

# VISUALIZING THE ELECTROMAGNETIC SPECTRUM

©2002 by David A. Katz. All rights reserved.  
Permission for classroom use as long as original copyright is included.

## David A. Katz

Chemist, Educator, and Consultant  
133 N. Desert Stream Dr., Tucson, AZ 85745, USA  
Voice/Fax: 520-624-2207 Email: dakatz45@msn.com

### X-Rays:

Show x-ray photos (historical pictures can be found in books or on the Internet)  
(I use the ones showing the hand with buckshot and a foot in high lace shoe)

### UV:

Portable UV lamp (long wave)  
Show fluorescence of clothing (usually due to optical brighteners in laundry detergents), minerals, fluorescent plastic stars or similar objects (due to phosphorescent zinc sulfide), package labels, and other consumer goods.

### Visible:

C-Spectra (holographic diffraction grating from Flinn Scientific Company) on overhead projector to show the visual spectrum (ROYGBV)

### IR:

Use a heat lamp. (Try to find a red one that gives off minimal visible light of other wavelengths)  
Found in hotel bathrooms, restaurants, etc.. (McDonalds had them made to give off "white" light plus IR to keep the French fried potatoes warm.)

### Radio Waves

Use a small radio.

You can make a radio "transmitter" using a tape or CD player:

Make two coils by wrapping some magnet wire around a circular object such as a drinking glass or glass jar. Use 50 or 100 turns of wire. Hold the coil together with electrical tape. Solder miniature phone plugs to the ends of the coils.

Plug one coil into the earphone jack of the tape or CD player.

Plug the second coil into the input of a small amplifier. (A Radio Shack Audio Amplifier-Speaker, Catalog no. 277-1008C works well.)

Depending on the power of your tape or CD player, you should be able to "transmit" the sound about 1 meter.

## Additional Activities

### Looking at Visible Light

#### Color by absorption

Use Flinn C-Spectra (Catalog no. AP1714) on an overhead projector with red, green, and blue color filters. Show how filters absorb certain wavelengths (or colors) Use colored solutions in flat-sided culture bottles.

### Color by transmission

Use three clamp-on-type light fixtures with reflectors and red, green and blue bulbs.

Show how colors combine by aiming at a projection screen or a white wall in a darkened room.

Show multiple shadows.

Show how different combinations of the bulbs affect visible colors of materials.

How does your color TV work?

You can actually give your students an assignment to watch television. Have them look closely at the TV screen to see the dots or bars of the phosphors and how they produce colors.