there is a glass of pure water and a cup of coffee. Which of the liquids is likely to be identical? Explain in terms of mixtures and compounds.

- Have students complete **Try This:** Comparing Mixtures and Compounds.

TRY THIS: COMPARING MIXTURES AND COMPOUNDS

Purpose

- Identify the basic difference between mixtures and compounds.

Notes

Student Safety

Students should wear safety goggles when working with chemicals. Advise them to use caution when working with hydrochloric acid, which is corrosive even in a dilute solution.

- Substances in a mixture keep their own properties and can be separated using these properties, whereas compounds have a new set of properties.
- One teaspoon is approximately 5 mL, so 2 mL will be slightly less than half a teaspoon.
- Tape paper around the magnets—it is easier to clean them of filings later.
- Prepare a batch of iron sulfide ahead of time so that it is cool and ready to use. This must be done in a fume hood as SO_2 gas is produced.
- As an alternative, you can buy a sample of iron(II) sulfide and use that.
- Ask students if they could devise a method other than the magnet to separate the sulfur and iron. Ask, *Is the method based on a difference of properties?*
- Ask, *How many substances are present in the mixture? How many are in the compound?*

Suggested Answers

A. The substance in circle C is a mixture, because iron and sulfur are still present and can be separated by physical means (i.e., the magnet). The substance in circle D is a compound, because sulfur and iron are no longer present; instead, a new substance with new properties exists. Neither the magnet nor hydrochloric acid affects this new substance. The old properties have disappeared and new ones are present

At Home

Ask students to identify materials that are pure substances, both compounds and elements, and substances that are mixtures. Some common compounds are table salt (sodium chloride), carbon dioxide, and sugar ($C_{12}H_{22}O_{11}$). Have students compare the number of elements, compounds, and mixtures they encountered during the week. Ask, *Which are the most common, and which are the least?*

Technology Connections

Have students create posters using a computer graphics program (or by hand) to show the similarities and differences between compounds and mixtures. Encourage them to include definitions, graphics (i.e., Venn diagrams), and examples in their posters.

3 Consolidate and Extend

- Tell students that they will encounter a variety of mixtures and compounds during forthcoming lessons in this unit. Ask them to note what these mixtures and compounds are and what they are used for.
- Have students complete the **Check Your Understanding** questions.

CHECK YOUR UNDERSTANDING—SUGGESTED ANSWERS

1. All matter has mass and volume (takes up space).
2. The two categories of pure substances are elements and compounds. Elements and compounds are similar in that they have the same properties throughout, and all their particles are identical. They differ because elements cannot be broken down into anything simpler, while a compound can be broken down into its elements.
3. Answers will vary but some examples are
   (a) element: aluminum, oxygen, carbon, sulfur, gold
   (b) compound: carbon dioxide, water, salt, baking soda
   (c) homogeneous mixture: tea, Kool-Aid, alloy, steel, air

(d) heterogeneous mixture: iron and sulfur, salt and pepper, fertilizer, gunpowder

4. **(a)** element
   (b) homogeneous mixture
   (c) heterogeneous mixture (the bubbles can be seen)
   (d) compound
5. The material is a pure substance. Students' explanations will vary, but the key issues for a pure substance are the fact that the smaller, elementary particles are assembled into larger particles, and these particles are identical.
6. The alchemists of the Middle Ages had not discovered that some substances are compounds, not mixtures.
7. **(a)** compound. All particles are identical and each particle is made from the joining of more than one type of particle or element.
   (b) mixture. There is more than one type of particle. It seems that it is a mixture of an element and a compound. It is probably homogeneous because the particles are still microscopic.
   (c) element. All particles are identical and made of the same two smaller particles.
8. **(a)** This may represent a mixture because there are two kinds of particles that are not joined.
   (b) This is not a mixture, for although different particles are present, they are combined into identical particles.
   (c) This cannot represent a mixture because it has only one type of particle.
9. **(a)** This cannot represent an element because a variety of particles are present.
   (b) This may represent an element. Although all elementary particles are assembled into groups of two, all the elementary particles are identical.
   (c) This cannot represent an element because although all particles are identical, more than one type of elementary particle is present.
10. **(a)** salt—compound
    (b) silver—element
    (c) seawater—mixture
    (d) hydrogen—element
    (e) gasoline—mixture
    (f) water—compound
11. Blood is a mixture. Reasons will vary. Answers may be similar to this one: blood contains red and white blood cells, platelets, and serum, as well as oxygen, carbon dioxide, nutrients, and wastes.
12. The original liquid was a homogeneous mixture, because it was clear to begin with, and then it was separated into water and solid crystals.
13. This oxide (the greyish powder) is a compound because there was a chemical reaction: the shiny magnesium disappeared and a new substance with new properties appeared.

Reading and Thinking Strategies

Determine the Meaning of Scientific and Technical Terms

- Discuss the scanning strategy (moving your eyes quickly down a page to find specific details) with students. Arrange students in pairs. Ask them to scan Student Book page 153 to look for words in bold.
- Have students take turns explaining the meaning of the words to each other by reading the sentence with the bolded word and the sentence after it. Suggest that the "explainer" use examples in his or her explanations. Encourage students who are listening to ask questions for clarification if the explanations are unclear.