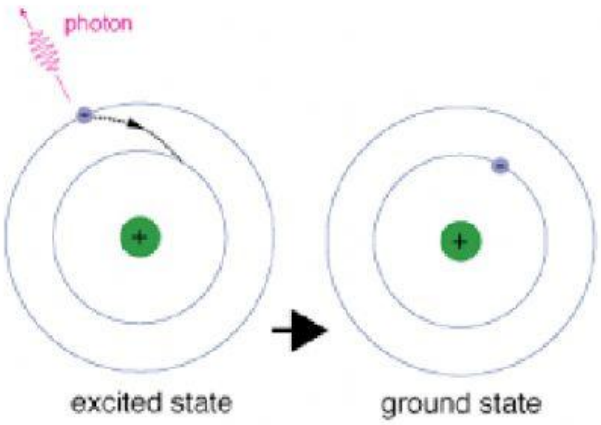
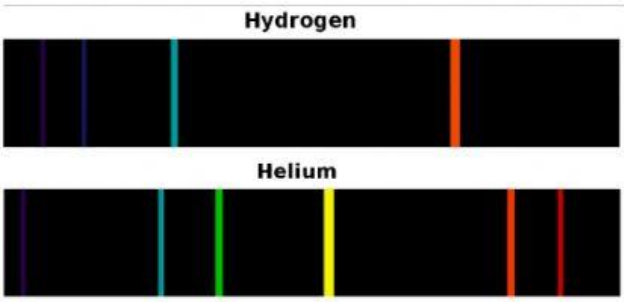
Name: _____ Date: _____

CHEMISTRY
Flame Test: Emissions of Light

Purpose: In this activity, you will observe the color of light released by burning different elements in a methane flame.

The light released by elements is due to "excited" electrons "relaxing" and returning to the ground state. Excited electrons release their excess energy (or quanta) in the form of a wave of lights of specific wavelengths or frequencies. This emission spectrum is like a fingerprint for the element—it is unique.





The emissions spectrum for hydrogen and for helium. Hydrogen gives off two broad-bands of color light (blue and orange) and two weak bands of violet light. Helium gives off three broad bands (green, yellow, and orange) and four weak bands (2 violet, blue, and red).

Helium lamp: Glows a pale copper color.

Hydrogen lamp: Glows magneta

In this visual activity, you will observe the color of light released by the burning of metals. The heat of the flame adds energy to the electrons, making the electrons excited (energetic and at a higher shell or energy orbital). When the electrons relax and return to their ground states, they release that excess of energy as light. The color seen is a combination of all of the light waves of the excited electrons discharging their excess energy.

LIVEWORKSHEETS

Part 1: Color of the Flame

1. Use the YouTube video: MegaLab Flame Test
Link: https://www.youtube.com/watch?v=NEUbBAGw14k

2. Watch the video. Identify the color of the flame of each metal that the instructor burns in the flame. Record your answers in the table.

Element	Color of flame
Lithium (Li)	
Sodium (Na)	
Potassium (K)	
Calcium (Ca)	
Strontium (Sr)	
Barium (Ba)	
Copper (Cu)	

Part 2: Color of the Flame

1. Use the YouTube video: Flame Test Lab (by Matthew Kirk)
Link: https://www.youtube.com/watch?v=kdSWB41xcUs

2. Watch the video. Identify the color of the flame of each metal that the instructor burns in the flame. Record your answers in the table.

Element	Color of flame
Barium (Ba)	
Calcium (Ca)	
Copper (Cu)	
Potassium (K)	

LIVEWORKSHEETS

Lithium (Li)	
Strontium (Sr)	
Sodium (Na)	
Unknown A	
Unknown B	

Which element was in Unknown A?

Which element was in Unknown B?

Part 3: Hands-On Flame Test Simulation

1. Go to the website https://javalab.org/en/flame_test_en/ JavaLab flame test interactive. Allow for Java Script if your computer prompts for permission.

2. Click on the web-download button to open the simulation: .

3. Check the box "Run" if it is not automatically on. The flame in the Bunsen burner should be ignited.

4. The element/compound choice menu is at the bottom under the flame and lab wire. Starting with NaNO3 (sodium nitrate), do the flame test for each of the metals/compounds. Choose metals/compounds by pressing the round button to the left of each.

5. Place the wire loop into the flame. Observe the color of the flame from the wire loop. Record the color of each in the table.

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Metal	Compound	Color of flame
Sodium (Na)	$NaNO_3$	
Sodium (Na)	NaCl	
Lithium (Li)	$LiNO_3$	
Strontium (Sr)	$Sr(NO_3)_2$	
Strontium (Sr)	$SrCl_2$	
Potassium (K)	KNO_3	
Calcium (Ca)	$CaCl_2$	
Copper (Cu	$CuCl_2$	
Copper (Cu)	$CuSO_4$	
Barium (Ba)	$Ba(NO_3)_2$	

LIVEWORKSHEETS