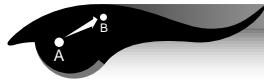




Exploring Diffraction With a Spectroscope

Objective



The student will be able to see what happens to light when it passes through a spectroscope.

gives off the same group of wavelengths. This group is called the emission spectrum of the element.

Science and Mathematics Standards



Science Standards

- Science as Inquiry
- Physical Science

Mathematics Standards

- Problem Solving
- Communication
- Connection
- Computation/Estimation
- Measurement

In the visible wavelengths of the electromagnetic spectrum, red, with the longest wavelength, is diffracted most; and violet, with the shortest wavelength, is diffracted least. Because each color is diffracted a different amount, each color bends at a different angle. The result is a separation of white light into the seven major colors of the spectrum or rainbow. A good way to remember these colors in order is the name Roy G. Biv. Each letter begins the name of a color: red, orange, yellow, green, blue, indigo, and violet. (Reference Electromagnetic Spectrum page 34.)

Theory



A spectroscope is a device that can be used to look at the group of wavelengths of light given off by an element. All elements give off a limited number of wavelengths when they are heated and changed into gas. Each element always

Materials



- spectroscope (one spectroscope for four students)
- light sources (sunlight, incandescent, fluorescent, cadmium, sodium, neon, mercury, helium, etc.) (See List of Catalogs, page 83.)
- diffraction grating
- compact disc



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R O Y G B I V

Red Orange Yellow Green Blue Indigo Violet

(Students should color these boxes with their crayons.)

Procedures



Use a spectroscope and look at different kinds of light. View bulbs with different gases inside.

3. When you look at the different light sources through the spectroscope, observe the stripes of color. Do they fade or blend into each other? Describe the bands of color.
4. Does each light source produce the same group of colors or spectrum?
5. Each group of colors for each different light source is called the emission spectrum for that source. How are the spectra or groups of colors alike? Different?
6. Why are the groups of color for each light source different?

Observations, Data, and Conclusions



1. Observe each source of light. Explain what you see.
2. Observe the colors. Start with the first color on the left and list them in the table in the order that you see them.

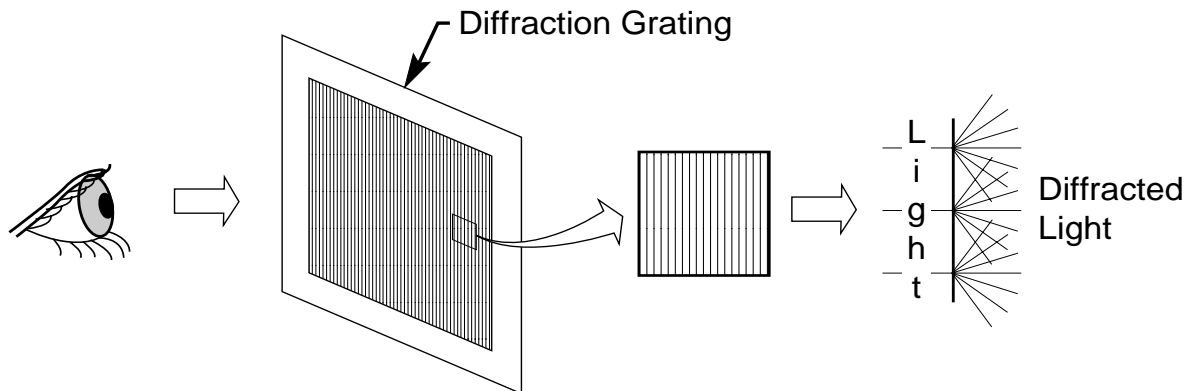
Light Source	Colors



Additional Activities



White light can be separated into all seven major colors of the complete spectrum or rainbow by using a diffraction grating or a prism. The diffraction grating separates light into colors as the light passes through the many fine slits of the grating. This is a transmission grating. There are also reflection gratings. A reflection grating is a shiny surface having many fine grooves. A compact disc makes a good reflection grating.



The prism separates light into colors because each color passes through the prism at a different speed and angle. The angles of reflection of the light, upon entering and leaving the prism, vary with the wavelength or color of the light.

