KEY CONCEPT

9.1 Chemical reactions alter arrangements of atoms.

CALIFORNIA Content Standards

8.5.a Students know reactant atoms and molecules interact to form products with different chemical properties.

8.5.c Students know chemical reactions usually liberate heat or absorb heat.

8.5.d Students know physical processes include freezing and boiling, in which a material changes form with no chemical reaction.

BEFORE, you learned

- Atoms of one element differ from atoms of all other elements
- Chemical bonds hold compounds together
- Chemical bonds may be ionic or covalent

NOW, you will learn

- About chemical changes and how they occur
- About three types of chemical reactions
- How the rate of a chemical reaction can be changed

VOCABULARY

chemical reaction p. 271
reactant p. 273
product p. 273
precipitate p. 274
catalyst p. 278

EXPLORE Chemical Changes (8.5.a)

How can you identify a chemical change?

PROCEDURE

1. Pour about 3 cm (1 in.) of vinegar into the bowl. Add a spoonful of salt. Stir until the salt dissolves.
2. Put the pennies into the bowl. Wait two minutes, and then put the nail into the bowl.
3. Observe the nail after five minutes and record your observations.

MATERIALS

- vinegar
- clear bowl
- plastic spoon
- table salt
- 20 pennies
- large iron nail

WHAT DO YOU THINK?

- What did you see on the nail? Where do you think it came from?
- Did a new substance form? What evidence supports your conclusion?

Atoms interact in chemical reactions.

COMBINATION NOTES
Use combination notes to organize information about how atoms interact during chemical reactions.

You see substances change every day. Some changes are physical, such as when liquid water changes to water vapor during boiling. Other changes are chemical, such as when wood burns to form smoke and ash, or when rust forms on iron. During a chemical change, substances change into one or more different substances.

A **chemical reaction** produces new substances by changing the way in which atoms are arranged. In a chemical reaction, bonds between atoms are broken and new bonds form between different atoms. This breaking and forming of bonds takes place when particles of the original materials collide with one another. After a chemical reaction, the new arrangements of atoms form different substances.