

WARNING NOTICE

The experiments described in these materials are potentially hazardous. Among other things, the experiments should include the following safety measures: a high level of safety training, special facilities and equipment, the use of proper personal protective equipment, and supervision by appropriate individuals. You bear the sole responsibility, liability, and risk for the implementation of such safety procedures and measures. MIT and Dow shall have no responsibility, liability, or risk for the content or implementation of any of the material presented. [Legal Notice](#)

SIMULATE THE COLORS IN FIREWORKS

Abstract

A small quantity of selected metal salts is burned on watch glasses in methanol. The spectrum of colors seen in fireworks is reproduced including blue, yellow, green, crimson, red, orange and purple.

Materials

Lithium Chloride	Methanol Anhydrous
Boric Acid	Six Watch glasses
Strontium Chloride	Spatula
Sodium Chloride	Bulb
Potassium Chloride	Pasteur Pipette
	Butane lighter

Safety

Methanol is extremely volatile make sure the bottle is away from the watch glasses when you ignite them. Strontium chloride irritates the lungs, eyes and skin. All of the salts are slightly toxic by ingestion including NaCl, $LD_{50} = 3000$ mg/kg.

Procedure:

1. Set up six watch glasses including one for the methanol, which is the control.
2. Add approximately 2-3 grams of each salt to the center of each watch glass except the first one, which will be reserved for the methanol control.
3. Add about 2-3 mL of methanol to each salt soaking them well.
4. Use a long butane lighter to ignite each watch glass one right after the other until all are burning. Turn down the lights.

Discussion:

Colors can be used to qualitatively identify the presence or absence of certain metal ions. The colors arise because heating the metals elevates the metals electrons to an excited state with electrons jumping into higher energy orbital's, they then relax

back to the ground state emitting visible light at specific frequencies resulting in the different colors. The relaxation of an excited electron varies from one metal ion to another. Each different ion produces its own line spectrum corresponding to various flame colors. Methanol is used as a control and burns with a blue flame. Lithium burns with a characteristic pinkish flame, boron a lighter green flame, strontium crimson red, sodium yellow, and potassium purple/lilac.

Disposal:

All of the left over salts can be rinsed with a small quantity of water into a dedicated waste collection flask. Dispose of following all local, state and federal regulations for disposal.

MIT OpenCourseWare

<http://ocw.mit.edu>

Chemistry Behind the Magic: Chemical Demonstrations for the Classroom

Fall 2012

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.