The Electromagnetic Spectrum

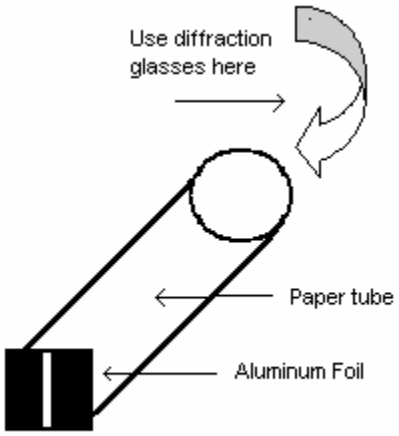
Student Handout

Cornell Laboratory for Accelerator-based Sciences and Education

Scientists have built tools that allow them to study the visible spectrum more closely. One such tool, called a spectroscope, is an instrument that works much like the diffraction glasses. A spectroscope is used to separate the light from a hot gas or other light source into its constituent colors. These colors appear as bands or spectral lines. The arrangement of these spectral lines can be used to identify materials. Particular light frequencies from certain materials give rise to sharply defined bands on the scale which can be thought of as fingerprints.

Activity One:

For this activity, you will work independently to build a spectroscope. Use a paper-towel tube, aluminum foil, scissors and your diffraction glasses to assemble this device. Using scissors *carefully* cut a small slit in the center of the aluminum foil. Wrap the foil around one end of the tube (see below illustration), and hold the foil-free end up to your eye while looking through their glasses. Check out the lights around you!

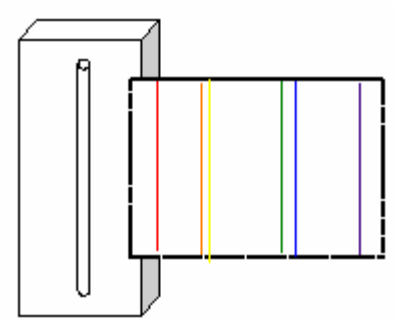


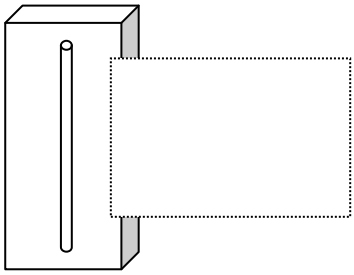
Activity Two:

For the following activity, you will work in small groups (3-4 students) and will be assigned to a work station. At the station, use your spectroscope to look at a gas bulb. The identity of the gas inside the bulb has been withheld. You must work together to create a diagram of the spectral lines emitted by your unknown gas. Use colored pencils at your station. You will share their results with the rest of class by coloring the spectral lines you see on an overhead transparency. Like a fingerprint, the color and placement of the bands will help you determine the identity of your unknown gas.

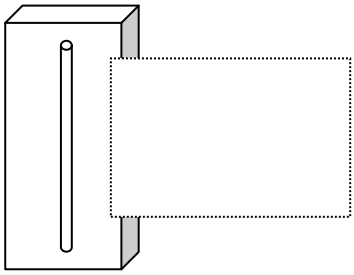
Data:

Example:

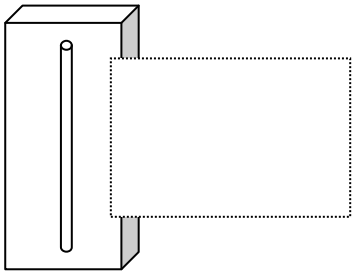




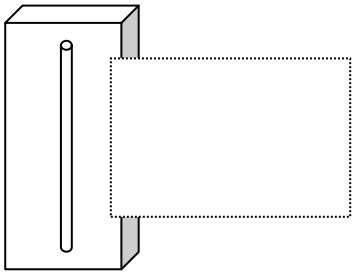
Station One



Station Two



Station Three



Station Four

Identity of your Unknown gas: _____