

### **New and Improved -- Flame Tests Demonstration (“Rainbow Demonstration”)**

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#### **Safety Considerations**

Barium chloride is highly toxic. Precautions must be taken to avoid ingestion of the salt or solution. Wear proper personal protective equipment when preparing solutions. Students should wear chemical splash goggles and avoid contact with solutions when performing this experiment. Wash hands after handling materials used to prepare for or perform this experiment.

Caution should be taken around open flames (Bunsen burner or propane torch). Ensure lab bench is clear of flammable materials (solvents, papers, etc.) when performing this experiment. Students should be closely supervised when performing this experiment.

#### **Wooden Applicators Soaked in Saturated Salts Solutions**

Saturated salt solutions were prepared according to the table to the right. Note grams were added to 250ml DI water (not brought to volume).

Salts solutions were prepared in DI water. Five wooden applicators were broken in half and placed in a weight boat. The saturated solutions were poured into the weigh boats to cover the applicators. Solutions were allowed to evaporate. Most salt solutions evaporated in 1 week. CaCl<sub>2</sub> and LiCl were still damp after 4 months as these salts are highly hygroscopic.




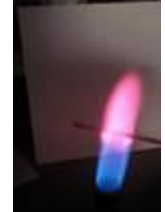
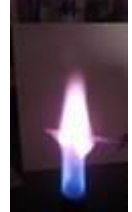



Salt	Actual g in 250 mL H <sub>2</sub> O
BaCl <sub>2</sub> /BaCl <sub>2</sub> • 2H <sub>2</sub> O	106
CaCl <sub>2</sub>	190
CuCl <sub>2</sub> • H <sub>2</sub> O	288
LiCl	233
KCl	88
NaCl	91
SrCl <sub>2</sub>	392

#### **Summary of Results:**

- Barium Chloride BaCl<sub>2</sub>\*2H<sub>2</sub>O (light green) - color flame clearly distinguishable
- Calcium Chloride CaCl<sub>2</sub> (orange red) – color flame clearly distinguishable
- Copper Chloride CuCl<sub>2</sub> (blue/green) – color flame clearly distinguishable
- Lithium Chloride LiCl (fuchsia flame) – color flame clearly distinguishable
- Potassium Chloride KCl (light lilac) – color flame distinguishable (better than any other tested)
- Sodium Chloride NaCl (yellow flame) – color flame clearly distinguishable
- Strontium Chloride SrCl<sub>2</sub> (red or crimson flame) – color flame clearly distinguishable

Flame tests were performed on damp  $\text{CaCl}_2$  and  $\text{LiCl}$ . All other salts were dry. Wooden applicators need an additional flame source to burn. Just burning applicators alone did not produce a flame to be seen from more than a feet away. A Bunsen burner or handheld propane torch were used to provide spectacular results!

A picture is worth a thousand words!

						
Ba light green	Ca orange/red	Cu blue & green 	Li fuchsia	K lilac	Na bright yellow	Sr crimson