

Dougherty Valley HS Chemistry
Flame Test

Name:
Date:
Period:

Purpose: When certain compounds are heated in a flame, they emit a distinctive color. The color of the emitted light can be used to identify the compound.

Background: The *atomic emission spectrum* of an element is the set of frequencies of the electromagnetic waves emitted by atoms of the element. Each element's atomic emission spectrum is unique and can be used to determine if that element is part of an unknown compound.

Materials:

Bunsen Burner Spray Bottles Distilled water
Solution of: LiCl, NaCl, KCl, CaCl₂, Sr(NO₃)₂, CuCl₂, CuSO₄, Copper Wire, Na₂SO₄, K₂SO₄, unknown

Procedure:

1. Using one spray bottle at a time, spray the solution at a 45 degree angle upward into the flame. For copper wire, place tip of wire directly in the flame. Observe the color of the flame and record it in your data table.
2. Repeat step 1 for each of the solutions to be tested. Be sure to record the color of each flame in your data table.
3. Obtain a sample of unknown solution from your teacher. Repeat the procedure in step 1 using the unknown solution. Record the color of the flame produced by the unknown solution in your data table. Do not throw anything away.

Data Table: [fill in title and empty boxes]

<u>Compound</u>	<u>Formula</u>	<u>Metal</u>	<u>Flame Color</u>
Calcium Chloride			
	CuCl ₂		
Barium Chloride			
	KCl		
Sodium Chloride			
	LiCl		
Copper Sulfate			
	K ₂ SO ₄		
Sodium Sulfate			
	CaSO ₄		
Copper Wire			
	Cu		
	Sr(NO ₃) ₂		

Question Set: [Copy and Answer in complete sentences on a separate sheet of paper]

1. Each of the known compounds tested contains chloride, yet each compound produced a flame of a different color. Explain why this occurred and support your answer.
2. Each of the known compounds tested contains Sulfate, yet each compound produced a flame of different color. Explain why this occurred and support your answer.
3. How does the atomic emission spectrum of an element relate to these flame tests? Explain what happens to an electron when it gains energy
4. What is the identity of the unknown metal solution? Describe how you know.
5. Draw a diagram that illustrates what is happening when you add energy to electrons and a color is given off as energy is lost. Also describe your diagram by explaining what you are showing.
6. What patterns do you notice in the groupings of elements within the periodic table?(Orbitals)
7. Predict what color Barium Sulfate (BaSO_4) will burn. Explain your reasoning.
8. Explain the difference between emission and absorption spectra. (Look them up)