

AP CHEMISTRY SUMMER ASSIGNMENT

To: Students presently registered to take AP Chemistry in 2019-2020

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Important Note:

This is a **required assignment**. It is a review of the early concepts covered in Chemistry 1. Portions of this assignment (as noted) will be collected and graded, and the material will be covered on the first unit test. We will spend the first few days of school focusing on this material.

Welcome to AP chemistry! AP chemistry is a difficult course - this is why I give a summer assignment. I need you ready for the start of the school year by reviewing the things you should have learned in Honors Chem or Chem 1. I will not have the time to re-teach what was covered in those earlier courses. We will be dealing with new topics and at a deeper and more technical level. With this in mind, if you find the summer assignment too difficult or just too much work, you may want to reconsider taking this course.

The AP Chemistry curriculum is content-intensive, so we will move quickly in order to be ready for the AP exam in May. As such, the class will be challenging and you should expect equally challenging assignments. Don't forget that this course is designed to match a first-year college chemistry class. Keep in mind that the biggest factor in determining your success will be the amount of effort you put in.

Over the summer, you are responsible for completing all of the assignments in this packet. The ten worksheets (clearly labeled) will be collected and graded for completion. They are due on the first day of school.

Included in this packet is a copy of your new periodic table and the formulas page used on the actual exam - so you should start getting used to it. You might notice that there is no list of polyatomic ions on the back of the table; that's because you are expected to know them!

The Summer Assignment: (All materials referenced here can be found in the google classroom site - entry code: cs1fmk)

Part I:

Mathematics Review for AP Chemistry Packet:

- format of AP Chemistry exam, strategies for doing the math on the exam, conversions and dimensional analysis, scientific notation and general math review
- practice problems (**not scored**) including math required for some sample AP exam problems

Part II:

Read Chapters 1 – 3 in this textbook:

Chemistry, Zumdahl and Zumdahl, 8th Edition Chapters are on-line in google classroom.

Note: This is not the text we use during the year – however, this is an excellent resource and I encourage you to use it heavily for this summer assignment.

Part III:

Answer the following suggested questions from the assigned chapters (these will not be collected). Be sure to report all answers for problems involving calculations to the correct number of significant figures.

Chapter 1 problems, pages 31-38, #s 4, 8, 15, 24, 60, 64, 66, 73, 77, 79, 82, 105

Chapter 2 problems, pages 69-75, #s 2, 5, 6, 7, 10, 11, 12, 14, 15, 23, 32, 33, 34, 56, 60, 62, 80, 95, 103, 106, 108, 110

Chapter 3 problems, pages 117-128, #s 13, 15, 16, 27, 30, 64, 69, 75, 76, 99, 100, 101, 106, and any from the “Additional Exercises, #s 132-148

Part IV:

Do these worksheets: **All to be turned on the first full day of school.**

These worksheets are also provided as separate pdf files in the AP Chem Google Classroom.

Worksheet #1: Significant Figures and Dimensional Analysis

Worksheet #2: Structure of the Atom and the Periodic Table

Worksheet #3: Naming Inorganic Compounds

Worksheet #4: Writing Equations for Chemical Reactions

Worksheet #5: The Mole

Worksheet #6: Empirical and Molecular Formulas

Worksheet #7: Stoichiometry Problems

Worksheet #8: Limiting Reactants and Theoretical Yield

Worksheet #9: Solubility Rules

Worksheet #10: Personal Statement

Part V:

AP Chemistry is not all about memorization; however, having the following items memorized is essential for success in learning the concepts covered in the course. Make flashcards, have your friends and family quiz you, take the lists with you on vacation, or do whatever it takes to get this information firmly planted.

Five things to memorize: (they are attached here for your convenience)

- 1) Rules for determining oxidation numbers
- 2) Solubility rules
- 3) Rules for naming ionic compounds
- 4) Rules for naming acids
- 5) Common ions and Polyatomic ions

Rules for Determining Oxidation Numbers (aka Oxidation States)

Oxidation Number: A number assigned to an atom in a molecular compound or molecular ion that indicates the general distribution of electrons among the bonded atoms.

1. The oxidation number of any uncombined element is zero.
2. The oxidation number of a monatomic ion equal the charge on the ion.
3. The more electronegative element in a binary compound is assigned the number equal to the charge it would have if it were an ion.
4. The oxidation number of fluorine in a compound is always -1
5. Oxygen has an oxidation number of -2 unless it is combined with F, when it is $+2$, or it is in a peroxide, when it is -1 .
6. The oxidation state of hydrogen in most of its compounds is $+1$ unless it combined with a metal, in which case it is -1 .
7. In compounds, the elements of groups 1 and 2 as well as aluminum have oxidation number of $+1$, $+2$, and $+3$, respectively
8. The sum of the oxidation numbers of all atoms in a neutral compound is zero.
9. The sum of the oxidation number of all atoms in a polyatomic ion equals the charge of the ion.

Solubility Rules

1. Salts containing Group I elements are soluble (Li^+ , Na^+ , K^+ , Cs^+ , Rb^+). Exceptions to this rule are rare. Salts containing the ammonium ion (NH_4^+) are also soluble.
2. Salts containing nitrate ion (NO_3^-) are generally soluble.
3. Salts containing Cl^- , Br^- , I^- are generally soluble. Important exceptions to this rule are halide salts of Ag^+ , Pb^{2+} , and $(\text{Hg}_2)^{2+}$. Thus, AgCl , PbBr_2 , and Hg_2Cl_2 are all insoluble.
4. Most silver salts are insoluble. AgNO_3 and $\text{Ag}(\text{C}_2\text{H}_3\text{O}_2)$ are common soluble salts of silver; virtually anything else is insoluble.
5. Most sulfate salts are soluble. Important exceptions to this rule include BaSO_4 , PbSO_4 , Ag_2SO_4 and SrSO_4 .
6. Most hydroxide salts are only slightly soluble. Hydroxide salts of Group I elements are soluble. Hydroxide salts of Group II elements (Ca, Sr, and Ba) are slightly soluble. Hydroxide salts of transition metals and Al^{3+} are insoluble. Thus, $\text{Fe}(\text{OH})_3$, $\text{Al}(\text{OH})_3$, $\text{Co}(\text{OH})_2$ are not soluble.
7. Most sulfides of transition metals are highly insoluble. Thus, CdS , FeS , ZnS , Ag_2S are all insoluble. Arsenic, antimony, bismuth, and lead sulfides are also insoluble.
8. Carbonates are frequently insoluble. Group II carbonates (Ca, Sr, and Ba) are insoluble. Some other insoluble carbonates include FeCO_3 and PbCO_3 .
9. Chromates are frequently insoluble. Examples: PbCrO_4 , BaCrO_4
10. Phosphates are frequently insoluble. Examples: $\text{Ca}_3(\text{PO}_4)_2$, Ag_3PO_4
11. Fluorides are frequently insoluble. Examples: BaF_2 , MgF_2 , PbF_2 .

Naming Covalent Compounds Rules

RULES FOR NAMING COVALENT COMPOUNDS

Diatomic Molecule (1 element only)

- $\text{Br}_2, \text{I}_2, \text{N}_2, \text{Cl}_2, \text{H}_2, \text{O}_2, \text{F}_2$
- Name the element!

Examples:

- H_2 _____
- I_2 _____

WHAT IS A PREFIX?

- A word added to the beginning of an element name that indicates how many of that element is present

PREFIXES

Look at the subscripts to tell you how many of each element you have

One	mono-
Two	di-
Three	tri-
Four	tetra-
Five	penta-
Six	hexa-
Seven	hepta-
Eight	octa-
Nine	nona-
Ten	deca-

Covalent Binary (Nonmetal / Nonmetal)

- Name the first element
O Add appropriate **prefixes EXCEPT "mono-"**
- Name the second element
O Add appropriate **prefixes INCLUDING "mono-"**
- Change ending of second element to **"-ide"**

Examples:

- P_2O_5 _____
- CO _____

Rules for Naming Binary Ionic Compounds

Examples:

NaCl – sodium chloride

BaF_2 – barium fluoride

CuO – copper (II) oxide

1. The full name of the cation is listed first. (A cation is a positive ion).
2. The root of the anion name is listed second and is followed by the suffix "ide." (An anion is a negative ion).
3. If the compound contains a transition metal, a Roman numeral is included after the cation name to indicate the oxidation number of the metal.
4. Remember that the cation(s) and anion(s) combine in the simplest ratio that balances the charge. That is, the sum of the charge must be equal to zero in the compound formed.

Rules for Naming Ionic Compounds Containing Polyatomic Ions

Examples:

CaCO_3 - calcium carbonate $\text{Fe}(\text{OH})_3$ -iron (III) hydroxide $(\text{NH}_4)_2\text{SO}_4$ – ammonium sulfate

1. The full name of the cation is listed first.
2. The full name of the anion is listed second.
3. Use the table below for common polyatomic ions
4. Remember that the cation(s) and anion(s) combine in the simplest ratio that balances the charge.
That is, the sum of the charge must be equal to zero in the compound formed.
5. Finally, use parentheses when the simplest ratio requires more than one polyatomic ion in the compound formula.

Naming Acids Rules

RULES FOR NAMING ACIDS

H + Element

- **Hydro** + *root of element name* + **-ic acid**

Examples:

- H_3N _____
- HI _____

H + Polyatomic Ion

Root of polyatomic ion name + appropriate ending:

- Polyatomic ion ends in “**-ate**” change ending to “**-ic acid**”
- Polyatomic ion ends in “**-ite**” change ending to “**-ous acid**”

Examples:

- H_2SO_4 _____
- HClO_2 _____

WHAT IS A ROOT?

- the **first part** of an element or polyatomic ion name:

Example:

Nitrogen = **Nitr-**

Chlorine = **Chlor-**

REMEMBER!!!!!!

-ate -ic

-ite -ous

Polyatomic Ions:

Polyatomic Ions are ions that contain a number of atoms. There is a list of polyatomic ions below. There is no formula for learning how to write their names, you must commit them to memory. (When you commit them to memory, remember the charges, names, and formulas.) Naming Polyatomic compounds is much like naming Binary I or II compounds. Remember transition metals usually form two or more ions and parentheses and Roman numeral should be used.

Memorize the following items. Know name, formula (or symbol) and charges:

Positive Ions (Cations)

1+	2+	3+	4+
ammonium NH_4^+	barium Ba^{2+}	aluminum Al^{3+}	carbon C^{4+}
cesium Cs^+	beryllium Be^{2+}	antimony(III) Sb^{3+}	lead(IV) Pb^{4+}
copper(I) Cu^+	cadmium(II) Cd^{2+}	bismuth(III) Bi^{3+}	silicon Si^{4+}
gold(I) Au^+	calcium Ca^{2+}	chromium(III) Cr^{3+}	tin(IV) Sn^{4+}
hydrogen H^+	chromium(II) Cr^{2+}	cobalt(III) Co^{3+}	
lithium Li^+	cobalt(II) Co^{2+}	gallium Ga^{3+}	
potassium K^+	copper(II) Cu^{2+}	gold(III) Au^{3+}	
rubidium Rb^+	iron(II) Fe^{2+}	manganese(III) Mn^{3+}	
silver Ag^+	lead(II) Pb^{2+}	nickel(III) Ni^{3+}	
sodium Na^+	magnesium Mg^{2+}	iron(III) Fe^{3+}	
	manganese(II) Mn^{2+}		
	mercury(I) Hg_2^{2+}		
	mercury(II) Hg^{2+}		
	nickel(II) Ni^{2+}		
	strontium Sr^{2+}		
	tin(II) Sn^{2+}		
	zinc Zn^{2+}		
			5+
			antimony(V) Sb^{5+}
			bismuth(V) Bi^{5+}

Memorize the following items. Know name, formula (or symbol) and charges:

Negative Ions (Anions)

-1	-2	-3	-4
acetate CH_3COO^-	carbonate CO_3^{2-}	arsenide As^{3-}	carbide C^{4-}
bromide Br^-	chromate CrO_4^{2-}	nitride N^{3-}	
chlorate ClO_3^-	dichromate $\text{Cr}_2\text{O}_7^{2-}$	phosphate PO_4^{3-}	
chloride Cl^-	oxalate $\text{C}_2\text{O}_4^{2-}$	phosphide P^{3-}	
chlorite ClO_2^-	oxide O^{2-}	phosphite PO_3^{3-}	
cyanide CN^-	peroxide O_2^{2-}		
fluoride F^-	silicate SiO_3^{2-}		
hydride H^-	sulfate SO_4^{2-}		
hydrogen carbonate HCO_3^- (bicarbonate)	sulfide S^{2-}		
hydroxide OH^-	sulfite SO_3^{2-}		
hypochlorite OCl^-	thiosulfate $\text{S}_2\text{O}_3^{2-}$		
iodate IO_3^-			
iodide I^-			
nitrate NO_3^-			
nitrite NO_2^-			
perchlorate ClO_4^-			
permanganate MnO_4^-			
thiocyanate SCN^-			

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Name _____

Worksheet #1

Significant Figures and Dimensional Analysis

For each problem below, write the equation and show your work. Always use units and box your final answer.

1. Round each of the following numbers to four significant figures, and express the result in scientific notation on the line provided:

- a. 300.235800 _____
- b. 456,500 _____
- c. 0.006543210 _____
- d. 0.000957830 _____
- e. -0.035000 _____

2. Carry out the following operations, and express the answers with the appropriate number of significant figures on the line provided:

- a. $1.24056 + 75.80$ _____
- b. $23/67 - 75$ _____
- c. $890,000 \times 112.3$ _____
- d. $78,132 / 2.50$ _____
- e. $1.23 + 75$ _____
- f. $1.89 - .20$ _____
- g. 45.6×8.2 _____
- h. $234 / 0.298$ _____
- i. $0.887 + 0.3$ _____
- j. $2340 - 100$ _____
- k. $(8 + 9)/(34.0 - 20.)$ _____
- l. $0.8897 \times 2.15 + 0.002/.1$ _____
- m. $45.0 \times 9.0 + 89.22 / 75$ _____

n. $(2.88 + .5) \times (23,000 - 0.11)$ _____

For each problem below, show your work. Always use units and box in your final answer.

3. The density of pure silver is 10.5 g/cm^3 at 20°C . If 5.25 g of pure silver pellets are added to a graduated cylinder containing 11.2 mL of water, to what volume level will the water in the cylinder rise?

4. The density of air at ordinary atmospheric pressure and 25°C is 1.19 g/L . What is the mass, in kilograms, of the air in a room that measures $12.5 \times 15.5 \times 8.0 \text{ ft}$?

5. An aluminum block has a density of 2.70 g/mL . If the mass of the block is 24.60 g, find the volume of the substance.

6. A student can eat 4.0 M&Ms every 1.00 seconds. If an M&M has a mass of 63 mg, determine how many kilograms of M&Ms can be eaten by a class of 20 students in 3 hours and 45 minutes.

7. Convert the following measurements to the desired unit:
 - a. $0.050 \text{ cm} = \underline{\hspace{2cm}} \text{ mm}$
 - b. $1872 \text{ mg} = \underline{\hspace{2cm}} \text{ kg}$
 - c. $1.9 \text{ dL} = \underline{\hspace{2cm}} \text{ cL}$
 - d. $3.4 \times 10^{-3} \text{ ks} = \underline{\hspace{2cm}} \text{ cs}$

Name _____

Worksheet #2

Structure of the Atom and the Periodic Table

1. What were the main points of Dalton's Atomic Theory? Which of these points are still accepted today? Which ones do we no longer accept, and why?
2. Summarize the evidence used by J.J. Thomson to argue that cathode rays consist of negatively charged particles.
3. Let's pretend you are holding two atoms of carbon that are isotopes. Describe what the two atoms have in common and how they are different.
4. Fill in the gaps in the table, assuming each column represents a neutral atom:

Symbol	$^{39}_{19}\text{K}$				
# Protons		25			82
# Neutrons		30	64		
# Electrons			48	56	
Mass #				137	207

5. Write the correct symbol, with both superscripts and subscripts, for each of the following:

a) the isotope of sodium with mass 23 _____

b) the atom of vanadium that contains 28 neutrons _____

c) the isotope of chlorine with mass 37 _____

d) an atom of magnesium that has an equal number of protons and neutrons _____

6. Give the name and the common charge for elements found in each of these groups of the Periodic Table:

a) Group 1 _____ b) Group 2 _____

c) Group 17 _____ d) Group 18 _____

6. Describe where each type of element is found on the Periodic Table:

a) metals _____ b) nonmetals _____

c) transition metals _____ d) lanthanides _____

d) actinides _____

Name _____

Worksheet #3

Naming Inorganic Compounds

1. Give the name for each of the following ionic compounds:

- a. AlF_3 _____
- b. $\text{Fe}(\text{OH})_2$ _____
- c. $\text{Cu}(\text{NO}_3)_2$ _____
- d. $\text{Ba}(\text{ClO}_4)_2$ _____
- e. Li_3PO_4 _____
- f. Hg_2S _____
- g. $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$ _____
- h. $\text{Cr}_2(\text{CO}_3)_3$ _____
- i. K_2CrO_4 _____
- j. $(\text{NH}_4)_2\text{SO}_4$ _____

2. Write the chemical formula for each of the following compounds:

- a. copper (I) oxide _____
- b. potassium peroxide _____
- c. aluminum hydroxide _____
- d. zinc nitrate _____
- e. mercury (I) bromide _____
- f. iron (III) carbonate _____
- g. sodium hypobromite _____

3. Give the name or chemical formula, as appropriate, for each of the following acids:

- a. HBrO_3 _____
- b. HBr _____
- c. H_3PO_4 _____
- d. hypochlorous acid _____
- e. iodic acid _____
- f. sulfurous acid _____

4. Give the name or chemical formula, as appropriate, for each of the following molecular substances:

a. SF_6 _____

b. IF_5 _____

c. XeO_3 _____

d. dinitrogen tetroxide _____

e. hydrogen cyanide _____

f. tetraphosphorous hexasulfide _____

Name _____

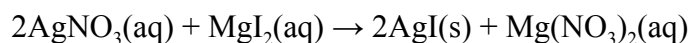
Worksheet #4

Writing Chemical Equations

For each equation below, identify the type (synthesis, decomposition, single replacement, double replacement, or combustion), predict the products, and then write the balanced equation for the reaction. Remember to use the solubility rules for double replacement reactions and the activity series for single replacement reactions. Hint: when writing these reactions, ignore all of the information about heat, or bubbling, or mixing. These are just excess words used to make complete sentences. Simply pull out the chemical formulas.

For example:

Solutions of silver nitrate and magnesium iodide are combined. This is a double replacement reaction.



1. Ammonium sulfate reacts with barium nitrate.
2. Zinc metal is added to a solution of copper (II) chloride.
3. Propane gas (C_3H_8) is burned in excess oxygen.
4. Perchloric acid reacts with cadmium to form cadmium perchlorate and a gas.
5. Magnesium and nitrogen gas are heated together.
6. Chlorine gas is bubbled through a solution of sodium bromide.

7. Solutions of lead nitrate and calcium iodide are combined.
8. Sulfuric acid is combined with sodium hydroxide.
9. Isopropyl alcohol ($\text{C}_3\text{H}_7\text{OH}$) is burned in oxygen.
10. Iron metal shavings are added to hydrochloric acid.
11. Solid sodium carbonate is heated in a crucible.
12. Sodium metal is added to distilled water.
13. Zinc carbonate can be heated to form zinc oxide and carbon dioxide
14. On treatment with hydrofluoric acid, silicon dioxide forms silicon tetrafluoride and water.
15. Sulfur dioxide reacts with water to form sulfurous acid.

16. Liquid butane fuel (C_4H_{10}) burns in the presence of oxygen gas.
17. A solution of sodium bromide reacts with a solution of vanadium (III) nitrate to form a brightly colored precipitate.

Name _____

Worksheet #5

The Mole

For each problem below, show your work. Always use units and box in your final answer.

1. Determine the molar mass of each of the following compounds:

- a) N_2O_5
- b) FeCO_3
- c) $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$
- d) $(\text{NH}_4)_3\text{PO}_4$
- e) sodium nitrate
- f) copper (II) sulfate
- g) disilicon hexabromide

2. The molecular formula of aspartame, the artificial sweetener marketed as NutraSweet, is $\text{C}_{14}\text{H}_{18}\text{N}_2\text{O}_5$.

- a) What is the molar mass of aspartame?
- b) How many moles of aspartame are present in 1.00 mg of aspartame? (1000 mg = 1g)
- c) How many molecules of aspartame are present in 1.00 mg of aspartame?
- d) How many hydrogen atoms are present in 1.00 mg of aspartame?

3. A sample of glucose, $\text{C}_6\text{H}_{12}\text{O}_6$, contains 2.03×10^{21} atoms of carbon.
- How many atoms of hydrogen does it contain?
 - How many molecules of glucose does it contain?
 - How many moles of glucose does it contain?
 - What is the mass of the sample in grams?
4. Calculate the following amounts:
- How many moles of chloride ions are in 0.0750 g of magnesium chloride?
 - What is the mass, in grams, of 3.50×10^{-3} mol of aluminum sulfate?
 - What is the mass, in grams, of 1.75×10^{20} molecules of caffeine, $\text{C}_8\text{H}_{10}\text{N}_4\text{O}_2$?
 - What is the molar mass of cholesterol if 0.00105 mol weigh 0.406 g?

5. Calculate the number of molecules in:
- a) 0.0666 mol propane, C_3H_8 , a hydrocarbon fuel
 - b) A 50.0 mg tablet of acetaminophen, $C_8H_9O_2N$, an analgesic solid under the name of Tylenol
 - c) A tablespoon of table sugar, $C_{12}H_{22}O_{11}$, weighing 10.5 g
6. The allowable concentration level of vinyl chloride, C_2H_3Cl , in the atmosphere in a chemical plant is 2.0×10^{-6} g/L.
- a) How many moles of vinyl chloride in each liter does this represent?
 - b) How many molecules per liter is this?

Name _____

Worksheet #6
Empirical and Molecular Formulas

For each problem below, show your work. Always use units and box in your final answer.

1. Determine the empirical formula of each of the following compounds if a sample contains
 - a. 0.104 mol K, 0.052 mol C, and 0.156 mol O

 - b. 5.28g Sn and 3.37g F

 - c. 87.5 percent N and 12.5 percent H by mass

2. Determine the empirical formulas of the compounds with the following compositions by mass
 - a. 10.4% C, 27.8% S, and 61.7% Cl

 - b. 21.7% C, 9.6% O, and 68.7% F

3. What is the molecular formula of each of the following compounds?
- a. empirical formula CH_2 , molar mass = 84 g/mol
 - b. empirical formula NH_2Cl , molar mass = 51.5 g/mol
4. Determine the empirical and molecular formulas of each of the following substances:
- a. Ibuprofen, a headache remedy, contains 75.69% C, 8.80% H, and 15.51% O by mass; the molar mass is about 206 g.
 - b. Benzene contains only carbon and hydrogen and is 7.74% hydrogen by mass. The molar mass of benzene is 78.1 g/mol.

5. Many homes in rural America are heated by propane gas, a compound that contains only carbon and hydrogen. Complete combustion of a sample of propane produced 2.641 g of carbon dioxide and 1.442 g of water as the only products. Find the empirical formula of propane. (Hint: Figure out how many moles of C and H were produced. They all came from the fuel.)
6. (This is probably the hardest problem in the whole packet!) Menthol, the substance we can smell in mentholated cough drops, is composed of C, H, and O. A 0.1005 g sample of menthol is combusted, producing 0.2829 g of CO_2 and 0.1159 g of H_2O .
- What is the empirical formula for menthol?
 - If the compound has a molar mass of 156 g/mol, what is its molecular formula?

Name _____

Worksheet #7
Stoichiometry Problems

For each problem below, show your work. Always use units and box in your final answer.

- 1) Why is it essential to use balanced chemical equations in solving stoichiometry problems?

- 2) Aluminum sulfide reacts with water to form aluminum hydroxide and hydrogen sulfide.
 - a. Write the balanced chemical equation for this reaction.

 - b. How many grams of aluminum hydroxide are obtained from 10.5 g of aluminum sulfide?

- 3) Aluminum sulfide reacts with water to form aluminum hydroxide and hydrogen sulfide.
 - a. Write the balanced chemical equation for this reaction.

 - b. How many grams of aluminum hydroxide are obtained from 10.5 g of aluminum sulfide?

- 4) Calcium carbonate decomposes upon heating, producing calcium oxide and carbon dioxide gas.
 - a. Write a balanced chemical equation for this reaction.

 - b. How many grams of calcium oxide will be produced after 12.25 g of calcium carbonate is completely decomposed?

c. What volume of carbon dioxide gas is produced from this amount of calcium carbonate, at STP?

5) Hydrogen gas and bromine gas react to form hydrogen bromide gas.

a. Write a balanced chemical equation for this reaction.

b. 3.2 g of hydrogen gas and 9.5 g of bromine gas react. Which is the limiting reagent?

c. How many grams of hydrogen bromide gas can be produced using the amounts in (b)?

d. How many grams of the excess reactant is left unreacted?

e. What volume of HBr, measured at STP, is produced in (b)?

6) When ammonia gas, oxygen gas and methane gas (CH_4) are combined, the products are hydrogen cyanide gas and water.

a. Write a balanced chemical equation for this reaction.

b. Calculate the mass of each product produced when 225 g of oxygen gas is reacted with an excess of the other two reactants.

c. If the actual yield of the experiment in (b) is 105 g of HCN, calculate the percent yield.

6) When solutions of potassium iodide and lead (II) nitrate are combined, the products are potassium nitrate and lead (II) iodide.

a. Write a balanced equation for this reaction, including (aq) and (s).

b. Calculate the mass of precipitate produced when 50.0mL of 0.45M potassium iodide solution and 75mL of 0.55M lead (II) nitrate solution are mixed.

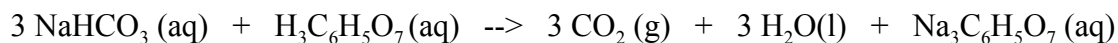
c. Calculate the volume of 0.50M potassium iodide required to react completely with 50.0mL of 0.50M lead (II) nitrate.

Name _____

Worksheet #8
Limiting Reactants and Theoretical Yield

For each problem below, show your work. Always use units and box in your final answer.

1. A manufacturer of bicycles has 50 wheels, 30 frames, and 24 seats.
 - a. How many bicycles can be manufactured using these parts?
 - b. How many parts of each kind are left over?
 - c. Which part is like a limiting reactant in that it limits the production of bicycles?
2. The fizz produced when an Alka-Seltzer tablet is dissolved in water is due to the reaction between sodium bicarbonate, NaHCO_3 , and citric acid, $\text{H}_3\text{C}_6\text{H}_5\text{O}_7$:



In a certain experiment 1.00 g of sodium bicarbonate and 1.00 g of citric acid are allowed to react.

- a. Which reactant is the limiting reactant? You must show work to support your answer.
- b. How many grams of carbon dioxide form?
- c. How much of the limiting reactant is left when the reaction is complete?
- d. How much of the excess reactant remains after the reaction is complete?

3. When hydrogen sulfide gas is bubbled into a solution of sodium hydroxide, the reaction forms sodium sulfide and water. How many grams of sodium sulfide are formed if 2.50 g of hydrogen sulfide is bubbled into a solution containing 1.85 g of sodium hydroxide, assuming that the limiting reagent is completely consumed?
4. Solutions of sulfuric acid and lead (II) acetate react to form solid lead (II) sulfate and a solution of acetic acid. If 10.0 g of sulfuric acid and 10.0 g of lead (II) acetate are mixed, calculate the number of grams of sulfuric acid, lead (II) acetate, lead (II) sulfate, and acetic acid present in the mixture after the reaction is complete.

5. A student reacts benzene, C_6H_6 , with bromine, Br_2 , to prepare bromobenzene, $\text{C}_6\text{H}_5\text{Br}$, and HBr .

a. What is the theoretical yield of bromobenzene in this reaction when 30.0 g of benzene reacts with 65.0 g of bromine?

b. If the actual yield of bromobenzene was 56.7 g, what was the percent yield?

Name _____

Worksheet #9
Solubility Rules

Review Solubility Rules provided at the beginning of the packet and identify each of the following compounds as soluble or insoluble in water. You must memorize the solubility rules!

Na_2CO_3 _____

CoCO_3 _____

$\text{Pb}(\text{NO}_3)_2$ _____

K_2S _____

BaSO_4 _____

$(\text{NH}_4)_2\text{S}$ _____

AgI _____

$\text{Ni}(\text{NO}_3)_2$ _____

KI _____

FeS _____

PbCl_2 _____

CuSO_4 _____

Li_2O _____

$\text{Mn}(\text{C}_2\text{H}_3\text{O}_2)_2$ _____

$\text{Cr}(\text{OH})_3$ _____

AgClO_3 _____

$\text{Sn}(\text{SO}_3)_4$ _____

FeF_2 _____

1) Circle the compounds from the list below which are insoluble in water

HCl , NH_3 , NaClO_3 , BaSO_4 , AgNO_3 , PbCl_2 , Cu_2O , CuSO_4 , $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)$, AgBr

Name _____

Worksheet #10

Personal Statement

1. Write a paragraph to tell me about your Chemistry experience last year. What did you like and dislike? What were you good at and not so good at? What teaching and learning techniques work well for you?
2. Write another paragraph to tell me about your hopes for AP Chemistry. What made you decide to take this class? How much effort are you willing to give to the class? What do you hope to take away from it?

