

Chemical Change

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CONCEPT

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Chemical Change

- Define chemical change, and give examples of chemical changes.
- List signs that a chemical change has occurred.
- Explain how some chemical changes can be reversed.



Communities often use fireworks to celebrate important occasions. Fireworks certainly create awesome sights and sounds! Do you know what causes the brilliant lights and loud booms of a fireworks display? The answer is chemical changes.

What Is a Chemical Change?

A **chemical change** occurs whenever matter changes into an entirely different substance with different chemical properties. A chemical change is also called a chemical reaction. Many complex chemical changes occur to produce the explosions of fireworks. An example of a simpler chemical change is the burning of methane. Methane is the main component of natural gas, which is burned in many home furnaces. During burning, methane combines with oxygen in the air to produce entirely different chemical substances, including the gases carbon dioxide and water vapor.

Identifying Chemical Changes

Most chemical changes are not as dramatic as exploding fireworks, so how can you tell whether a chemical change has occurred? There are usually clues. You just need to know what to look for. A chemical change has probably occurred if bubbles are released, there is a change of color, or an odor is produced. Other clues include the release of heat, light, or loud sounds. Examples of chemical changes that produce these clues are shown in the **Figure 1.1**.



FIGURE 1.1

Q: In addition to iron rusting, what is another example of matter changing color? Do you think this color change is a sign that a new chemical substance has been produced?

A: Another example of matter changing color is a penny changing from reddish brown to greenish brown as it becomes tarnished. The color change indicates that a new chemical substance has been produced. Copper on the surface of the penny has combined with oxygen in the air to produce a different substance called copper oxide.

Q: Besides food spoiling, what is another change that produces an odor? Is this a chemical change?

A: When wood burns, it produces a smoky odor. Burning is a chemical change.

Q: Which signs of chemical change do fireworks produce?

A: Fireworks produce heat, light, and loud sounds. These are all signs of chemical change.

Can Chemical Changes Be Reversed?

Because chemical changes produce new substances, they often cannot be undone. For example, you can't change ashes from burning logs back into wood. Some chemical changes can be reversed, but only by other chemical changes. For example, to undo tarnish on copper pennies, you can place them in vinegar. The acid in the vinegar combines with the copper oxide of the tarnish. This changes the copper oxide back to copper and oxygen, making the pennies reddish brown again. You can try this at home to see how well it works.

Summary

- A chemical change occurs whenever matter changes into an entirely different substance with different chemical properties. Burning is an example of a chemical change.
- Signs of chemical change include the release of bubbles, a change of color, production of an odor, release of heat and light, and production of loud sounds.
- Because chemical changes result in different substances, they often cannot be undone. Some chemical changes can be reversed, but only by other chemical changes.

Review Questions

1. What happens in any chemical change?
2. List three signs that a chemical change has occurred.
3. Give an example of a chemical change. Explain why you think it is a chemical change.

References

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