Virtual Lab: Flame Tests



Introduction: The flame test is a qualitative test used in chemistry to help determine the identity or possible identity of a metal or metalloid ion in a substance. The practical uses for flame tests are in identifying the age of stars and making fireworks.

Purpose: To identify the element that is producing colored light when its valence electrons are excited by flame.

Procedure:

1. Light the Bunsen burner. Adjust until you have a small blue flame.
2. Remove one wooden splint from the bottle, note the element on the label. Immediately replace the cap back onto the bottle!
3. Carefully and slowly hold the wooden splint in the flame of the Bunsen burner and observe the color produced. Record. (Do not let the wooden splint catch on fire!)
4. Place the used wooden splint on the lab table after making sure it is NOT on fire. Do NOT re-use the wooden splint.
5. Repeat steps #2 – 4 with the rest of the samples.
6. Clean up when you are done. Turn off the Bunsen burner, rinse the used wooden splints with water and then throw them in the trash.. Wipe down the counters with a wet paper towel. Wash your hands.

Data:

|  |  |
| --- | --- |
| **Element** | **Color** |
| Ba (barium) |  |
| Ca (calcium) |  |
| Cu (copper) | XXXXXXXXXXXXXXXXXXXXXXXX |
| Li (lithium) |  |
| K (potassium) |  |
| Na (sodium) |  |
| Sr (Strontium) |  |
| U1 (unknown 1) |  |
| U2 (unknown 2) |  |

Analysis: **Show your work, mathematically, to receive any credit. All answers need to be in the correct amount of significant figures and have units.**

1. Match the color of the flame with wavelength of the colored light.
2. Calculate the frequency of colored light released by each element.

**c = λ × ν**. (c = 3.00 × 108 m/s)

1. Calculate the energy released by a photon of colored light by each element,

**E = h × ν** (h = 6.626 × 10-34 J·s)

Table 2

|  |  |
| --- | --- |
| Color | Wavelength (λ) |
| Orange - red | 6.49 × 10-7 m |
| Red / Magenta | 6.25 × 10-7 m |
| Red | 6.70 × 10-7 m |
| Yellow  - Orange | 5.70 × 10-7 m |
| Yellow - green | 5.10 × 10-7 m |
| Green | 4.75 × 10-7 m |
| Lavender/ Pink | 4.00 × 10-7 m |

|  |  |  |
| --- | --- | --- |
| **Element** | **Frequency (ν)** | **Energy (J)** |
| Ba (barium) |  |  |
| Ca (calcium) |  |  |
| Cu (copper) |  |  |
| Li (lithium) |  |  |
| K (potassium) |  |  |
| Na (sodium) |  |  |
| Sr (Strontium) |  |  |
| U1 (unknown 1) |  |  |
| U2 (unknown 2) |  |  |

Conclusion: Write a paragraph, using complete sentences, explaining how the lab was performed and include the answers to the questions below.

1. Which element released the least amount of energy? The most energy?
2. Explain, exactly, how the element releases colored light.