

# Emission Spectra Using Vernier/Ocean Optics Spectrometer (V-SPEC)

From *Vernier Spectrometer User's Guide*

In this experiment, you will use a Vernier Spectrometer (V-SPEC) to measure the light emitted by selected sources. These sources can be, but are not limited to, discharge tubes, LEDs, lamps, or luminescent or fluorescent liquid solutions.

The electrons of atoms and molecules exist in specific energy states. The energy emitted by the excitation of electrons is limited to differences between these states, thus specific energies of light are emitted. The color of a glowing LED is determined by the energy of the emitted light. The energy and wavelength of the light is described by the equation  $E=hc/\lambda$  where  $\lambda$  is the wavelength,  $h$  is Planck's constant ( $6.63 \times 10^{-34}$ ) and  $c$  is the speed of light ( $3.00 \times 10^8$ ). If you are measuring the emission spectrum of a gas trapped in a discharge tube, only certain wavelengths of light are emitted by the gas and the "pattern" that is produced is unique for that substance.

## PURPOSE

1. Practice measuring the emission spectrum of a source of light.
2. Compare and contrast the spectra various light sources.

## MATERIALS

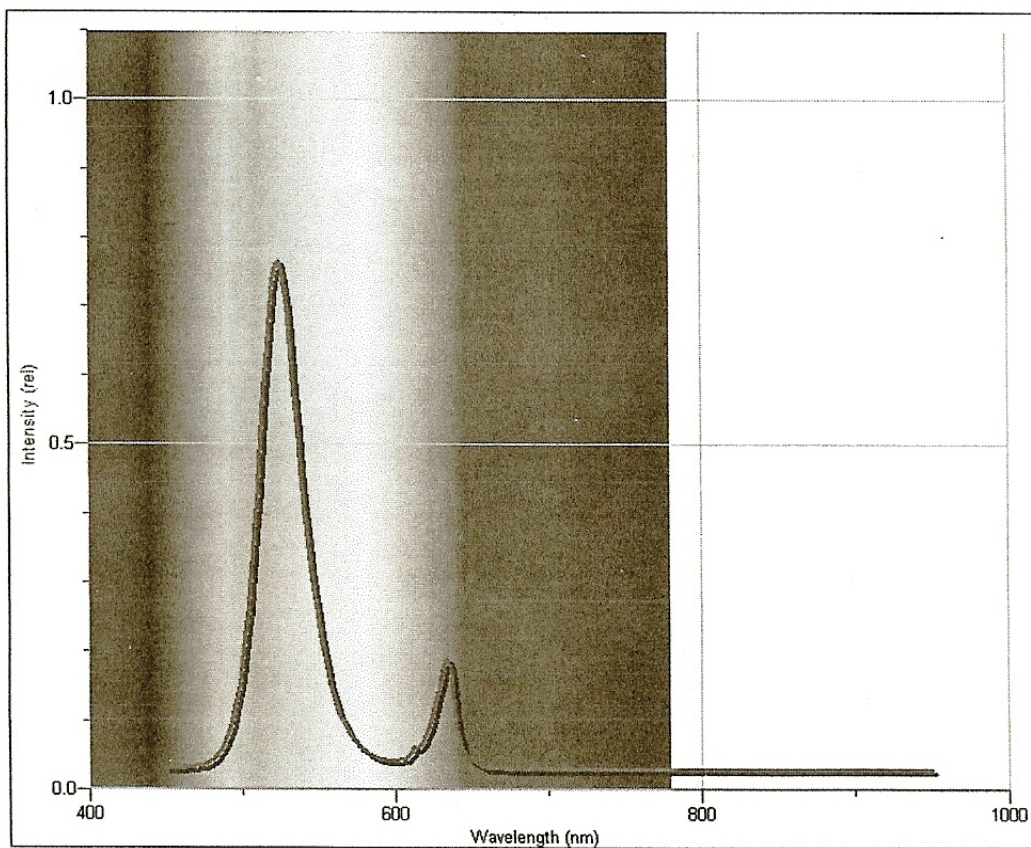
Vernier Spectrometer, with light source removed  
Computer with Logger Pro installed  
Fiber optic cable (optional)

Light sources:  
LEDs  
discharge tubes  
lamp/flashlight

## PROCEDURE

1. Connect the spectrometer to your computer.
2. Start the Logger Pro program.
3. Prepare a data table listing the type of light source and features of the spectrum
4. Record the type of light source in your data table.
5. Prepare the spectrometer to measure light emission.
  - a) Open the Experiment menu and select "Connect Interface → Spectrometer → Scan for spectrometers".
  - b) Open the Experiment menu and select "Change Units → Spectrometer: 1 → Intensity.
6. Measure the emission spectrum of a light source.
  - a) Place the light source near (within a few cm) the detector opening on the Spectrometer. If this is not possible you may want to use a Fiber Optical Cable.
  - b) Click "Collect". An emission spectrum will be graphed.





Violet Indigo Blue Green Yellow Orange Red

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