Name _____

Beer's Law Inquiry Activity

Part 1: Colored Solutions and Spectrophotometers

Introduction

Take a minute to **explore** the simulation by clicking on the link provided. Specifically, check out the Beer's Law tab. (http://phet.colorado.edu/sims/html/beers-law-lab/latest/beers-law-lab_en.html).

Using the virtual spectrophotometer in the Beer's Law tab, how does Concentration affect how much light is **absorbed** and **transmitted** through the solution?

Teacher initial: _____

Investigating Absorption and Concentration

a. **Predict** what a graph of absorbance versus concentration would look like. Sketch your prediction below using a colored pencil.
b. On the simulation, the solution chosen for you is of a generic "Drink Mix" and measure the Absorbance for 5 different concentrations, chosen for you in the table below, with the fixed wavelength setting and graph the data using a different colored pencil

Conc (M)	Conc (mM)	Abs
0		
0.05		
0.1		
0.2		
0.3		

Absorbance

Concentration

c. How does your second graph compare to your prediction?

d. Based on Beer's Law (A = elC, A = absorbance, e = molar absorptivity, l = pathlength and C = concentration), would you expect the wavelength used to affect your absorbance versus concentration relationship?

Teacher initial: _____

Investigating Absorption and Wavelength

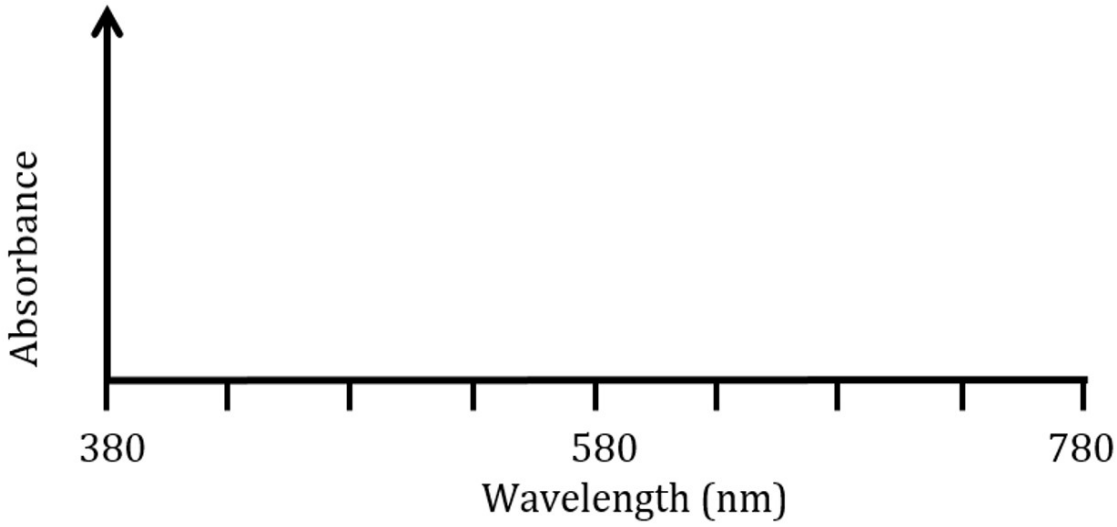
3. Compare three solutions of different colors with the same pathlength.

		Preset Wavelength: Simulation default setting			**Variable Wavelength: Set to same color as solution**		
Solution name	**Soln. Color**	**Beam Color**	**Value (nm)**	**Abs**	**Beam Color**	**Value (nm)**	**Abs**

a. How are beam color, solution color, and absorbance related? What combinations give the most absorbance? Why?

b. Choose a solution and set concentration and pathlength. Keep these settings constant and graph the absorbance for 8 different wavelengths. Your absorbance range may vary depending on your solution settings.

Wavelength (nm)	Abs



c. Where in the spectrum is the value for the "fixed" or "present" wavelength in the simulation? Mark this point on your sketch. Why do you think this is the best wavelength to use for this solution?

d. Compare your absorbance spectrum sketch with a group that chose a different solution. Would you use the same wavelength of light to do spectroscopy experiments with different colored solutions? Why or why not?