AP Chemistry Summer Assignment/Review 2015

Welcome to the summer before AP Chemistry. This summer assignment is designed as a review of the big topics from Honors Chemistry so that we can efficiently complete the AP Chemistry curriculum. Please plan to work on this assignment throughout the summer – I've included a suggested time frame. When you return to school in August, we are picking up where this review leaves off. We will spend the first two weeks of school reviewing the most challenging aspects of the review topics, with our first unit test at the end of the two weeks. This assignment is a review – please take the time to carefully go through these topics, or you will not be prepared for this course. My goal for this course is two-fold: (1) prepare you for the AP Exam and (2) make sure you learn chemistry!

Supplies for the Summer Assignment:
- Honors Chemistry Notebook
- Blank periodic table (here is a link, or you can search/use one of your own): http://www.csudh.edu/oliver/chemdata/periodic/periodic-1.htm
- A review book is highly recommended, though not required. Princeton Review, and/or 5 steps to a 5 are all good for different reasons. Barrons is also an option, but can be a bit overwhelming

Supplies during the school year
- Lab notebook
- WebAssign subscription
- Scientific or graphing calculator

Timeline
- June-July – complete the summer assignment, this will be due on August 14th
- Week of August 17th – 1st AP Lab
- Week of August 24th - 1st test

Part I – Get Organized
- Organize your honors notebook by topic: measurement, atomic structure, electron configuration & periodicity, bonding, chemical reactions, moles and stoichiometry, thermochemistry, gas laws, solutions, acids and bases. Use this notebook as a reference for the summer assignment and during the school year.
- Use a blank periodic table to label the following information (if you already have a beautifully labeled table, please use this for review):
    - Lightly color code metals, nonmetals, metalloids
    - Outline and label the s, p, d, and f blocks. Also label the energy levels by row and electron # in each sublevel by column (ie, $3d^1$…. d block, 3 on the row of 3d's and d^1 on the d^1 column)
    - Family names
    - Valence electrons and oxidation #s
    - Trends for electronegativity, ionization energy, atomic radius
- You still need to know the element/symbols and polyatomic ions! (if you never memorized your poly's, add it to your to-do list!)

Part II – AP Chemistry Review Book (suggested: Barron's or Princeton Review)

Introduction: Read the entire introduction carefully and fill in the following table regarding the exam format. You might be surprised to find out the rule for calculators…

Multiple choice
Time:
#?s:
Calculator?
Formula Sheet?
Other Notes:

FRQ Part A	FRQ Part B
Time:	Time:
#?s:	#?s:
Calculator?	Calculator?
Formula Sheet?	Formula Sheet?
Other Notes:	Other Notes:

Part III – Review Problems – this is the part you will be turning in..
Work through the following sets of review problems. **You must show work for credit**. The problems will be due Friday, August 14th, 2015, and it will be a formative grade. During the first week and a half, we will be going over the next level of the problems (harder version) on the review sheet, so it is very important that all of this is fresh in your mind!

I will be checking email periodically (not daily) throughout the summer if you have questions –
acolavito@forsyth.k12.ga.us   **Have a wonderful, safe summer!**

Measurement Review

1. Round off each of the following numbers to the indicated number of significant digits and write the answer in standard scientific notation.
   - a. 0.00034159 to three digits
   - b. 103.351×10^2 to four digits
   - c. 17.9915 to five digits
   - d. 0.00067548 to two digits
   - e. 234.637×10^2 to three digits
   - f. 3.365×10^5 to two digits

2. Perform the following mathematical operations and express the result to the correct number of significant figures.
   - a. (2.526/3.1) + (0.470/0.623) + (80.705/0.4326)
   - b. (3.404 x 2.91)/(18.7-17.1)
   - c. $6.071 \times 10^{-5} - 8.2 \times 10^{-6} - 0.521 \times 10^{-4}$
   - d. $(3.8 \times 10^{-12} + 4.0 \times 10^{-13})/(4 \times 10^{12} + 6.3 \times 10^{13})$
   - e. (9.5 + 4.1 + 2.8 + 3.175)/4
   - f. (8.925 – 8.905)/(8.925) x 100

3. Perform each of the following conversions.
   - a. 8.43 cm to mm
   - b. 2.41×10^2 cm to m
   - c. 294.5 nm to cm
   - d. 1.445×10^4 m to km
   - e. 235.3 m to mm
   - f. 903.3 nm to micrometers

4. You pass a road sign saying "New York 112 km." If you drive at a constant speed of 65 mi/hr, how long should it take you to reach New York? If your car gets 28 miles to the gallon, how many liters of gasoline are necessary to travel 112 km?

5. A material will float on the surface of a liquid if the material has a density less than that of the liquid. Given that the density of water is approximately 1.0 g/mL, will a block of material having a volume of 1.2×10^4 in^3 and weighing 350 lb float or sink in a reservoir of water?

6. A star is estimated to have a mass of 2×10^{36} kg. Assuming it to be a sphere of average radius 7.0 x 10^5 km, calculate the average density of the star in units of grams per cubic centimeter.

7. A rectangular black has dimensions 2.9 cm x 3.5 cm x 10.0 cm. The mass of the block is 615.0 g. What are the volume and density of the block?

8. A sample containing 33.42 g of metal pellets is poured into a graduated cylinder initially containing 12.7 mL of water, causing the water level in the cylinder to rise to 21.6 mL. Calculate the density of the metal.

Atomic Structure Review

Symbol	Number of Protons in Nucleus	Number of Neutrons in Nucleus	Number of Electrons	Net Charge
^{238}U				
	20	20		2+
	23	28	20	
^{89}Y				
	35	44	36	
	15	16		3-

Bonding Review

Formula	Name	Ionic, Covalent or Acid
Hg_2O		
$TiCl_4$		
	cobalt (III) iodide	
	mercury (II) oxide	
Li_3N		
Ag_2S		
TiO_2		
	calcium nitride	
	aluminum sulfide	
	mercury(I) selenide	
$BaSO_3$		
$NaNO_2$		
	ammonium acetate	
	magnesium cyanide	
CuI		
CuI_2		
CoI_2		
Na_2CO_3		
	sulfur difluoride	
	potassium chlorate	
	sulfur hexafluoride	
	lithium nitride	
$HC_2H_3O_2$		
NH_4NO_2		
Co_2S_3		
KIO_3		
	disulfur dichloride	
	sodium oxide	
	nitrous acid	
	cesium perchlorate	
H_2SO_4		
$HClO$		
SF_6		
SnO_2		
	ammonia	
	carbon tetraiodide	
	dipohosphorus pentoxide	
	ammonium sulfite	
$Al_2(SO_3)_3$		
	bromous acid	

Mole/Stoichiometry Review

1. An element consists of 1.40% of an isotope with mass 203.973 amu, 24.10% of an isotope with mass 205.9759 amu, and 52.40% of an isotope with mass 207.9766 amu. Calculate the average atomic mass and identify the element.
2. What amount (moles) are represented by each of these samples?
   a. 150.0 g Fe_2O_3
   b. 10.0 mg NO_2
   c. 1.5 x 10^{16} molecules of BF_3
3. Aspartame is 160 times sweeter than sucrose when dissolved in water. The molecular formula of it is $C_{14}H_{18}N_2O_5$
   a. Calculate the molar mass of aspartame
   b. What amount (moles) of molecules is present in 10.0 g aspartame?
   c. Calculate the mass in grams of 1.56 mol aspartame
   d. What number of molecules are in 5.0 mg aspartame?
   e. What number of atoms of nitrogen are present in 1.2 g aspartame?
   f. What is the mass in grams of 1.0 x 10^9 molecules of aspartame?
   g. What is the mass in grams of one molecule of aspartame?
4. Express the composition of each of the following compounds as the mass percents of its elements
   a. Formaldehyde CH_2O
   b. Glucose $C_6H_{12}O_6$
   c. Acetic Acid $HC_2H_3O_2$
5. The compound adrenaline contains 56.79% C, 6.56% H, 28.37% O, and 8.28% N by mass. What is the empirical formula?
6. A compound containing only sulfur and nitrogen is 69.6% S by mass: the molar mass is 184 g/mol. What are the empirical and molecular formulas of the compound?
7. Adipic acid is composed of 49.31% C, 43.79% O, and the rest hydrogen. If the molar mass is 146.1 g/mol, what are the empirical and molecular formulas of adipic acid?
8. $Fe_2O_3(s) + 2Al(s) \rightarrow 2Fe(l) + Al_2O_3(s)$
   a. What masses of iron(III) oxide and aluminum must be used to produce 15.0g iron? What is the maximum mass of aluminum oxide that could be produced?
9. Aspirin ($C_9H_8O_4$) is synthesized by reacting salicylic acid ($C_7H_6O_3$) with acetic anhydride ($C_4H_6O_3$). The equation is
   $C_7H_6O_3 + C_4H_6O_3 \rightarrow C_9H_8O_4 + HC_2H_3O_2$
   a. What mass of acetic anhydride is needed to completely consume 1.00 x 10^2 g salicylic acid?
   b. What is the maximum mass of aspirin that could be produced in this reaction?
   c. A student reacts 1.50g salicylic acid with 2.00g acetic anhydride. The yield was 1.50g aspicrin. Calculate the theoretical yield and the percent yield for this experiment.
10. DDT, an insecticide harmful to fish, birds, and humans, is produced by the following reaction:
   $2C_6H_5Cl + C_2HOCl_3 \rightarrow C_{14}H_9Cl_5 + H_2O$
   Chlorobenzene   chloral   DDT
   In a government lab, 1142g of chlorbenzene is reacted with 485g chloral
   a. What mass of DDT is formed
   b. Which reactant is limiting? Which is in excess?
   c. What mass of the excess reactant is left over?
   d. If 200.0g of DDT is produced, what is the percent yield?