

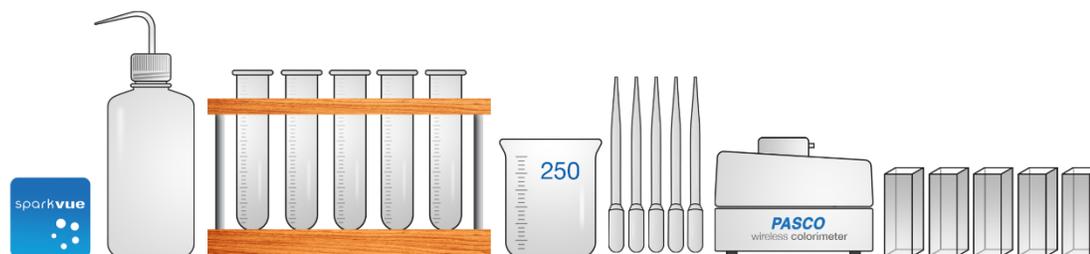
13C – COLORED SOLUTIONS

INQUIRY

How does the light that is absorbed into the solution related to the color of the solution?

MATERIALS

- Device with SPARKvue software
- Colorimeter
- Cuvettes (5)
- Wipes, lint/scratch-free for cuvettes
- Pipets, graduated to 1 mL (5)
- Test tube rack
- Test tubes, 20 mm x 150 mm (5)
- Red, green, blue and yellow food coloring solutions (10 mL each)
- Wash bottle with distilled water



BACKGROUND

Color is an important part of life and chemistry. If you've ever added a powdered drink mix to water, you realize that the more particles in the drink, the deeper the color of the solution. When we look at something, our eyes are picking up light that is reflecting off that object. Colored objects absorb one or more wavelengths of light, so our eyes only receive part of the visible spectrum. Thus, our brain registers the object as having a color. A red object, for example, might absorb blue, yellow and green wavelengths. Our brain receives the reflected violet, red and orange wavelengths and "averages" them together, making us think we have seen red. Dyes are chemicals that create color by absorbing specific wavelengths of light. What creates the colors that we see?

SAFETY

Follow these important safety precautions in addition to your regular classroom procedures.

- Wear safety goggles at all times.

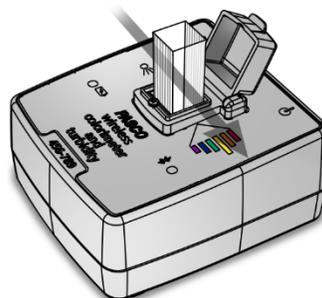
PROCEDURE

1. Fill a clean cuvette at least 3/4 full of distilled water. This will be used for your reference measurement. Be sure to handle the cuvette only by its ribbed sides.
2. Open SPARKvue.
3. Open the 13C Colored Solutions lab file in SPARKvue.
4. Use the Bluetooth icon to connect the Colorimeter.

PROCEDURE

5. Calibrate the colorimeter with the cuvette containing distilled water (the water sample is called a "blank"). Orient the cuvette inside the colorimeter so the arrow shown in the diagram passes through the clear sides of the cuvette.

Note: It is important to wipe the clear sides of the cuvette before placing it into the colorimeter.



6. Obtain 10 mL of each of the colored solutions in four separate test tubes.
7. Use a pipet to transfer about 3 mL of each solution into a cuvette so each is at least 3/4 full. You should have four cuvettes, each with a different color, plus your "blank" cuvette with water.
8. Place the cap on the cuvettes and wipe off the clear sides.
9. Start collecting data.
10. In SPARKvue, the first page shows the absorbance values of your solution at different wavelengths. Record results of the distilled water (blank) in Table 1 on your answer sheet.
11. Go to the next page in SPARKvue. This shows the %transmittance values of your solution at different wavelengths. Record the results of the distilled water (blank) in Table 1.
12. Repeat steps 10-11 for each of your colored solutions.
13. Stop collecting data.

ANALYSIS

Complete the analysis on your answer sheet.

QUESTIONS

Answer the questions on your answer sheet.