Welcome to AP Chemistry **Mrs. Scott**

The Course:

AP Chemistry is a two-semester college level course. It is a time-consuming and challenging, yet extremely rewarding course! It moves at a fast pace and will require a large amount of independent study outside of the class. Your study skills will improve and you will learn to do college level work.

To have success on the AP exam, students will need to spend on average five to ten additional hours per week outside of class working on AP chemistry. This time will be spent on homework assignments, pre-labs, lab reports, problem sets, etc. There will be times that students will be able to complete things during class if they use their time efficiently. These statements are not meant to discourage, but to point out and state the truth to avoid any misconceptions about the high expectations for this course. As your teacher, I will do my very best to provide a college level course/experience which not only prepares you for the AP exam, but provides a solid foundation in chemistry. It is also intended for it to be fun! You are fortunate to be able to take this type of college level course in the high school setting as part of a small class.

Summer Assignment:

1. Read the Data Analysis Power Point. It has info that may help with worksheets – don't print
2. Do the worksheets below.

This will be graded as homework assignment and for correctness. It is due on the FIRST day of class. This is an AP class and all work must be completed independently. You are on the honor system. The material on these pages is NOT new, you learned them last year. But they are skills you will need that I won't be teaching again. You can use your notes from Honors Chemistry to help you or the AP text book.

<u>This form must be signed and returned with Summer Assignment:</u>

I, _____, worked on this assignment by myself. (student signature)

I know that everything that I take credit for in this class is a reflection of both myself and my character. I promise to take full responsibility for all my actions and strive to give my best at all times.

For the fall, similar to Honors Chemistry, you will be given a worksheet packet along with a power point for each chapter/unit. I would recommend a binder for this class. I am really excited to work with you all again this fall!!!

Advanced Placement Chemistry Review Assignment

Topic 1: Significant Figures & Scientific Notation

1. Count the number of significant figures in the following measurements.

   a. 2.71 g _____ b. 0.00047 kg _____ c. 7.0×10^5 m _____ d. 1,030 L _____

   e. 150 pencils _____ f. 37500 µg _____ g. 0.1010 cm _____

2. Express each of the following in proper scientific notation (Pay attention to sig figs and units).

   a. 0.000125 m _____ b. 155.0 mL _____

   c. 123,030,000 ng _____ d. 481.9×10^{-9} cm _____

3. Calculate the correct answer with proper units and significant figures for each of the following: (Remember multiplication and division uses least sig fig and addition and subtraction uses least decimal place)

   a. 12 g + 0.677 g + 86.33 g = _____

   b. (355.78 g) / (0.056 g) = _____

   c. 97.34 mL – 34.1 mL = _____

4. Perform the following calculations with scientific notation and report your answer with the correct number of significant figures. (Use EE button on calculator)

   a. $0.14 \times (6.02 \times 10^{23})$ = _____

   b. $\dfrac{(9.875 \times 10^4) - (9.795 \times 10^4)}{9.875 \times 10^4} \times 100\ \%$ = _____ (assume 100 is exact)

   c. $\dfrac{(3.8 \times 10^{-12} \times 4.0 \times 10^{-13})}{(4 \times 10^{12} \times 6.3 \times 10^{13})}$ = _____

Topic 2: Dimensional Analysis

Show work using dimensional analysis. Follow significant figures and rounding rules unless the number of significant figures is specified. Include units where appropriate.

5. Find the number of centimeters in 1.00×10^2 yards. (1 yd = 3 ft, 1 ft = 12 in, 2.54 cm = 1 in)

6. If Jules Verne expressed the title of his famous book, Twenty Thousand Leagues under the Sea in basic SI units, what would the title be? Round your answer to three significant figures.
   (1 league = 3.45 mi, 1 mi = 1609 m)

7. Wavelengths are often represented in nm. What is the diameter of a helium (He) atom in nm if it is equivalent to 1.0×10^{-10} m? (move the decimal place)

8. The acceleration of a sphere is determined to be 9.52 m/s^2. What is the acceleration in km/min^2? (just get the units to cancel, if it is sec^2, write sec two times)

Topic 3: Density and Temperature

Show all work. No work = no credit even if answer is correct. Follow significant figures and rounding rules. Include units where appropriate.

9. A rectangular block has dimensions of 2.9 cm x 3.5 cm x 10.0 cm. The mass of the block is 615.0 grams. What is the volume and the density of the block?

10. The density of pure silver is 10.5 g/mL at 20°C. If 5.25 grams of pure silver pellets are added to a graduated cylinder containing 11.2 mL of water, to what volume will the water in the cylinder rise?

11. Mercury is found as a liquid at room temperature. If it has a boiling point of 630. K, what is this boiling point in degrees Celsius?

Topic 4: Percent Error

12. The density of ethanol was determined experimentally at 25°C in a series of trials to be 0.608 g/mL, 0.705 g/mL, and 0.689 g/mL. The accepted density of ethanol is reported to be 0.789 g/mL. Calculate % error for this experiment. Use the average experimental density in your calculation and report your answer to 0.1%. Show your work.

Topic 5: Properties and Changes

13. Identify the following as a physical property, physical change, chemical property, or chemical change:

    a. Ethanol has a density of 0.697 g/mL. _____
    b. The solution turns blue upon mixing water and food coloring. _____
    c. Wood burns in an oven. _____
    d. Methyl alcohol is highly flammable. _____
    e. The ability of ice to melt in a beaker. _____
    f. Methyl ethanoate smells like apples. _____
    g. Iron rusts on a car. _____
    h. Alkali metals react strongly in hydrochloric acid. _____

Topic 6: Atom Structure

14. Complete the following table:

Name	Mass #	Atomic #	# of Protons	# of Neutrons	# of Electrons
					31
$^{31}_{15}P^{-3}$					
+2					36
$^{55}_{25}Mn^{+2}$					

15. The natural abundance for boron isotopes is 19.9% boron-10 (exact mass 10.013 amu) and 80.1% boron-11 (exact mass 11.009 amu). Calculate the average atomic mass of boron using the exact masses instead of mass numbers in your calculations. Show your work.
    (Remember avg atomic mass = (%)(mass) + (%)(mass)….

16. Europium has an average atomic mass of 151.97 u. It has two stable isotopes, ^{151}Eu and ^{153}Eu, with masses of 150.9197 u and 152.9212 u, respectively. Calculate the percent abundances of these isotopes of europium to 0.1%. Hint: The percent abundances of these two isotopes must add to 100%. Show your work. Follow significant figures and rounding rules. Include appropriate units.

Topic 7: Periodic Table Structure

Identify by name the group or section of the periodic table noted for the following features.

17. a. group containing the most reactive nonmetals; all are diatomics; form -1 ions _____

b. group containing metals that only form +2 ions _____

c. d block metals; the majority have multiple charges as ions _____

d. group containing the most reactive metals; form +1 ions _____

e. group containing least reactive elements on periodic table, typically inert _____

18. Using the elements: B, Ba, Bk, Bi, and Br. Identify which of these elements match the following descriptions. You may use elements once, more than once, or not at all.

a. Which are metals? _____

b. Nonmetals?_____

c. Which are actinides? _____

d. Which are main block elements (s and p block)? _____

Topic 8: Equations

19. Balance the following equations using the lowest whole-number coefficients.

a. _____Fe + _____P_4 → _____Fe_3P_2

b. _____Ca + _____H_2O → _____$Ca(OH)_2$ + _____H_2

c. _____$Ba(OH)_2$ + _____H_3PO_4 → _____$Ba_3(PO_4)_2$ + _____H_2O

d. _____$(NH_4)_2CO_3$ + _____$Al(ClO_3)_3$ → _____$Al_2(CO_3)_3$ + _____NH_4ClO_3

20. Write balanced chemical equations for the following word equations. **State the type (Synthesis, Decomposition, Single Replacement, Double Replacement or Combustion).**

a. Aqueous solutions of ammonium sulfate, $(NH_4)_2SO_4$ and barium nitrate, $Ba(NO_3)_2$ form a precipitate of barium sulfate, $BaSO_4$ and aqueous ammonium nitrate, NH_4NO_3.

b. Elemental magnesium and oxygen gas (O_2) combine to form solid magnesium oxide, MgO.

c. Chlorine gas (Cl_2) and aqueous potassium bromide, KBr react to form bromine liquid (Br_2) and aqueous potassium chloride, KCl.

d. Solid copper (II) carbonate $CuCO_3$ breaks down to form crystals of copper (II) oxide CuO and carbon dioxide gas.

<u>Topic 10: Mole Conversions & Stoichiometry</u>

Show your work. Follow significant figures and rounding rules. Include appropriate units.

21. a. Calculate the number of moles in 500. atoms of iron (Fe).

b. What is the molar mass of lead (IV) carbonate, $Pb(CO_3)_2$?

c. How many formula units (can't say molecules bc it is an ionic compound – so you say formula units) are present in 87.2 grams of lead (IV) carbonate?

d. What percentage of oxygen is found in lead (IV) carbonate? Round your answer to 0.1%.

22. The reusable booster rockets of the U.S. space shuttle employed a mixture of aluminum and ammonium perchlorate for fuel. A possible reaction for this is:

_____$Al(s)$ + _____ $NH_4ClO_4(s)$ → _____ $Al_2O_3(s)$ + ____ $AlCl_3(s)$ + ___ $NO(g)$ +____$H_2O(g)$

a. Balance the above reaction using the lowest possible whole-number coefficients.

b. If 4.00 g of aluminum reacted completely, how many grams of aluminum oxide would be made?

c. If 4.18 g of aluminum chloride was produced, how many moles of ammonium perchlorate would be consumed?

23. The decomposition of ammonia is shown in the following equation: $2NH_3(g) \rightarrow N_2(g) + 3H_2(g)$.

a. 42.0 g of nitrogen has what volume in liters at STP? (remember 22.4L is the volume of 1 mole of any gas at STP)

b. How many liters of ammonia were decomposed at STP if 3.0×10^{23} nitrogen molecules were made?