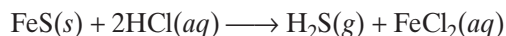
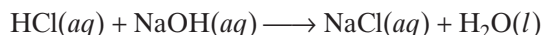


reacts with hydrochloric acid to form hydrogen sulfide gas and iron(II) chloride.



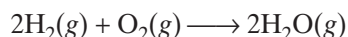
Formation of Water

In some double-displacement reactions, a very stable molecular compound, such as water, is one of the products. For example, hydrochloric acid reacts with an aqueous solution of sodium hydroxide to yield aqueous sodium chloride and water.



Combustion Reactions

*In a **combustion reaction**, a substance combines with oxygen, releasing a large amount of energy in the form of light and heat.* The combustion of hydrogen is shown below in **Figure 13**. The reaction's product is water vapor.



The burning of natural gas, propane, gasoline, and wood are also examples of combustion reactions. For example, the burning of propane, C_3H_8 , results in the production of carbon dioxide and water vapor.

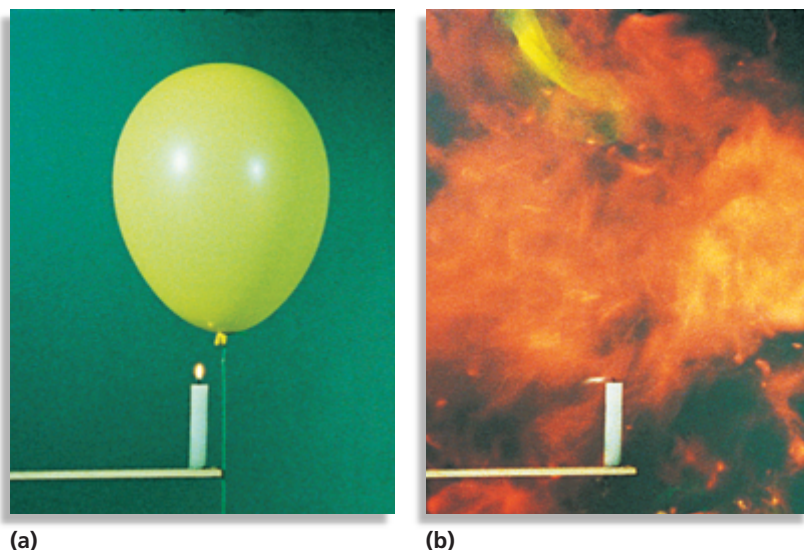
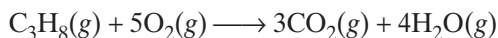


FIGURE 13 (a) The candle supplies heat to the hydrogen and oxygen in the balloon, triggering the explosive combustion reaction shown in (b).

Chemistry in Action

Fluoridation and Tooth Decay

The main component of tooth enamel is a mineral called hydroxyapatite, $\text{Ca}_5(\text{PO}_4)_3\text{OH}$. Some foods contain acids or produce acids in the mouth, and acid dissolves tooth enamel, which leads to tooth decay. One way to help prevent tooth decay is by using fluoride. Fluoride reacts with hydroxyapatite in a double-displacement reaction. It displaces the OH^- group in hydroxyapatite to produce fluorapatite, $\text{Ca}_5(\text{PO}_4)_3\text{F}$. Studies show that calcium fluorapatite is about 20% less soluble than hydroxyapatite in acid. Therefore, fluoride lowers the incidence of tooth decay.