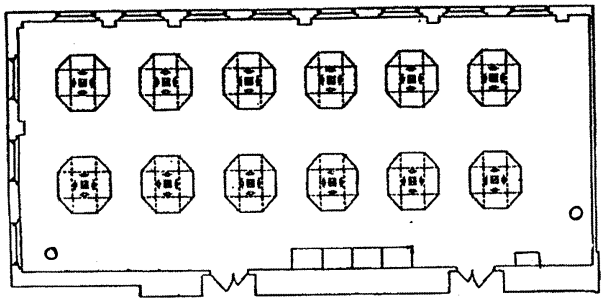
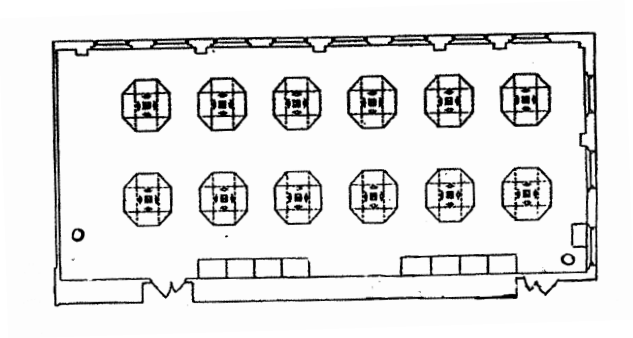
Final Review Chem 1319 – WS16

1. **MSDS, Safety, etc.**
   a. Read over **Safety Practices** in the first book pp. 1-14.
   b. Know **MSDS Information** for the chemicals used in the experiments below (to include):
      Studies of Light, Forensics & Paper Chromatography & Millikan Drop: N/A
      TM: NaCl, SiO_2, $CaCO_3$, HCl, K_2CO_3 and HF
      Radiochemistry: α-, β-, γ- and *n* radiation
      Antacid Analysis: Phenolphthalein, $CaCO_3$, $Al(OH)_3$, $MgCO_3$, HCl & NaOH
   c. **Room Diagram** – Be able to label equipment in your room.
      Balances, Distilled Water, Exits, Fire Extinguishers, Hoods,
      Safety Blankets, Safety Showers, Waste Containers



Room 201



Room 212

2. **Nomenclature**
   a. Read over information in packet: **pp. 41-52** (*nomenclature*).
   b. Know the names of all of the chemicals that we used in the experiments listed above.

3. **Studies of Light – Atomic Spectra & Colorimetry**
   a. Read over handout **pp 1-7**.
   b. Know the Rydberg equation and thus how to calculate **frequency, υ**.

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

   c. Know how to convert to **wavelength, λ**, from frequency, **υ**, using the speed of light, **C**.

C = λυ

   d. Know which wavelengths correspond to the **Balmer series** (visible) and which ones correspond to the **Lyman series** (ultraviolet).
   e. Know the equation for Absorbance and how to convert from transmittance to absorbance.

A = log (100 / %T)

   f. Know how to find the maximum absorbance for individual unknowns and for a mixture of colors.
   g. Be able to calculate the concentration of the unknowns if given the concentration of the standards: $\mathbf{C_1V_1=C_2V_2}$
   h. Know how to calculate the concentration of an unknown solution given the %T and the Beer's Law equation.

A = log (100 / %T) **A = abc**

4. **Separating Components of a Mixture**
   a. Read over *Separating the Components of a Ternary Mixture* – **pp. 95-111**.
   b. Be able to make a flowchart if given a table of components in a mixture.
   c. Know how to determine the percent of each of the components in the mixture.
   d. Know how to determine the percent recovery and the percent error of the overall composition.

5. **Forensics & Paper Chromatography**
   a. Read over the Handout.
   b. Know how to determine an unknown from its characteristics by following a flowchart.
   c. Be able to solve a simple (like the how to) logic problem using a logic table.

6. Radiochemistry

a. Read over the Lab Packet **pp 115-132**.
b. Be able to balance nuclear decay equations for α-emission, β-emission, and neutron emission.
c. If given the time and counts, be able to find the natural log of the counts (ln counts).
d. Be able to determine the specific decay constant, k, by finding the slope of a line.
(Note: it is always best to use data points furthest apart to determine the slope of a line.)
The slope of a line:

$$\mathbf{m = (y_2 - y_1) / (x_2 - x_1)}$$

e. Having calculated the slope and using any data point, be able to find the y intercept, b, of a line:

$$\mathbf{y = mx + b}$$

$$\mathbf{b = y - mx}$$

f. Having found the y-intercept, b, be able to convert the answer from ln counts to counts in order to find A_o.
g. Having calculated k, be able to determine the half-life of the compound.
h. Be able to calculate the percent error (percent difference) of the calculated half-life vs. a given theoretical half-life.

7. Antacid Analysis

a. Read over the Lab Packet pp 103-118.
b. Know how to balance equations for antacids reacting with HCl.
c. Given concentrations and volumes of HCl and NAOH, know how to determine how much acid was neutralized by the antacid. (*Actual*)
Note: mole/L = mmole/ml
d. Be able to determine how much acid the antacid should have been able to neutralize. (*Theoretical*)

8. Millikan Drop Activity

a. Read over the Handout.
b. Know how to determine the mass of an individual object from a series of masses.

9. Packet – Graphing & Redox

a. Read over information in packet: **pp. 17-24** (*graphing*); & **69-74** (*redox*).
b. Be able to do problems similar to those in these sections.

10. Statistical Analysis

a. Read over Statistical Analysis – first book **pp. 53-72**.
b. Know how to calculate the mean (average) of a set of data.
1. Average or mean: $\mathbf{x = \Sigma x_i / n}$
c. Know how to calculate the standard deviation or estimate, if given the equation:
2. Standard Deviation: $\mathbf{\sigma = [\Sigma (x_i - x)^2 / n]^{1/2}}$
3. Estimate of the Standard Deviation: $\mathbf{s = [\Sigma (x_i - x)^2 / (n-1)]^{1/2}}$
d. Know the differences between equations 2 & 3 and when each of these equations is applicable.

11. Dimensional Analysis & Scientific Notation

a. Read over Dimensional Analysis – first book **pp. 15-52**.
b. Be able to evaluate problems similar to those in each of the following sections.
1. Problem Set 1 – conversion of units.
2. Problem Set 2 – conversion of grams to moles, moles to grams, atoms to moles, moles to atoms
3. Problem Set 4 – determine the limiting reagent and the theoretical yield
4. Problem Set 5 – determine the concentration of a solution and the concentration or a dilution
c. Know and be able to apply the rules for significant figures.
1. All non-zero digits are significant.
2. Zeros between non-zero digits are significant.
3. Zeros to the left of the first non-zero digit are not significant.
4. If a number ends in zeros to the right of the decimal point, those zeros are significant.
5. For **addition & subtraction**, decimal places are overwriting the significant figure rule. The answer should have the same number of decimal places as the quantity with the least decimal places. For example, 3.7 m + 9.40 m = 13.1 m.
6. For **multiplication & division**, the product or quotient should have the same number of significant digits as the quantity with least significant figures. For example, 56.90125 s / 2.45 s = 23.2.
d. Know the **Rules for Proper Exponential Notation**.
1. There should be only one digit to the left of the decimal point.
2. Numbers greater than one have positive exponents; those less than one have negative.