

CHEMISTRY

Flame Tests

Problem

Can we identify an unknown mixture by using a flame test?

Introduction

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 seven different metal ions. You will use your observations to identify two unknown solutions.

Materials

- Safety goggles
- Lab apron
- Nichrome wire loop
- Solutions
- Bunsen burner
- Wash bottle or beaker with deionized water

Solutions of the following salts:

- calcium nitrate
- copper(II) nitrate
- lithium nitrate
- potassium nitrate
- sodium nitrate
- strontium nitrate
- barium nitrate

Safety

1. Safety goggles and a lab apron must be worn at all times in the laboratory.
2. Many of these salts are toxic. If you come in contact with any solution, inform your instructor and wash the contacted area thoroughly.

Procedure

1. Clean the nichrome wire. First, rinse with deionized water found in the beaker. Place the loop into the flame of the Bunsen burner for about a minute. Pay attention to the color of the clean nichrome wire in the flame.
2. Perform a flame test on each solution by first heating the loop of the nichrome wire in the Bunsen burner. Place the loop into the labelled solution. Place the very end of the wire (the loop) into the flame. Make careful observations of the flame of the Bunsen burner and record your observations.
4. Clean the wire as described in step 1.
5. Repeat for each of the remaining labelled solutions. Use the nichrome wire affiliated with each solution only for that solution.
6. Obtain two unknown solutions from your teacher and perform flame tests on each (cleaning the wire between unknowns). Record all observations in your laboratory notebook. You may also record them in the table below.

Data/Observations

Salt solution	Observation
lithium nitrate	
copper(II) nitrate	
calcium nitrate	
potassium nitrate	
sodium nitrate	
strontium nitrate	
barium nitrate	
Unknown #1	
Unknown #2	

Analysis and Conclusions

1. How does the flame test provide support for quantized energy levels? Explain your answer.
2. List the metal ions present in your two unknown solutions and provide reasons.