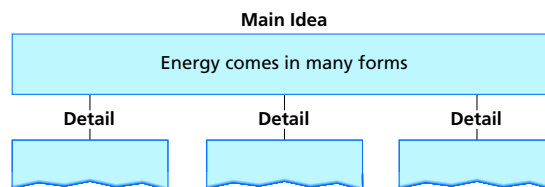


Target Reading Skill

Identify Main Idea Review Section 3 on Energy and Matter. Then, complete the graphic organizer to the right.



Reviewing Key Terms

Choose the letter of the best answer.

- The ability to dissolve in water and to conduct electricity are examples of
 - physical properties.
 - chemical changes.
 - chemical properties.
 - chemical bonding.
- Water is an example of
 - an element.
 - a homogeneous mixture.
 - a compound.
 - a heterogeneous mixture.
- When matter changes, the most common form of energy released or absorbed is
 - electrical energy.
 - thermal energy.
 - chemical energy.
 - electromagnetic energy.
- New substances are always formed when matter undergoes a
 - change in shape.
 - physical change.
 - change in temperature.
 - chemical change.
- Chemical energy is the energy
 - of temperature.
 - stored in the bonds between atoms.
 - of moving, electrically charged particles.
 - that travels through space as waves.

Complete the following sentences so that your answers clearly explain the key terms.

- The pencil you write with is an example of **matter**, which is defined as anything that _____.
- Different substances can be classified by their **chemical properties**, or properties that _____.
- All matter is made up of slightly more than 100 different **elements**, which are pure substances that _____.
- Chemist Antoine Lavoisier's experiments demonstrated the **law of conservation of matter**, which states that _____.
- The melting of ice is an example of an **endothermic change**, or a change in which _____.

Writing in Science

How-to Paragraph Suppose you are preparing for a long journey on the ocean or in space. Write a journal entry that describes your plan for having fresh, drinkable water throughout your entire trip.

 **Video Assessment**
Discovery Channel School
Introduction to Matter

Chapter 2 ♦ 81

Target Reading Skill

Check students' graphic organizers for accuracy. Students should list thermal energy, chemical energy, electromagnetic energy, and electrical energy.

Reviewing Key Terms

- a
- c
- b
- d
- b
- anything that has mass and takes up space.
- describe a pure substance's ability to change into different substances.
- cannot be broken down into any other substances by chemical or physical means.
- matter is not created or destroyed in any chemical or physical change.
- energy is taken in.

Writing in Science



E-LA: Writing 8.2.0

Writing Mode Expository

Scoring Rubric

- Exceeds criteria; includes highly detailed, step-by-step directions that describe how to build and use a device to get fresh water from the ocean
- Meets criteria
- Includes brief directions that contain a few errors or omissions
- Includes sketchy directions with serious errors

Video Assessment

Introduction to Matter

Show the Video Assessment to review chapter content and as a prompt for the writing assignment. Discussion questions:

What is the difference between a compound and a mixture? (*Compounds are chemically combined elements; mixtures are not chemically combined.*) **How are NASA engineers planning to provide astronauts with drinking water during space voyages?** (*By recycling the water they bring with them using water purification technology*)

Review and Assessment

Checking Concepts

11. Compounds—pure substances made up of two or more elements chemically combined; elements combined in a specific ratio; properties differ from those of combined elements

Mixtures—not pure substances; made up of two or more elements and/or compounds not chemically combined; parts not combined in a specific ratio; mixed substances retain individual properties

12. In a physical change, the same substance is present before and after the change. In a chemical change, new substances are produced.

13. Every physical or chemical change in matter includes a change in energy.

14. The burning wax releases energy in the form of light (electromagnetic energy) and heat (thermal energy). A change that gives off energy is an exothermic change.

Thinking Critically

15. Fruit punch is a solution because its parts retain their individual properties but are evenly mixed.

16. Sample answer: The solution would taste salty so the salt would still be present. Boiling the liquid separates the water from the salt.

17. The reaction released energy. The temperature of the reaction mixture increased.

Math Practice

18. 2 : 5; the compound P_2O_5 has two atoms of phosphorus for every five atoms of oxygen.

Applying Skills

19. Diagrams A and B represent single elements because each is made up of a single type of atom.

20. Diagrams A, B, and D represent pure substances. Diagrams A and B represent elements. Diagram D represents a compound because its two kinds of atoms are chemically combined in a set ratio.

21. A—a single kind of atom; D—two kinds of atoms

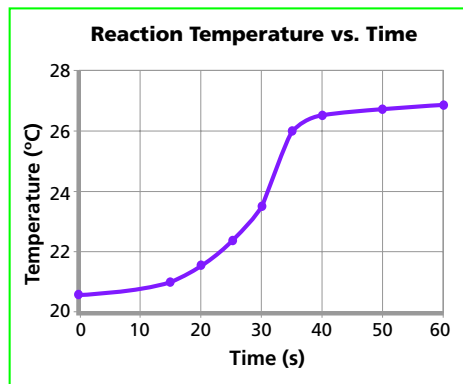
22. Diagram C represents a mixture because it contains several different kinds of substances that are not chemically combined.

Checking Concepts

11. What are three ways that compounds and mixtures differ?
12. How does a physical change differ from a chemical change?
13. How are changes in matter related to changes in energy?
14. How do you know that the burning of candle wax is an exothermic change?

Thinking Critically

15. **Classifying** Which of the following is a solution: pure water, fruit punch, cereal and milk in a bowl? Explain how you know.
16. **Problem Solving** Suppose you dissolve some table salt in a glass of water. How could you prove to someone that the dissolving was a physical change, not a chemical change?
17. **Interpreting Graphs** A student has two liquids at the same temperature. The liquids react with one another when mixed. The graph below shows the change in temperature after the two liquids are mixed. Did the reaction absorb or release thermal energy? Explain your answer.



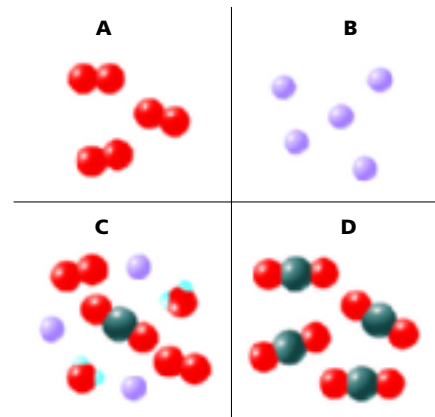
Math Practice

18. **Ratios** The elements phosphorus and oxygen form a compound with the formula P_2O_5 . What is the ratio of phosphorus atoms to oxygen atoms in the compound?

Applying Skills

Use the information and the diagrams below to answer Questions 19–22.

Each diagram below represents a different kind of matter. Each ball represents an atom. Balls of the same color represent the same kind of atom.



19. **Interpreting Diagrams** Which diagrams represent a single element? Explain.
20. **Classifying** Which diagrams represent pure substances? Explain.
21. **Interpreting Data** How do the molecules in diagram A differ from those in diagram D?
22. **Interpreting Diagrams** Which diagram represents a mixture? Explain.

Standards Investigation

Performance Assessment Compare the changes you recorded in your log with those of your classmates. Defend your opinions as to whether or not your observations describe physical or chemical changes.

Choose the letter of the best answer.

- What is the best title for the chart below?
 A Chemical Properties of Some Compounds
 B Physical Properties of Some Elements
 C The Periodic Table of the Elements
 D Gases Found in Air S 8.3.b

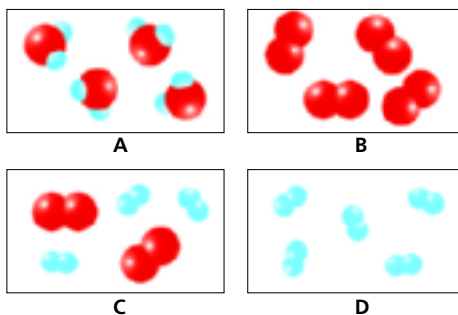
?	
Helium	Colorless; less dense than air
Iron	Attracted to a magnet; melting point of 1,535°C
Oxygen	Odorless; gas at room temperature

A scientist did an experiment, described by the words and symbols below. Use the information to answer Questions 2 to 4.



- The scientist found that 2 grams of hydrogen reacted completely with 16 grams of oxygen. What was the total mass of water produced?
 A 8 grams C 18 grams
 B 14 grams D 32 grams S 8.5.b
- The properties of the water produced by the reaction are
 A different from the properties of both hydrogen and oxygen.
 B the same as the properties of both hydrogen and oxygen.
 C the same as the properties of hydrogen, but different from the properties of oxygen.
 D the same as the properties of oxygen, but different from the properties of hydrogen. S 8.3.b
- Which pair of terms best describes the type of change that occurred in the reaction?
 A chemical and exothermic
 B chemical and endothermic
 C physical and exothermic
 D physical and endothermic S 8.5.c

- The fact that matter is neither created nor destroyed in any chemical or physical change is called the
 A law of exothermic change.
 B law of endothermic change.
 C law of thermal change.
 D law of conservation of matter. S 8.5.b
- How would you classify the burning of natural gas?
 A exothermic chemical change
 B endothermic chemical change
 C exothermic physical change
 D endothermic physical change S 8.5.c
- Which diagram best represents a mixture of two kinds of gas molecules?
S 8.3.b



Apply the BIG Idea

- Water is a compound with the chemical formula H_2O . Compare a physical change involving water with a chemical change involving water. How do the changes differ? S 8.3.b

Teachers can monitor student progress and supply remediation when necessary.

Standards Practice

- B; S 8.3.b
- C; S 8.5.b
- A; S 8.3.b
- A; S 8.5.c
- D; S 8.5.b
- A; S 8.5.c
- C; S 8.3.b

Apply the BIG Idea

- Sample answer: In a physical change, such as melting or freezing, water remains the same substance: the compound H_2O . In a chemical change, such as electrolysis, a reaction produces products with different properties than the compound H_2O . S 8.3.b

Lab zone Standards Investigation

S 8.3.b

Performance Assessment As students complete their observations and compile a list, have them identify common observations and make sure they classified observations in the same way. It may help to have volunteers make a poster or a large data table on the board for students to fill in.

Students should identify changes that were easy to observe and classify as well as those that were difficult. Students should give an example of a change they had trouble analyzing.

Teaching Resources

Laboratory Manual TE

- Standards Investigation Scoring Rubric

The Standards Investigation Scoring Rubric will help you evaluate students' work. If you shared the rubric in advance, students will know what is expected of them.