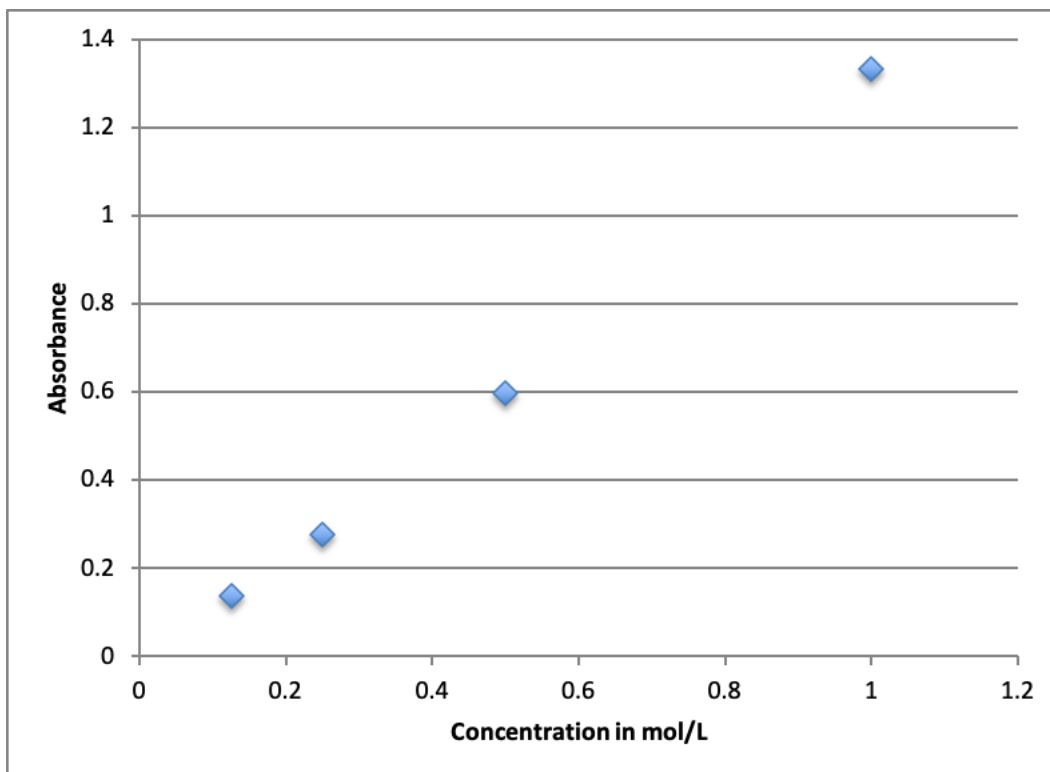


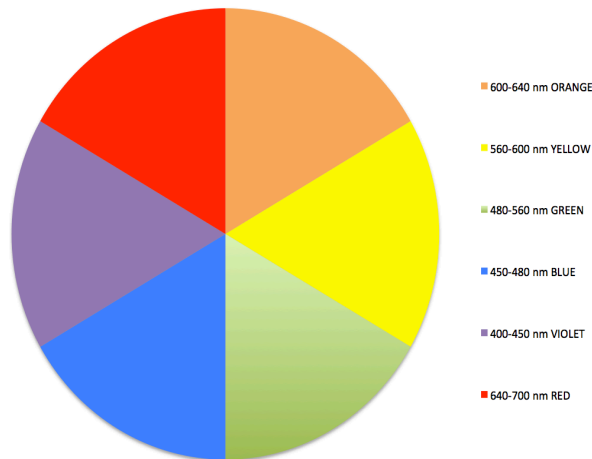
AP WORKSHEET 03M: Beer-Lambert Law

A Beer-Lambert law experiment is conducted to determine the concentration of an unknown solution of nickel(II) sulfate. A colorimeter is used, in which the wavelength of the incident (incoming) light is set to 640 nm. The following data are collected and plotted as below.

Absorbance	Concentration in mol L ⁻¹
1.332	1.00
0.598	0.500
0.276	0.250
0.139	0.125



- (a) Nickel(II) ions are green in aqueous solution. With the aid of the color wheel shown below, explain why the incident light is set at a particular wavelength, in this case 640 nm.



- (b) What is the relationship between absorbance and transmittance of the incident light? Explain your answer. (2)



- (c) Use the following equation, and the definition of transmittance (T) as the fraction of incident light that passes through the sample, to 'prove' what you have written in (b). (2)

$$\text{Absorbance (A)} = -\log T$$

- (d) Determine the concentration of the unknown solution of nickel(II) sulfate, given that it exhibits an absorbance of 1. (1)
- (e) Comment on the usefulness of this experiment/technique for the analysis of a solution of magnesium chloride. Explain your answer. (2)