

CHAPTER 1 REVIEW

Matter and Change

SECTION 1

SHORT ANSWER Answer the following questions in the space provided.

1. _____ Technological development of a chemical product often.
 - (a) lags behind basic research on the same substance.
 - (b) does not involve chance discoveries.
 - (c) is driven by curiosity.
 - (d) is done for the sake of learning something new.

2. _____ The primary motivation behind basic research is to
 - (a) develop new products.
 - (b) make money.
 - (c) understand an environmental problem.
 - (d) gain knowledge.

3. _____ Applied research is designed to
 - (a) solve a particular problem.
 - (b) satisfy curiosity.
 - (c) gain knowledge.
 - (d) learn for the sake of learning.

4. _____ Chemistry is usually classified as
 - (a) a biological science.
 - (b) a physical science.
 - (c) a social science.
 - (d) a computer science.

5. Define the six major branches of chemistry.

SECTION 1 continued

6. For each of the following types of chemical investigations, determine whether the investigation is *basic research*, *applied research*, or *technological development*. More than one choice may apply.

- _____ a. A laboratory in a major university surveys all the reactions involving bromine.
- _____ b. A pharmaceutical company explores a disease in order to produce a better medicine.
- _____ c. A scientist investigates the cause of the ozone hole to find a way to stop the loss of the ozone layer.
- _____ d. A pharmaceutical company discovers a more efficient method of producing a drug.
- _____ e. A chemical company develops a new biodegradable plastic.
- _____ f. A laboratory explores the use of ozone to inactivate bacteria in a drinking-water system.

7. Give examples of two different instruments routinely used in chemistry.

8. What are microstructures?

9. What is a chemical?

10. What is chemistry?

CHAPTER 1 REVIEW

Matter and Change

SECTION 2

SHORT ANSWER Answer the following questions in the space provided.

1. Classify each of the following as a *homogeneous* or *heterogeneous* substance.

- _____ a. iron ore
- _____ b. quartz
- _____ c. granite
- _____ d. energy drink
- _____ e. oil-and-vinegar salad dressing
- _____ f. salt
- _____ g. rainwater
- _____ h. nitrogen

2. Classify each of the following as a *physical* or *chemical* change.

- _____ a. ice melting
- _____ b. paper burning
- _____ c. metal rusting
- _____ d. gas pressure increasing
- _____ e. liquid evaporating
- _____ f. food digesting

3. Compare a physical change with a chemical change.

SECTION 2 continued

4. Compare and contrast each of the following terms:

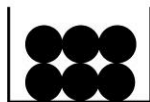
a. *mass* and *matter*

b. *atom* and *compound*

c. *physical property* and *chemical property*

d. *homogeneous mixture* and *heterogeneous mixture*

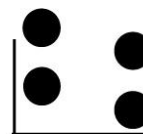
5. Using circles to represent particles, draw a diagram that compares the arrangement of particles in the solid, liquid, and gas states.



Solid



Liquid



Gas

6. How is energy involved in chemical and physical changes?

SECTION 3

SHORT ANSWER Answer the following questions in the space provided.

1. A horizontal row of elements in the periodic table is called a(n) _____.
2. The symbol for the element in Period 2, Group 13, is _____.
3. Elements that are good conductors of heat and electricity are _____.
4. Elements that are poor conductors of heat and electricity are _____.
5. A vertical column of elements in the periodic table is called a(n) _____.
6. The ability of a substance to be hammered or rolled into thin sheets is called _____.
7. Is an element that is soft and easy to cut cleanly with a knife likely to be a metal or a nonmetal? _____.
8. The elements in Group 18, which are generally unreactive, are called _____.
9. At room temperature, most metals are _____.
10. Name three characteristics of most nonmetals.

11. Name three characteristics of metals.

12. Name three characteristics of most metalloids.

13. Name two characteristics of noble gases.

SECTION 3 continued

14. What do elements of the same group in the periodic table have in common?

15. Within the same period of the periodic table, how do the properties of elements close to each other compare with the properties of elements far from each other?

16. You are trying to manufacture a new material, but you would like to replace one of the elements in your new substance with another element that has similar chemical properties. How would you use the periodic table to choose a likely substitute?

17. What is the difference between a family of elements and elements in the same period?

18. Complete the table below by filling in the spaces with correct names or symbols.

Name of element	Symbol of element
Aluminum	Al
Calcium	Ca
Manganese	Mn
Nickel	Ni
Potassium	K
Cobalt	Co
Silver	Ag
Hydrogen	H

CHAPTER 2 REVIEW

Measurements and Calculations

SECTION 1

SHORT ANSWER Answer the following questions in the space provided.

1. Determine whether each of the following is an example of *observation and data*, a *theory*, a *hypothesis*, a *control*, or a *model*.

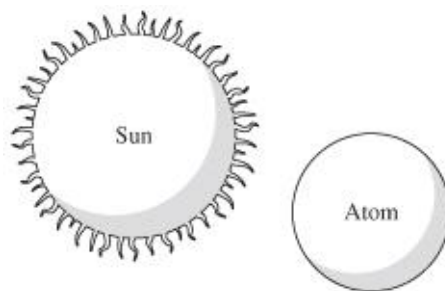
- _____ a. A research team records the rainfall in inches per day in a prescribed area of the rain forest. The square footage of vegetation and relative plant density per square foot are also measured.
- _____ b. The intensity, duration, and time of day of the precipitation are noted for each precipitation episode. The types of vegetation in the area are recorded and classified.
- _____ c. The information gathered is compared with the data on the average precipitation and the plant population collected over the last 10 years.
- _____ d. The information gathered by the research team indicates that rainfall has decreased significantly. They propose that deforestation is the primary cause of this phenomenon.

2. “When 10.0 g of a white, crystalline sugar are dissolved in 100. mL of water, the solution is observed to freeze at -0.54°C , not 0.0°C . The system is denser than pure water.” Which parts of these statements represent quantitative information, and which parts represent qualitative information?

3. Compare and contrast a model with a theory.

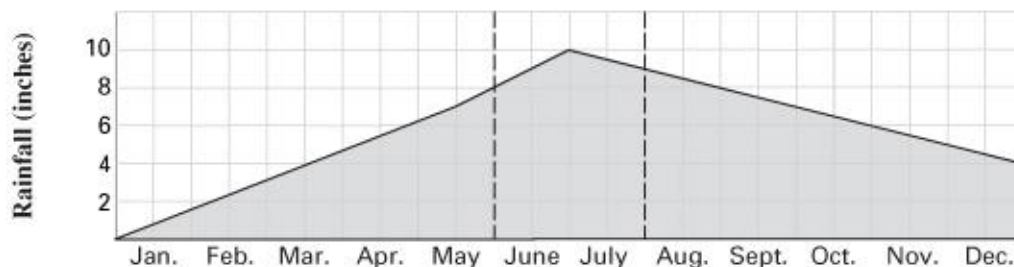
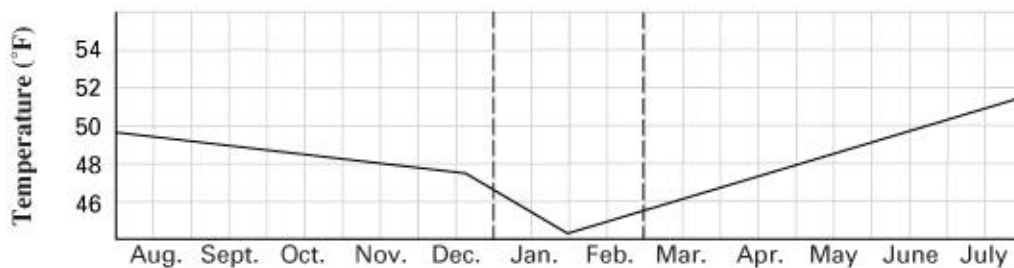
SECTION 1 continued

4. Evaluate the models shown below. Describe how the models resemble the objects they represent and how they differ from the objects they represent.



5. _____ How many different variables are represented in the two graphs shown below?

- a. one b. two c. three d. four



SECTION 2

SHORT ANSWER Answer the following questions in the space provided.

1. Complete the following conversions:

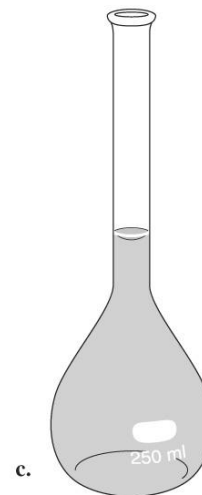
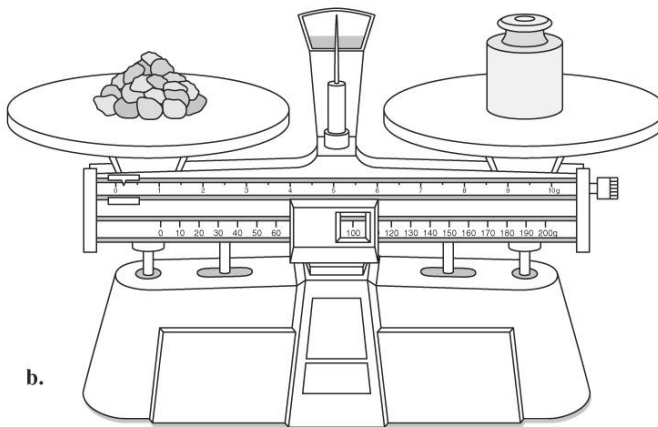
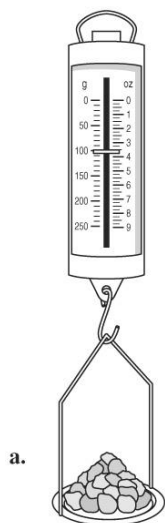
a. $100 \text{ mL} = \underline{\hspace{2cm}} \text{ L}$

b. $0.25 \text{ g} = \underline{\hspace{2cm}} \text{ cg}$

c. $400 \text{ cm}^3 = \underline{\hspace{2cm}} \text{ L}$

d. $400 \text{ cm}^3 = \underline{\hspace{2cm}} \text{ m}^3$

2. For each measuring device shown below, identify the quantity measured and tell when it would remain constant and when it would vary.



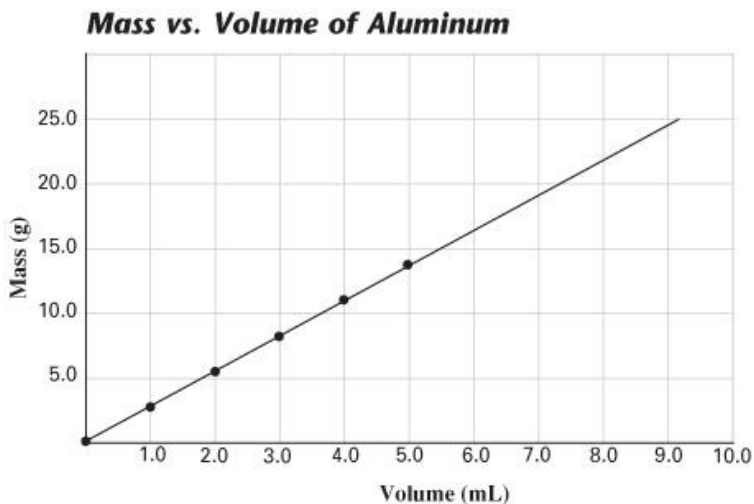
SECTION 2 continued

3. Use the data found in **Table 4** on page 38 of the text to answer the following questions:

- _____ a. If ice were denser than liquid water at 0°C, would it float or sink in water?
- _____ b. Water and kerosene do not dissolve readily in one another. If the two are mixed, they quickly separate into layers. Which liquid floats on top?
- _____ c. The other liquids in **Table 4** that do not dissolve in water are gasoline, turpentine, and mercury. Which of these liquids would settle to the bottom when mixed with water?

4. Use the graph of the density of aluminum below to determine the approximate mass of aluminum samples with the following volumes.

- _____ a. 8.0 mL
- _____ b. 1.50 mL
- _____ c. 7.25 mL
- _____ d. 3.50 mL



PROBLEMS Write the answer on the line to the left. Show all your work in the space provided.

5. _____ Aluminum has a density of 2.70 g/cm³. What would be the mass of a sample whose volume is 10.0 cm³?
6. _____ A certain piece of copper wire is determined to have a mass of 2.00 g per meter. How many centimeters of the wire would be needed to provide 0.28 g of copper?

CHAPTER 2 REVIEW

Measurements and Calculations

SECTION 3

SHORT ANSWER Answer the following questions in the space provided.

1. Report the number of significant figures in each of the following values:

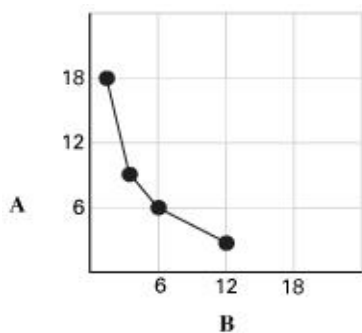
- | | |
|--|---|
| _____ a. 0.002 37 g
_____ b. 0.002 037 g
_____ c. 350. J | _____ d. 64 mL
_____ e. 1.3×10^2 cm
_____ f. 1.30×10^2 cm |
|--|---|

2. Write the value of the following operations using scientific notation.

- _____ a. $\frac{10^3 \times 10^{-6}}{10^{-2}}$
- _____ b. $\frac{8 \times 10^3}{2 \times 10^5}$
- _____ c. $3 \times 10^3 + 4.0 \times 10^4$

3. The following data are given for two variables, A and B:

<i>A</i>	<i>B</i>
18	2
9	4
6	6
3	12



a. In the graph provided, plot the data.

- _____ b. Are *A* and *B* directly or inversely proportional?
- _____ c. Do the data points form a straight line?
- _____ d. Which equation fits the relationship shown by the data? $\frac{A}{B} = k$ (a constant) or $A \times B = k$ (a constant)
- _____ e. What is the value of *k*?

SECTION 3 continued

4. Carry out the following calculations. Express each answer to the correct number of significant figures and use the proper units.

_____ a. $37.26 \text{ m} + 2.7 \text{ m} + 0.0015 \text{ m} =$

_____ b. $256.3 \text{ mL} + 2 \text{ L} + 137 \text{ mL} =$

_____ c. $300. \text{ kPa} \times 274.57 \text{ mL} =$

_____ d. $346 \text{ mL} \times 200 \text{ K} =$

5. Round the following measurements to three significant figures.

_____ a. 22.77 g

_____ b. 14.62 m

_____ c. 9.3052 L

_____ d. 87.55 cm

_____ e. 30.25 g

PROBLEMS Write the answer on the line to the left. Show all your work in the space provided.

6. A pure solid at a fixed temperature has a constant density. We know that

$$\text{density} = \frac{\text{mass}}{\text{volume}} \text{ or } D = \frac{m}{V}$$

_____ a. Are mass and volume directly proportional or inversely proportional for a fixed density?

_____ b. If a solid has a density of 4.0 g/cm^3 , what volume of the solid has a mass of 24 g ?

7. A crime-scene tape has a width of 13.8 cm . A long strip of it is torn off and measured to be 56 m long.

_____ a. Convert 56 m into centimeters.

_____ b. What is the area of this rectangular strip of tape, in cm^2 ?