LAB: Flame Test (This is a Typed Lab Report)

SAFETY IS VERY IMPORTANT!

FOR THIS LAB DO NOT WEAR BAGGY CLOTHES OR OPEN-TOED SHOES.

Students: Please read the following information given below, and then come to class on your lab day with the following already prepared in your notebooks:

1) Date, 2) Partner, 3) Title, 4) Purpose, 5) Materials, 6) Safety, 7) Diagram, 8) Procedures, and 9) Data Table.

The typed up lab report is due one week after the completion of this lab.

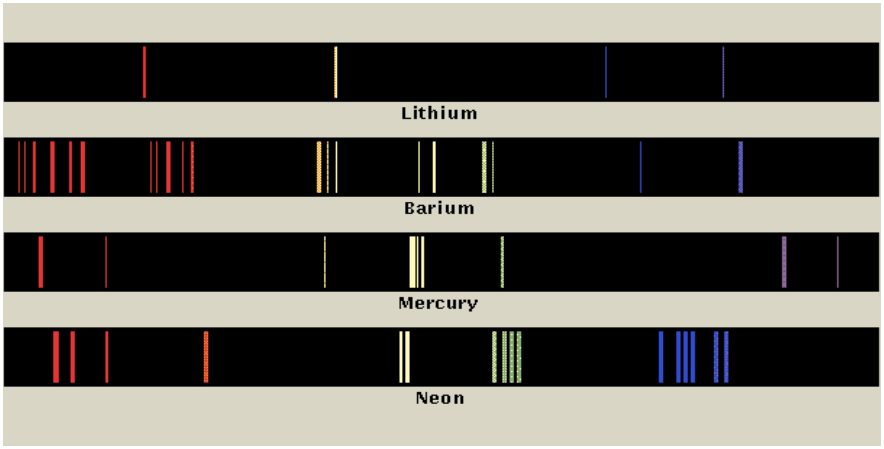
Safety: Students must confine long hair and loose clothing. Remember the location of the safety equipment in case of an emergency situation.

The Flame test is used to identify certain metals. When a dissolved metallic salt is introduced into a Bunsen burner flame, the metallic ion produces characteristic color in the flame.

During the most stable energy state of an atom, called the ground state, all the electrons are in the lowest possible energy levels, or closest to the nucleus. When heated, some of the electrons absorb definite amounts of energy and move to higher energy levels. Subsequently, these same electrons return to the ground state, but to accomplish that, they must release the extra quantum of energy. They do so in the form of electromagnetic radiation. This return to the ground state is often identified by a visually observed color of light. The observed color is caused by the blending of several visible wavelengths of light in different areas of the visible region. Each wavelength corresponds to a frequency of electromagnetic radiation, and therefore, a quantized amount of energy. The color of each of the wavelengths of light depends on its frequency, which in turn is determined by the quantity of energy that was emitted.

The difference between the energy levels accounts for the specific wavelengths, or color of the light given off. The color of the emitted light depends on its energy. Blue light is more energetic than red light, for example.

Atoms of different elements contain different number of electrons and different number of principle energy levels. Therefore, every chemical element has a characteristic spectrum, or particular distribution of electromagnetic radiation. Because of these "signature" wavelength patterns, it is possible to identify the constituents of an unknown substance by analyzing its spectrum; this technique is called spectroscopy. Emission spectrums, such as the representative examples shown below, appear as several lines of specific wavelengths separated by absolute darkness. Each line represents an electron transition between sublevels of definite energy.



Only metals with their loosely held electrons are excited in the flame of a Bunsen burner. A colored glass is sometimes used to filter out light from one metal; for instance, blue cobalt glass filters out the yellow of sodium.

In this lab you will identify the colors emitted by the metallic ion solutions. You will use the information collected during the lab to determine the identity of one unknown element from its flame test.

Each lab station will find a beaker or two containing a solution of a metal ion. Wood splints will be soaking in these beakers. There will also be a Bunsen burner with a wing tip on it that spreads the flame out. A soaking wood splint should be removed from the beaker and placed into the flame. The observations should be recorded in your lab notebook in a data table (flame should be observed with the naked eye and through cobalt glass). If the wood splint begins to burn, it should be extinguished with some water. Once the wood splint has been tested place it onto a stack of very wet paper towels. If you are unable to get a reliable reading from one splint, you may repeat with another splint from the beaker. If there are two beakers at the lab station, do everything necessary to ensure that there is no cross-contamination between the beakers. These steps should be repeated for the rest of the samples which will be located at other lab stations around the room. Each lab station should be visited by all lab groups. Once all samples are finished, test the unknown that is at your lab station. **Record the number and identity of the unknown in your data table.** When the lab is completed, the wood splints and matches should be extinguished with water and discarded in the garbage.

Scroll down and copy the table in your notebooks.

There is no need to print out anything! This table along with the questions on the last page can be copied and pasted into your typed up lab report document.

Remember this is a formal typed up lab REPORT to be submitted one week after the completion of the lab.

DATA: -COPY INTO YOUR NOTEBOOKS, BUT DO NOT PRINT THIS OUT

Metallic Ion	Visual Description of Solution	Visual Description of Flame
Lithium		
Sodium		
Copper		
Strontium		
Potassium		
Magnesium		
Barium		
Lead		
Zinc		
Unknown #_____ Name _____		

Questions: Copy and paste these questions into your typed up lab report.

1. Distinguish between the ground state and excited state of an atom.

2. What is a line spectrum? How are they produced?

3. Describe the 3 rules that govern the filling of atomic orbitals.

4. What color of light is lowest in energy? What is highest? Do they have high or low frequencies and short or long wavelengths?