

The Visible Light Spectrum

Visible light (that which can be seen by the naked eye) is composed of different wavelengths (λ) of light ranging from violet (380 nm) to red (760 nm). A wavelength of light is defined as the distance from one peak to the next in the wave and is measured in nanometers (nm); one nm is equivalent to 10^{-9} meters.

Many kinds of molecules interact with or absorb specific types of radiant energy in a predictable fashion. When white light strikes an object, the color the human eye perceives is determined by the wavelengths of light absorbed and the remaining wavelength(s) that are reflected or transmitted. An object that appears red absorbs wavelengths of all colors but red. The red wavelength of light is what reflects back to the eye. If an object absorbs all wavelengths of light, the object appears black; if all are reflected, it appears white.

Observing the visible light spectrum

To observe the color of light emitted at various wavelengths within the visible light spectrum you will use a spectrophotometer. A white piece of chalk or a white piece of paper will be placed in a cuvette and put into the spectrophotometer sample compartment. The wavelength of light will be changed and you will note the color of light passing through the compartment and hitting the chalk or white paper.

A. Equipment/Materials

1. A piece of chalk, 2-3 cm long, cut or rubbed with sandpaper so that there is a 45° angle on one end (figure 1). A white strip of paper may be substituted if chalk is not available.



Figure 1. Chalk with a 45° angle cut on one end

2. Spectrophotometer
3. Cuvette

B. Procedure

1. Place the chalk in a cuvette, angle end up. If using paper, place the strip of paper into the cuvette.
2. Set the wavelength on the spectrophotometer to 400 nm

3. Place the cuvette in the sample compartment of the spectrophotometer so the angle face of the chalk faces to the right. If using paper, make sure the face of the paper is parallel to the light slit.
4. Look into the compartment at the chalk face and record the color you see. If you don't see anything, turn the transmittance/absorbance control until color can be seen.
5. Change the wavelength to 425 nm and repeat step 4.
6. Continue to change the wavelength by 25 nm increments until you reach 700 nm. Record the color of light seen on the chalk face for each wavelength.
7. Look at the visible light spectrum chart. How closely do you results match the chart?

Wavelength (λ) nm	Color observed
400	
425	
450	
475	
500	
525	
550	
575	
600	
625	
650	
675	
700	