

Mr. Lin

## AP Chemistry Summer Assignment Instructions

AP Chemistry

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**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 10<sup>th</sup> 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.

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Name \_\_\_\_\_  
Per \_\_\_\_\_

## Solubility and Naming Compounds

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**Name the following compounds from their formula:**

1.  $\text{NH}_4\text{I}$
2.  $\text{Fe}_2(\text{SO}_3)_3$
3.  $\text{H}_3\text{PO}_4$  (aq)
4.  $\text{AgClO}_3$
5.  $\text{SnC}_2\text{O}_4$
6.  $\text{NaCN}$
7.  $\text{Zn}(\text{OH})_2$
8.  $\text{Rb}_2\text{SiO}_3$
9.  $\text{MnO}_2$
10.  $\text{H}_2\text{O}_2$
11.  $\text{KCl}$
12.  $\text{KC}_2\text{H}_3\text{O}_2$
13.  $\text{CaSO}_4$
14.  $\text{Sb}_2(\text{Cr}_2\text{O}_7)_3$
15.  $\text{Li}_3\text{P}$

**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

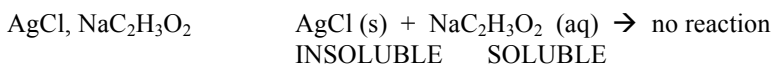
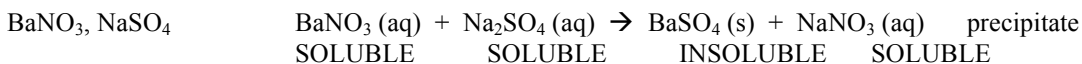
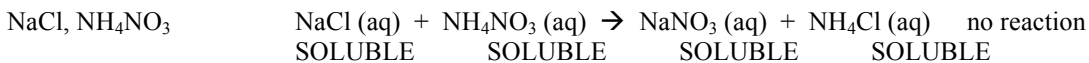
8. Mercury (I) Fluoride
9. Barium Phosphate
10. Bismuth (III) Hydride
11. Aluminum Borate
12. Gold Oxide
13. Copper (I) Hypochlorite
14. Tin (II) Chlorite
15. Phosphorous Pentachloride

## 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:



**Beaker 1/ Beaker 2**

- 1) NaCl, Ba(NO<sub>3</sub>)<sub>2</sub>
- 2) SrSO<sub>4</sub>, NH<sub>4</sub>ClO<sub>4</sub>
- 3) NaCl, AgNO<sub>3</sub>
- 4) Au<sub>2</sub>CO<sub>3</sub>, PbSO<sub>4</sub>
- 5) Ag<sub>2</sub>S, HCH<sub>3</sub>CO<sub>2</sub>
- 6) Cs<sub>2</sub>SO<sub>4</sub>, SrCl<sub>2</sub>
- 7) Fe<sub>2</sub>O<sub>3</sub>, (NH<sub>4</sub>)<sub>3</sub>P
- 8) CaF<sub>2</sub>, MgBr<sub>2</sub>
- 9) Ag<sub>2</sub>SO<sub>4</sub>, PbI<sub>2</sub>
- 10) (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub>, NaI

# Names, Formulas, and Charges of Common Ions

## Positive Ions (Cations)

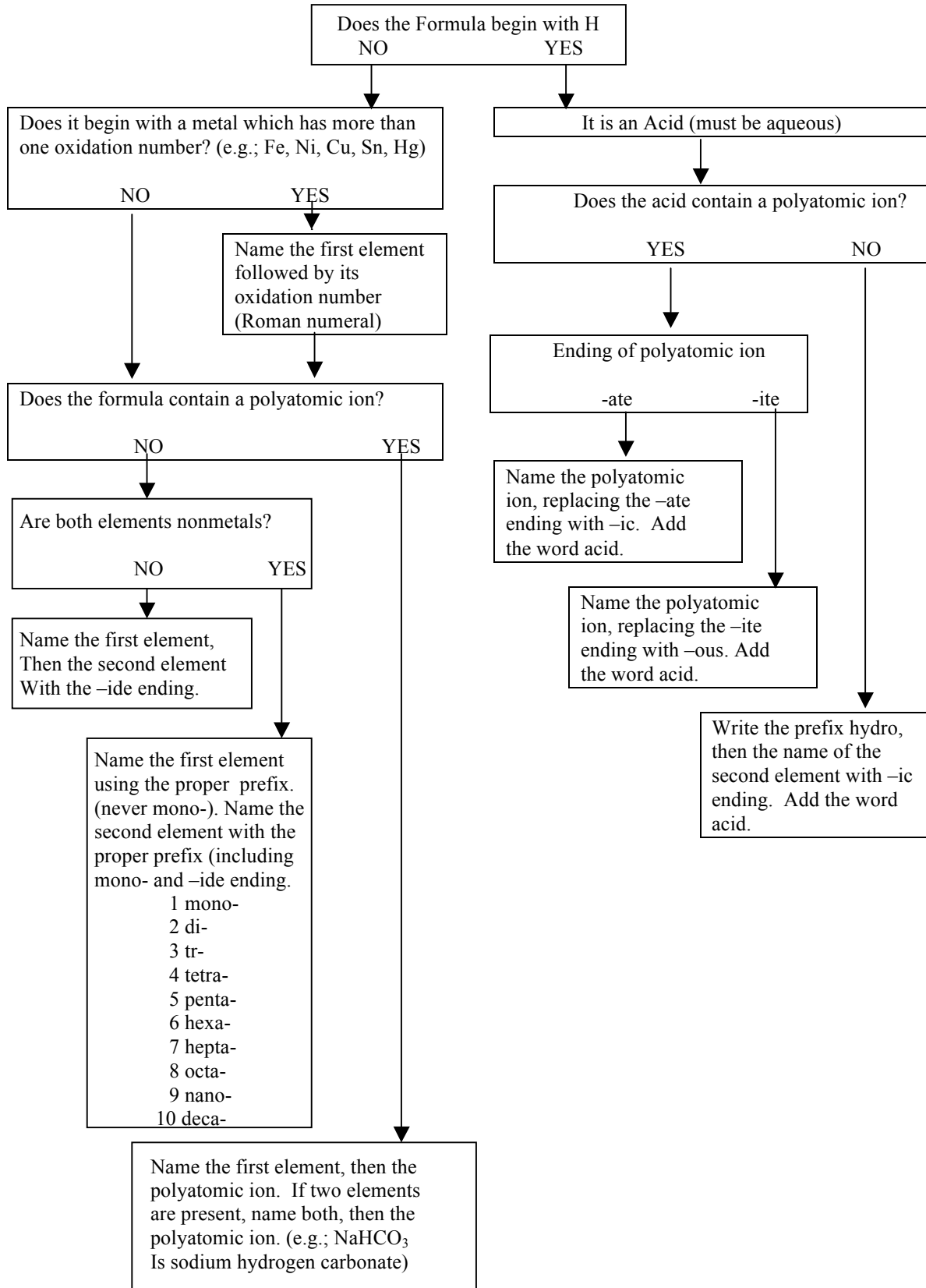
1+	2+	3+	4+
Ammonium $\text{NH}_4^+$ Cesium $\text{Cs}^+$ Gold $\text{Au}^+$ Silver $\text{Ag}^+$	Nickel(II) $\text{Ni}^{2+}$ Zinc $\text{Zn}^{2+}$	Antimony(III) $\text{Sb}^{3+}$ Arsenic(III) $\text{As}^{3+}$ Bismuth(III) $\text{Bi}^{3+}$ Boron(III) $\text{B}^{3+}$ Titanium $\text{Ti}^{3+}$	
<u>Copper(I) <math>\text{Cu}^+ \rightarrow</math></u>	<u>Copper(II) <math>\text{Cu}^{2+}</math></u> <u>Cobalt(II) <math>\text{Co}^{2+} \rightarrow</math></u> <u>Chromium(II) <math>\text{Cr}^{2+} \rightarrow</math></u> <u>Iron(II) <math>\text{Fe}^{2+} \rightarrow</math></u> <u>Lead(II) <math>\text{Pb}^{2+} \rightarrow</math></u> <u>Manganese(II) <math>\text{Mn}^{2+} \rightarrow</math></u> <u>Mercury(I) <math>\text{Hg}_2^{2+} \rightarrow</math></u> <u>Tin(II) <math>\text{Sn}^{2+} \rightarrow</math></u>	<u>Cobalt(III) <math>\text{Co}^{3+}</math></u> <u>Chromium(III) <math>\text{Cr}^{3+}</math></u> <u>Iron(III) <math>\text{Fe}^{3+}</math></u>	<u>Lead(IV) <math>\text{Pb}^{4+}</math></u> <u>Manganese(IV) <math>\text{Mn}^{4+}</math></u>  <u>Tin(IV) <math>\text{Sn}^{4+}</math></u>

## Negative Ions (Anions)

1-	2-	3-
Acetate $\text{C}_2\text{H}_3\text{O}_2^-$ Hypochlorite $\text{ClO}^-$ Chlorite $\text{ClO}_2^-$ Chlorate $\text{ClO}_3^-$ Perchlorate $\text{ClO}_4^-$ Nitrite $\text{NO}_2^-$ Nitrate $\text{NO}_3^-$ Carbide $\text{C}_2^{2-}$ Hydride $\text{H}^-$ Cyanide $\text{CN}^-$ Hydroxide $\text{OH}^-$ Thiocyanate $\text{SCN}^-$ Permanganate $\text{MnO}_4^-$	Silicate $\text{SiO}_3^{2-}$ Peroxide $\text{O}_2^{2-}$ Chromate $\text{CrO}_4^{2-}$ Dichromate $\text{Cr}_2\text{O}_7^{2-}$	Arsenate $\text{AsO}_4^{3-}$ Borate $\text{BO}_3^{3-}$ Nitride $\text{N}^{3-}$
<u>Dihydrogen phosphate <math>\text{H}_2\text{PO}_4^- \rightarrow</math></u> <u>Hydrogen oxalate <math>\text{HC}_2\text{O}_4^- \rightarrow</math></u> <u>Hydrogen carbonate <math>\text{HCO}_3^- \rightarrow</math></u> <u>Hydrogen sulfide <math>\text{HS}^- \rightarrow</math></u> <u>Hydrogen sulfite <math>\text{HSO}_3^- \rightarrow</math></u> (Bisulfite) <u>Hydrogen sulfate <math>\text{HSO}_4^- \rightarrow</math></u> (Bisulfate)	<u>Hydrogen phosphate <math>\text{HPO}_4^{2-} \rightarrow</math></u> <u>Oxalate <math>\text{C}_2\text{O}_4^{2-}</math></u> <u>Carbonate <math>\text{CO}_3^{2-}</math></u> <u>Sulfide <math>\text{S}^{2-}</math></u> <u>Sulfite <math>\text{SO}_3^{2-}</math></u>  <u>Sulfate <math>\text{SO}_4^{2-}</math></u>	Phosphide $\text{P}^{3-}$ Phosphite $\text{PO}_3^{3-}$  <u>Phosphate <math>\text{PO}_4^{3-}</math></u>

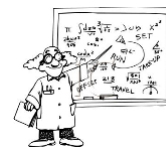


# Naming Compounds Flow Chart



<b>Soluble Compounds</b>	
	<b>Exceptions</b>
All salts of $\text{Na}^+$ , $\text{K}^+$ , and $\text{NH}_4^+$	
All salts of $\text{Cl}^-$ , $\text{Br}^-$ , and $\text{I}^-$	$\Leftrightarrow$ Halides of $\text{Ag}^+$ , $\text{Hg}_2^{2+}$ , and $\text{Pb}^{2+}$
Compounds containing $\text{F}^-$	$\Leftrightarrow$ Fluorides of $\text{Mg}^{2+}$ , $\text{Ca}^{2+}$ , $\text{Sr}^{2+}$ , $\text{Ba}^{2+}$ , $\text{Pb}^{2+}$
Salts of Nitrate, $\text{NO}_3^-$ Chlorate, $\text{ClO}_3^-$ Perchlorate, $\text{ClO}_4^-$ Acetate, $\text{CH}_3\text{COO}^-$	
Salts of Sulfate, $\text{SO}_4^{2-}$	$\Leftrightarrow$ Sulfates of $\text{Sr}^{2+}$ , $\text{Ba}^{2+}$ , $\text{Pb}^{2+}$

<b>Insoluble Compounds</b>	
	<b>Exceptions</b>
All salts of Carbonate, $\text{CO}_3^{2-}$ Phosphate, $\text{PO}_4^{3-}$ Oxalate, $\text{C}_2\text{O}_4^{2-}$ Chromate, $\text{CrO}_4^{2-}$ Sulfide, $\text{S}^{2-}$	$\Leftrightarrow$ Salts of $\text{NH}_4^+$ and the alkali metal cations (Group I)
Most metal hydroxides and oxides, $\text{OH}^-$ and $\text{O}^{2-}$	



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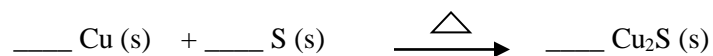
Period

## The Limiting Reactant Worksheet

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

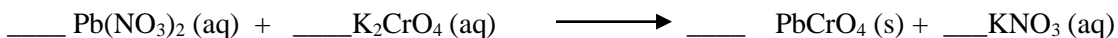


- a. What is the limiting reagent?

- b. What mass of the product  $\text{Cu}_2\text{S}$  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  $\text{Pb}(\text{NO}_3)_2$  and 0.9875g of  $\text{K}_2\text{CrO}_4$ , determine the following values:



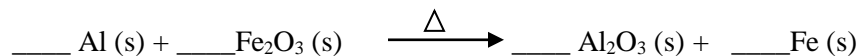
- a. What is the limiting reactant?

- b. What mass of  $\text{PbCrO}_4$  is produced?

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



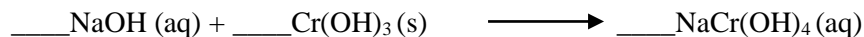
3. In the following unbalanced equation, the production of solid iron is made from iron (III) oxide and solid aluminum with the addition of tremendous heat:



- a. Balance the reaction.  
b. In a reaction where 2.75 grams of iron (III) oxide is reacted with 15.5 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  $\text{Cr(OH)}_3$  and produces 38.4 g of  $\text{NaCr(OH)}_4$ ?



5.  $\underline{\hspace{1cm}} \text{Na (s)} + \underline{\hspace{1cm}} \text{O}_2 \text{ (g)} \longrightarrow \underline{\hspace{1cm}} \text{Na}_2\text{O (s)}$

- a) What is the maximum number of grams of  $\text{Na}_2\text{O}$  that can be formed when 64.0 g of Na reacts with 28.54 g  $\text{O}_2$ ?

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