

## Chapter 1 Introduction to Matter

## Study Guide

## 1. Describing Matter

- a. Properties of Matter
  - i. **Chemistry**
- b. Kinds of Matter
  - i. **Elements**
    1. **Atoms**
    2. **Symbol**
  - ii. **Compounds**
    1. **Formula**
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- c. Changes in Matter
  - i. **Physical Change**
  - ii. **Chemical Change**
    1. **Chemical reaction**

## 2. Measuring Matter

- a. Mass
  - i. **Weight and Mass**
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    1. **International System of Units**
- b. **Volume**
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## 3. Particles of Matter

- a. Early Ideas About **Atoms**
- b. Dalton's Ideas About Atoms
- c. Ideas About Atoms Today
- d. Atoms and **Molecules**
  - i. **Chemical bond**
- e. The Atom as a Model

4. Elements From Earth

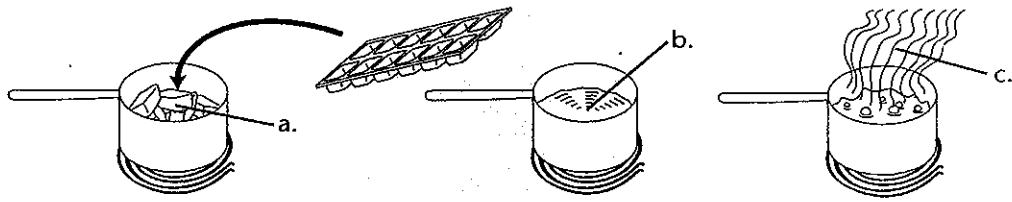
- a. Gold and Density
- b. Copper and **Electrolysis**
  - i. **Electrodes**
- c. Iron and the Blast Furnace

**SECTION 1-1 REVIEW AND REINFORCE**

**Describing Matter**

**◆ Understanding Main Ideas**

Use the illustration below to answer questions 1 and 2. Write your answers to all the following questions in the spaces provided.



1. Label the state of matter represented by water in each figure in the blanks provided.

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_

2. Are the changes from *a* to *b* and from *b* to *c* physical or chemical changes? Explain your answer.

\_\_\_\_\_

\_\_\_\_\_

3. Explain how a compound differs from a mixture.

\_\_\_\_\_

\_\_\_\_\_

4. What is *chemistry*?

\_\_\_\_\_

\_\_\_\_\_

**◆ Building Vocabulary**

Give an example of each of the terms below. Write your answer on the line next to the term.

- 5. an element \_\_\_\_\_
- 6. a formula \_\_\_\_\_
- 7. a mixture \_\_\_\_\_
- 8. a compound \_\_\_\_\_

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**SECTION 1-2 REVIEW AND REINFORCE**

**Measuring Matter**

**◆ Understanding Main Ideas**

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

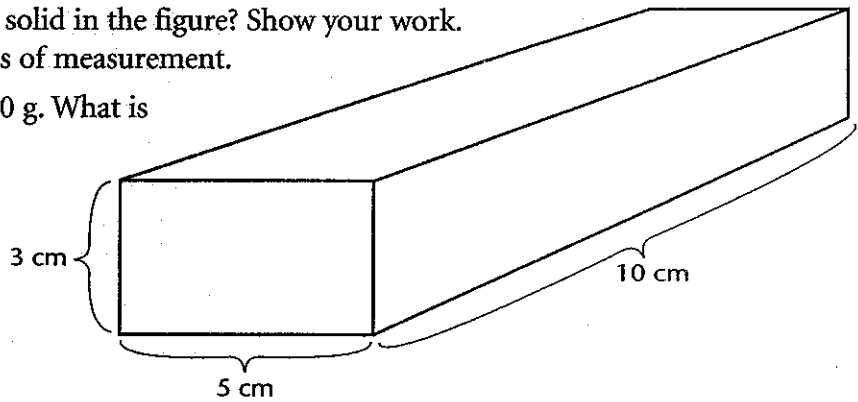
1. What is the volume of the solid in the figure? Show your work.  
Be sure to use correct units of measurement.

2. The solid has a mass of 180 g. What is the density of the solid?  
Show your work. Be sure to use correct units of measurement.

3. Would the above solid have a mass of 180 g on the moon? Would it have the same weight on Earth as on the moon? Explain your answers.

4. The solid above sinks to the bottom when you put it in a container filled with water. What does that tell you about its density?

5. Will every sample of a particular compound have the same density? Explain your answer.



**◆ Building Vocabulary**

Write a definition for each of the following terms on the lines below.

6. mass  
\_\_\_\_\_  
\_\_\_\_\_

7. volume  
\_\_\_\_\_  
\_\_\_\_\_

8. density  
\_\_\_\_\_  
\_\_\_\_\_

9. Give two examples of common units for each of the above measurements.  
\_\_\_\_\_  
\_\_\_\_\_

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**SECTION 1-3**

**REVIEW AND REINFORCE**

**Particles of Matter**

**◆ Understanding Main Ideas**

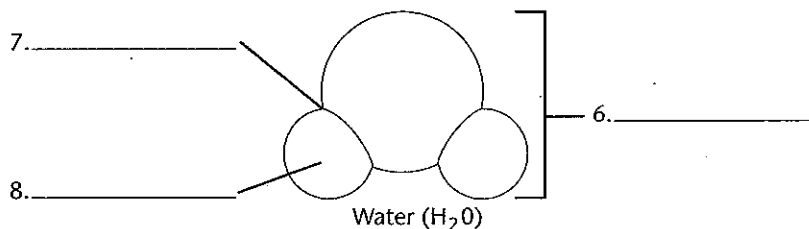
*The following statements refer to Dalton's ideas on atomic theory. If the statement correctly describes Dalton's ideas, write true. If the statement does not describe Dalton's ideas correctly, change the underlined word or words to make the statement correct. Write the characteristic of atoms from Dalton's theory that supports your answer.*

- \_\_\_\_\_ 1. The element oxygen and the element hydrogen are made from the same kind of atom.  
Characteristic: \_\_\_\_\_
  
- \_\_\_\_\_ 2. The hydrogen and oxygen atoms chemically bond to form the mixture called water.  
Characteristic: \_\_\_\_\_
  
- \_\_\_\_\_ 3. The hydrogen atoms in the water molecule are identical to all other hydrogen atoms.  
Characteristic: \_\_\_\_\_
  
- \_\_\_\_\_ 4. Dalton believed that atoms could be divided into smaller pieces.  
Characteristic: \_\_\_\_\_
  
- \_\_\_\_\_ 5. The mass of a hydrogen atom is different from the mass of an oxygen atom.  
Characteristic: \_\_\_\_\_

**◆ Building Vocabulary**

*Use the following terms to label the parts of the illustration.*

- atom
- molecule
- chemical bond

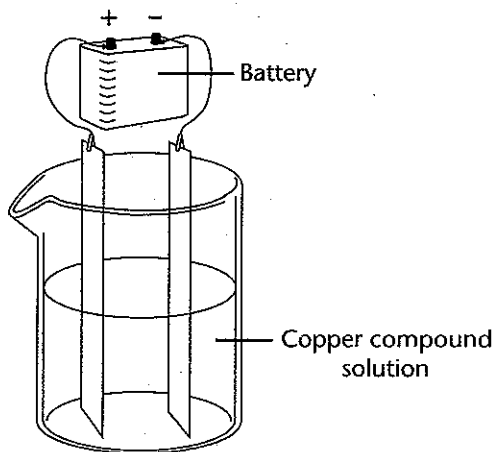


**SECTION 1-4 REVIEW AND REINFORCE**

**Elements From Earth**

**◆ Understanding Main Ideas**

Use the illustration below to answer questions 1 through 3. Write your answers in the spaces provided.



1. What process is illustrated in the figure above?  
\_\_\_\_\_
2. Explain how the above process separates copper from a solution of copper compounds.  
\_\_\_\_\_  
\_\_\_\_\_
3. What are the metal strips called that are inside the copper compound solution?  
\_\_\_\_\_

Answer the following questions on a separate sheet of paper.

4. What is an ore?
5. Describe how gold can be separated from a mixture of sand and dirt. What property of gold allows it to be separated in this way?
6. Describe how iron can be separated from its ores. Does this process involve a chemical change? Explain.

Name: \_\_\_\_\_

Class: Physical Science  
Ch-1 Review

Choose the letter of the correct answer.

- The measurement of the force of gravity on an object is the object's  
[A] mass.                      [B] weight.                      [C] volume.                      [D] density.
- Which statement was NOT part of Dalton's theory of atoms?  
[A] The masses of the elements in a compound are always in a constant ratio.  
[B] All atoms are alike.  
[C] Atoms of each element have a unique mass.  
[D] Atoms of different elements are different from one another.
- Which of the following statements about the properties of matter is true?  
[A] The properties of specific kinds of matter never change.  
[B] Each specific substance can be identified by its properties.  
[C] All kinds of matter have the same properties.  
[D] The properties of a mixture are always the same.
- The measurement of the amount of mass contained in a given volume is called  
[A] liter.                      [B] density.                      [C] weight.                      [D] kilogram.
- Iron can be obtained from a compound of iron and oxygen by  
[A] electrolysis.                      [B] breaking iron ore into small pieces.  
[C] panning.                      [D] heating the compound and carbon together.
- All elements are composed of extremely small particles called  
[A] mixtures.                      [B] atoms.                      [C] molecules.                      [D] compounds.
- In nature, copper usually exists as  
[A] large grouping of copper atoms.                      [B] a pure element.  
[C] a compound in an ore.                      [D] chunks of iron ore.

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

- The smallest possible molecule is made of two \_\_\_\_\_ held together by a chemical bond.

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

9. A \_\_\_\_\_ of water is made up of one oxygen atom and two hydrogen atoms.
10. Mass is the measure of the total amount of \_\_\_\_\_ in any object.
11. When you describe the color, texture, and hardness of a substance, you are giving examples of its \_\_\_\_\_.
12. The metallic element \_\_\_\_\_ has a high density that causes it to separate from other materials during the panning process.
13. A \_\_\_\_\_ change is usually needed to release iron from the ore in which it is found.
14. John Dalton said that the masses of the elements in a compound are always in a constant \_\_\_\_\_.
15. The unit used to measure density is a unit of mass divided by a unit of \_\_\_\_\_.
16. According to Dalton's theory about matter, the \_\_\_\_\_ of different elements are different.

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

17. A change that produces one or more new substances is called a physical change.
18. Chemistry is the study of the properties of matter and the changes matter can undergo.
19. In blast furnaces, iron metal separates from its compound because oxygen in the compound reacts with carbon.



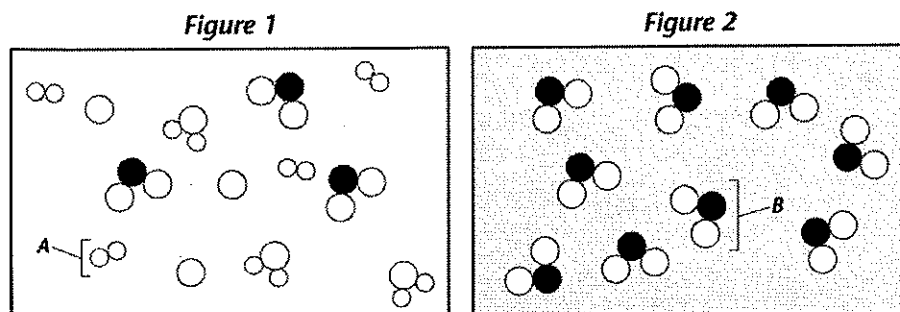
Use the table to answer the question(s).

**Densities of Some  
Common Substances**

<b>Substance</b>	<b>Density (g/mL)</b>
Air	0.0013
Gasoline	0.7
Wood (oak)	0.85
Water (ice)	0.9
Water (liquid)	1.0
Aluminum	2.7
Steel	7.8
Silver	10.5
Lead	11.3
Mercury	13.5
Gold	19.3

20. If samples of silver and lead each had volumes equal to 1 mL, which would have the greater mass, and how much would the difference in the masses be?
21. If gasoline is poured carefully into liquid water, will it sink or float? Explain why.
22. What is the mass of 150 mL of liquid water? Explain.

Use the diagram to answer the question(s).



23. Identify which figure is a model of a compound and which is a model of a mixture. Explain your reasoning.
24. What force holds the smaller particles in particle B together?
25. What type of particle is modeled by A and B? How are the substances represented by these particles different?

Write an answer to the following question(s).

26. Suppose that a spacecraft from Earth lands on the moon and then returns to Earth. Describe how the mass and weight of a person in the spacecraft would be affected while on Earth and on the moon. Remember that the moon has a weaker force of gravity.
27. Explain why panning, which can be used to obtain the element gold, cannot be used to obtain the element iron.
28. When an electric current is passed through water during the process of electrolysis, two gases are formed. One gas has a boiling point of  $-183^{\circ}\text{C}$ , and the other a boiling point of  $-253^{\circ}\text{C}$ . Was this event a physical change or a chemical change? Explain.
29. Explain the difference between atoms and molecules.
30. Describe Dalton's theory of atoms.