Mr. Lin

AP Chemistry Summer Assignment Instructions

AP Chemistry	AP Chemistry	AP Chemistry	AP Chemistry	AP Chemistry	AP Chemistry

Silently challenge everything. This does not mean in a contemptuous manner. Challenge your own understanding in your mind. Take on a healthy dose of skepticism without being a cynic. Find insight about your own thinking and improve upon it.

If you completed **honors chemistry**, you must complete Part I and Part II by the first day of class.

If you completed **general chemistry**, you must complete Part I, Part II, AND Part III by the first day of class.

Part I

1. Purchase the required text. (**Chemistry 10th Ed**, Zumdahl, Zumdahl, and DeCoste)

2. Complete the following:
   A. Read and outline Ch 1
   B. Ch 1 Problems (19, 25, 29, 32, 35, 37, 38, 41, 43, 59, 69, 83, 89, 127; describe distillation, filtration, chromatography)
   C. Read and outline Ch 2
   D. Ch 2 Problems (1, 10, 11, 23, 25, 30, 33, 38, 39, 41, 61, 63, 71, 83, 89, 99)
   E. Read and outline Ch 3.1-3.2
   F. Ch 3a Problems (6, 39, 53, 55, 63)

Part II

Included in the packet are the following handouts: common ions, naming compounds flow chart, solubility rules, and naming and solubility worksheet

1. Memorize the names, formulas, and charges of common ions.

2. Memorize the naming compounds flow chart.

3. Memorize the solubility rules.

4. Complete the solubility and naming compounds worksheet.

Note: Take time to memorize this information. Do NOT procrastinate. (Procrastination is a five-syllable word for sloth.) Flashcards are useful. Knowing this information will make the rest of the year easier. The AP Test is written with the expectation that this information has been memorized.
You will be quizzed on the ions, naming compounds, and solubility rules the second day of class.

Part III

Read 3.10 and 3.11. Complete the Limiting Reactants Worksheet.

Names, Formulas, and Charges of Common Ions

Positive Ions (Cations)

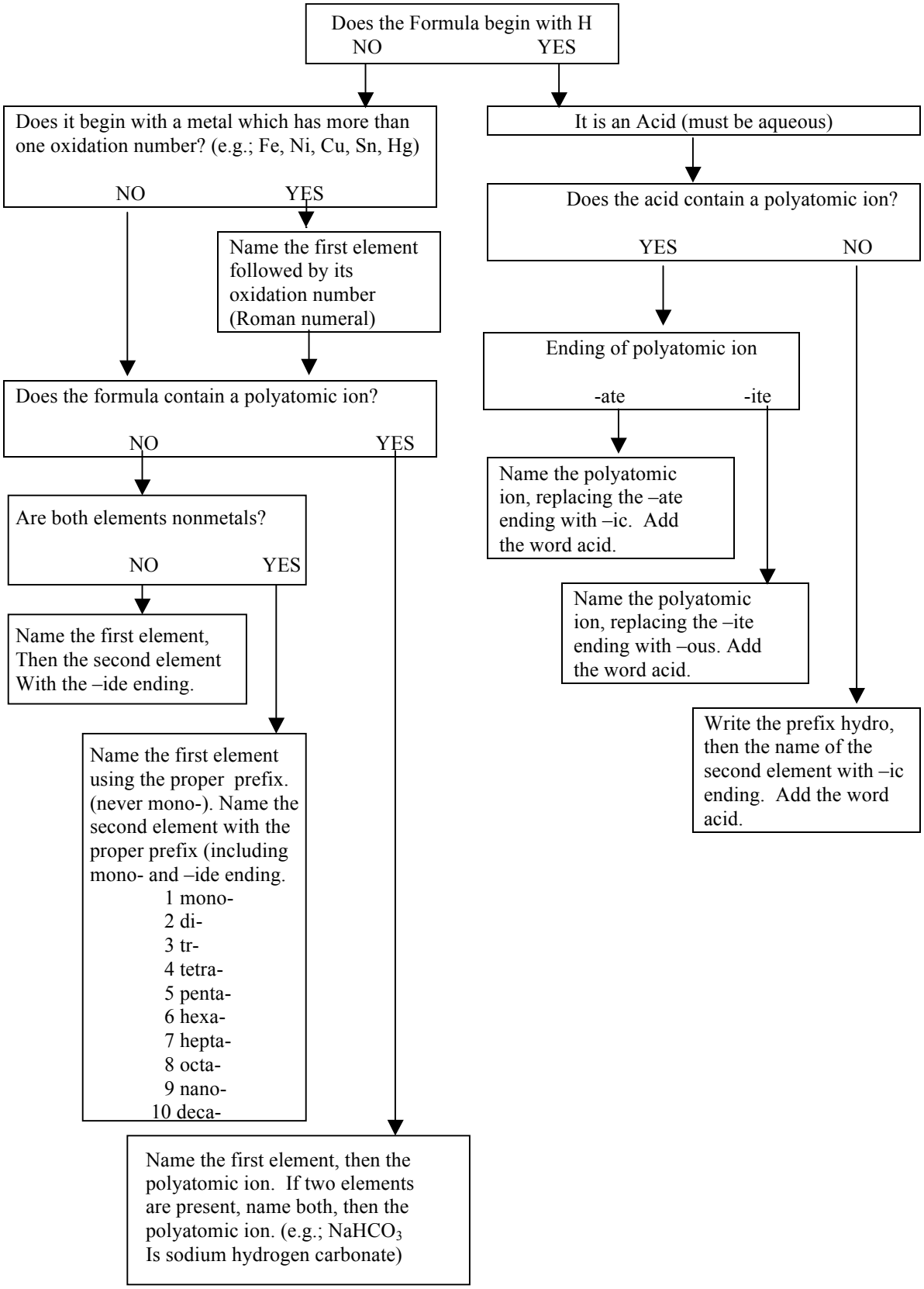
1+	2+	3+	4+
Ammonium NH_4^+	Nickel(II) Ni^{2+}	Antimony(III) Sb^{3+}	
Cesium Cs^+	Zinc Zn^{2+}	Arsenic(III) As^{3+}	
Gold Au^+		Bismuth(III) Bi^{3+}	
Silver Ag^+		Boron(III) B^{3+}	
		Titanium Ti^{3+}	
Copper (I) Cu^+ →	Copper(II) Cu^{2+}		
	Cobalt(II) Co^{2+} →	Cobalt(III) Co^{3+}	
	Chromium(II) Cr^{2+} →	Chromium(III) Cr^{3+}	
	Iron(II) Fe^{2+} →	Iron(III) Fe^{3+}	
	Lead(II) Pb^{2+} →		Lead(IV) Pb^{4+}
	Manganese(II) Mn^{2+} →		Manganese(IV) Mn^{4+}
Mercury(I) Hg_2^{2+} →	Mercury(II) Hg^{2+}		
	Tin(II) Sn^{2+} →		Tin(IV) Sn^{4+}

Negative Ions (Anions)

1-	2-	3-
Acetate $C_2H_3O_2^-$	Silicate SiO_3^{2-}	Arsenate AsO_4^{3-}
Hypochlorite ClO^-	Peroxide O_2^{2-}	Borate BO_3^{3-}
Chlorite ClO_2^-	Chromate CrO_4^{2-}	Nitride N^{3-}
Chlorate ClO_3^-	Dichromate $Cr_2O_7^{2-}$	
Perchlorate ClO_4^-		
Nitrite NO_2^-		
Nitrate NO_3^-		
Carbide C_2^{2-}		
Hydride H^-		
Cyanide CN^-		
Hydroxide OH^-		
Thiocyanate SCN^-		Phosphide P^{3-}
Permanganate MnO_4^-		Phosphite PO_3^{3-}
Dihydrogen phosphate $H_2PO_4^-$ →	Hydrogen phosphate HPO_4^{2-} →	Phosphate PO_4^{3-}
Hydrogen oxalate $HC_2O_4^-$ →	Oxalate $C_2O_4^{2-}$	
Hydrogen carbonate HCO_3^- →	Carbonate CO_3^{2-}	
Hydrogen sulfide HS^- →	Sulfide S^{2-}	
Hydrogen sulfite HSO_3^- → (Bisulfite)	Sulfite SO_3^{2-}	
Hydrogen sulfate HSO_4^- → (Bisulfate)	Sulfate SO_4^{2-}	

Li^+														N^{3-}	O^{2-}	F^-	
Na^+	Mg^{2+}											Al^{3+}			S^{2-}	Cl^-	
K^+	Ca^{2+}				Cr^{2+} Cr^{3+}	Mn^{2+} Mn^{3+}	Fe^{2+} Fe^{3+}	Co^{2+} Co^{3+}		Cu^+ Cu^{2+}	Zn^{2+}					Br^-	
Rb^+	Sr^{2+}									Ag^+	Cd^{2+}		Sn^{2+} Sn^{4+}			I^-	
Cs^+	Ba^{2+}										Hg_2^{2+} Hg^{2+}		Pb^{2+} Pb^{4+}				

Naming Compounds Flow Chart



Soluble Compounds

	Exceptions	
All salts of Na^+, K^+, and NH_4^+		
All salts of Cl^-, Br^-, and I^-	⇔	Halides of Ag^+, Hg_2^{2+}, and Pb^{2+}
Compounds containing F^-	⇔	Fluorides of Mg^{2+}, Ca^{2+}, Sr^{2+}, Ba^{2+}, Pb^{2+}
Salts of Nitrate, NO_3^- Chlorate, ClO_3^- Perchlorate, ClO_4^- Acetate, CH_3COO^-		
Salts of Sulfate, SO_4^{2-}	⇔	Sulfates of Sr^{2+}, Ba^{2+}, Pb^{2+}

Insoluble Compounds

	Exceptions	
All salts of Carbonate, CO_3^{2-} Phosphate, PO_4^{3-} Oxalate, $C_2O_4^{2-}$ Chromate, CrO_4^{2-} Sulfide, S^{2-} Most metal hydroxides and oxides, OH^- and O^{2-}	⇔	Salts of NH_4^+ and the alkali metal cations (Group I)

Mr. Lin Name

Per _____

Solubility and Naming Compounds

AP Chemistry	AP Chemistry	AP Chemistry	AP Chemistry	AP Chemistry	AP Chemistry

Name the following compounds from their formula:

1. NH_4I
2. $Fe_2(SO_3)_3$
3. H_3PO_4 (aq)
4. $AgClO_3$
5. SnC_2O_4
6. $NaCN$
7. $Zn(OH)_2$
8. Rb_2SiO_3
9. MnO_2
10. H_2O_2
11. KCl
12. $KC_2H_3O_2$
13. $CaSO_4$
14. $Sb_2(Cr_2O_7)_3$
15. Li_3P

Write the chemical formula from the compounds name:

1. Lead (IV) Carbonate
2. Magnesium Fluoride
3. Cesium Arsenate
4. Boron (III) Silicate
5. Francium Nitrite
6. Cobalt (II) Chloride
7. Mercury (I) Permanganate

8. Mercury (I) Fluoride
9. Barium Phosphate
10. Bismuth (III) Hydride
11. Aluminum Borate
12. Gold Oxide
13. Copper (I) Hypochlorite
14. Tin (II) Chlorite
15. Phosphorous Pentachloride

Solubility

Directions: Two beakers are filled with 250 ml of water. Determine if the following compounds will dissolve in each beaker and if a precipitate will form through double displacement if both beakers are mixed. Write the proper molecular equation.

(aq) = aqueous → soluble (s) = solid → insoluble

Examples:

$NaCl$, NH_4NO_3 $NaCl\ (aq) + NH_4NO_3\ (aq) \rightarrow NaNO_3\ (aq) + NH_4Cl\ (aq)$ no reaction
SOLUBLE SOLUBLE SOLUBLE SOLUBLE

$BaNO_3$, $NaSO_4$ $BaNO_3\ (aq) + Na_2SO_4\ (aq) \rightarrow BaSO_4\ (s) + NaNO_3\ (aq)$ precipitate
SOLUBLE SOLUBLE INSOLUBLE SOLUBLE

$AgCl$, $NaC_2H_3O_2$ $AgCl\ (s) + NaC_2H_3O_2\ (aq) \rightarrow$ no reaction
INSOLUBLE SOLUBLE

Beaker 1/ Beaker 2

1) $NaCl$, $Ba(NO_3)_2$
2) $SrSO_4$, NH_4ClO_4
3) $NaCl$, $AgNO_3$
4) Au_2CO_3, $PbSO_4$
5) Ag_2S, HCH_3CO_2
6) Cs_2SO_4, $SrCl_2$
7) Fe_2O_3, $(NH_4)_3P$
8) CaF_2, $MgBr_2$
9) Ag_2SO_4, PbI_2
10) $(NH_4)_2CO_3$, NaI

Chemistry **Name**

Period

The Limiting Reactant Worksheet

1. Given the following reaction, a student heated 5.52g of copper and 10.1 g of sulfur.

$$\_\_\_\_\ Cu\ (s) + \_\_\_\_\ S\ (s) \xrightarrow{\triangle} \_\_\_\_\ Cu_2S\ (s)$$

a. What is the limiting reagent?

b. What mass of the product Cu_2S is formed?

c. How much of the excess reactant will be left over?

2. Given the following unbalanced reaction, if a student mixed 1.350g of $Pb(NO_3)_2$ and 0.9875g of K_2CrO_4, determine the following values:

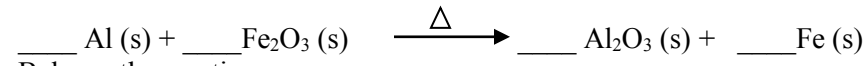
$$\_\_\_\_\ Pb(NO_3)_2\ (aq) + \_\_\_\_K_2CrO_4\ (aq) \longrightarrow \_\_\_\_\ PbCrO_4\ (s) + \_\_\_KNO_3\ (aq)$$

a. What is the limiting reactant?

b. What mass of $PbCrO_4$ is produced?

c. How much of the excess reactant will be left over?

3. In the following unbalanced equation, the production of solid iron is made from iron (III) oxide and solid aluminum with the addition of tremendous heat:



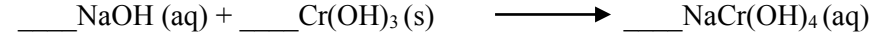
____ Al (s) + ____Fe_2O_3 (s) $\xrightarrow{\Delta}$ ____ Al_2O_3 (s) + ____Fe (s)

a. Balance the reaction.

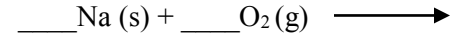
b. In a reaction where 2.75 grams of iron (III) oxide is reacted with15.5 grams of aluminum, which is the limiting reactant?

c. Calculate the mass of iron formed.

4. Using the following unbalanced equation, what is the percent yield if a chemist begins with 66.0 g $Cr(OH)_3$ and produces 38.4 g of $NaCr(OH)_4$?



____NaOH (aq) + ____$Cr(OH)_3$ (s) ⟶ ____$NaCr(OH)_4$ (aq)

5. 

____Na (s) + ____O_2 (g) ⟶ ____Na_2O (s)

a) What is the maximum number of grams of Na_2O that can be formed when 64.0 g of Na reacts with 28.54 g O_2?

b) What is the percent yield if 14.55 grams of sodium oxide is produced during an experiment?