LAD D3 (pg 1 of 2) Flame Tests

Name_____

Introduction

When energy is added to an atom, one or more of its electrons may be raised to a higher energy level (the *excited state*). Energy can be added in the form of heat, light, or electricity. The electrons will always return to the lower level, (the *ground state*) until more energy is added. As the electrons return to the ground state, energy may be released in the form of visible light. This light emitted is of different energy values and therefore shows different colors. Certain metallic elements can be identified by their very unique and characteristic colors − the different amount and different arrangement of electrons with in each element causes each element to be unique. Since every element has a unique *emission spectra,* these spectra can be used as a fingerprint of the element. Compared to nonmetals, metals have very loose electrons and their electrons are fairly easily elevated to higher energy levels. Nonmetals have tight electrons that do not become excited very easily.

Procedure

A. Teacher will spray solutions of various ions into the 2 L bottle−Bunsen burner set up.

B. Record the various colors exhibited by the excitation each of the metals listed below.

1	barium ions	
2	calcium ions	
3	copper ions	
4	lithium ions	
5	potassium ions	
6	sodium ions	
7	strontium ions	

Post LAD Questions

1. What is the term that describes an atom in which all of its electrons in the lowest possible energy levels?

2. What is the term that describes an atom in which some of its electrons have been elevated to higher levels?

3. Why is it that the only the metals are listed in the chart above, yet the compounds listed on the outside of the solution bottles contain nonmetals as well? Comment on the “binding energy” associated with the valence electrons of non-metals compared to the “binding energy” of the valence electrons of metals.

4. Explain the action of the electrons that is occurring inside the atom that causes colored light to be emitted when viewing an emission spectrum.

5. In general, what is it that's different about the various metals that causes each individual metal to give off different and distinct colors.

6. Why are emission spectra sometimes called the finger print of elements?