Chemistry
Lab: Flame Tests

Name _____
Date_____
Block_____

Description:
Small amounts of different salts are burned in the flame of a Bunsen burner. The characteristic color associated with each metallic ion will be observed and used to identify an unknown salt mixture.

Concept:
Just as a fingerprint is unique to each person, the color light emitted by metals heated in a flame is unique to each metal. When atoms of elements are heated or electrified, some give off visible colored light. For example, the familiar red glow of a neon sign is caused by neon atoms excited by electricity. Fireworks displays of bright lavender, red, green and yellow are the result of excited metal atoms. In fact, the kind of color given off by each atom is so exact that it can be used to identify that atom. You will test various metal salt solutions in a hot flame to learn the expected color given off by each excited atom.

Atoms have two kinds of states; a ground state and an excited state. The ground state is the state in which the electrons in the atom are in their lowest energy levels (orbitals) possible. Atoms naturally are in the ground state, so electrons need a source of energy to jump up to a higher energy level. In the ground state, electrons have the lowest possible values for "n" the principal quantum number.

Specific quantized amounts of energy are needed to excite an electron in an atom and produce an excited state. The excited electron is still "in" the atom even in an excited state. The valence electron will only escape the atom if the electron is given an amount of energy equal to the ionization energy for that atom.

When an element is burned, the electrons will be excited. Then as these electrons fall back from one energy level to another, they release energy and will emit photons of light. These photons will have different colors depending on the element and its discrete energy levels. That is, different wavelengths of light (colors) will be emitted when the electrons of different elements go down the step(s) between their energy level(s). Each element will have its own set of steps, therefore each will have its own color or set of colors.

Materials:

Write the names of the following compounds:

$BaCl_2$	KCl
$CaCl_2$	NaCl
$CuCl_2$	$SrCl_2$
LiCl	Unknown

Safety: Do not touch any of the solid chemicals. Copper (II) Chloride and Barium Chloride are highly toxic by ingestion; avoid contact with eyes, skin and mucous membranes. Lithium Chloride is moderately toxic by ingestion and is a body tissue irritant.

Procedure:

1. Splints have been soaking overnight. Make sure your splint is wet. Light the Bunsen burner.
2. We will turn out the lights.
3. Hold the splint in the OUTER CONE of the flame and burn to show the color. **Do not let the splint burn.**
4. When the lights are turned on, put your splint back into the salt solution and move to the next station.
5. Fill in the data table below.

Data Table:

Name of solid	Symbol and Charge of Cation	Color of Flame
Unknown Letter _____	ID	

Questions:

1. What are the two states electrons in an atom might have?

2. Which is the most stable state?

3. What happens when electrons fall back from one energy level to another?

4. What compounds are present in the unknown?

For more information go to:
http://chemistry.about.com/library/weekly/aa110401a.htm

http://www.800mainstreet.com/spect/emission-flame-exp.html