***Flame Test Lab !*** Name _____p._____

***Purpose:*** To observe different color light given off by excited metal ions, and use flame tests to identify unknown salts.

***Procedure: WEAR GOGGLES! If a bunsen burner goes out, turn off the gas immediately!***

**1.** Start at your normal lab station. Put on goggles, and light your bunsen burner. Adjust it so that you have a blue flame. Place the tip of the nichrome wire into the beaker of water. Dip the wire into the salt bottle, so that a small amount of salt sticks to the wire. TIP THE BUNSEN BURNER ON ITS SIDE SO THAT THE SALT DOESN'T DRIP ONTO THE BURNER, and hold the wire right above the bunsen burner flame. Record detailed observations in the qualitative data table.

**2.** When done, make sure lab station is neat (leave burner on, and upright) and travel to another lab station. Leave all supplies at your lab station. Move through the lab until you have observed all 8 salts and 4 unknown salts and recorded observations.

**3** Stay in lab until everyone has finished observations, then shut off burners and return to class.

***Qualitative Data:***

| Compound Name | Formula | Flame test result |
|---|---|---|
| Potassium chloride | | |
| Copper (II) nitrate | | |
| Barium chloride | | |
| Sodium chloride | | |
| Strontium chloride | | |
| Copper (II) chloride | | |
| Lithium chloride | | |
| Calcium chloride | | |
| Unknown A | | |
| Unknown B | | |
| Unknown C | | |
| Unknown D | | |

**Analysis:**

**1.** Identify each unknown by completing the "formula" column on the data table on the front. (Choose from the 8 known compounds in the data table.)

**2.** We did not test any mercury compounds in this lab.
**a.** Why would it be a bad idea to do a flame test with mercury salts in this lab?

**b.** If the light from a heated mercury sample is separated by a prism, it is found to contain several colors, including orange, violet, indigo, green, and yellow-green.

Which of these colors has the highest frequency? _____

Which of these colors has the longest wavelength?_____

Which of these colors has the highest photon energy?_____

**c.** The wavelengths of the colors mentioned above in part (b) are 577 nm, 436 nm, 615 nm, 405 nm, and 546 nm. Which wavelength is which color? (write the color on the line)

| 577 nm | 436 nm | 615 nm | 405 nm | 546 nm |
|---|---|---|---|---|
| _____ | _____ | _____ | _____ | _____ |

**d.** Calculate the frequency, in Hertz, the highest energy type of light in (c).

**3.** Many elements (for example, calcium and sodium) have very similar flame tests when viewed with the "naked eye." What is a possible way to distinguish between the elements?
(Still by using their flame tests somehow).

**4.** Barium emitted several colors, including red, orange, yellow, green, blue, and violet!
The most prominent wavelength emitted had a of 455 nm.
Calculate the photon energy of this light.

**5.** The most prominent type of light emitted by the sodium had a photon energy of $3.37 \times 10^{-19}$ J.
Determine the wavelength of this light. Report your answer in nanometers.