AP CHEMISTRY SUMMER ASSIGNMENT 2009
MRS. MATNEY ROOM 236

THE FOLLOWING ASSIGNMENT MUST BE COMPLETED OVER YOUR SUMMER BREAK. THE WORK FROM CHAPTERS 1-3A AND THE 1ST & 2nd POD MUST BE TURNED IN TO THE SCHOOL IN AN ENVELOPE ADDRESSED TO MRS. KATHRYN MATNEY BY **JULY 21 2009**, FOR YOUR FIRST GRADE IN AP CHEMISTRY. THE REMAINING WORK MUST BE TURNED IN YOUR **FIRST DAY OF THE 2009-10 SCHOOL YEAR**. YOU ALSO WILL BE RESPONSIBLE FOR ALL OF THE POLYATOMIC IONS AND SOLUBILITY RULES FOUND ON THE SECOND SHEET (BACK OF THIS SHEET IF A PHOTOCOPY GIVEN). THERE WILL BE A *QUIZ* ON BOTH OF THESE THE FIRST TWO BlOCKS (OR FIRST TWO DAYS OF SCHOOL) OF SCHOOL. YOU WILL NEED TO KNOW YOUR IONS AND SOLUBILITY RULES FOR THE WHOLE SCHOOL YEAR. IF YOU ARE FINDING THAT YOU NEED HELP WITH SOME OF THE QUESTIONS OR PROBLEMS I WILL BE AVAILABLE AT SCHOOL FOR *STUDY SESSIONS* ON **JULY 20 AT 1:00 p.m. until 3:00 p.m., AUGUST 25 AT 1:00 UNTIL 3:00 p.m.,** AND **SEPTEMBER 3 AT 2:00 p.m. until 4:00 p.m. ALL IN ROOM 236. YOU CAN ALSO EMAIL ME AT kcmatney@vbschools.com WITH YOUR QUESTIONS.** THESE SESSIONS WILL COUNT AS EXTRA GRADES IF YOU ATTEND AND YOU ONLY HAVE TO STAY FOR AN HOUR TO GET CREDIT. THANK YOU AND HAVE A GREAT SUMMER. WE ***WILL*** WORK EXTREMELY HARD NEXT YEAR, AND I WILL NEED AT LEAST 1.0 – 1.5 HOURS OF YOUR TIME **EACH NIGHT** DURING THE SCHOOL YEAR DEVOTED JUST TO AP CHEMISTRY SO PLEASE MAKE SURE THAT YOU ARE PREPARED AND READY!!!

1ST PART OF THE SUMMER ASSIGNMENT (DUE JULY 21ST)
*****POD #1 & #2

*****READ CHAPTER 1, PAGES 3-18 AND THEN DO THE FOLLOWING PROBLEMS AT THE END pp22-23; 1, 7, 9, 19, 23, 25, 27, 43, 45 & 51.

*****READ CHAPTER 2, PAGES 27-44, STUDYING FIGURES 2.7, 2.9 & 2.10, AND THEN DO THE FOLLOWING PROBLEMS AT THE END pp47-49; 1, 7, 9, 13, 19, 21, 27, 31, 33, 35, 37, 41, 45, & 47.

*****READ CHAPTER 3A PAGES 53-59 AND THEN DO THE FOLLOWING PROBLEMS AT THE END pp70-71; 3, 13, 17, 21b&c, 23, 25, & 27.

----------END OF 1ST PART

2ND PART OF THE SUMMER ASSIGNMENT (DUE FIRST AP DAY OF SCHOOL)
*****POD #3 & #4

*****READ CHAPTER 3 (ONLY PAGES 59-67) AND THEN DO THE FOLLOWING PROBLEMS AT THE END pp71-73; 35, 37, 47, 49, 51, 53, 57, 63& 65a.

*****READ CHAPTER 4 ONLY PAGES 77-81, STUDYING FIGURES 4.2 & 4.3, AND THEN DO THE FOLLOWING PROBLEMS AT THE END pp96-97; 1, 3, 5, 7, 11, 13 & 15.

*****READ CHAPTER 5, ONLY PAGES 103-115 AND THEN WORK THE FOLLOWING PROBLEMS AT THE END pp125-126; 5, 7b, 11, 13, 17 (USE

R = .0821 L*atm/mol*K FOR THIS ONE AND #19), & 19 (only 1st 3).

POLYATOMIC ION ROOTS FOR AP CHEMISTRY

NH_4^{+1}	AMMONIUM	SeO_4^{-2}	SELENATE	PO_4^{-3}	PHOSPHATE
IO_3^{-1}	IODATE	CrO_4^{-2}	CHROMATE	BO_3^{-3}	BORATE
MnO_3^{-1}	MANGANATE	$Cr_2O_7^{-2}$	DICHROMATE	AsO_4^{-3}	ARSENATE
ClO_3^{-1}	CHLORATE	SO_4^{-2}	SULFATE		
NO_3^{-1}	NITRATE	$C_20_4^{-2}$	OXALATE		
BrO_3^{-1}	BROMATE	CO_3^{-2}	CARBONATE		
SCN^{-1}	THIOCYANATE	SiO_3^{-2}	SILICATE		
CN^{-1}	CYANIDE	Hg_2^{+2}	MERCURY (I)		
OH^{-1}	HYDROXIDE	O_2^{-2}	PEROXIDE		

$C_2H_3O_2^{-1}$ ACETATE (OR CH_3COO^{-1})

HSO_4^{-1}	HYDROGEN SULFATE	$H_2PO_4^{-1}$	DIHYDROGEN PHOSPHATE
HCO_3^{-1}	HYDROGEN CARBONATE	HPO4^{-2}	HYDROGEN PHOSPHATE

RULES FOR CHANGING THE OXYGENS AND THUS NAMES OF THESE ROOTS:

IF 1 MORE OXY. THAN THE ROOT, ADD THE PREFIX “PER” TO THE NAME:
EXAMPLE MnO_4^{-1} IS PERMANGANATE

IF 1 LESS OXY. THAN THE ROOT, CHANGE ENDING TO “ITE”:
EXAMPLE ClO_2^{-1} IS CHLORITE

IF 2 LESS OXY. THAN THE ROOT, CHANGE ENDING TO “ITE” AND ADD PREFIX “HYPO”: EXAMPLE NO^{-1} IS HYPONITRITE

SOLUBITLIY RULES FOR AP CHEMISTRY

ALL SOLUTIONS CONTAINING Na^{+1}, K^{+1}, H^{+1} OR NH_4^{+1} ARE ALWAYS SOLUBLE
ALL SOLUTIONS CONTAINING $C_2H_3O_2^{-1}$, NO_3^{-1}, OR ClO_3^{-1} ARE ALWAYS SOLUBLE
MOST SULFATES AND CHROMATES ARE SOLUBLE EXCEPT Ca^{+2}, Ba^{+2}, Sr^{+2}, Ag^{+1}, AND Pb^{+2}
MOST CHLORIDES, BROMIDES, AND IODIDES ARE SOLUBLE EXCEPT Ag^{+1}, Pb^{+2}, AND Hg_2^{+2}
MOST CARBONATES, PHOSPHATES, AND SILICATES ARE INSOLUBLE EXCEPT GROUP 1 METALS
MOST SULFIDES AND HYDROXIDES ARE INSOLUBLE EXC. GROUP 1 & 2 METALS

#1 POD (chapter 6 in the book for info)

Answer the following questions about the element selenium, Se (atomic number 34).

a) Samples of natural selenium contain six stable isotopes. In terms of atomic structure, explain what these isotopes have in common, and how they differ.

b) Write the complete electron configuration (e.g., $1s^2\ 2s^2$ … etc.) for a selenium atom in the ground state. Indicate the number of unpaired electrons in the ground-state atom, and explain your reasoning.

c) In terms of atomic structure, explain why the first ionization energy of selenium is

i) less than that of bromine (atomic number 35), and

ii) greater than that of tellurium (atomic number 52).

#2 POD (chapter 6 in the book for info)

a. The longest wavelength of light with enough energy to break the Cl-Cl bond in $Cl_2(g)$ is 495 nm.

   i. Calculate the frequency, in s^{-1}, of the light.

   ii. Calculate the energy, in J, of a photon of the light.

   iii. Calculate the minimum energy, in kJ mol^{-1}, of the Cl-Cl bond.

b. A certain line in the spectrum of atomic hydrogen is associated with the electronic transition in the H atom from the sixth energy level (n = 6) to the second energy level (n=2).

   iv. Indicate whether the H atom emits energy or whether it absorbs energy during the transition. Justify your answer.

c. Calculate the wavelength, in nm, of the radiation associated with the spectral line.

#3 POD (chapter 7 for info)

Answer the following questions using principles of chemical bonding and molecular structure.

a. Consider the carbon dioxide molecule, CO_2 , and the carbonate ion, CO_3^{2-}

i. Draw the complete Lewis electron-dot structure for each species.

ii. Account for the fact that the carbon-oxygen bond length in CO_3^{2-} is greater than the carbon-oxygen bond length in CO_2.

b. Consider the molecules CF_4.

i. Draw the complete Lewis electron-dot structure for this molecule.

ii. In terms of molecular geometry, account for the fact that the CF_4 molecule is nonpolar.

#4 POD (chapter 3 for info)

A sample of dolomitic limestone containing only $CaCO_3$ and $MgCO_3$ was analyzed.

(a) When a 0.2800 gram sample of this limestone was decomposed by heating, 75.0 milliliters of CO_2 at 750 mm Hg, and 20°C were evolved. How many grams of CO_2 were produced?

(b) Write equations for the **decomposition** of both carbonates described above.

(c) It was also determined that the initial sample contained 0.0448 gram of calcium. What percent of the limestone by mass was $CaCO_3$?