

Flame Tests

Goggles must be worn in the lab!

PRE-LAB DISCUSSION:

Many substances produce flames of a characteristic color when they come in contact with the flame of a Bunsen burner. Using this method, scientists can determine some of the composition of an unknown mixture or solution. They even extend this to the study of stars, where the spectrum of light produced by the star helps to identify elements present there.

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.

As the compounds in this lab are heated, electrons in atoms gain energy and move away from the nucleus of the atom. As the "excited" electron returns to its ground state (closer to the nucleus), it gives off energy, often in the form of visible light. This is the principle by which chemicals are used to produce color in fireworks.

In this lab, we will be using ionic compounds, which are composed of a positive ion, which is named first, and a negative ion, which is named second. We would like to know if the color of the flame produced is due to the positive ion, the negative ion, or both.

CLAIM: By comparing the color of flames produced by a series of ionic compounds (salts) we can determine if the color of the flame is produced by the positive ion, the negative ion, or both.

PROCEDURE:

ALWAYS wear goggles when working in the laboratory!

1. Get a nickel-chromium wire flame tester from the side table. It is important that the wire be clean before starting. The easiest way to do this is with sandpaper (side table). Since the sandpaper can be used several times, PLEASE return it along with the flame tester to the side table at the end of the period. A clean wire should produce no color when inserted into the flame.
2. Place a spatula (micro-spoon) of one of the salts to be tested on a clean glass slide. Add enough DISTILLED water to make a thick slurry on your slide. Dip your wire into the slurry and insert the wire into the flame. Record your results in the data section. Repeat the above steps until you have identified the flame color of each of the required salts.
3. When you have successfully completed the observations on the known salts, proceed to testing the unknowns. On the side counter you will find two unknowns.

EVIDENCE:

Salt	Formula of Salt Used	Color of Flame
Barium chloride	BaCl ₂	
Sodium sulfate	Na ₂ SO ₄	
Potassium chloride	KCl	
Sodium nitrate	KNO ₃	
Potassium sulfate	K ₂ SO ₄	
Strontium chloride	SrCl ₂	
Potassium nitrate	KNO ₃	
Sodium chloride	NaCl	

Tests on the unknowns

Unknown #	Color of flame observed
1	
2	