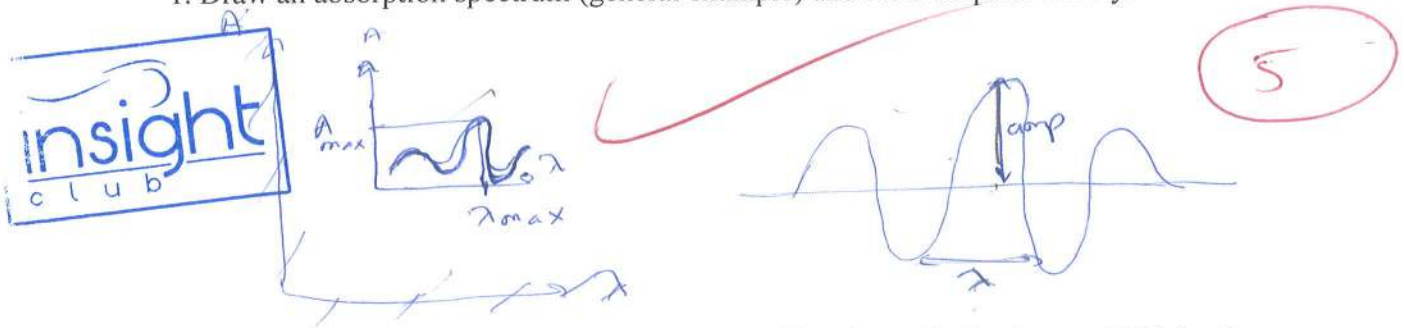
14/15 Very good.

Time: 10' | **Chem 205** **Drop Quiz 3** | **Friday, March 16, 2012** **H. Deeb**

Name:

1. Draw an absorption spectrum (general example) and label all parts clearly.



5

2. A 10.00 mL of an unknown iron sample was diluted to a final volume of 500.0 mL using a volumetric flask. The absorbance of the diluted sample was found to be 0.80 using a 1.00 cm cuvet. The molar absorbtivity of the unknown is $4.560 \times 10^3\ M^{-1}\ cm^{-1}$.

a) Calculate the concentration of the diluted sample.

10.00 ml ⟶ 500.0 ml

A = 0.80

b = 1.00 cm

c = ?

$A = \varepsilon b c$ (acc. to Beer's law)

$\Rightarrow c = \frac{A}{\varepsilon b} = \frac{0.80}{(4.560 \times 10^3)(1.00)} =$

$c = \frac{0.80}{4560} = 1.75 \times 10^{-4}$ mol/l.

2

b) Calculate the percent transmittance of the diluted sample.

$A = -\log \frac{T\%}{100} \Rightarrow T\% = 10^{-A} \times 100$

$T\% = 10^{-0.80} \times 100$

$= 15.8\%$

2

c) Calculate the concentration of the original unknown sample before dilution.

1

Acc. to dilution law,

$M_1V_1 = M_2V_2$

$\Rightarrow M_1 = \frac{M_2V_2}{V_1} = \frac{(1.75 \times 10^{-4})(500.0 \times 10^{-3})}{(10.00 \times 10^{-3})} = \frac{8.75 \times 10^{-5}}{0.01}$

$= 0.875$ mol/l

$\times 10^{-2}$

3. Hydroquinone is added to the solution to be analyzed in today's experiment, what is the function of hydroquinone?

Hydroquinone: makes the solution acidic, & reduces Fe^{3+} into Fe^{2+}.

4

15/15

Time: 10' **Chem 205** **Friday, March 1, 2013**
Drop Quiz 3 **H. Deeb**

Name: _

$\times 10^{6}$

1. An AM radio station broadcasts at a frequency of 1270 kHz. Calculate the wavelength of the broadcast signal in meters. ($c = 2.9979 \times 10^{8}$ m/s)

1270 kHz. $\nu = \frac{c}{\lambda}$ $\lambda = \frac{c}{\nu}$

$= 1270 \times 10^{3}$ Hz.

$\lambda = 236$ nm. $\lambda = 236 \times 10^{-9}$ m.

2. An iron-phenanthroline complex has a concentration of 8.40×10^{-4} mol Fe/L and gives a %T of 4.6% in a 1.00 cm cell at 520 nm wavelength. Calculate the absorbance and the molar absorptivity of this complex.

%T = 4.6%. b = 1,00 cm. λ = 520 nm.

$A = \varepsilon \cdot b \cdot c$ $\varepsilon = \frac{A}{b \cdot c}$

$A = -\log \frac{\%T}{100} = 1.34$

$1,34 = \varepsilon \cdot 1,00 \times 8.40 \times 10^{-4}$

$\varepsilon = \frac{1.34}{1,00 \times 8.40 \times 10^{-4}}$

$= 1591,95 \ cm^{-1} M^{-1}$

$\varepsilon \simeq 1592 \ cm^{-1} M^{-1}$

$A = 1.34$

3. The absorption spectrum of an unknown compound shows λ_{max} at 320 nm. Sketch a rough diagram for this spectrum and label it properly. Do you expect this compound to be colored? Justify your answer.

No, I don't expect it to be colored because it is not present in the visible light range (400 – 700 nm). 320 nm < 400 nm.