# Flame Tests

**Purpose:** Determine the identity of unknown substances using the flame test.

**Overview:** Flame tests provide a way to qualitatively test for the presence of specific metallic ions. The heat of the flame excites the electrons in the metal ion, and this energy is released as the electrons “fall back” to their ground states. The color we see is a combination of the visible wavelengths of light emitted by the ion.

In this lab you will perform flame tests on several different metal ions. You will use your observations to identify two unknown substances.

## Materials

|  |  |
| --- | --- |
| Well plate | Distilled water |
| Bunsen burner | Known Ionic Compounds |
| Flint striker | Unknown Ionic Compounds |
| Q-tips | Crucible tongs |

Gas Hose

## Procedure

1. Wet a Q-tip with the distilled water.
2. Wet the Q-tipand dip into one of the compounds. Make sure some of the crystals attach to the Q-tip.
3. Place the Q-tip into the flame of the Bunsen burner. Record your results.
4. Repeat steps 3 & 4 for all of the known compounds.
5. Obtain and then test the two unknown compounds.
6. Clean Up! Make sure that all materials are cleaned out of the wells in the well plate.

# Data

|  |  |  |
| --- | --- | --- |
| Well # | Metal ion | Flame color |
| 1 | Sodium Chloride |  |
| 2 | Copper(II) Chloride |  |
| 3 | Potassium Chloride |  |
| 4 | Strontium Chloride |  |
| 5 | Barium Chloride |  |
| 6 | Calcium Chloride |  |
|  |  |  |
| 7 | Unknown 1 |  |
| 8 | Unknown 2 |  |

## Analysis

1. What were the unknown compounds? Explain your reasoning.
2. Is the flame color test a test for the metal or the chloride in each compound?
3. Why is it necessary to use a new Q-tip for each compound?
4. What happens when an electron moves from a higher energy level to a lower energy level?
5. Each salt had a different color because the structures of the electron clouds are different for each compound. In which compound did the electrons release the most energy?
6. What is an electron cloud?
7. What would happen if the test compound was a mixture of two metals?

Extra Credit: How would this relate to the real world? (Hint: Think of a summer holiday)