

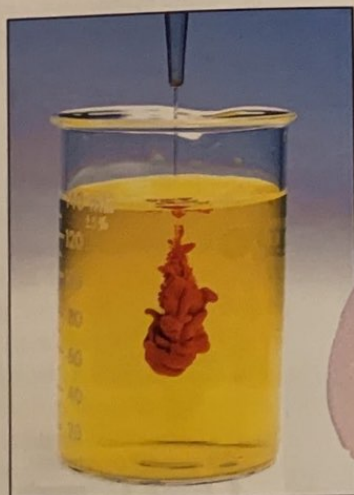
Evidence for Chemical Reactions

Look at the photograph below of the beaker. Even without reading the caption, you probably could guess it shows a chemical reaction. But how do you know? How can you tell when a chemical reaction occurs? **Chemical reactions involve two main kinds of changes that you can observe—formation of new substances and changes in energy.**

Changes in Properties One way to detect chemical reactions is to observe changes in the properties of the materials involved. Changes in properties result when new substances form. What kinds of changes should you look for? Look at Figure 4. First, a color change may signal that a new substance has formed. Second, a solid may appear when two solutions are mixed. A solid that forms from solution during a chemical reaction is called a **precipitate** (pree SIP uh tayt).

FIGURE 4
Evidence for Chemical Reactions

Many kinds of change provide evidence that a chemical reaction has occurred. **Applying Concepts** What other evidence might tell you a chemical reaction has occurred?



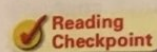
Two clear liquids react, ▲ forming a precipitate.

◀ The light green leaves of early spring slowly turn darker as chemical reactions in the leaves produce more of the green compound chlorophyll.

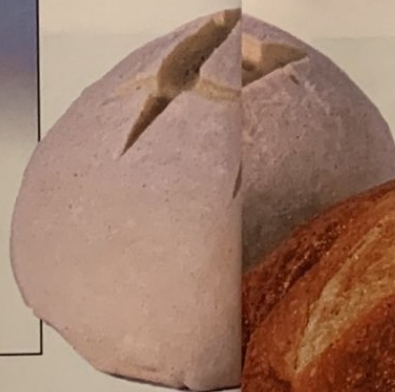


Third, a gas might be produced from solids or liquids. If the reaction occurs in a liquid, you may see the gas as bubbles. Finally, other kinds of observable changes in properties can also signal a chemical reaction. For example, moist bread dough forms a dry, porous solid after baking.

Although you may observe a property change in matter, the change does not always indicate that a chemical reaction has taken place. Sometimes physical changes give similar results. For example, when water boils, the gas bubbles you see are made of molecules of water, just as the original liquid was. The sign of a chemical reaction is that one or more new substances are produced. For example, when an electric current is passed through water during electrolysis, two gases are produced, hydrogen gas (H_2) and oxygen gas (O_2).



Reading Checkpoint How is a precipitate evidence for a chemical reaction?



A golden loaf of bread with its crunchy crust has very different properties from the soft dough that went into the oven. ▼



Oxygen bubbles that form during photosynthesis collect on the leaves of a plant. ▼



Lab zone Try This Activity

Mostly Cloudy

1. Put on your safety goggles and apron.
2. Pour about 5 mL of limewater into a plastic cup.
3. Pour an equal amount of plain water into another plastic cup.
4. Add about 5 mL of carbonated water to each of the cups.

Drawing Conclusions In which cup do you think a chemical reaction occurred? What evidence supports your conclusion?