Name(s)_____ Date_____ Period_____ #(s)_____

FLAME TEST LAB

When metal salts (ionic compounds) are heated in a Bunsen burner flame, the metal gives off a characteristic color. For example, sodium makes the flame turn bright orange – this is the same orange color made by sodium street lamps and many fireworks. In this lab you will be given six unknown samples of metal salt, and you must determine which salt is which. Be sure to use good lab techniques.

Procedure:

1. Gather needed materials and put on goggles. You will be removed from lab without them.
2. Light the Bunsen burner, and adjust it so that you have a small (2 cm) blue cone of flame.
3. Dip a clean q-tip into the beaker of clean water.
4. Dip the clean q-tip into the tube marked "1".
5. Hold the q-tip over the flame and record the color of the flame on your data table.
6. Repeat steps 2-5 for each of the remaining samples. It is important that you use a new q-tip for each type of metal salt and do not touch it to the burner, as contamination will mess up your lab results.
7. When you have finished flame testing each sample, please turn off your gas and clean your lab area.

Data and Analysis: Using the data you collected, the electromagnetic spectrum, and the information in the table below, tell which metal was in each salt. For now, leave the bottom two rows blank.

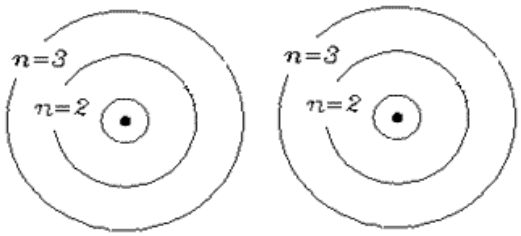
Sample	**1**	**2**	**3**	**4**	**5**	**6**
Flame color						
Frequency						
Metal?						
Wavelength						
Energy						

METAL	**FLAME COLOR**
Barium	yellow-green
Calcium	brick red (maroon)
Copper	blue-green
Lead	blue/white
Sodium	bright orange-yellow
Potassium	purple
Lithium	red
Strontium	crimson red (bright)
Zinc	white-green

Conclusion:

1. What classification of matter are the metal salts (ex. NaCl and KNO_3)? _____
2. Is the flame test color an intensive or extensive property? _____
3. Is the flame test color a chemical or physical property? _____

4. Draw the electrons on a fluorine atom in the ground state. In the figure to the right, draw it in the excited state. This means that one electron has moved to a higher energy level.



Draw an arrow showing the electron's movement.

Was energy released or absorbed?

_____

5. Below is a photon of blue light. Draw a possible photon of red light. (Hint: red has a longer wavelength)

Which one has more energy? _____

6. Why do different chemicals emit different colors of light?

7. Why do you think the chemicals have to be heated in the flame first before the colored light is emitted? Does a flame test show released or absorbed energy?

8. Could flame tests be useful in determining identities of metals in a mixture? If so, what problems might arise? If not, why not?

9. Suppose you were a firefighter and you were called to a chemical plant fire. Upon arrival you see a bright violet/purple flame. What chemical would that tell you is burning?

10. A fireworks employee works in a lab that designs fireworks. He wants to create a firework display that burns blue, red, and orange. If you were helping, what chemicals from the data above would you choose?
    A. NaCl, $CuSO_4$, and $Fe(NO_3)_3$
    B. $CuSO_4$, KCI, and $Fe(NO_3)_3$
    C. KCl, $CuSO_4$, and NaCl
    D. $Sr(NO_3)_2$, $CuSO_4$, and NaCl

11. Using the information in your data table and the formulas on the STAAR reference chart, calculate the wavelength and energy of each metal sample.

    a. Which metal salt color has the highest frequency? _____

    b. Which metal salt color has the longest wavelength? _____

    c. Which metal salt color has the most energy? _____