**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period\_\_\_\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**FLAME TEST LAB**

Intro: Read the lab sheet given to you for review

Pre-Lab Questions:

1. When an atom absorbs energy, the electrons move from their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ state to an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_state. When an atom emits energy, the electrons move from a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ state to their \_\_\_\_\_\_\_\_\_\_\_\_ state and give off \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. Is a flame test a qualitative or quantitative test for the identify of an unknown? Explain.

Materials:

CaCl2•2 H2O, 0.5 g

CuCl2•2 H2O, 0.5 g

LiCl, 0.5 g

KCl, 0.5 g

NaCl, 0.5 g

SrCl2•6 H2O, 0.5 g

BaCl2, 0.5 g

Unknown metal chloride

2 250 mL beakers

Bunsen burner

Scoop

Weighing dishes

Wooden splints

DI water

Safety

* Copper (II) Chloride is highly toxic by ingestion-avoid contact with eyes & skin
* Lithium chloride is moderately toxic and is a body tissue irritant
* Fully extinguish wooden splints by immersing them in a beaker of water before discarding them in the trash
* Wash hands with soap and water after lab

Procedure

1. Fill a 250 mL beaker about half full with distilled water. Obtain 8 wooden splints that have been soaked in distilled water. Place them in this beaker at your lab station.
2. Fill a second 250 mL beaker half full with tap water. Label this rinse water.
3. With your across the table partners, label 8 weighing dishes Ca, Cu, Li, Na, K, Ba, Sr, and unknown. Place about one scoop full of each solid into the corresponding weighing dish.
4. Light the Bunsen burner
5. Dip the soaked end of one of the wooden splints into one of the metal chlorides, then place it into the flame. Observe the color of the flame. Allow the splint to burn until the color fades. Try not to allow any of the solid to fall into the Bunsen burner.
6. Immerse the wooden splint into the rinse water to extinguishing the flame, and then throw away.
7. Record observations for the flame color produced by the metal chloride in the data table.
8. Repeat steps 5-7 for other six known metal chlorides.
9. Perform a flame test on an unknown metal chloride and record its flame color and the probably identify of the unknown.

DATA:

|  |  |
| --- | --- |
| **METAL ION** | **COLOR OF FLAME** |
| Barium |  |
| Calcium |  |
| Copper |  |
| Lithium |  |
| Sodium |  |
| Potassium |  |
| Strontium |  |
| Unknown |  |

RESULTS TABLE

|  |  |  |  |
| --- | --- | --- | --- |
| **METAL FLAME COLOR** | **λ (nm)** | **λ (m)** | **∆E (J)** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

QUESTIONS:

1. Use the table on your lab reference sheet to record the approximate wavelength of light emitted for each known metal ion in the results table.
2. Convert each wavelength from nm to m. Show one sample calculation in your lab report and record all values.
3. The characteristic color of the sodium flame is due to two closely spaced energy transitions. Use the equation from the front of this lab handout to calculated the average energy, ∆E, corresponding to the observed flame color of each metal. Show one sample calculation in your lab report and record all values.
4. What evidence is there from your results that the characteristic color for each observed compound is due to the cation in each case. Describe an additional test that could be done to confirm that the color is due to the metal ion.
5. A glass rod was heated in a burner flame and gave off a bright yellow flame. What metal ion predominates in the glass rod?
6. The alkali metals Cesium and Rubidium were discovered based on their characteristic flame colors. Cesium is named after the sky and rubidium after the gem color. What colors of light do you think these metals give off when heated in a flame?