A SPECTRUM

Introduction:

The spectrophotometer is designed to detect absorbances of light at different wavelengths when the light passes through a solution of some given concentration. Some compounds absorb more light at one wavelength than another, so the wavelength must be changed every time a different compound is being analyzed to achieve optimum results from a spectrophotometer. The wavelength of light is selected by adjusting the wavelength control knob. In this lab, the color of light at each wavelength will be observed with the eye. The visible range of light is from 350 to 650 nm, so this will be the working range for this lab.

Note: The accepted symbol for wavelength is the Greek letter lambda (λ).

Equipment / Materials:

a piece of white chalk 2-3 cm long
spectrophotometer
cuvette
small test tube rack

Purpose:

The purpose is to observe the color of light emitted by the spectrophotometer at various wavelengths.

Safety:

- Always wear goggles and an apron in the lab.

Procedure:

1. Cut or rub a 45° angle in one end of the piece of chalk.
2. Place the piece of chalk in a cuvette angle end up.
3. Set the wavelength to 400 nm.
4. Place the cuvette in the spectrophotometer so the angle of the chalk faces to the right.
5. Open the light slit by turning the transmittance adjustment knob (front, right knob) clockwise.
6. Look down into the sample compartment and record on the data sheet the color of the light striking the chalk.
7. Repeat steps 4 through 7 increasing the wavelength by 25 nm until you reach 650 nm.

Name_____

Name_____

Period_____

Date_____

DETERMINATION OF WAVELENGTH OF MAXIMUM ABSORBANCE

Data Table:

Color of solution _____

wavelength (nm)	absorbance
350	
375	
400	
425	
450	
475	
500	
525	
550	
575	
600	
625	
650	

wavelength (nm)	absorbance

Data:

Wavelength (λ)	observed color
400	
425	
450	
475	
500	
525	
550	
575	
600	
625	
650	

Questions:

1. Why was a white piece of chalk used for this lab?

2.a. What would be an approximate wavelength of infrared light?

b. Of ultraviolet light?

Teacher Notes

Lab Time: 20 minutes

Answers to questions:

1. White chalk was used because white relects all colors of light and allows the entire visible region to be seen.

2.a. Above 650 nm

b. Below 350 nm

Considerations:

This lab is very fast, easy, and creates no mess. It gives the students the experience of seeing exactly how a spectrophotometer operates inside. It is recommended that this lab be used to introduce the spectrophotometer before the other labs from this section are used. By performing this lab, students will begin to associate a wavelength with the color of light transmitted. This is useful in understanding why certain wavelengths are chosen for various colored solution analysis.