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FLAME TESTS

Inorganic chemistry deals with the compounds that do not contain carbon. However, inorganic compounds will be encountered as physical evidence at crime scenes. One only has to consider the prevalence of metallic materials such as: iron, steel, copper, and aluminum, in our society to understand the possibilities of finding tools, coins, weapons, and perhaps metal scrapings at crime scenes. To analyze these types of physical evidence accurately a forensic scientist must examine the metallic ions emission spectrum.

Emission spectra is when light is emitted from a source and separated into its component colors or frequencies. These analyses allow the investigator to compare known metal samples to unknown scrapings or particles left at a crime scene.

PURPOSE: Observe the characteristic colors produced by certain metallic ions when vaporized in the Bunsen burner flame. Identify an unknown metallic ion by emission spectra comparison.

MATERIALS:

EQUIPMENT

CHEMICALS

PROCEDURE:

1. Obtain the following samples from you instructor.
 - a. Lithium Chloride Salt
 - b. Calcium Chloride Salt
 - c. Strontium Chloride Salt
 - d. Copper Chloride Salt
 - e. Barium Chloride Salt
 - f. Potassium Chloride Salt

DO NOT TASTE ANY OF THESE SALTS, THEY REACT WHEN IN WATER

2. Obtain a sample of HCl (aq), Nichrome wire, Bunsen burner, Spectroscope, Fireworks glasses and Colored Pencils.

3. Dip the nichrome wire into the HCl (aq) solution, then place the wire in the blue portion of the Bunsen burner flame. Repeat this step several times and record color in the data table.
4. Repeat step 3 using the fireworks glasses or spectroscope and draw the emission spectrum. Repeat if needed to complete the spectrum.
5. Collect a few crystals of Lithium Chloride on the end of the nichrome wire, place a few drops of HCl on the sample, than place in the blue portion of the Bunsen burner flame. Record your results (color of flame and emission spectrum) in the data table.
6. Repeat step 5 for all of the remaining samples and record observations on the data table.
7. When all the samples have been tested, return the original samples and sign out your unknown from your instructor.
8. Record the unknown number on the data table and repeat step 5 for your unknown.
9. Identify your unknown. Clean up lab table.
10. Turn in data sheets to your instructor.

DATA AND OBSERVATIONS

DATA TABLE

SAMPLES	COLOR	EMISSION SPECTRA
LITHIUM CHLORIDE		
CALCIUM CHLORIDE		
STRONTIUM CHLORIDE		
COPPER CHLORIDE		
BARIUM CHLORIDE		
POTASSIUM CHLORIDE		
UNKNOWN # _____		

OBSERVATIONS:

ADDITIONAL QUESTIONS:

1. What inaccuracies may be involved in using flame tests for identification purposes?
2. Which pairs of ions produce similar colors in the flame tests?
3. Explain how the colors observed in the flame tests are produced.
4. Define the following terms:
 - a. Quanta
 - b. Ground State
 - Excited State
5. What is a Spectroscope? What is observed if the flame tests are viewed through a spectroscope?
6. What is the identity of your unknown?

SUMMARY: