The flame test is a procedure used in chemistry to detect the presence of certain metal ions. As you know from your previous lab experience, it involves introducing a sample to a flame, and observing the color that results. The test is based on the fact that each metal ion has its own characteristic emission of visible light when its electron(s) returns to his ground state from an excited state.

Problem

What colors do specific metal ions emit in a flame test?

Objectives

- Observe the colors emitted by seven known metal ions
- Determine the identity of an unknown sample's metal ion

Materials

1.0M HCl solution...cleaning solution

0.5M LiCl solution

0.5M NaCl solution

0.5M KCl solution

0.5M $SrCl_2$ solution

0.5M $BaCl_2$ solution

0.5M $CuCl_2$ solution

0.5M $NiCl_2$ solution

Unknown #____ solution

96-well plate

nichrome wire

burner

igniter

beaker

tap water

Procedure

1. Prepare a data table to include all of the seven known solutions (LiCl through $NiCl_2$) and the unknown solution along with your observations from the flame tests of each solution.

2. Determine which wells will contain your solutions, allowing multiple wells for the HCl and leaving at least one well between different solutions to avoid contamination. Label your data table with the location of the well(s) in which each solution will be located (i.e. A1, A2, and A3 for HCl and A5 for LiCl).

3. Take your well plate to the back table, and place six drops of the appropriate solution into the appropriate well location. Carefully return to your lab station with your well plate.

4. Light the burner and adjust the flame until you have a blue flame with a crisp inner cone.

5. Clean the nichrome wire by dipping it in the HCl solution and holding the loop in the flame for a few seconds until there is no color other than the orange that you recognize. Make certain that the HCl solution is suspended in the loop of the wire. If necessary, repeat the HCl dipping.

6. Dip the wire into one of your known solutions, making certain that the solution is suspended in the loop of the wire. Place the loop in the flame. Observe the color of the flame within the first second or two and record it in your data table. Dip the loop into this same solution at least two more times to verify the color of flame.

7. Clean the loop with the HCl until there is no color from the wire in the flame other than the orange color of the clean wire. Cool the wire by pouring water from your beaker over

the loop into the sink.

8. Repeat this testing of each known solution until you have tested all seven known solutions. Make sure to clean the loop with the HCl solution between different known solutions.

9. Flame-test the unknown solution at least three times and record your observations in your data table. Clean the wire.

10. Pour the water in the beaker down the drain and thoroughly rinse the well plate with tap water. Flick as much of the water out of the wells into the sink as is possible.

11. Place the beaker and the well plate upside-down onto a piece of paper towel to dry.