Science 9 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**FLAME TEST LAB**

**Background:**

The normal electron configuration of atoms or ions of an element is known as the “ground state”. In this mist stable energy stable energy state, all electrons are in the lowest energy labels available. When the atoms or ions in the “ground state” are heated to high temperatures, some electrons may absorb enough energy to allow them to “jump” to higher energy levels. The element is then said to be in the “excited state”. This excited configuration is unstable, and the electrons “fall” back to their normal positions of lower energy (ground state). As the electrons returned to their normal levels, the energy that was absorbed is emitted in form of electromagnetic energy. Some of this energy may be in the form of visible light. The colour of this light can be used as a means for identifying the elements involved. Such analysis is known as a flame test.

To do a flame test on a metallic element, the metal is first dissolved in a solution and the solution is then held in the hot, blue flame of a Bunsen burner. This test works well for metal ions and was perfected by Robert Bunsen (1811-1899). Many metallic ions exhibit characteristic colours when vaporized in the burner flame.

**Purpose:**

In this activity, you will heat several compounds in the flame of a Bunsen burner until the flame takes on a colour characteristic of the metal ion in the compound. The colours are related to the arrangement of electrons in each ion.

**Materials:**

* Set of metal chloride solutions: NaCl, CuCl2, KCl2, SrCl2, LiCl, CaCl2, BaCl2
* 2 unknown solutions (from above list): “Unknown #1” & “Unknown #2”
* Bunsen burner
* Striker
* 10 wooden splints
* 10 test tubes
* Test tube rack
* Masking tape

**Safety**

* Handle chemicals safely.
* Be careful around open flames.
* Tie back long hair.
* Wash your hands thoroughly after doing this investigation.
* BE EXTREMELY CAREFUL WITH BUNSEN BURNERS!!!

**Procedure:**

1. Label the top of each test tube with the symbol of the metal ion that is in solution: Na, Ca, K, Li, Ba, Sr, Cu, Unknown 1, and Unknown 2.
2. A supply of wooden splints that have been soaked in solutions of metal ions have been set out. Take one splint per group for each metal ion, and place it in the appropriate test tube.
3. Light a Bunsen burner. Set it so that it has a blue flame.
4. Place the wooden splints in the flame, one at a time, and note the colour of the metal ion.
5. Test the two unknown solutions. Both are metal ions from the seven you have tested. The goal is to identify them.
6. Clean up and put away your equipment.

**Observations & Data -** *what kind of table(s) do you need?*

**Analysis:**

Based on your observations, identify the two unknowns you examined:

Unknown A is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Unknown B is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.