

Flame Tests

ACTIVITY DISCUSSION:

When an electron becomes excited, it will jump to a higher energy level. As the excited electron returns to its ground state, it gives off energy, often in the form of visible light. As in all cases where electrons become excited, the flame will only produce color for a few seconds at most. Many elements produce flames of a characteristic color when they come in contact with the flame of the burner. Using this method, scientists can determine some elements of an unknown mixture or solution. The flame test is made by dipping a nickel-chromium wire into a slurry of the salt, heating it in a flame, and noting the distinctive color of the flame produced by the vaporized salt.

Important vocabulary in this lab includes:

Excited State- when an electron gains enough energy to temporarily leave its ground state orbital and move to an orbital of higher energy.

Ground State- the level of energy that an electron will be in when it is not excited.

PURPOSE: To learn to identify selective cations (positive ions) using the flame test.

PROCEDURE:

ALWAYS wear goggles when working in the laboratory!

1. Get a nickel-chromium wire flame tester from the front table. It is important that the wire be clean before starting. The easiest way to do this is with sandpaper (front table). Since the sandpaper can be used several times, PLEASE return it along with the flame tester to the front table at the end of the period. A clean wire should produce no color when inserted into the flame.
2. Using your reagent tray (the clear tray), carefully obtain 1 small spatula of salts of sodium, calcium, barium, strontium, potassium, and copper. Make sure you label or identify which salt you place in which number on the clear tray so as to not mix them up at your lab table.
3. Place a spatula of a salt on a clean glass slide. Add enough DISTILLED water to make a thin slurry on your slide. Set up a Bunsen Burner. Dip your wire into the slurry and insert the wire into the flame. Record your results in the data section. Be sure to include such details as whether or not a color is slow in appearing. Repeat the above steps until you have identified the flame color of these five ions.
4. When you have successfully completed the identification of the known ions, proceed to identifying the unknowns. On the front counter you will find five unknowns. Each salt has a positive ion that can be identified using a flame test.

RESULTS

Results
of
the flame
tests

Ion Tested	Name of Salt Used	Color of Flame and Notes
Na ¹⁺		
Ca ²⁺		
Ba ²⁺		
Sr ²⁺		
K ¹⁺		
Cu ¹⁺		

Tests on the unknowns

Unknown #	Color of flame observed	Positive ion in the salt
1		
2		
3		
4		
5		