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## INTRODUCTION TO CHEMISTRY

### SECTION 1.1 CHEMISTRY (pages 7–11)

*This section defines chemistry and differentiates among its traditional divisions. It also distinguishes pure from applied chemistry and provides several reasons to study chemistry.*

#### ► What Is Chemistry? (page 7)

1. What is matter?

\_\_\_\_\_

2. What is chemistry?

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

#### ► Areas of Study (page 8)

3. What are the five major areas of chemistry?

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_
- e. \_\_\_\_\_

4. Is the following sentence true or false? The boundaries between the five areas of chemistry are not firm. \_\_\_\_\_

5. Complete the table by filling in the appropriate subdivision of chemistry.

	Investigating ways to slow down the rusting of steel
	Developing a better insulin-delivery system for diabetics
	Determining the amount of mercury present in a soil sample
	Comparing the hardness of copper and silver
	Developing a new carbon-based fiber for clothing

**CHAPTER 1, Introduction to Chemistry** *(continued)***► Pure and Applied Chemistry (page 9)**

6. \_\_\_\_\_ chemistry is research that is directed toward a practical goal or application; \_\_\_\_\_ chemistry is the pursuit of chemical knowledge for its own sake.

**► Why Study Chemistry? (pages 10–11)**

7. Why is the study of chemistry important?
- a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
8. List three careers that require some knowledge of chemistry.
- \_\_\_\_\_

**Reading Skill Practice**

Outlining can help you understand and remember what you have read. Write an outline for Section 1.1, Chemistry. Begin your outline by copying the headings in the textbook. Under each heading, write the main idea. Then list the details that support the main idea. Do your work on a separate sheet of paper.

**SECTION 1.2 CHEMISTRY FAR AND WIDE (pages 12–17)**

*This section summarizes ways in which chemistry affects many aspects of life.*

**► Materials (page 12)**

1. Is the following statement true or false? Chemists design materials to fit general needs. \_\_\_\_\_
2. In George de Mestral's hook-and-loop tapes, were the hooks macroscopic or microscopic? \_\_\_\_\_

**► Energy (page 13)**

3. List two ways to meet the demand for energy.
- a. \_\_\_\_\_
  - b. \_\_\_\_\_

4. How does insulation help conserve energy?

\_\_\_\_\_

5. How are soybeans used as a source of energy?

\_\_\_\_\_

\_\_\_\_\_

6. Circle the letter of the statement that is always true about a battery.

- a. All batteries are able to be recharged.
- b. Batteries use chemicals to store energy.
- c. Batteries are devices that conserve energy.
- d. NASA developed batteries that are thrown away after use.

► **Medicine and Biotechnology (page 14)**

7. What is the role of chemistry in the development of medicines?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

8. List three new materials chemists have developed that have medical applications.

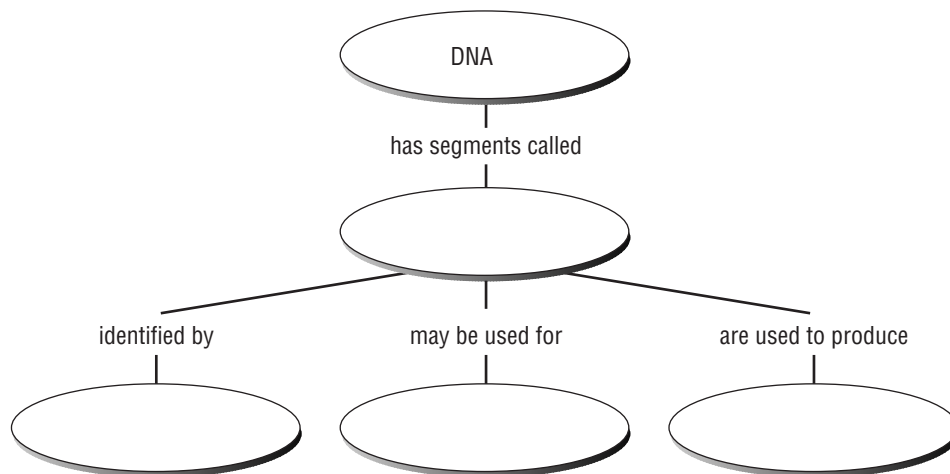
- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_

9. The field that applies science to the production of biological products is

\_\_\_\_\_ .

### CHAPTER 1, Introduction to Chemistry (continued)

10. Complete the concept map about genes.



### ► Agriculture (page 15)

11. How do chemists contribute to agriculture?

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12. How can a potato plant modified with a jellyfish gene help a farmer to conserve water?

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13. What type of pesticides do chemists design to protect crops?

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14. In Figure 1.11, how does the plastic tube around the tomato stem protect the plant?

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► **The Environment (page 16)**

15. What are two ways that chemists work to protect the environment?

a. \_\_\_\_\_

b. \_\_\_\_\_

16. Define a pollutant.

\_\_\_\_\_  
\_\_\_\_\_

17. How is lead harmful to humans?

\_\_\_\_\_  
\_\_\_\_\_

18. What strategies have been used to prevent lead poisoning in children?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

► **The Universe (page 17)**

19. Scientists can learn about the chemical composition of stars by analyzing the \_\_\_\_\_ they transmit.

20. Why won't the method used to discover the chemical composition of stars work for the moon and planets?

\_\_\_\_\_  
\_\_\_\_\_

21. What did chemists learn about the moon's surface by analyzing moon rocks?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

22. Look at Figure 1.14 on page 17. What is the key difference in the methods scientists used to analyze rocks from Earth's moon and Mars?

\_\_\_\_\_  
\_\_\_\_\_

## CHAPTER 1, Introduction to Chemistry *(continued)*

### SECTION 1.3 THINKING LIKE A SCIENTIST (pages 20–25)

*This section describes the development of an experimental approach to chemistry and steps involved in the scientific method. It also discusses the role of collaboration and communication in science.*

#### ► Alchemy (page 20)

1. Practical alchemy focused on

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2. Alchemists developed processes for separating \_\_\_\_\_ and purifying \_\_\_\_\_.

#### ► An Experimental Approach to Science (page 21)

3. How did Lavoisier help to transform chemistry?

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4. Circle the letter of the word that identifies what Lavoisier demonstrated was necessary for materials to burn.

- a. phlogiston
- b. nitrogen
- c. oxygen
- d. metals

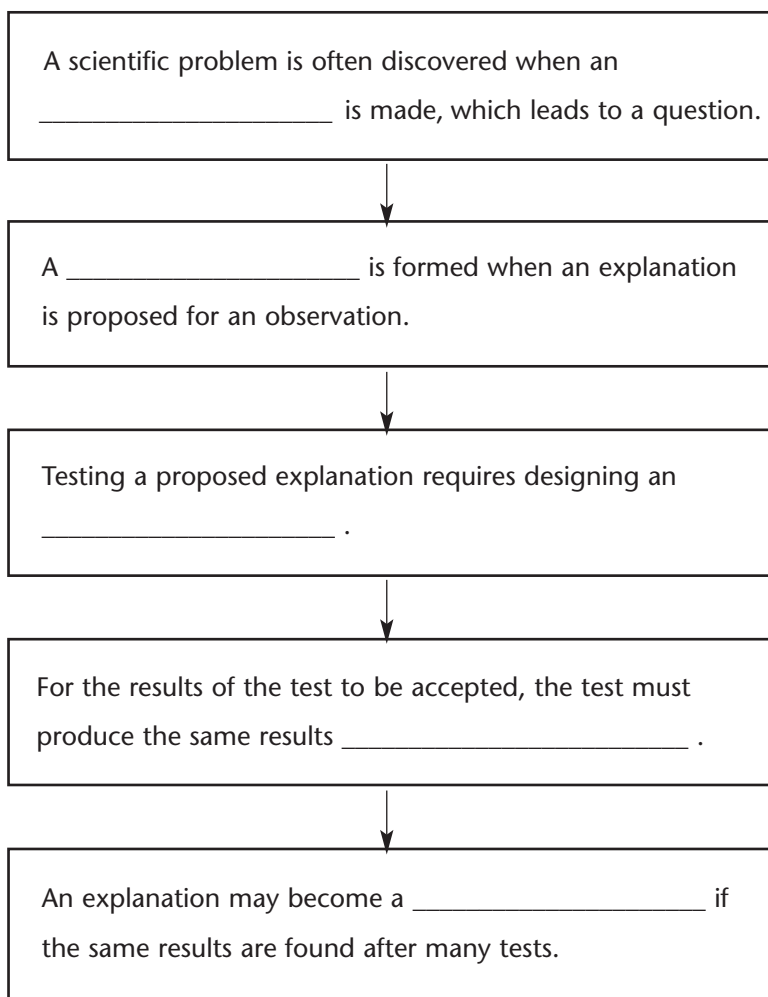
#### ► The Scientific Method (pages 22–23)

5. What is the scientific method?

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6. Complete the flowchart about the scientific method.



7. Circle the letter of the activity that involves using the senses to gather information directly.

- a. forming a hypothesis
- b. making an observation
- c. planning an experiment
- d. analyzing data

8. What do scientists do if the results of an experiment do not support the hypothesis?

\_\_\_\_\_

\_\_\_\_\_

9. The variable that you change during an experiment is the \_\_\_\_\_ .  
 The variable that is observed during an experiment is the \_\_\_\_\_ .

## CHAPTER 1, Introduction to Chemistry (continued)

10. Is the following sentence true or false? Once a theory has been proven, no experiment will ever disprove it. \_\_\_\_\_

11. What is a scientific law?

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12. Circle the letter of each statement that expresses a scientific law.

- a. As the temperature of a balloon increases, the balloon expands.
- b. Increasing the temperature of a balloon might cause it to burst.
- c. If all other variables are kept constant, the volume of a gas increases as the temperature increases.
- d. Sometimes increasing the temperature of a gas causes the gas to expand.

### ► Collaboration and Communication (pages 24–25)

13. Several scientists working together to solve a problem is \_\_\_\_\_.

14. Is the following statement true or false? Scientists from different disciplines may need to work together on a problem because the problem is too complex for one person to solve. \_\_\_\_\_

15. Exchanging ideas about science is called \_\_\_\_\_.

16. How are journals helpful to scientists?

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17. Is the following statement true or false? Experts in an author's field review articles after they are published in a journal. \_\_\_\_\_.



## SECTION 1.4 PROBLEM SOLVING IN CHEMISTRY (pages 28–32)

*This section describes effective approaches for solving numeric problems and conceptual problems.*

### ► Skills Used in Solving Problems (page 28)

1. Name an everyday situation that requires problem-solving skills.

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2. What is involved in effective problem solving?

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### ► Solving Numeric Problems (pages 29–30)

3. What are the three steps for solving numeric problems?

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

4. What must you determine first when solving a word problem?

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5. What are two skills that you may need to use as you calculate an answer to a problem?

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6. If your answer to a problem does not seem reasonable, list two things you can do.

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**CHAPTER 1, Introduction to Chemistry** *(continued)*

7. For the following word problem, fill in the table, listing the known and unknown information: A person can walk a mile in 20 minutes. The person is going for a 10-mile walk. How many hours will it take for the person to complete the walk?

Known	Unknown

► **Solving Conceptual Problems** (pages 31–32)

8. After you identify the known and unknown in a conceptual problem, what should you do next?

\_\_\_\_\_

9. What are the steps for solving conceptual problems?

\_\_\_\_\_