1) Compound A has a molar absorbtivity of 10000 L mol^{-1} cm^{-1} at λ 475nm. Compound B has a molar absorbtivity of 500 L mol^{-1} cm^{-1} λ 475 nm. Using the same spectrometer set at λ 475 nm and identical cuvettes, you obtain identical absorbance readings. Which sample has the greater concentration?

2) A blue dye is used in a blue raspberry flavored drink. You have been asked to find out the concentration of this blue dye in the prepared beverage. You have 1.0 g of the dye (MW =369 g/mol) available to you and need to prepare the solutions in Table 1.

a) Describe (in detail) how you would prepare 100 mL of sample 2.
b) Why would you choose 686nm as the wavelength that you measure?

After preparing the solutions and a sample of the drink mix, you obtain the absorbance data in Table 1.

c) What is the molar absorptivity of the dye (assume you used a 1cm wide cuvette)?
d) What is the concentration of the dye in the drink mix?

Table 1: Data for Problem 2

Sample Name	Conc (M)	Absorbance (686nm)
Blank	0	0.001
1	0.001	0.19
2	0.002	0.415
3	0.004	0.876
4	0.005	1.2
drink		0.235

3a) Based on the Well Wishes case study, is there enough O_2 in the drainfield to oxidize all the carbon, nitrogen and sulfur species under unsaturated soil conditions?
b) Under saturated soil conditions?
The relevant chemical equations are:

$NH_4^+ + 2\ O_2 \rightarrow NO_3^- + 2\ H^+ + H_2O$

$CH_2O + O_2 \rightarrow CO_2 + H_2O$

$H_2S + 2\ O_2 \rightarrow SO_4^{2-} + 2\ H^+$

4) How would you prepare 500 mL of a 2.00 $x10^{-6}$M KCl (molar mass = 64.55 g) solution by using a balance that can measure mass only to 0.01g.

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