

Sample Questions for Chem 002 Final FS07

1. MSDS (the rest listed on review):

- Proper attire –
- Acid Spill –
- Bunsen Burners –
- Phenolphthalein –
- Types of radiation are stopped by
 - alpha –
 - beta –
 - gamma –
 - neutron –

2. Radioactive Decay:

- Balance the following radioactive decay equations:



- Determine the specific decay constant, initial activity and half-life of a radioactive isotope. Given

Time, minutes	Counts/Min	ln (Counts/Min)
0		
2	14472	
3	14328	
4	14248	
5	14095	
6	13920	
10	13359	

- Determine the specific decay constant, k , for this radioactive decay.
- Determine the initial activity, A_0 .
- Determine the half-life.

4. Spectrophotometry: Using a Spectrophotometer (Spec 20), a student recorded below the Percent Transmittance data for the following solutions:

Red Dye Standard (6.30 ppm)
Blue Dye Standard (5.05 ppm)
Purple Unknown

	400 nm	450 nm	500 nm	550 nm	600 nm	650 nm
Red Std	63.5	48.5	23.5	38.6	78.3	98.5
Blue Std	80.5	99.0	82.5	56.5	8.5	72.4
Purple Unk	79.3	72.5	35.5	85.8	45.5	65.3

a. Calculate the Absorbance for each of the %T listed above .

	400 nm	450 nm	500 nm	550 nm	600 nm	650 nm
Red Std						
Blue Std						
Purple Unk						

b. Determine the following from the data calculated in Part 1 (2 pts):

Red Dye Max. Absorbance = _____ at _____ nm (λ Max)

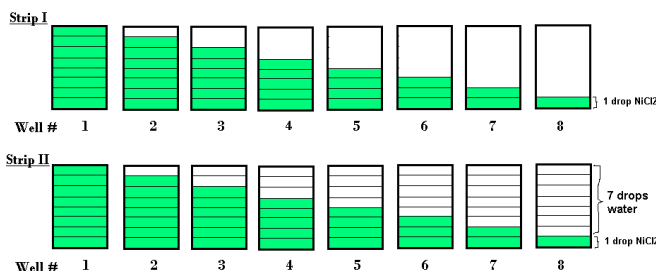
Blue Dye Max. Absorbance = _____ at _____ nm (λ Max)

c. Calculate the Absorbance Ratio of the Unknown/Standard at (λ Max).

d. Calculate the Dye Concentration in the Unknown. (Standard Concentrations given above.)

	Abs of Unknown (at λ Max)	Abs of Standard (at λ Max)	Abs Ratio Unk/Std (at λ Max)	Dye Conc. in Unknown
Red in Purple				
Blue in Purple				

5. Colorimetry: Using the well strips below, the student put the following number of drops in the wells. In strip I, 1-8 drops of red dye standard solution (6.30 ppm) were added as shown in the diagram. In strip II, additional drops of water were added in order to have the same total volume of 8 drops for each well.



Given: The student found that the unknown solution of red dye matched well #5 on Strip II.

- What is changing in the first well strip – concentration or pathlength?
- What is changing in the second well strip – concentration or pathlength?
- Looking from the top how does the intensity compare for Strip 1 to Strip 2?
more intense – the same – less intense
- Using $C_1V_1 = C_2V_2$, what is the approximate concentration in ppm for the unknown?

6. Atomic Spectra: Using the Rydberg equation (where $R = 3.29 \times 10^{15}$ Hz) and the speed of light ($C = 2.998 \times 10^8$ m/s):

a. Calculate the expected frequencies in Hertz (s^{-1}) of the radiation emitted by a hydrogen atom for the following electronic transitions.

$$\nu = R\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

b. Calculate the expected wavelengths in nanometers (nm) of the radiation emitted by a hydrogen atom for the same electronic transitions.

$$C = \lambda\nu$$

c. Label which wavelengths correspond to the Balmer series and which wavelengths correspond to the Lyman series.

Transitions	Frequency (s^{-1})	Wavelength (nm)	Balmer / Lyman
$n_2 = 3$ & $n_1 = 1$			
$n_2 = 2$ & $n_1 = 1$			
$n_2 = 5$ & $n_1 = 2$			
$n_2 = 4$ & $n_1 = 2$			
$n_2 = 3$ & $n_1 = 2$			

7. Flame Tests – What color flame is produced by each of the following elements?

- copper –
- lithium –
- potassium –
- magnesium –
- sodium –

8. Gas Laws: Using the ideal gas law calculate the volume of the system.

Given: pressure = 738 mmHg, mass = 0.725 grams, $MW_{\text{butane}} = 58.000$ g/mole, $T = 20^\circ\text{C}$, $R = 0.08206$ Latm/molK

- What is the number of moles of butane?
- What is the pressure in atm?
- What is the temperature in K?
- What is the volume of the system?
- What would the volume be at STP?

11. Statistics: For the following data set (2.10, 3.20, 3.50, 4.90, 4.30, 2.90) find the mean (average) and the % Error if the expected answer was 3.500.

12. People – How did these people contribute to the experiments we did in Chem 2?

- a. Galileo
- b. Isaac Newton
- c. Pierre and Marie Curie
- d. Niels Bohr
- e. Max Planck
- f. Albert Einstein
- g. Robert Bunsen
- h. Gustav Kirchoff
- i. Johann Balmer
- j. Ernst Rutherford
- k. Joseph von Fraunhoffer
- l. Mikhail Tswett

13. Dimensional Analysis: Choose problems from sets 1, 2, 4 or 5 and work them.