

Chapter 3

Use with Section 1

ENRICHMENT

● Structure of Matter

Flow, Flow, Old Phlogiston!

Before Antoine Lavoisier developed the oxygen theory of burning and rusting, most scientists believed in the phlogiston (floh JIHS tuhn) theory. Each theory is briefly described below.

- **Oxygen Theory.** When wood burns, it combines with the oxygen in the air to form new substances—carbon dioxide, water, and ash. When iron rusts, it combines with the oxygen in the air to form a new substance, iron oxide. In both cases, the total mass of the original substance and the oxygen it combines with equals the total mass of the resulting substances.
- **Phlogiston Theory.** Wood is made up of ash and a substance called phlogiston. When wood burns, it gives off phlogiston into the air, leaving the ash. Iron is made up of metallic ash (now called iron oxide) and phlogiston. When iron rusts, it gives off phlogiston into the air, leaving the metallic ash.

Answer the following questions, using complete sentences.

1. Two experiments that scientists used to test the phlogiston and oxygen theories involved burning wood in a closed container filled with either pure nitrogen or pure oxygen instead of air. (Air consists of 78% nitrogen, 21% oxygen, and 1% other gases.) The wood would not burn in the nitrogen container, but it burned vigorously in the oxygen container. Which theory do these results support? Explain.

2. When iron rusts, the resulting substance has a greater mass than the original iron. Which theory does this result seem to fit better? Explain.
