

Chemistry

The Flame Test

Name _____

OBJECTIVE: To observe the emission spectra of several metals.

INTRODUCTION:

A **flame test** is a qualitative analytic procedure used to detect the presence of certain **elements**, primarily **metal ions**, based on the **emission spectrum**.

The test involves introducing a sample of the element or compound to a hot, non-luminous flame, and observing the color of the flame that results. The idea of the test is that sample atoms evaporate and since they are hot, they emit light when being in flame. Separate atoms of the sample present in the flame can emit energy only due to **electronic transitions** between different atomic **energy levels**. Those transitions emit **light** of very specific **frequencies**, characteristic of chemical element itself. Therefore, the flame gets the color, which is primarily determined by properties of the chemical element of the substance being put into flame.

Safety: Always use good safety techniques. Wear chemical splash approved goggles. Wear a chemical apron. Practice the flame test under the supervision of a chemistry teacher.

MATERIALS

Safety Goggles

Gloves

Beakers, 250-mL, 2

Matches

Weighing dishes, 6

Wooden splints soaked in water, 6

Water, distilled or deionized, 250 mL

Solid samples:

Calcium chloride, $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$

Copper chloride, $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$

Lithium chloride, LiCl

Potassium chloride, KCl

Sodium chloride, NaCl

Strontium chloride, $\text{SrCl}_2 \cdot 6\text{H}_2\text{O}$

PROCEDURE

1. Put on Safety Goggles.
2. Wear gloves when handling chemicals.
3. Obtain a 250-mL beaker about half-full with distilled or deionized water. Obtain six wooden splints that have been soaked in distilled or deionized water. Place them in this beaker of water to continue soaking at your lab station.
4. Fill a second 250-mL beaker about half-full with tap water. Label this beaker "rinse water".
5. Obtain six weighing dishes labeled **CaCl₂**, **CuCl₂**, **LiCl**, **NaCl**, **KCl**, **SrCl₂**. Each contains a small scoopful of each metallic solid in the corresponding weighing dish.
6. Dip the soaked end of one of the wooden splints in one of the metallic salts.
7. Light a match and then place the "dipped" wooden splint into the flame. Observe the color of the flame. Allow the splint to burn until the color fades. Try not to allow any of the solid to fall onto your desk. If necessary, repeat the test with the same splint and salt.
8. Immerse the wooden splint in the "rinse water" to fully extinguish it, as well as the match.
9. Record your observations for the flame color produced by the metallic salt in the Data Table.
10. Repeat Steps 6–8 for the other five metallic salts. Record your observations for the flame color produced by each metallic salt in the Data Table.
11. Clean up your area, put everything away, and wash your hands before leaving the lab.

