have learned in this section to explain why a match will not light if you do not strike it hard enough.

Name _____

Date _____

Chemical Reaction

Section 4 Reaction Rates and Equilibrium

Read the section headings and ask three questions that come to mind.

1. _____
2. _____
3. _____

Review Vocabulary

Define pressure using your own words.

pressure

New Vocabulary

Use your book or a dictionary to define these key terms.

reaction rate

collision model

catalyst

inhibitor

reversible reaction

equilibrium

Le Chatelier's principle

Academic Vocabulary

Use a dictionary to define principle.

principle

Section 4 Reaction Rates and Equilibrium (continued)

Main Idea

Reaction Rates

I found this information
on page _____

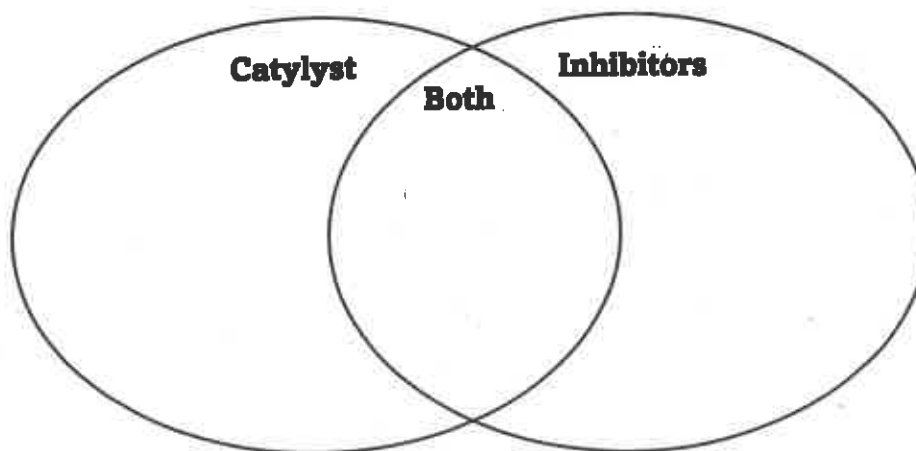
Details

Explain whether each of the factors in the chart speeds up a reaction, or slows it down, and how they work.

Factor	Speeds up the reaction...	Slows down the reaction...
Temperature		
Concentration		
Pressure and Volume		
Surface Area		
Catalyst		
Inhibitor		

Compare and contrast the roles of catalysts and inhibitors in reactions. Fill in the Venn diagram with phrases from the bank.

- does not enter into the reaction itself
- enzymes in body
- food preservatives
- temperature change
- used in auto industry
- used to make polymers



Section 4 Reaction Rates and Equilibrium (continued)

Main Idea**Equilibrium**

*I found this information
on page _____*

Details

Explain reversible reactions by inserting the words left and right in the following statements.

The reactants for the forward reaction are on the _____. The products are on the _____. The reactants for the reverse reaction are on the _____. The products are on the _____.

List the reactants and products of the following reversible reaction.
 $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g})$ (reversible reaction arrows) $2\text{NH}_3(\text{g})$

	Reactant(s)	Product(s)
Forward reaction		
Reverse reaction		

Complete the following statement.

The state in which forward and reverse reactions balance each other because they take place at equal rates is called _____.

Although a chemical reaction might be in equilibrium, the _____ and _____ can continually be _____ because chemical equilibrium is a dynamic process.

Factors Affecting Equilibria

*I found this information
on page _____*

Determine how each of the following changes affects a system in equilibrium.

Changes in concentration (collisions)

Changes in volume (pressure, products)

Changes in temperature (endothermic, exothermic)
