Name _____ Date _____ Class _____

Describing Matter

Guide for Reading

- What kinds of properties are used to describe matter?
- What are elements, and how do they relate to compounds?
- What are the properties of a mixture?

Matter is anything that has mass and takes up space. **Chemistry** is the study of the properties of matter and how matter changes. In chemistry, a **substance** is a single kind of matter that is pure.

Every form of matter has two kinds of properties—physical properties and chemical properties. A physical property is observed without changing the substance into another substance. Examples of physical properties are hardness, texture, color, and ability to dissolve in water. A **chemical property** is the ability of a substance to change into different substances. Some chemical properties are burning and rusting.

All matter is made up of elements. An **element** is a pure substance that cannot be broken down into any other substance. **Elements are the simplest substances.** Each element is identified by its specific physical and chemical properties. An **atom** is the basic particle that makes up an element. Atoms of most elements can combine with other atoms. A **chemical bond** is the force that holds two atoms together. Atoms often combine to form **molecules**, which are groups of two or more atoms held together by chemical bonds.

When elements are chemically combined, they form compounds having properties that are different from those of the uncombined elements. A **compound** is a pure substance made of two or more elements chemically combined in a set ratio. A compound may be represented by a **chemical formula**. A chemical formula shows the elements in the compound and the ratio of atoms. For example, the chemical formula for carbon dioxide is CO_2. In carbon dioxide, there are always two oxygen atoms and one carbon atom.

Elements and compounds are pure substances, but most of the materials you see every day are not. Instead, they are mixtures. A **mixture** is made of two or more substances that are together in the same place, but are not chemically combined. Mixtures differ from compounds in two ways. **Each substance in a mixture keeps its individual properties. Also, the parts of a mixture are not combined in a set ratio.**

A mixture can be heterogeneous or homogeneous. In a **heterogeneous mixture**, you can see the different parts. The substances in a **homogeneous mixture** are so evenly mixed that you cannot see the different parts. A **solution** is an example of a homogeneous mixture. Air is a solution of nitrogen gas, oxygen gas, plus small amounts of other gases. Unlike compounds, mixtures are easily separated into their components. For example, iron filings can be easily removed from salt with a magnet.

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Introduction to Matter ▪ *Guided Reading and Study*

Describing Matter

This section describes the kinds of properties used to describe matter. It also defines elements and contrasts compounds and mixtures.

Use Target Reading Skills

Write a definition of each Key Term in your own words.

matter: _____

chemistry: _____

substance: _____

_____

physical property: _____

_____

chemical property: _____

_____

element: _____

_____

atom: _____

_____

chemical bond: _____

_____

molecule: _____

_____

compound: _____

_____

chemical formula: _____

_____

mixture: _____

_____

heterogeneous mixture: _____

_____

homogeneous mixture: _____

_____

solution: _____

_____

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Describing Matter *(continued)*

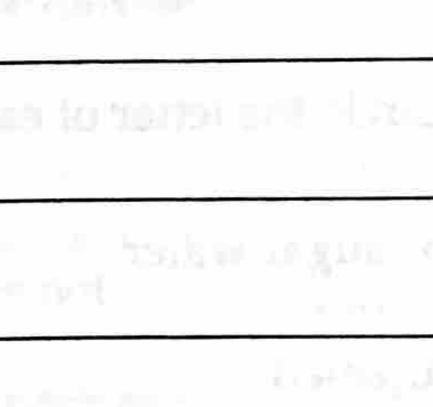
Properties of Matter

1. The study of the properties of matter and how matter changes is called _____.
2. Is the following sentence true or false? Table sugar and table salt are pure substances. _____
3. A(n) _____ property is a characteristic of a pure substance that can be observed without changing the substance into something else.
4. Complete the table by classifying each property as either a physical or chemical property.

Properties of Matter	
Property	**Physical or Chemical?**
Ability to burn	**a.**
Color	**b.**
Flexibility	**c.**
Ability to tarnish	**d.**
Ability to freeze	**e.**
Ability to rust	**f.**

Elements

5. A pure substance that cannot be broken down into any other substances by chemical or physical means is a(n) _____.
6. Is the following sentence true or false? The basic particle from which all elements are made is a molecule. _____
7. When atoms combine, the force of attraction that holds them together is a(n) _____.
8. How many atoms of hydrogen are in this water molecule? _____



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Compounds

9. What is a compound?

_____

_____

_____

10. What is the ratio of atoms in carbon dioxide, or CO_2?

_____

11. What is the chemical formula of carbon monoxide?

_____

12. Is the following sentence true or false? When elements chemically combine, they form compounds that have properties that are similar to those of the uncombined elements. _____

Mixtures

13. A(n) _____ is made of two or more substances that are together in the same place but are not chemically combined.

14. What are two ways in which mixtures differ from compounds?

a. _____

_____

b. _____

_____

15. Circle the letter of each mixture below that is heterogeneous.

a. damp soil
b. sugar water
c. brass
d. salad

16. Is the following sentence true or false? A solution is an example of a homogeneous mixture. _____

17. What are two ways in which mixtures differ from compounds?

_____

_____

_____

_____