Chapter 6 Understanding the Properties of Compounds

What You Will Learn

In this chapter, you will learn how to...

- **explain** the difference between ionic compounds and molecular compounds
- **demonstrate** an understanding of the important properties of ionic and molecular compounds
- **assess** the social, environmental, and economic impacts of the use of some common compounds

Why It Matters

Modern scientists study thousands of new and increasingly complex compounds. A central part of this important research is knowing how the elements in a compound are chemically bonded together. This information can be used to predict and determine the properties and applications of a compound.

Skills You Will Use

In this chapter, you will learn how to...

- **investigate** the properties of ionic and molecular compounds
- **explore** the chemistry of rusting
- **construct** three-dimensional models of molecules

As this climber scales the rock face, high above the ground, she depends on the properties of different compounds to keep her safe. She uses chalk–a white, powdery compound–to absorb the sweat on her hands and improve her grip. She also uses a rope made from a strong, lightweight, and flexible type of compound. All compounds are composed of two or more elements that are chemically combined. The way that the elements are combined, however, can differ. This plays a large part in determining their properties and practical uses.

Activity 6-1

Bouncing Glue

In the 1940s, an engineer was trying to develop a new kind of rubber. One of his early attempts produced a compound that is similar to what you will make in this activity. The compound did not have the properties he wanted, so he considered it a failure. Years later, however, it became a popular toy. What toy do you think it became?

The mixture you make will gradually harden.

Safety Precautions

- Wear safety goggles and a lab apron.
- Clean up any spills immediately, and inform your teacher.

Materials

- 10 mL of Elmer's® glue
- 10 mL of water
- 100 mL beaker
- tablespoon
- wooden stir stick
- food colouring
- 10 mL of 4% borax solution

Procedure

1. Read over the Procedure, and then make a table to record your observations. Give your table a title.
2. Place 10 mL of glue and 10 mL of water in the beaker. Stir vigorously with the stir stick. Add one or two drops of food colouring, and stir to make sure that it is thoroughly mixed in.
3. Add 10 mL of borax solution, and immediately begin stirring with the stir stick. The material should start to become slimy.
4. After a few more minutes of stirring, the material should be hard enough to place in your hand. Continue kneading the material until it does not harden anymore.
5. Try to do different things with the material, such as bouncing it and stretching it. Can you think of any other tests to perform on the material? Record your observations.

Questions

1. Are all the glue balls made by the class the same, or are there differences? If there are differences, what do you think is responsible for them?
2. Based on your observations, what popular toy do you think the inventor's "mistake" became?

Study Toolkit

These strategies will help you use this textbook to develop your understanding of science concepts and skills.
To find out more about these and other strategies, refer to the Study Toolkit Overview, which begins on page 561.

Reading Effectively

Making Inferences

Often, a text does not contain *all* the details related to a particular topic. Some details or connections between ideas may be implied rather than stated explicitly. The writer relies on the reader to make inferences, or to "read between the lines."

Making an inference involves combining information in the text with prior knowledge. For example, the table below shows one inference you could make about the following text: "Your body relies on dissolved ions for many vital processes. For example, sodium ions and potassium ions are important for the transmission of nerve impulses and the control of muscular contractions."

Information in Text	+ Prior Knowledge	= Inference
The human body relies on sodium and potassium for many vital processes.	I don't take sodium and potassium supplements, but I'm healthy.	Some of what we eat or drink regularly must contain sodium and potassium.

Use the Strategy

Read the second paragraph in the section titled "Solubility" on page 225. Create a table like the one above to make an inference about electrolytes.

Reading Effectively

Monitoring Comprehension

As you read, stop periodically to *monitor*, or check, whether you understand what you have just read. Place a sticky note beside each chunk of text. When you finish reading, put a ✓ on the sticky note if you understand what you have just read, and an ✗ if you do not. For each chunk of text that you *do* understand, restate the main idea. For each chunk that you *do not* understand, reread the text. Try to pinpoint what aspect is confusing to you:

- If a word or term is confusing, check the margin, the Glossary, or a dictionary for a definition.
- If a concept is confusing, examine the visuals on the page to see if they help to explain the concept.
- If a formula or definition is confusing, look for examples in the text that might help you understand.

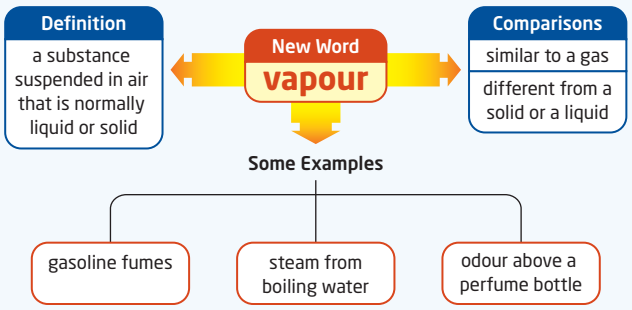
Use the Strategy

1. Read the paragraphs on the next page.
2. Put a ✓ or an ✗ on a sticky note beside the paragraph.
3. If you put a ✓ on the sticky note, restate the main idea. If you put an ✗ on the sticky note, follow the steps above. If you still do not understand, ask a classmate or your teacher for help.

Word Study

Creating a Word Map

One strategy you can use to learn a new word is to create a **word map**.



Use the Strategy

1. As you read this chapter, create a word map for the word "bond."
2. Compare your word map with a partner's word map.
3. If your partner has any information that helps you understand the word better, add this information to your word map.