

Exp 10: Flame Test Pre Laboratory
Assignment

Name: _____

Section: _____

1. Pyrotechnics is the technology of fireworks. Use the internet to find information regarding the chemistry of fireworks. Print out the first page of one of the sites you locate and turn it in.
2. Use the internet to determine what compounds used commonly in fireworks give specific colors. List three compounds and the corresponding colors.
3. What wavelengths (in nanometers) and energies (in joules) correspond to the colors in question number 2?

Experiment 10: Flame Test Identification of Cations

Introduction:

The currently accepted model of atomic structure describes the atom as a nucleus (protons and neutrons) surrounded by electrons. You have recently learned that the electrons are organized to exist at specific allowed locations and distances from the nucleus and have a corresponding specific energy. Most of the atoms of an element at room temperature are in their “ground state” which means that the electrons are arranged in a configuration representing the lowest possible total energy. In your last experiment you observed the emission spectra of some common elements using a spectrograph. The electrons of the element atoms initially in their ground state (lowest energy configuration) were excited to a higher energy level in the atom after absorbing energy from an electric discharge. When the electrons in the atom “relax” or fall back to their ground state location, they must give up the excess energy they possessed in the excited state. This excess energy is given off in the form of the visible light we observed. The wavelength (color) of the light observed is a direct measure of the difference in energy an electron possessed in the excited state relative to the ground state. Also, you should have observed that different elements had a different line spectrum (collection of emission lines) due to the different number and arrangement of the electrons in different element atoms. The fact that different elements have individual characteristic emission spectra can often be used to identify the presence of an element. We will use the characteristic emission spectra of different cations to identify the presence of a particular cation in a compound.

In this experiment, we will use a flame (heat) to excite the electrons in our samples.

Materials: Goggles, nichrome wire and holder, eight small test tubes, test tube rack, Bunsen burner.

Safety: The 6M HCl you will work with in today’s experiment is concentrated enough to cause serious skin /eye burns. You should be wearing safety goggles at **ALL** times and be careful not to spill the HCL or any of the solutions on your skin or clothing. If an accident occurs and you spill or get solution on you skin or in your eyes, immediately rinse with plenty of water and notify your lab instructor. Be careful lighting and working around the open flame of the Bunsen burner.

Procedure:

1. You will work individually for this experiment. Each student will be given **two** unknowns.
2. Place approximately 0.5 mL of the following solutions into small labeled test tubes:
6M HCl, LiCl, CuCl₂, KCl, BaCl, NaCl, SrCl₂, CaCl₂
3. Obtain a nichrome wire with a cork holder.
4. Carefully light the Bunsen burner.

5. Dip the metal end of your nichrome wire in the 6M HCl solution and heat the wire in the hottest part of the flame. Repeat twice. This will clean off your wire so that any metal contaminants present on the wire will be removed. You will need to repeat this step before examining each different solution.
6. You are now ready to perform the flame tests on the known solutions. Dip the wire into your first solution and place it in the hottest part of the Bunsen burner flame. Note the color of the flame and record your observations on your data sheet. You should perform the test a few times for each solution.
7. Clean your wire with the 6M HCl as described in step 5. Repeat the tests on the remaining solutions as described in step 6. Record your observations on the data sheet. Make sure to clean the wire between solutions.
8. Each student should obtain **two** unknowns from the lab instructor. Perform the flame tests on each unknown according to step 6 and record your observations on the data sheet. Don't forget to record your unknown numbers on the data sheet.
9. Make sure that you turn the gas to Bunsen burner off when you are finished.

Due at the end of lab**Name** _____**Lab Section** _____

Data sheet for Flame Test Experiment

<u>Solution</u>	<u>Observations</u>
LiCl	
CuCl ₂	
KCl	
BaCl ₂	
NaCl	
SrCl ₂	
CaCl ₂	
Unknown #	
Unknown #	

Based on your observations, what is the identity of your unknowns?

Unknown # _____ Identity _____

Unknown # _____ Identity _____

Instructor date and initials: _____