

## 7.2: Evidence of a Chemical Reaction

### Learning Objectives

- Identify the evidence for chemical reactions.

In a chemical change, new substances are formed. In order for this to occur, the chemical bonds of the initial substances break, and the atoms that compose them separate and rearrange themselves into new substances with new chemical bonds. When this process occurs, we call it a chemical reaction. A **chemical reaction** is the process in which one or more substances are changed into one or more new substances.

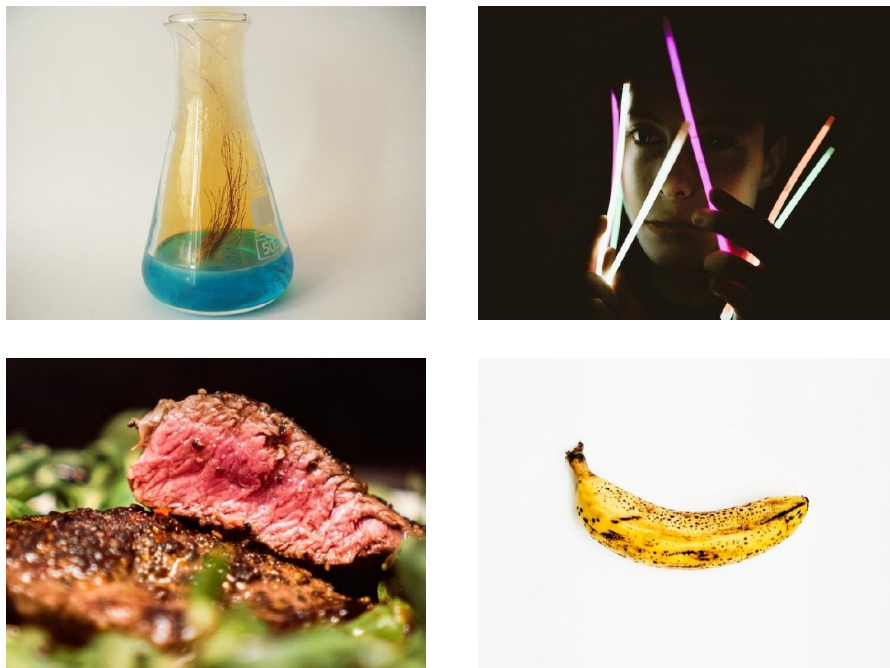


Figure 7.2.1: Clockwise from upper left. (A) Copper and nitric acid undergo a chemical change to form copper nitrate and brown, gaseous nitrogen dioxide (unknown via Wikipedia Commons). (B) A chemical reaction that gives off light, a process called chemiluminescence, occurs when a glow stick is bent, a crack is heard and the inner solutions mix together (Anton Darius via Unsplash). (C) Cooking red meat causes a number of chemical changes, including the oxidation of iron in myoglobin that results in the familiar red-to-brown color change (Justus Menke via Unsplash). (D) A banana turning brown is a chemical change as new, darker substances that have a different taste form (Bruno Emmanuelle via Unsplash).

To identify a chemical reaction, we look for a **chemical change**. A chemical change always produces one or more types of matter that differ from the matter present before the change. The formation of rust is a chemical change because rust is a different kind of matter than the iron, oxygen, and water present before the rust formed. The explosion of nitroglycerin is a chemical change because the gases produced are very different kinds of matter from the original substance.

Various signs of a chemical reaction include:

1. Change in Color
2. Formation of a Gas
3. Formation of a Precipitate
4. Change in Odor
5. Change in Temperature
6. Something is Burning
7. Light is Being Produced



Video 7.2.1: Evidence of a Chemical Reaction

### ✓ Example 7.2.1: Evidence of a Chemical Reaction

Which of the following is a chemical reaction?

- A. Freezing liquid mercury.
- B. Adding yellow to blue to make green.
- C. Cutting a piece of paper into two pieces.
- D. Burning natural gas.
- E. Dissolving salt in water.

#### **Solution**

A, B, C, & E involve only physical changes. Burning involves a reaction with oxygen where the reacting materials have been consumed and the products have a different chemical composition, so the answer is D.

### Exercise 7.2.1

Which of these involve a chemical reaction?

- A. Painting a wall blue.
- B. Mixing baking soda and vinegar to produce a gas.
- C. Ice cream melting.
- D. Boiling water.
- E. Roasting a marshmallow over a flame until it turns brown.

#### **Answer**

B and E

### Summary

- Chemical reactions can be identified via a wide range of different observable factors including change in color, energy change (temperature change or light produced), gas production, something burning, and the formation of a precipitate.

This page is shared under a [CC BY 4.0](#) license and was authored, remixed, and/or curated by [Marisa Alviar-Agnew & Henry Agnew \(OpenStax\)](#) and Lance S. Lund (Anoka-Ramsey Community College) via [source content](#) that was edited to the style and standards of the LibreTexts platform; a detailed edit history is available upon request.

7.2: Evidence of a Chemical Reaction is shared under a [not declared](#) license and was authored, remixed, and/or curated by LibreTexts.