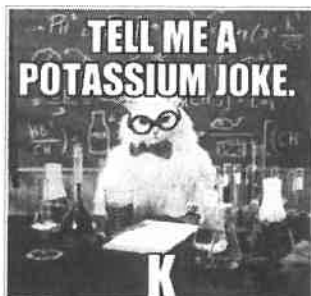


Welcome to AP Chemistry

2017-2018



All joking aside...

I am excited that you will have the opportunity to take the challenge that AP Chemistry has to offer! To start the year on a positive note and help you prepare for this challenge I have put together this "Summer Assignment". This homework is meant to be a review of the materials covered during 1st year chemistry as well as some memorization of ions and solubility rules that you will need throughout the year. Having these skills will be essential to your success in AP Chemistry and I will expect that you already have a firm grasp of these topics as we start the year.

The "Summer Assignment" is a collection of questions about the topics covered in chapters 1-3 of the Zumdahl textbook. Reading each chapter and taking notes or making concept maps is highly encouraged. Although there are many amazing resources, videos and tutorials on the internet, the ability to extract information from a textbook is a skill worthy of practice!

In the packet you will find a chapter outline for the first three chapters. The outline includes objectives and practice problems. Please finish these and make sure to **SHOW ALL WORK**. Please remember, **no credit, if no work is shown**. There are some additional worksheets on some topics. **Complete all of the attached handouts.**

You will find links, podcasts, lecture notes, pencasts and other material to help you with the review assignment on the classroom website. You should receive an invitation to join google classroom based on your school email.

Please note all portions of the summer assignment will be due the week of orientation - BEFORE the start of the school year. Instructions for turning in the assignment as well as the specific due date will be posted on the classroom web page at the beginning of August.

Part II of the summer assignment involves memorizing ions, some rules about solubility and reaction patterns.

AP Chemistry is an extremely challenging course. While it is definitely not about memorization, having these items memorized is essential to successfully learn the concepts covered in the course

1. There is a list of ions that you must know. Utilize the suggestions for making the process of memorization easier. For instance, most of you will remember that most of the monatomic ions have charges that are related directly to their placement on the periodic table. There are naming patterns that greatly simplify the learning of the polyatomic ions as well. I have include a sheet of flashcards for the polyatomic ions that you must learn. I strongly suggest you cut them out and begin memorizing them immediately. Use the hints on the common ions sheet to help you reduce the amount of memorizing that you must do.
2. Memorize the solubility rules and be able to identify whether a substance will break into ions when dissolved in water.
3. Start to memorize some of the basic reaction patterns these can be found on the pattern sheet and are marked with a star *

I could wait and throw these at you on the first day of school, but I don't think that would be fair to you. Use every modality possible as you try to learn these - speak them, write them, visualize them. Make flash cards, form a study group, have your family and friends quiz you, take the lists with you on vacation, but do whatever it takes to get this information embedded in your head.

I look forward to seeing you all at the beginning of the next school year. If you need to contact me during the summer, you can email me and I will get back to you quickly. Please make sure to check the website at the beginning of August for any additional information about the summer assignment. Have a fun and rejuvenating summer!

Mrs. Kynast

Kynasta@howellschools.com

Review for the Summer

STUDY LIST

Chapter 1 – Matter and Measurement

- Define solid, liquid, and gas
- Know the Kinetic Molecular Theory and how particles behave in different states of matter
- Know qualitative, quantitative and inference observations
- Know the difference between homogeneous and heterogeneous mixtures
- Know the difference between elements and atoms
- Know the difference between ions and molecules
- Know how to distinguish physical properties
- Know the density formula and how to use it to calculate density, mass and volume

~~Problem 54, 59~~

- Know the difference between Celsius and Kelvin; convert from one to the other
- Know how temperature affects physical properties such as density
- Know the difference between intensive and extensive properties
- Know your safety rules
- Know the difference between physical and chemical changes
- Know the SI units
- Know all the prefixes and their values

~~Problem 38~~

- Know how to do dimensional analysis
- Know how to do scientific notation
- Know the difference between precision and accuracy, and experimental error

~~Problem 19~~

- Know significant figures of measurements and in calculations

~~Problems 26, 27, 30~~

- Know how to do percents

Chapter 2 – Atoms and Elements

- Know the scientists, their theories, and what they did.
 - Define law of conservation of matter, law of constant composition (definite proportions)
- ~~Problem 15, 25~~
- Know the characteristics of protons, electrons, and neutrons.

- Know alpha (α), beta (β), and gamma (γ) rays.
- Review the cathode ray experiment (by Thomson), the oil drop experiment (by Millikan), and the gold foil experiment (by Rutherford).

~~Problem 17, 18~~

- Know about how J.J. Thompson obtained the charge / mass ratio
- Know the structure of the atom.
- Know the principle behind Rutherford's gold foil experiment and the discovery of the nucleus
- Define atomic number, atomic mass, atomic mass unit, and mass number.
- Be able to calculate the number of electrons, protons, and neutrons present in an atom given its mass number.

~~Problem 44, 52~~

- Know isotopes and how to write them
- Know most elements have at least two stable (non-radioactive) isotopes
- Know how to find the number of protons and neutrons in an isotope
- Know the 3 isotopes of hydrogen
- Know how to calculate the average atomic mass from Isotopic Abundances (will cover in class)
- Know how to calculate Isotopic Abundances
- Know what a mass spectrometer is and what it measures (will cover in class)
- Know the difference between a group (family) and a period on the periodic table
- Know where metals, non-metals, and metalloids are on the periodic table; know the properties of each
- Know the locations of Group 1A (Alkali Metals), Group 2A (Alkaline Earth Metals), Group 3A-Group 6A, Group 7A (Halogens) and Group 8A (Noble Gases/inert gases)

~~Problem 53, 56~~

- Know location of Group B's (transition elements)
- Know location of Lanthanides and Actinides
- Know the 7 diatomic elements
- Know your ions (monatomic ions and polyatomic ions)

- Know how to name ions in the traditional (-ic, -ous) and Stock system (II, III)
- Know the terms cations and anions
- Write and name ionic compounds
- Write and name nonmetal (molecular) compounds (mono-, di-, tri-, etc.)
- Know common names of binary compounds

Chapter 3 – Molecules and Compounds

- Know the terms chemical formula, empirical formula, molecular formula, and structural formula
- Know definition of mole and Avogadro's Number (6.02×10^{23} molecules in one mole)
- Calculate the molar mass of a substance
- Know how to convert from moles to mass(g), molecules, volume(L) using conversion factor
- Know how to calculate % composition
- Know how to calculate empirical and molecular formulas from mass percent and combustion reactions
- Define hydrated compounds
- Know how to determine the formula of a hydrated compound from experimental data

Summary of Reactions

Anhydrides

- Metallic hydrides plus water produce hydrogen gas and metallic hydroxides. *
- Soluble metallic oxides and water form bases (metallic hydroxides).
- Group IA and IIA metallic nitrides react with water to produce metallic hydroxides and ammonia. *
- Soluble nonmetallic oxides and water form acids. (Note: The nonmetal retains its oxidation number.)

Combustion

- Hydrocarbons and other organic compounds combine with excess oxygen to form carbon dioxide and water.
- Metals combine with oxygen to form metallic oxides.
- Nonmetallic hydrides combine with oxygen to form water and nonmetal oxides.
- Nonmetallic sulfides combine with oxygen to form sulfur dioxide and nonmetal sulfides. *

Complex Ions

- Complex ion solutions treated with a strong acid solution produce the free metal ion or a metal precipitate and the ligand ion.
- An electron pair acceptor is combined with an electron pair donor to form a coordinate covalent compound.
- Metal ion solutions react with an excess of concentrated ammonia to form ammine complex ions.
- Metal ion solutions react with an excess of cyanide solution to form cyano complex ions.
- Metal ion solutions react with an excess of hydroxide solution to form hydroxo complex ions.
- Metal ion solutions react with thiocyanate solution to form thiocyanato complex ions.
- Solid metallic hydroxides when combined with concentrated ammonia solution produce soluble ammine complex ions and hydroxide ions.
- Solid metallic hydroxides added to hydroxide solution produce hydroxo complex ions.

Decomposition

- Ammonium carbonate decomposes into ammonia, water and carbon dioxide. *
- Ammonium hydroxide decomposes into ammonia and water.
- Binary ionic compounds (molten) can be electrolyzed into their metal and nonmetal components. *
- Carbonic acid decomposes into water and carbon dioxide.

- * Hydrogen peroxide decomposes into water and oxygen.
- * Metallic carbonates decompose into metallic oxides and carbon dioxide.
- * Metallic chlorates decompose into metallic chlorides and oxygen.
- * Oxyacids decompose into water and a nonmetallic oxide.
- * Sulfurous acid decomposes into water and sulfur dioxide.

Synthesis

- * A binary molecular compound combined with a nonmetal (contained in the compound) forms a single compound.
 - An electron pair acceptor is combined with an electron pair donor to form a coordinate covalent compound.
 - A halogen is added to an alkane forming a halogenated alkane.
 - A halogen is added to an alkene forming a halogenated alkane.
 - Hydrogen is added to an alkene forming an alkane.
- * Metals and nonmetals combine to form binary ionic compounds.
 - Metal ion solutions react with an excess of concentrated ammonia to form ammine complex ions.
 - Metal ion solutions react with an excess of cyanide solution to form cyano complex ions.
 - Metal ion solutions react with an excess of hydroxide solution to form hydroxo complex ions.
- * Metal oxides combine with carbon dioxide to form metallic carbonates.
- * Metal oxides combine with sulfur dioxide to form metallic sulfites.
- * Nonmetallic oxides and water form acids. (Note: The nonmetal retains its oxidation number.)
- * Soluble metallic oxides and water form bases (metallic hydroxides).

Metathesis (Double Replacement)

- * Two soluble ions in aqueous solution may form an insoluble precipitate.
 - Metal sulfides when combined with any acid will form hydrogen sulfide gas and a salt.
 - Metallic carbonates when combined with any acid will form carbon dioxide gas, water and a salt.
 - Metallic sulfites when combined with any acid will form sulfur dioxide gas, water and a salt.
 - Ammonium salts when heated with a soluble strong hydroxide will form ammonia gas, water and a salt.
- * An acid and a base will form a salt and water.
 - A salt formed from a strong acid and a weak base will hydrolyze in water to form a strong acid and a weak base.
 - A salt formed from a weak acid and a strong base will hydrolyze in water to form a weak acid and a strong base.

Ions to memorize

TABLE 4.4

Common Polyatomic Ions					
1- charge		2- charge		3- charge	
Formula	Name	Formula	Name	Formula	Name
H_2PO_4^-	Dihydrogen phosphate	HPO_4^{2-}	Hydrogen phosphate	PO_3^{3-}	Phosphite
$\text{C}_2\text{H}_3\text{O}_2^-$	Acetate	$\text{C}_2\text{O}_4^{2-}$	Oxalate	PO_4^{3-}	Phosphate
HSO_3^-	Hydrogen sulfite	SO_3^{2-}	Sulfite		
HSO_4^-	Hydrogen sulfate	SO_4^{2-}	Sulfate		
HCO_3^-	Hydrogen carbonate	CO_3^{2-}	Carbonate		
NO_2^-	Nitrite	CrO_4^{2-}	Chromate	1+ charge	
NO_3^-	Nitrate	$\text{Cr}_2\text{O}_7^{2-}$	Dichromate	Formula	Name
CN^-	Cyanide	SiO_3^{2-}	Silicate	NH_4^+	Ammonium
OH^-	Hydroxide				
MnO_4^-	Permanganate				
ClO^-	Hypochlorite				
ClO_2^-	Chlorite				
ClO_3^-	Chlorate				
ClO_4^-	Perchlorate				

SOLUBILITY RULES

- Salts of ammonium (NH_4^+) and Group IA are always soluble.**
- All chlorides (Cl^-) are soluble except AgCl , Hg_2Cl_2 , and PbCl_2 which are insoluble.
 - All bromides (Br^-) are soluble except with Ag, Hg and Pb (same as chloride)
 - All iodides (I^-) are soluble except with Ag, Hg, Pb (same as chloride)
- Chlorates (ClO_3^-), nitrates (NO_3^-), and acetates (CH_3COO^-) are soluble.
- Sulfates (SO_4^{2-}) are soluble except CaSO_4 , SrSO_4 , BaSO_4 , Hg_2SO_4 , HgSO_4 , PbSO_4 , and Ag_2SO_4 which are insoluble.
- Phosphates (PO_4^{3-}), and carbonates (CO_3^{2-}) are insoluble except NH_4^+ and Group IA compounds.
- All metallic hydroxides (OH^-) are insoluble except NH_4^+ and Group IA and Group IIA from calcium down.

Advanced Placement Chem ~ Summer Assignment

Learning Target 1 – I can count the number of significant figures in a measurement.

Review Reading: Zumdahl 5th Ed. Pg 13-16

1) Count the number of significant figures in the following measurements:

- a) 2.71 g _____ b) 0.00047 kg _____ c) 7.0×10^5 m _____ d) 1,030 L _____
e) 150 pencils _____ f) 37500 g _____ g) 0.1010 cm _____

Learning Target 2 – I can convert numbers to scientific notation while applying significant figures.

Review Reading: Zumdahl 5th Ed. Pg 13-16

2) Express each of the following in proper scientific notation (Pay attention to sig figs and units)

- a) 0.000125 m _____ b) 155.0 mL _____
c) 123,030,000 kg _____ d) 481.9×10^{-9} cm _____

Learning Target 3 - I can add, subtract, multiply, and divide with the correct number of significant figures.

Review Reading: Zumdahl 5th Ed. Pg 13-16

3) Calculate the correct answer with proper units and sig figs for each of the following:

- a) $12 \text{ g} + 0.677 \text{ g} + 86.33 \text{ g} =$ _____
b) $(355.78 \text{ g}) / (0.056 \text{ g}) =$ _____
c) $97.34 \text{ mL} - 34.1 \text{ mL} =$ _____
d) $14.68 \times 5 =$ _____

4) Perform the following calculations with scientific notation and report your answer with the correct number of significant figures.

- a) $0.14 \times (6.02 \times 10^{23}) =$ _____
b) $\frac{(9.875 \times 10^4) - (9.795 \times 10^4)}{9.875 \times 10^4} \times 100 \% =$ _____ (assume 100 is exact)
c) $\frac{(3.8 \times 10^{-12} + 4.0 \times 10^{-13})}{(4 \times 10^{12} + 6.3 \times 10^{13})} =$ _____

Learning Target 4 – I can use conversions to solve dimensional analysis problems.

Review Reading: Zumdahl 5th Ed. Pg 17-21

- 5) Solve the following problems using conversions and dimensional analysis.
- A large railroad car is filled with 1745 gallons of milk. The car springs a leak in the bottom, and milk starts dripping out at a rate of 204.84 mL/sec. If the train is traveling at a speed of 65.4 miles per hour, calculate how many miles it will travel before all the milk has drained out of the car. (1 gal = 3.78 L, 1 mile = 5280 ft, 1 in = 2.54 cm)
 - The world record for the hundred meter dash is 9.77 seconds. What is the corresponding average speed in units of m/sec, km/hr, ft/sec, and miles/hr?

Learning Target 5 – I can explain density and use the density equation to find an unknown.

Review Reading: Zumdahl 5th Ed. Pg 25

- A rectangular block has dimensions of 2.9 cm x 3.5 cm x 10.0 cm. The mass of the block is 615.0 grams. What are the volume and the density of the block?
- The density of pure silver is 10.5 g/mL at 20°C. If 5.25 grams of pure silver pellets are added to a graduated cylinder containing 11.2 mL of water, to what volume will the water in the cylinder rise?

Learning Target 6 – I can define and explain terms that identify physical/chemical characteristics of matter.

Review Reading: Zumdahl 5th Ed. Pg 25-28

- 8) Define the following terms:
- Solid –
 - Liquid –
 - Gas –
 - Pure substance –
 - Homogeneous mixture –
 - Heterogeneous mixture –
 - Chemical change –
 - Physical change –

9) Identify the following as a physical property, physical change, chemical property, or chemical change:

- a) Ethanol has a density of 0.697 g/mL.
- b) The solution turns blue upon mixing water and food coloring.
- c) Wood burns in an oven.
- d) Methyl alcohol is highly flammable.
- e) Ice melts in a beaker.
- f) Methyl ethanoate smells like apples.
- g) A car crashes into a wall.
- h) Sugar dissolves in water.

Learning Target 7 – I can identify the number of protons, neutrons, and electrons in atoms and isotopes.

Review Reading: Zumdahl 5th Ed. Pg 55-58

10) What number of protons and neutrons are contained in the nucleus of each of the following atoms?

Assuming each atom is uncharged, what number of electrons are present?

- a) ${}_{92}^{235}\text{U}$
- b) ${}_{6}^{13}\text{C}$
- c) ${}_{26}^{57}\text{Fe}$
- d) ${}_{82}^{208}\text{Pb}$

11) Complete the following table:

Name	Mass #	Atomic #	# of Protons	# of Neutrons	# of Electrons	Symbol
Gallium	70					
						${}_{15}^{31}\text{P}^{-3}$
Strontium-80						
						${}_{25}^{55}\text{Mn}^{+2}$

Learning Target 8 – I can define and use the Law of Definite Proportions and the Law of Multiple Proportions.

Reading: Zumdahl 5th Ed. 41-46 (might not be review)

12) Explain:

- a) Law of Definite Proportions:
- b) Law of Multiple Proportions:

13) Solve the following problem:

Tin – Oxygen compound	Tin % by mass	Oxygen % by mass
Stannous oxide	88.10%	11.90%
Stannic oxide	78.70%	21.30%

Tin – Oxygen compound	Tin mass	Oxygen mass
Stannous oxide	100.0 grams	
Stannic oxide	100.0 grams	

a) Use the Law of Definite Proportions to determine the mass of oxygen needed to combine with the given masses of tin for stannous oxide and stannic oxide.

b) Does the Law of Multiple Proportions hold true in this case? Explain why or why not.

Learning Target 9 – I can name and write formulas for ionic compounds.

Review Reading: Zumdahl 5th Ed. Pg 60-66

14) Name or give the formula for the following compounds:

<u>Name</u>	<u>Formula</u>
Acetic Acid	_____
_____	K ₂ O
Calcium phosphate	_____
_____	CrO
Iron (II) chloride	_____
_____	NaMnO ₄
Sodium sulfate	_____
_____	CaCO ₃
Lithium phosphate	_____
_____	SO ₂
Calcium hydroxide	_____
_____	H ₂ SO ₄
Cupric chloride	_____

Learning Target 10 – *I can write and balance equations.*

Review Reading: Zumdahl 5th Ed.

Write and balance the following equations:

- a) Iron metal reacts with oxygen to form rust, iron (III) oxide.

- b) Calcium metal reacts with water to produce aqueous calcium hydroxide and hydrogen gas.

- c) Aqueous barium hydroxide reacts with aqueous sulfuric acid to produce solid barium sulfate and water.

Learning Target 11 – *I can do conversions associated with moles.*

Review Reading: Zumdahl 5th Ed. 83-90

15) Solve the following problems:

- a) Calculate the mass of 500. Atoms of iron (Fe).

- b) How many formula units are present in 87.2 grams of lead (IV) carbonate?

- c) Aspartame is an artificial sweetener that is 160 times sweeter than sucrose (table sugar) when dissolved in water. It is marketed as Nutra-Sweet. The molecular formula of aspartame is $C_{14}H_{18}N_2O_5$.
 - i. Calculate the molar mass of aspartame.

 - ii. Calculate the mass, in grams, of 1.56 mol of aspartame.

 - iii. How many molecules are in 5.0 mg of aspartame?

 - iv. How many atoms of nitrogen are in 1.2 g aspartame?

 - v. What is the mass of one molecule of aspartame?

Learning Target 12 – I can calculate percent by mass for an element in a compound.

Review Reading: Zumdahl 5th Ed. 91-100

16) Calculate the percent by mass for each element in aspartame from the previous problem.

17) Calculate the percent composition of $\text{Al}_2(\text{SO}_4)_3$

Learning Target 13 – I can calculate the average atomic mass of an isotope using percent abundance.

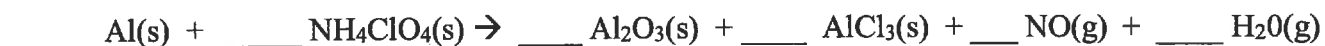
Review Reading: Zumdahl 5th Ed. 52-60

18) An element consists of 1.40% of an isotope with a mass of 203.973 amu, 24.10% of an isotope with mass 205.9745 amu, 22.10% of an isotope with mass 206.9759 amu, and 52.40% of an isotope with mass 207.9766 amu. Calculate the average atomic mass and identify the element.

Learning Target 14 – I can solve stoichiometry problems, include those that use limiting and excess.

Review Reading: Zumdahl 5th Ed. 102-120

19) The reusable booster rockets of the U.S. space shuttle employs a mixture of aluminum and ammonium perchlorate for fuel. A possible reaction for this is:



a) Balance the following reaction:

b) If 4.0 g of aluminum reacted with 15.0 g of ammonium perchlorate, what would be the limiting reactant? How much excess of the other reactant would you have?

c) Using the above information, how much aluminum chloride would be produced in grams?

d) If you actually collected 4.18 g of aluminum chloride what would be your percent yield?

20) You add aluminum to a solution of copper (II) chloride and it reacts exothermically. Write and balance the equation below.

a) If you react 1.25 g of Al, how much copper (II) chloride do you need to add for the Al to fully react?

b) How much of each product would you collect?

21) When 125.0 g of ethylene (C_2H_4) burns in 60.0 grams of oxygen to give carbon dioxide and water, how many grams of CO_2 are formed? (Hint: balance the equation and determine limiting reactant first)

Learning Target 15 – *I can determine the empirical and molecular formula by calculation.*

Reading: Zumdahl 5th Ed. 93-100 (might not be review)

22) Phenol is a compound that contains 76.57% carbon, 6.43% hydrogen, and 17.0% oxygen.

a) Calculate the empirical formula.

b) If its molecular weight is 188 g/mol, what would be its molecular formula?

Learning Target 16 - *I can calculate the empirical formula of an unknown hydrocarbon through a combustion reaction and calculation.*

Reading: 93-105

- 22) Menthol, the substance we can smell in mentholated cough drops, is composed of carbon, hydrogen, and oxygen. A 0.1005 gram sample of menthol is combusted producing 0.2829 g of CO₂ and 0.1159 g of H₂O. What is the empirical formula for menthol? Show work.

NOMENCLATURE REVIEW

Molecular Compounds, Ionic Compounds, & Acids

NAME THE FOLLOWING COMPOUNDS:

1. BaSO_3
2. $(\text{NH}_4)_3\text{PO}_4$
3. PBr_5
4. MgSO_4
5. CaO
6. H_3PO_4 (aq)
7. $\text{Na}_2\text{Cr}_2\text{O}_7$
8. MgO
9. SO_4
10. $\text{Cu}(\text{NO}_3)_2$
11. HI (aq)
12. N_2O
13. MnO
14. AgNO_3
15. As_2O_5
16. Fe_2O_3
17. HClO (aq)
18. N_2O_3
19. HF (aq)
20. $\text{H}_2\text{C}_2\text{O}_4$
21. NaHCO_3
22. SiBr_4
23. CuCl_2
24. HNO_2 (aq)
25. SnO_2
26. BaCrO_4

do the
odds

WRITE FORMULAS FOR THE FOLLOWING COMPOUNDS:

27. hydrobromic acid
28. chromium(III) carbonate
29. magnesium sulfide
30. iodine trichloride
31. lithium hydride
32. ammonium hydroxide
33. calcium chloride
34. hydroselenic acid
35. iron(II) nitride
36. aluminum hydroxide
37. tin(II) fluoride
38. sulfur tetrachloride
39. mercury(II) iodide
40. diphosphorus pentoxide
41. sulfurous acid
42. lead(II) nitrate
43. dihydrogen monoxide
44. sodium oxalate
45. perchloric acid
46. chlorous acid
47. silicon dioxide
48. carbonic acid
49. sodium chlorate
50. xenon hexafluoride
51. nickel nitrate
52. potassium perchlorate

... ..

14. Citric acid, a flavoring agent in many carbonated beverages, has a molar mass of 192 g/mole and a percent composition by mass of 37.50% C, 4.21% H, and 58.29% O. Determine the empirical and the molecular formulas for citric acid.
-
15. An Unknown compound containing only Carbon and Hydrogen is burned in O_2 and generates: 0.294 g CO_2 0.120 g H_2O
a.) What is the Empirical Formula?
- b.) If the molar mass of the compound is found to be 28 g/mole, determine its molecular formula.
16. A 0.8640 g sample of a Compound containing only Carbon, Hydrogen and Oxygen is burned in a combustion analysis apparatus, and generates the following data: 1.727 g CO_2 0.7068 g H_2O
Determine the Empirical Formula for the compound.
17. 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/mole, what is the molecular formula?

3. Solubility rules

I. Review solubility rules and identify each of the following compounds as soluble (S) or insoluble (I) in water. You must memorize the solubility rules given in this packet. *You may want to spend time memorizing the solubility rules before you compete the next two sections, try them without using your solubility chart, and then check them using the chart.*

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 _____

II. Write out the balanced chemical equation for each of the following double replacement reactions. Predict whether each of these double replacement reactions will give a precipitate or not based on the solubility of the products. If yes, identify the precipitate.

silver nitrate and potassium chloride

magnesium nitrate and sodium carbonate

strontium bromide and potassium sulfate

cobalt (III) bromide and potassium sulfide

ammonium hydroxide and copper (II) acetate

lithium chlorate and chromium (III) fluoride
