

✓ CHECK YOUR LEARNING

Suggested Answers

- (a) I did not realize that chemical changes were sometimes reversible.

(b) This helps me understand how batteries get recharged. The reaction runs backward to restore the system to its original state.
- (a) physical; (b) chemical; (c) chemical; (d) physical; (e) chemical; (f) chemical
- (a) The change is physical because air does not combine with ice cream to create a new substance.

(b) The change is physical, because the water changes state and does not create a new substance.

(c) The change is chemical, because hydrogen gas is burned and carbon dioxide is produced.

(d) The change is chemical, because ethanol is burned as fuel to produce energy.

(e) The change is physical, because the geothermal energy causes water to change state, but no new substances are produced.

(f) The change is chemical, because silver oxidizes to produce a new, green substance.
- The corrosive hazard symbol indicates that chlorine can react with living tissue. Corrosiveness is a chemical property.
- The bubbles that appear are a sign that a chemical change is taking place.
- (a) Paint solvents should be able to dissolve or mix well with dyes but evaporate much more readily than the dye they are mixed with. Mixing, dissolving, and evaporating are all physical changes. To ensure safety of the painter, the solvents should not combust readily. Combustibility is a chemical property.

(b) Ideal solvents should be able to dissolve a wide variety of different kinds of compounds and not harm the environment.
- The bubbles that appear are a sign that a chemical change is taking place.
- The temperature change is a sign that a chemical change is taking place.
- The clumps might be precipitates. This indicates that a chemical change might be occurring.
- Physical properties: Dental braces are strong, shiny, flexible, etc. Chemical property: Dental braces should not react with food or saliva.
- I still think teeth whiteners are good; however, learning about hazards of teeth whiteners will make me more careful in the future.

DIFFERENTIATED INSTRUCTION

- The difference between chemical and physical changes is critical to student understanding of the lesson's content. To make the distinction between the two types of change, display an apple, then cut the apple in half. Cutting is a physical change because the apple is still the same substance; no new substances have been made. Now allow the apple to turn brown over time. Point out that this colour change is a chemical change. The brown film is a new substance that is different from the substance that makes up the apple.
- Have students summarize both the physical and the chemical change that takes place in the apple example above according to their learning style. For example, verbal/linguistic learners may wish to write a summary, interpersonal learners may wish to work in pairs to create a summary, and musical/rhythmic learners may wish to create a rhyme.

ENGLISH LANGUAGE LEARNERS

- Use a word web diagram to clarify the use of the word *physical* in this chapter. Explain that *physical* can relate to the human body, as in the *physical* ability of an athlete. The use of *physical* in this chapter refers to things that are concrete and real. *Physical* properties are not simply ideas, they are the characteristics of a substance that you can see, feel, touch, and taste.

At Home

Students can look for examples of physical and chemical changes at home. Physical changes might include freezing water to make ice cubes, dissolving sugar in coffee, and cutting a piece of bread. Chemical changes might include lighting a fire, finding corrosion on metal equipment, and using a chemical battery to power a flashlight.