**Analysis of Food Dyes in Beverages**

**Experiment Overview**

The purpose of this advanced inquiry lab is to use spectroscopy and graphical analysis to determine the concentration of dye in a sports drink. The investigation begins with a baseline procedure for preparing a series of standard dilutions of an FD&C Blue 1 stock solution and measuring the percent transmittance of each. The results will be analyzed graphically to identify an optimum linear relationship among various functions (T, %T, log T and A) for a Beer’s Law Calibration curve. The procedure provides a model for guided-inquiry analysis of the concentration of food dyes(s) in sports drinks and other consumer beverages. Additional dyes, FD%C Yellow 5 and FD&C Red 40 are also available for optional extension or cooperative class studies.

**Materials**

Beakers, 50 ml 2-3 Pipets

Cuvettes Samples of Sports Drinks

FD&C Blue 1 Stock Solution Colorimeter

Test Tube Rack

**Safety Precautions**

The FD&C dyes are slightly hazardous by eye and skin contact. The dyes have been stored with other, nonfood-grade chemicals and are not for consumption. Avoid contact with eyes, skin and clothing. Wash hand thoroughly with soap and water before leaving the laboratory. Please follow all laboratory safety guidelines.

**Procedure**

1. Plug in the Vernier Lab Pro base into an outlet.

1. Plug in the Vernier Colorimeter into CH 1 of the Lab Pro base. The CH 1 plug will be located left of the base.
2. Plug in the I/O cable from the bottom of the Lab Pro base into the TI calculator. The plug on the calculator will be on the top left on TI-84's.
3. Turn on the Calculator and press APPS.
4. Scroll to EASYDATA and press ENTER.

6. Select the appropriate wavelength On the Colorimeter, use the left and right arrows to set the wavelength.

7. Prepare a *blank* by filling an empty cuvette ¾ full with distilled water. Seal the cuvette with a lid. To correctly use a Colorimeter cuvette, remember:

* All cuvettes should be wiped clean and dry on the outside with a tissue.
* Handle cuvettes only by the top edge of the ribbed sides.
* All solutions should be free of bubbles.
* Always put the same clear side of the cuvette facing the white arrow.

8. Insert the blank (filled with distilled water) cuvette and press CAL to calibrate the device.

Release the CAL button when the red LED begins to flash. The absorbance should now be 0.000or 0.001. Remove the blank cuvette.

9. You are now ready to collect absorbance-concentration data for the standard solutions. . Fill the cuvette approximately ¾ full. Place in the colorimeter in the correct way.

10. Record the absorbance displayed.

11. Repeat for all the known solutions and then the unknown solution.

**Data Table**- Include one with all three trials.

**Graph -** Create a graph in Excel and Print a graph of absorbance *vs.* concentration, with a regression line and interpolated unknown concentration displayed. Choose the trial with the best data and state why that data was chosen.

**Calculations**

1. Determine the concentration of FD&C Blue 1 in your sample of sports drink.

2. Determine the mass of FD&C Blue 1 in 1 Liter of sports drink. The molar mass of FD&C Blue 1 is 793 g/mol.

**Questions**

1. Research the side effects of ingesting FD&C Blue 1. List two.

2. What could safety replace FD&C Blue 1?

**Conclusion** – Write one

**Post Lab Quiz**- Do it.

http://www.quia.com/quiz/4246363.html