

Chem 201 Self Quiz #2

Exercise 2: Absorption spectrophotometry:

A $1.05 \times 10^{-5} \text{M}$ solution of a certain absorbing soluble substance, W, has a % transmittance of 75%. (assume pathlength is 1 cm unless otherwise stated).

1) What is the absorbance and the extinction coefficient, ϵ , for this solution?

Answer: $2.87 \times 10^4 \text{M}^{-1} \text{cm}^{-1}$

2) Assuming that Beer's Law is followed, what is the % transmittance for a $3.20 \times 10^{-5} \text{M}$ solution?

Answer: 8.7%

3) Suppose a 52.0 mg soluble mixture that contains W is dissolved in 800. mL and has an absorbance of 0.30, what is the % W in the ore? (let's give 1150.g as the molar mass of W).

Answer: 18.4%

Exercise 3: Absorption spectrophotometry of a mixture of 2 absorbing species (with well-resolved absorption spectra).

A certain solution contains a mixture of 2 absorbing species X and Y. Their λ_{max} differ (ie. 430 nm for X and 680 nm for Y) and the absorbance of the solution is measured at the 2 wavelengths. Each of their ϵ 's at these wavelengths are given in the table below. If the absorbance of the solution is 0.75 AU at $\lambda = 430 \text{ nm}$ and 0.60 AU at $\lambda = 680 \text{ nm}$, what are the molar concentrations of the species X and Y?

data table:

wavelength	ϵ_X (i.e of X)	ϵ_Y	Absorbance (AU)	
430 nm	520	150	0.75	
680 nm	125	700	0.60	

Answers: $1.25 \times 10^{-3} \text{M}$, $6.32 \times 10^{-4} \text{M}$