

# Chemistry Lab

## Flaming Metal Ions

/20

Name:

Date:

Block:

Lab Station: \_\_\_\_\_

**Question:**

- Which flame colours are associated with which metals?
- Once I have matched the colours with particular metals, can I identify the metal ions in 2 unknown compounds?

**Background:**

If certain metal ions are heated, the flame produced will have a characteristic colour. Some of these metals are used to make different-coloured fireworks!

**Hypothesis:** (1 mark)

IF a metal is heated, THEN \_\_\_\_\_ BECAUSE \_\_\_\_\_.

**Procedure:**

- Set up your Bunsen burner. Set up the Bunsen burner right next to the SINK so you can drop burning splints in there if you need to. Your goal is to create a small, tight BLUE flame. Once your Bunsen burner is set up, NEVER LEAVE IT UNATTENDED!
- Retrieve one popsicle stick at a time that have been soaking in different solutions. Take note of which solution you are taking your popsicle stick from
- Place the wet end of the splint over the flame and see what colour the flame turns. The initial colour you see will be from the **metal** in the liquid solution. After that, the flame produced will be from the **wooden splint burning**. So be attentive to the flame colour produced when you FIRST put the wet splint over the flame.
- Record the flame colour produced by the metal in the solution (e.g., bright orange, neon pink, reddish orange, green).
- Blow out the flame; place burned splints in the sink. DO NOT GOOF AROUND WITH BURNING SPLINTS.
- Repeat procedure for all known metal solutions and two unknown solutions.
- Put out your Bunsen burner. Be sure to turn off the gas at the outlet and blow down the barrel to make sure there's no remaining flame. Leave the Bunsen burner to cool.
- Throw your sticks into the garbage can and clean the area you used.

**Safety:**

- Avoid contact with chemical solutions with eyes and all body tissues
- Be sure to wear safety goggles and a lab apron at ALL times when in the lab
- Be sure to tie up long hair and roll up long sleeves
- Closed-toed shoes and long pants need to be worn during the lab
- When working with the Bunsen burner, be sure to follow all instructions provided for proper handling of the lab equipment
- After the lab is complete, be sure to wash hands thoroughly with soap and water before leaving the laboratory.

**Data & Observations:**

Testing of the known metal solutions:

COMPOUND	METAL ION	FLAME COLOUR
CaCl <sub>2</sub>	Ca <sup>2+</sup>	
SrCl <sub>2</sub>		
NaCl		
BaCl <sub>2</sub>		
CuCl <sub>2</sub>		
KCl		
LiCl		

Testing of the unknown metal solutions:

	FLAME COLOUR	Suspected identity of unknown metal
UNKNOWN 1		
UNKNOWN 2		

**Error Analysis:**

What are some sources of error in this experiment? (1 mark)

How may these sources of error affect your results? (1 mark)

**Analysis:**

1. Which metal ions did you find difficult to identify using the flame test? Why? (1 mark)
2. How did you use the flame test to identify the metals in the **unknown solutions**? (1 mark)
3. How do you know it was the metal ion (the cation) that produces the colour and not the non-metal ion (the anion)? (Hint: look at the compounds that formed each solution) (1 mark)
4. Why is it important that the Bunsen Burner has a blue flame before burning the chemical on the popsicle stick? (1 mark)
5. What flame colour would you expect the following solutions to produce? (Hint: Think about the colours that were produced in this experiment) (3 marks)
  - a. **CuSO<sub>4</sub>**
  - b. **Ba(NO<sub>3</sub>)<sub>2</sub>**
  - c. **KF**
  - d. **KNO<sub>3</sub>**
  - e. **SrSO<sub>4</sub>**
  - f. **NaI**
6. Write 3 things a student should know about using a Bunsen burner (3 marks)
  - a.
  - b.
  - c.
7. Name two applications of where we would need to understand what colours metal ions produce (i.e., not in Science class!) (2 marks)
  - a.
  - b.

## Conclusion:

Write a paragraph to summarize your results. Be sure to include the following questions in your response: (5 marks)

- A summary of your **results** for the experiment.
- The **effect** of your **independent** variable on your **dependent** variable.
- If your **hypothesis** was **supported** or **rejected**.
- **Factors** that could have affected your results (i.e. sources of error)
  - *do not include experimental errors like spilling, reading the scale incorrectly, etc.*
- What you would do **differently** if you were to **redo** this experiment.
  - *i.e. How could you reduce the factors that affected your results?*
- What can you **conclude** about this experiment?