MICRO-LAB

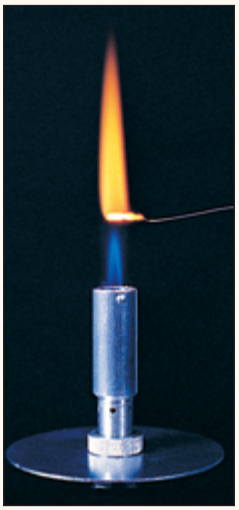
# Flame Tests

## OBJECTIVES

- *Identify* a set of flame-test color standards for selected metal ions.
- *Relate* the colors of a flame test to the behavior of excited electrons in a metal ion.
- *Identify* an unknown metal ion by using a flame test.
- *Demonstrate* proficiency in performing a flame test and in using a spectroscope.

## MATERIALS

- 250 mL beaker
- Bunsen burner and related equipment
- cobalt glass plates
- crucible tongs
- distilled water
- flame-test wire
- glass test plate (or a microchemistry plate with wells)
- spectroscope
- 1.0 M HCl solution
- $CaCl_2$ solution
- $K_2SO_4$ solution
- $Li_2SO_4$ solution
- $Na_2SO_4$ solution
- $SrCl_2$ solution
- unknown solution



## OPTIONAL EQUIPMENT

- wooden splints

## BACKGROUND

The characteristic light emitted by an element is the basis for the chemical test known as a *flame test.*

To identify an unknown substance, you must first determine the characteristic colors produced by different elements. You will do this by performing a flame test on a variety of standard solutions of metal compounds. Then, you will perform a flame test with an unknown sample to see if it matches any of the standard solutions. The presence of even a speck of another substance can interfere with the identification of the true color of a particular type of atom, so be sure to keep your equipment very clean and perform multiple trials to check your work.

## SAFETY

For review of safety, please see **Safety in the Chemistry Laboratory** in the front of your book.

## PREPARATION

1. Prepare a data table in your lab notebook. Include rows for each of the solutions of metal compounds listed in the materials list and an unknown solution. The table should have three wide columns for the three trials you will perform with each substance. Each column should have room to record the colors and wavelengths of light. Be sure you have plenty of room to write your observations about each test.

2. Label a beaker *Waste*. Thoroughly clean and dry a well strip. Fill the first well one-fourth full with 1.0 M HCl on the plate. Clean the test wire by first dipping it in the HCl and then holding it in the colorless flame of the Bunsen burner. Repeat this procedure until the flame is not colored by the wire. When the wire is ready, rinse