

Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

### Rainbow of Colors – The Flame Test Lab

#### Objectives:

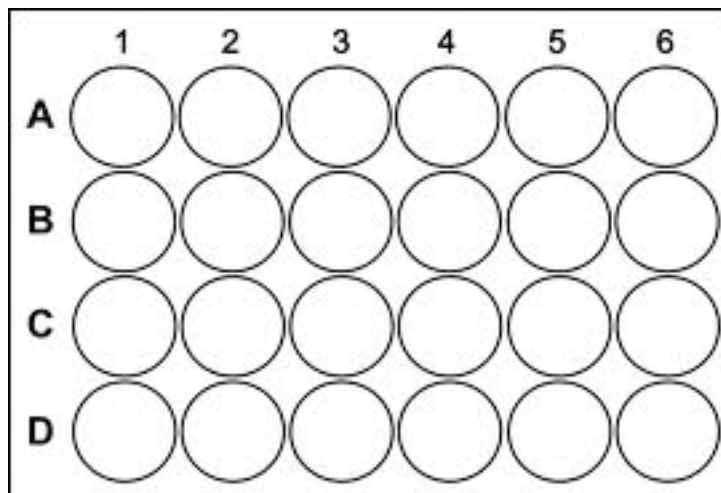
1. Be able to explain the difference between a line spectrum and a continuous spectrum in terms of how they appear through a diffraction grating.
2. Be able to explain why different atoms emit different atomic line spectra and how this relates to the movement of electrons between energy levels in an atom.

#### Pre-Lab Questions:

1. Define the term: ground state.
2. Define the term: excited state.
3. Explain what is necessary for an electron to move from ground state to an excited state.
4. Explain what happens when an electron moves from an excited state to a lower energy level.
5. List the colors of visible light from lowest energy to highest energy.

#### Procedure:

1. Thoroughly wash out your well plate.
2. Collect the 7 chemicals in your well plate. You will only need 1 pipet squirt of each solution; enough to wet the head of a q-tip.
3. Diagram your well plate so you remember what each well contains.
4. Place one cotton swab in each well of the well plate and allow them to soak for a few minutes. In the meantime, set up your Bunsen burner.
- 5.



Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

One by one, place each q-tip into the edge of the burner flame. Observe the different colors emitted by the various chemicals.

6. Dispose of the used q-tips in a small beaker of water.
7. Record all of your observations in the data table.
8. Dispose of the used chemicals from the well plate in the waste beaker.
9. Dispose of the used, soaked q-tips in the trash.

Chemical	Color(s) Emitted
1. H <sub>2</sub> O	
2. LiNO <sub>3</sub>	
3. Cu(NO <sub>3</sub> ) <sub>2</sub>	
4. K NO <sub>3</sub>	
5. Na NO <sub>3</sub>	
6. Sr(NO <sub>3</sub> ) <sub>2</sub>	
7. Ba(NO <sub>3</sub> ) <sub>2</sub>	

10. Using the spectroscope, view the emission line spectrums for each of the following gases. Record your observations by drawing a picture of each spectrum observed using colored pencils.

Type of Gas/Light	Spectrum Observed
1. Hydrogen	
2. Helium	
3. Neon	
4. Xenon (ceiling lights)	
5. White Light (sunlight)	

Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

**Summing Up:**

- 1) Describe what was happening to the electrons in the atom when the atom produced light.
  
- 2) Explain the relationship between the colors of light observed and the electronic energy levels in an atom.
  
- 3) Give two reasons why different elements produce different colors of light.
  
- 4) a) What kind of spectrum was observed through the spectroscope when looking at the white light (sunshine)?  
  
b) What kind of spectrum was observed through the spectroscope when looking at the various gas discharge tubes?  
  
c) Explain the difference between these two types of spectra.
  
- 5) Each element in the flame test emitted light of a different color. Rank the elements in order from lowest energy light emitted to highest energy light emitted.
  
- 6) Look at the line spectrum that you drew for hydrogen gas. What colors did you see? Which color of emitted light came from the largest energy transition? Which came from the smallest energy transition?