

Group # \_\_\_\_\_

Name \_\_\_\_\_

Period \_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

## Lab Ch 9 • Flame Tests

Lab Partners: \_\_\_\_\_

### READ Prelab!!!

**Read ENTIRE lab up to Disposal Section. HIGHLIGHT & MAKE NOTES!!!**

#### Introduction:

When an electron becomes excited, it will jump to a higher energy level. As the excited electron returns to its ground state, it gives off energy, often in the form of visible light. As in all cases where electrons become excited, the flame will only produce color for a few seconds at most. Many elements produce flames of a characteristic color when they come in contact with the flame of the burner. Using this method, scientists can determine some elements of an unknown mixture or solution.

Excited State- when an electron gains enough energy to temporarily leave its ground state orbital and move to an orbital of higher energy.

Ground State- the level of energy that an electron will be in when it is not excited.

Metallic atoms and ions possess electrons that are easily “excited”. This being the case, the flame test is a quick, simple technique to help identify a particular metal.

#### Objective:

How does the color of the flame test relate to the specific metal positive ions (cations)

#### Materials:

Chemical	Equipment
Various metal nitrates (see list from teacher)	Bunsen Burner
DI water	Striker
	Wooden sticks
	Tongs

#### IMPORTANT TIPS: Read before performing experiment.

- Be very careful not to cross contaminate nitrates.
- Don't reuse the wooden splints. Use the other end to retest. If you do not, you will not be able to distinguish clearly between the colors produced.
- You must observe the colors **BEFORE** the wooden splint starts to burn.  
The flame will only produce color for a few seconds at most.

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- When it starts to burn it will produce an orange flame that will obscure the color imparted to the flame by the metal

### Procedures:

1. The wooden splints have been soaking in the nitrate solutions overnight. So the nitrates so should completely absorbed in the wooden splints.
2. Grab a wooden splint from the metal nitrate beakers.
3. Without burning the wooden splints, hold the soaked end WITH TONGS of the splint with the nitrate on it and move the swab back and forth through the **hottest spot of the flame.**
4. Record the flame color that you observe in the results table. Some are tough to distinguish like Na and K.
5. You can use the other end of wooden splint to test it again.
6. Repeat steps 1 through 6 for the remaining nitrates.
7. Extinguish the wooden splint with water.
8. Throw all cotton swabs in the trash.

### Disposal/Clean Up

- Once you are done with a wooden splint, soak it with water then throw it in the trash.
- Clean ALL equipment with LAB Equipment soap & brushes
- Clean Lab BENCH with small soap bottle and sponge.
- Wash hands with hand soap.
- Let me know when you are ready. **Do not get unprotected until dismissed.**

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### DATA

Formula of Metal Nitrate	Metal Ion	Color of Flame

### POST-QUESTIONS

1. What is the difference between excited state and ground state?
  
2. From your results which metal ions were more difficult to distinguish from one another and explain why.
  
3. Will an electron stay in an excited state without outside energy (e.g. a flame)? Explain

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