Advanced Placement Chemistry – Review Packet

Name_____

Date_____

Ionic Charges of Representative Elements							
1A	2A	3A	4A	5A	6A	7A	0
Li^+	Be^{2+}			N^{3-}	O^{2-}	F^-	
Na^+	Mg^{2+}	Al^{3+}		P^{3-}	S^{2-}	Cl^-	
K^+	Ca^{2+}			As^{3-}	Se^{2-}	Br^-	
Rb^+	Sr^{2+}					I^-	
Cs^+	Ba^{2+}						

Formulas and Names of Common Metal Ions with More than One Ionic Charge		
Formula	Stock Name	Classical Name
Cu^+	Copper(I) ion	Cuprous ion
Cu^{2+}	Copper(II) ion	Cupric ion
Fe^{2+}	Iron(II) ion	Ferrous ion
Fe^{3+}	Iron(III) ion	Ferric ion
Hg_2^{2+}	Mercury(I) ion	Mercurious ion
Hg^{2+}	Mercury(II) ion	Mercuric ion
Pb^{2+}	Lead(II) ion	Plumbous ion
Pb^{4+}	Lead(IV) ion	Plumbic ion
Sn^{2+}	Tin(II) ion	Stannous ion
Sn^{4+}	Tin(IV) ion	Stannic ion
Cr^{2+}	Chromium(II) ion	Chromous ion
Cr^{3+}	Chromium(III) ion	Chromic ion
Mn^{2+}	Manganese(II) ion	Manganous ion
Mn^{3+}	Manganese(III) ion	Manganic ion
Co^{2+}	Cobalt(II) ion	Cobaltous ion
Co^{3+}	Cobalt(III) ion	Cobaltic ion

Common Polyatomic Ions

+1 Charge	
NH_4^+	ammonium

-2 Charge	
CO_3^{2-}	carbonate
CrO_4^{2-}	chromate
$Cr_2O_7^{2-}$	dichromate
HPO_4^{2-}	hydrogen phosphate
O_2^{2-}	peroxide
SO_4^{2-}	sulfate
SO_3^{2-}	sulfite
$S_2O_3^{2-}$	thiosulfate

-3 charge	
PO_4^{3-}	phosphate
PO_3^{3-}	phosphite

-1 Charge	
$C_2H_3O_2^-$	acetate
ClO^{3-}	chlorate
ClO^{2-}	chlorite
CN^-	cyanide
$H_2PO_4^-$	dihydrogen phosphate
HCO_3^-	hydrogen carbonate
HSO_4^-	hydrogen sulfate
OH^-	hydroxide
ClO^-	hypochlorite
NO_3^-	nitrate
NO_2^-	nitrite
ClO_4^-	perchlorate
MnO_4^-	permanganate
SCN^-	thiocyanate

Some Common Acids

Acetic	$HC_2H_3O_2$
Carbonic	H_2CO_3
Hydrochloric	HCl
Hydrobromic	HBr
Hydrofluoric	HF
Nitric	HNO_3
Phosphoric	H_3PO_4
Sulfuric	H_2SO_4

Assignment #1: Formula Writing and Nomenclature

Memorize each formula, name and charge of the following common ions.

Assignment #2: Nomenclature and Writing Formulas

You will be expected to be able to write the formula of a compound, if given the name. You will also be expected to name the compound if given the formula. Review the rules for naming compounds. Remember that how a compound is named depends on whether the compound is ionic, molecular (covalent) or an acid. There are different rules for each type. The rules were covered in your previous chemistry class and can be found in any basic chemistry textbook.

Complete the following table:

	Formula	Name	Type of Compound (ionic, molecular, acid)	Is it a binary Compound? (y/n)
1	$Ca(NO_3)_2$			
2	SnO			
3	$CuCr_2O_7$			
4	$Al(CN)_3$			
5	HCl			
6	$(NH_4)_2SO_4$			
7	$CrCO_3$			
8	BaO			
9	BaO_2			
10	$Fe(OH)_3$			
11		Cadmium bicarbonate		
12		Lead (II) chloride		
13		Aluminum oxide		
14		Copper (I) cyanide		
15		Nitric acid		
16		Sodium hydroxide		
17		Copper (II) nitrate		
18		Nitrogen dioxide		
19		Sulfur trioxide		
20		Phosphorus pentachloride		
21		Carbon dioxide		
22	Cl_2O_7			
23	N_2O_5			
24	P_2O_5			
25	CCl_4			
26	SF_6			
27	CO			
28	N_2H_4			
29	P_4O_{10}			
30	SiO_2			

Assignment #3: The Mole

You will be expected to use the mole concept in various contexts. You should know Avogadro's number, the molar volume of a gas at STP, the meaning of STP and molar mass. All work and units should be shown. The use of dimensional analysis (conversion factors) is strongly encouraged.

1. Given 2.50 grams of $SO_{3(g)}$, calculate:
    a. The number of moles of SO_3.
    b. The number of SO_3 molecules.
    c. The number of sulfur and oxygen atoms present.
    d. The volume occupied by the gas at STP.
    e. The density of the gas at STP.
2. Given 2.80×10^{22} molecules of carbon dioxide gas, calculate:
    a. The number of moles of CO_2.
    b. The mass of the sample.
    c. The number of carbon and oxygen atoms present.
    d. The volume of carbon dioxide gas at STP.
    e. The density of the gas at STP.
3. Given a volume of 250.0 mL of fluorine gas at STP, calculate:
    a. The mass of the fluorine gas.
    b. The number of fluorine molecules in the sample.
    c. The number of fluorine atoms in the sample.
    d. The density of the gas at STP.

Assignment #4: Balancing Equations and Stoichiometry

You will be expected to understand basic chemical equations and stoichiometry.

1. Balance the following equations:
    a. $C_2H_6O + O_2 \rightarrow CO_2 + H_2O$

    b. $Al(OH)_3 + H_2SO_4 \rightarrow Al_2(SO_4)_3 + H_2O$

    c. $Na_2CO_3 + C + N_2 \rightarrow NaCN + CO$

2. Calculate the mass of carbon dioxide formed when 2.60g of C_2H_6O is burned in excess oxygen gas. Refer to equation 1a.
3. Calculate the mass of sulfuric acid that would react with 3.50g of aluminum hydroxide. Refer to equation 1b.
4. Calculate the volume of carbon monoxide gas, which would form when 2.80g of nitrogen reacts with excess reactants. Refer to equation 1c.
5. Identify the limiting reagent and excess reagent when 5.0g of $Al(OH)_3$ reacts with 5.0g of H_2SO_4 as in equation 1b. Calculate the amount (in grams) of the excess reagent that remains at the completion of the reaction.
6. Assuming that reaction 1a has a 95% yield, calculate the volume of carbon dioxide that will be produced from 2.50g of oxygen gas is completely consumed.

Assignment #5: Molarity

You will be expected to be familiar with the definition of molarity (M) and to be able to perform molarity related calculations.

1. Calculate the molarity of a solution prepared by dissolving 4.52g of Na_2SO_4 in enough water to prepare 350 mL of solution.
2. Calculate the mass of lead(II) nitrate present in 200.0mL of 0.50M $Pb(NO_3)_{2(aq)}$.
3. Calculate the volume of 0.25M $Ba(OH)_2$ that contains 15.0g of the solute.