LIGHT AND COLOR

A SUMMARY OF WORKSHOP DEMOS AND ACTIVITIES

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1. Visualizing the Electromagnetic Spectrum

x-ray overheads (download pictures from www.xray.hmc.psu.edu/rci/)
uv lamp – fluorescence using a portable long wave UV light (Flinn Scientific #AP1901) or check your local pet store (used to look for pet stains on carpet or floors)
visible light – use any light source, such as an overhead projector
IR - red heat lamp, available at most hardware stores
radio waves - coil transmitter using portable tape or CD player, two coils, and a small audio amplifier (Radio Shack audio amplifier-speaker, Cat. No. 277-1008c)

2. Looking at Visible Light

View the spectrum using an overhead projector (OHP) spectroscope (C-spectra, Flinn Scientific #AP1714)
Color by absorption on OHP using colored filters with OHP spectroscope (color filters available from art store or theatrical supply)
Color by transmission - RGB using colored filters on OHP
Overlap sections of R,G, and B filters on overhead projector – what colors do you observe?
How does your color TV work – a homework assignment: What kind of dots or lines are on the TV screen?

3. Colored Shadows

Use red, green and blue light bulbs in portable reflectors to make (almost) white light. (R, G, B party bulbs and clamp-on reflector/sockets are available at most hardware stores.)
Observe colored shadows when standing in front of the RGB lights
Observe how colors of clothing or objects change when viewing them in front of combinations of two of the RGB bulbs

4. Colors and Elements

Colored flames using portable burner and anhydrous salts (Burner from Flinn Scientific, #AP1032) For salts , use sodium chloride (popcorn salt), potassium chloride, lithium chloride, barium chloride, strontium chloride, calcium oxide or hydroxide, and copper(II) chloride. All salts must be very finely ground, and anhydrous. Dry all salts in an over at 100°C for minimum 1 hour or overnight. Keep sealed in plastic screw cap bottles.
How do fireworks work – use colored sparklers in a fire-safe, well ventilated environment
Color emission from elements - spectrum tubes
How do we detect elements in stars and other planets? A class activity using spectrum tubes and Flinn C-Spectra

5. Phosphorescence

Phosphorescent stars, toys, and chalk available at Discovery Channel stores and Spencer's Gifts at your local malls.
Freeze your shadow using a phosphorescent sheet and a photoflash (Phosphorescent vinyl sheet, Flinn Scientific #AP4794 or paint panels or walls with Phosphorescent Flash Paint, Flinn Scientific # P0272)
Write with light using phosphorescent sheet and a small flashlight
Glowing images and messages by hand or computer (Phosphorescent Paper, Flinn Scientific #AP5887)

6. Sound into light

Flashlight transmitter
Mirror on speaker with laser pointer

7. Lenses and Kaleidoscopes

Make magnifying lenses using wire loops and water or plastic wrap and water
Use magnifying lenses and small 30x microscopes to explore various objects such as skin, clothes, pen and pencil writing, insects, etc. (Illuminated 30x microscopes from Radio Shack, on sale twice a year at approximately $6.00)
Explore concave (negative) lenses
Simple kaleidoscopes (contain no "filling material"): "Prismagic" cone shape with plastic multilens, and tubular kaleidoscopes with only a round plastic sphere as a lens (Check your local toy store)
Candy kaleidoscopes – have plastic compartment to add candy, beads, colored paper, glitter flakes, etc. for viewing. (Check your local toy store)

8. Polarizing Filter

Use a piece of polarizing filter to observe reflections from objects in a room, water from a pool or puddle, shiny objects such as a car, etc. Rotate the filter to see if there is any effect.
Use two pieces of polarizing filter on overhead projector. Rotate them relative to one another to show how they can block out light transmission
Place a clear, colorless plastic bag or sheet, a plastic cup, etc. between two pieces of polarizing filter on an overhead projector. Rotate the top filter and observe the object between the filters. Squeeze or stretch the object.
Circular polarizing filter. Place on overhead projector, put a clear glass or beaker on top, add white corn syrup (such as Karo) to observe how sugars rotate the light. (Available as Kaleidoscoptical Activity kit, Flinn Scientific #AP8781)

9. Red sunset

Decomposition of sodium thiosulfate with dilute (1M) hydrochloric acid (Available as The Aloha Chemical Sunset kit, Flinn Scientific #AP8988)

9. Activities

Build a kaleidoscope with microscope slides and 35mm film canisters
Build a hand-held spectroscope with Flinn C-Spectra and a 35mm film canister
Build an OHP spectroscope with Flinn C-Spectra

10. The Chemistry of Color

Investigate the chemistry of color changing markers (See Katz and Anderson, "A Mark of Color", **ChemMatters** magazine, October, 1998)
Investigate liquid crystals using mood rings, liquid crystal sheets, liquid crystal thermometers, etc.