2016 – 2017 AP/IB Chemistry
Mrs. Legrand
Summer Assignment

Welcome to AP Chemistry! Next year, we will have roughly 19 chapters to cover in approximately 30 weeks. Although that appears to be a reasonable task, several of the chapters require a minimum of two weeks to cover fully. To make this a more manageable task for us during the school year, you should begin preparing during the summer. With that thought in mind, the assignment below is to be completed over the summer. Do not leave the entire assignment to be done in the few weeks before school starts. One effective way to mark the areas you have questions on is to write your question on a *Post it* note and place it on the page in your textbook that is giving you difficulty. You may also e-mail me any questions at hlegrand@pasco.k12.fl.us . I will try to respond to you in a timely manner and answer your questions if it can be done easily via e-mail. I will be out of town for a week at the end of June and the first two weeks of July.

Part 1

Make flashcards (or other memorization learning devices) and memorize:

a) The names & symbols of the most commonly used elements (#1-36, 47-56, 74, 78-83, 86, 88, 92, 93)
b) The names, symbols & charges of common ions = two tables are provided, both tables must be memorized
c) Prefixes of the metric system = table provided
d) The method used in naming common covalent and ionic compounds
e) Solubility Rules

*There will be a **quiz** of the memorized material on the first day of school. You will be **tested** on the memorized review within a week after we return to school. AP Chemistry is a different kind of course. It is not all about memorization; however, having these 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 in your head. Do no wait until the night before school begins.

Names, Formulas, and Charges of Some Common Polyatomic Ions

NH_4^+	Ammonium	SO_4^{2-}	Sulfate	S^{2-}	Sulfide
$C_2H_3O_2^-$	Acetate	HSO_4^-	Hydrogen sulfate	ClO^-	Hypochlorite
CO_3^{2-}	Carbonate	SO_3^{2-}	Sulfite	ClO_2^-	Chlorite
HCO_3^-	Hydrogen carbonate	HSO_3^-	Hydrogen sulfite	ClO_3^-	Chlorate
$C_2O_4^{2-}$	Oxalate	$S_2O_3^{2-}$	Thiosulfate	ClO_4^-	Perchlorate
CN^-	Cyanide	HS^-	Hydrogen sulfide	SiO_4^{4-}	Silicate
OCN^-	Cyanate	O^{2-}	Oxide	BrO_3^-	Bromate
SCN^-	Thiocyanate	O_2^{2-}	Peroxide	BO_3^{3-}	Borate
NO_2^-	Nitrite	CrO_4^{2-}	Chromate	P^{3-}	Phosphide
NO_3^-	Nitrate	$Cr_2O_7^{2-}$	Dichromate	IO_3^-	Iodate
PO_4^{3-}	Phosphate	MnO_4^-	Permanganate	N^{3-}	Nitride
HPO_4^{2-}	Hydrogen phosphate	Br^-	Bromide	Cl^-	Chloride
$H_2PO_4^-$	Dihydrogen phosphate	F^-	Fluoride	OH^-	hydroxide

Names, Formulas, and Charges of Some Common Ions

Al^{3+}	Aluminum	Au^{3+}	Gold (III)	Fe^{3+}	Iron (III)
Na^{+}	Sodium	Sn^{2+}	Tin (II)	Co^{2+}	Cobalt (II)
Mn^{2+}	Manganese (II)	Sn^{4+}	Tin (IV)	Co^{3+}	Cobalt (III)
Ni^{2+}	Nickel (II)	Pb^{2+}	Lead (II)	Cu^{+}	Copper (I)
Zn^{2+}	Zinc	Pb^{4+}	Lead (IV)	Cu^{2+}	Copper (II)
Cd^{2+}	Cadmium	Cr^{2+}	Chromium (II)	Hg_2^{2+}	Mercury (I)
Ag^{+}	Silver	Cr^{3+}	Chromium (III)	Hg^{2+}	Mercury (II)
Au^{+}	Gold (I)	Fe^{2+}	Iron (II)	Ca^{2+}	Calcium

Prefixes of the Metric System

Mega	M	10^{6} or 1,000,000	One million of
Kilo	K	10^{3} or 1000	One thousand of
Deci	d	10^{-1} or 1/10	One tenth of
Centi	c	10^{-2} or 1/100	One hundredth of
Milli	m	10^{-3} or 1/1000	One thousandth of
Macro	μ	10^{-6} or 1/1,000,000	One millionth of
Nano	n	10^{-9} or 1/1,000,000,000	One billionth of

Naming

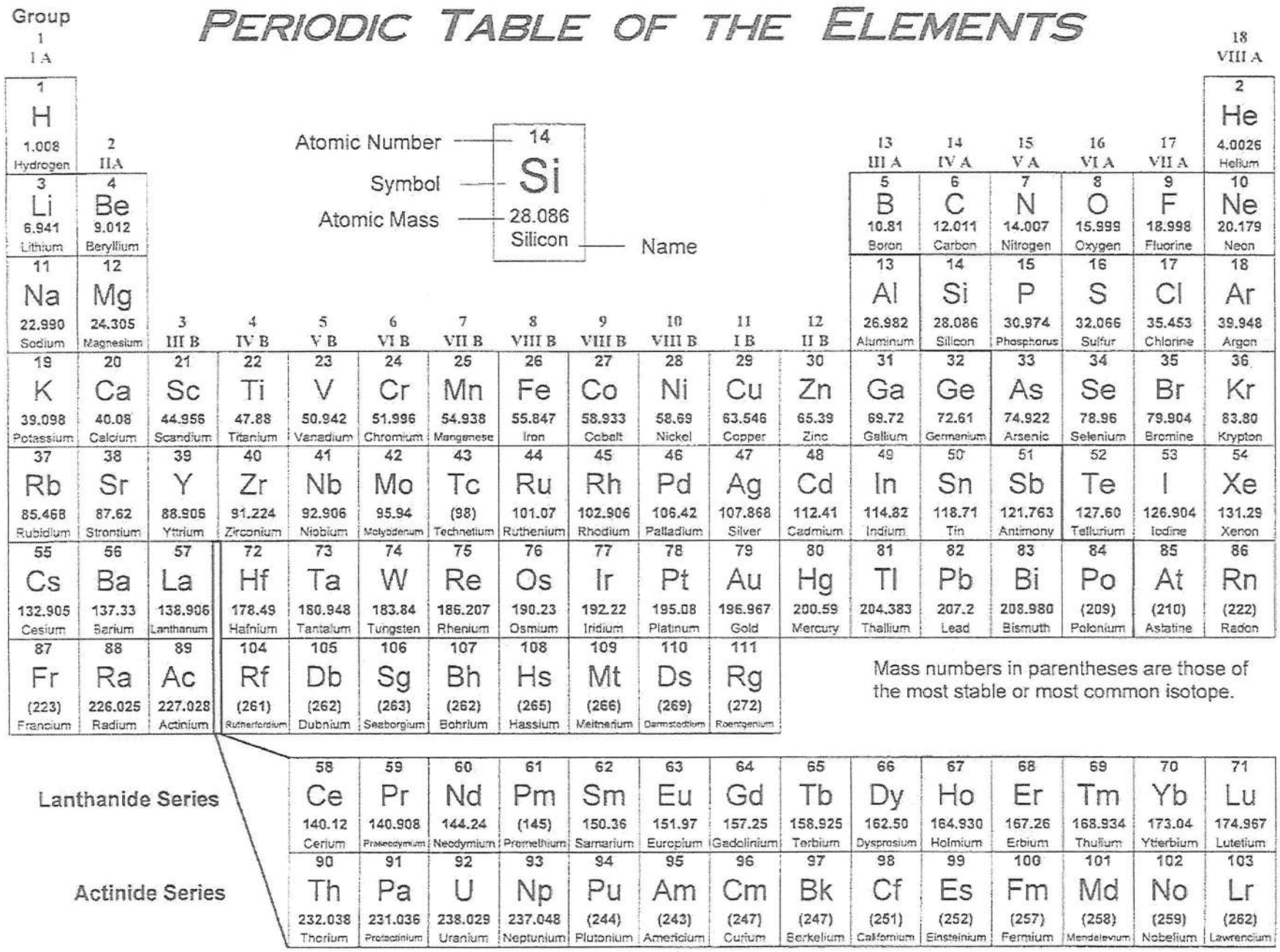
Covalent compounds are formed between nonmetallic elements. The names of binary covalent compounds are obtained from the names of the two elements. The elements are named in the same order as they appear in the formula. The first element name is unchanged; the ending of the second becomes "-ide." The element names have prefixes depending on the subscript of that element in the formula, except that prefix mono- (meaning one of) is rarely used for the first element in a formula. Other prefixes are : di=2, tri=3, tetra=4, penta=5, hexa=6, hepta=7, octa=8, nona=9, and deca=10. Review how to name ionic compounds (metal and nonmetal). This procedure can be found in your textbook for the three types (metal with single oxidation number, metal with multiple oxidation numbers, and polyatomic ions). Also, review how to name acids.

Solubility Rules

When two chemicals are mixed, they sometimes form a solid precipitate. Memorizing these rules will allow you to predict whether or not a chemical reaction will occur. On the first day quiz, you will be asked whether a substance is soluble or insoluble, and you must correctly predict it based on your memorization of the rules below.

1. All compounds containing alkali metal cations and NH_4^{+} ions are soluble.
2. All compounds containing NO_3^{-}, ClO_4^{-}, ClO_3^{-}, and $C_2H_3O_2^{-}$ anions are soluble.
3. All chlorides, bromides, and iodides are soluble except those containing Ag^{+}, Pb^{2+}, or Hg^{2+}.
4. All sulfates are soluble except those containing Hg^{2+}, Pb^{2+}, Sr^{2+}, Ca^{2+}, or Ba^{2+}.
5. All hydroxides are insoluble except compounds of the alkali metals, Sr^{2+}, Ca^{2+}, and Ba^{2+}.
6. All compounds containing PO_4^{3-}, S^{2-}, CO_3^{2-}, and SO_3^{2-}, ions are insoluble except those that also contain alkali metals or NH_4^{+}.

Periodic Table of the Elements



NAMING COMMON INORGANIC COMPOUNDS

INORGANIC COMPOUNDS

Metal-Nonmetal (IONIC)

FIXED CHARGES
Groups IA, 2A, 3A, Zn, Cd, Ag

Rule:
Name of metal + name of anion (or polyatomic ion)

Examples:
$Ba(NO_3)_2$, Barium Nitrate
CaF_2, Calcium Fluoride
Al_2O_3, Aluminum Oxide
MgO, Magnesium Oxide
K_2SO_4, Potassium Sulfate
NaCl, Sodium Chloride

Comments: Ammonium ion, NH_4^+, can act as the "metal"

Example: Ammonium acetate, $NH_4C_2H_3O_2$

VARIABLE CHARGES
Transition metals, Sn, Pb

STOCK SYSTEM
Name of metal (Roman numeral to indicate ion's charge) + name of anion/polyatomic ion.

Examples:

Cu_2O, Copper (I) oxide

CuO, Copper (II) oxide

$FeCl_2$, Iron (II) chloride

$Fe_3(PO_4)_2$, Iron (II) phosphate

$PbSO_4$, Lead (II) Sulfate

SnO_2, Tin (IV) oxide

Nonmetal-Nonmetal (COVALENT)

Rules:
(1) Prefix + name of 1st element
   a. No change in name
   b. **Mono** is never used for the 1st element.
(2) Prefix + name of 2nd element and change the ending to <u>-ide</u>
   a. Drop the "a" or "o" on the end of a prefix if oxide is the 2nd element

EXAMPLES:
CO_2 - carbon dioxide
N_2O_3 - dinitrogen trioxide

PREFIXES:

1-mono	4-tetra	7-hepta
2-di	5-penta	8-octa
3-tri	6-hexa	9-nona
		10-deca

WRITING FORMULA RULES

This system of writing formulas is based on whether the compound had ionic or covalent bonds or is an acid. The two common methods used are:

1. Least common multiple of charges
2. Crisscross method

I. IONIC COMPOUNDS [Metal (or NH_4^+) + Nonmetal or Negative Polyatomic ion]

1. Write the symbols for the ions side by side. Write the cation first. **Use parentheses for polyatomic ions: EX: $(SO_4)^{2-}$**
   Iron (III) Oxide Fe^{3+} O^{2-}
2. Find the least common multiple of charges.
   Iron (III) Oxide Fe^{3+} O^{2-} → 3 x 2 = 6
3. Find the number of ions needed to reach this multiple. (You can use crisscross method as a shortcut.) The total positive charge must match the total negative charge in the compound.

4. Get rid of the charges and then write the final formula
   Iron (III) Oxide Fe_2O_3

EXAMPLES:

Barium sulfide Ba^{2+} S^{2-}

Barium sulfide Ba^{2+} S^{2-} → 2

→ Ba_1S_1

Barium sulfide BaS

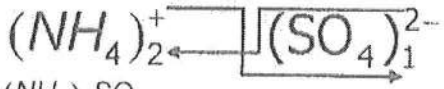
Calcium nitrate Ca^{2+} $(NO_3)^-$

Calcium nitrate Ca^{2+} $(NO_3)^-$ → 2 x 1 = 2

Calcium nitrate $Ca(NO_3)_2$

Ammonium sulfate $(NH_4)^+$ $(SO_4)^{2-}$

Ammonium sulfate $(NH_4)^+$ $(SO_4)^{2-}$ → 1 x 2 = 2



Ammonium sulfate $(NH_4)_2SO_4$

NOTE:

1. We don't bother writing subscripts for one (1) ion.
2. We ONLY use parentheses if BOTH: a. It is a polyatomic ion; AND b. We have more than one of them
3. Always reduce **subscripts to the lowest ratio** by dividing them by their largest common factor.

II. BINARY COVALENT COMPOUNDS (Nonmetal + Nonmetal)

1. Prefix in front of each element tells you what subscript to use
2. Less electronegative element goes first and the second element always ends in ***–ide.***
3. Prefix mono is omitted for the first element in the name

Examples:

1. Dinitrogen trioxide (2 nitrogens and 3 oxygens), formula N_2O_3.
2. Phosphorus pentachloride (no prefix means 1 atom of phosphorus with 5 chlorines), formula PCl_5.

PREFIXES:	1 - mono	3 - tri	5 - penta	7 - hepta	9 - nona
	2 - di	4 - tetra	6 - hexa	8 - octa	10 - deca

ACID NOMENCLATURE & FORMULA WRITING
(H IS THE FIRST ELEMENT)

1. **Binary acid** – contains only two different elements: Hydrogen and one of the more electronegative elements
2. **Oxyacids** – acids that contain hydrogen, oxygen and a third element (usually a nonmetal)
3. Acids are ionic formulas in which the positive ion is H^+. Use as many H^+ ions as the charge on the negative ion.

   EX: H^+_2 **and** SO_4^{2-} **=** H_2SO_4

4. Acids are named based on the name of the **negative ion** in the compound and have the suffixes **–ate, –ite, and –ide.**

SUFFIX OF NEGATIVE ION	NAME OF ACID
1. Root name + **ate** Ex. NO_3^- : Nitr**ate**	Root name + **ic acid** HNO_3 : Nitr**ic acid**
2. Root name + **ite** Ex. NO_2^- : Nitr**ite**	Root name + **ous acid** HNO_2 : Nitr**ous Acid**
3. Root name + **ide** Ex. Cl^-: Chlor**ide**	**Hydro** + Root name + **ic acid** HCl : **Hydro**chlor**ic acid**

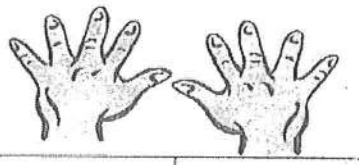
NOTE: Two elements have variations.

H_2SO_4 – the sulfate ion changes to sulf**ur**ic acid.
H_2SO_3 – the sulfite ion changes to sulf**ur**ous acid.
H_2S – the sulfide ion changes to hydrosulf**ur**ic acid.

H_3PO_4 – the phosphate ion changes to phosph**or**ic acid

AP CHEMISTRY

THE 30 POLYATOMICS
TO KNOW LIKE THE BACK OF YOUR HAND



Name	Symbol
Ammonium	NH_4^{+1}
Nitrite	NO_2^{-1}
Nitrate	NO_3^{-1}
Sulfite	SO_3^{-2}
Sulfate	SO_4^{-2}
Hydroxide	OH^{-1}
Cyanide	CN^{-1}
Phosphate	PO_4^{-3}
Hydrogen Phosphate	HPO_4^{-2}
Dihydrogen Phosphate	$H_2PO_4^{-1}$
Phosphite	PO_3^{-3}
Carbonate	CO_3^{-2}
Hydrogen Carbonate	HCO_3^{-1}
Hypochlorite	ClO^{-1}
Chlorite	ClO_2^{-1}
Chlorate	ClO_3^{-1}
Perchlorate	ClO_4^{-1}
Hypoiodite	IO^{-1}
Iodite	IO_2^{-1}
Iodate	IO_3^{-1}
Periodate	IO_4^{-1}
Hypobromite	BrO^{-1}
Bromite	BrO_2^{-1}
Bromate	BrO_3^{-1}
Perbromate	BrO_4^{-1}
Acetate	$C_2H_3O_2^{-1}$
Permanganate	MnO_4^{-1}
Dichromate	$Cr_2O_7^{-2}$
Chromate	CrO_4^{-2}
Oxalate	$C_2O_4^{-2}$

AP Chemistry Summer Assignment [redacted] (Due the 1st day of school.)

You must **show work** for all the problems. USE SIGNIFICANT DIGITS in problems.
The posted power points will be helpful especially if you don't have the book.
You may also download (free) Ohio State flipping videos/lectures which are based from our book. http://drfus.com/chemistry

CONVERSIONS & UNITS

1. Use **factor labeling** method to convert the following:

   a) 325 days = _____ seconds.

   b) 3 meters into centimeters

   c) 10 kilometers into meters

   d) 15,050 milligrams into grams

   e) 3,264 milliliters into liters

   f) 9,674,444 grams into kilograms

2. Classify each of the following as units of mass, volume, length, density, energy, or pressure.

   a) mg _____

   b) mL _____

   c) cm^3 _____

   d) mm _____

   e) $\frac{kg}{m3}$ _____

   f) kJ _____

   g) atm _____

   h) cal _____

3. Most laboratory experiments are performed at room temperature at 25°C. Express this temperature in:

   a) °F

   b) K

4. A cylinder rod formed from silicon is 16.8 cm long and has a mass of 2.17 kg. The density of silicon is 2.33 g/cm3. What is the diameter of the cylinder? Significant figures.

   (Volume of cylinder = π r2h, where r is the radius and h is the length)

Significant Figures

5. Write the most common guidelines to determine significant figures (digits) with an example?

6. How many significant figures are in each of the following?

   a) 1.92 mm _____

   b) 0.030100 kJ _____

   c) 6.022×10^{23} atoms _____

   d) 460.00 L _____

   e) 0.00036 cm3 _____

   f) 100 _____

   g) 1001 _____

   h) 0.001 _____

   i) 0.0101 _____

7. Record the following in correct scientific notation:

   a) 350,000,000 cal _____

   b) 0.0000721 mol _____

   c) 0.0000000809 Á _____

   d) 765,400,000,000 atoms _____

8. Calculate the following to the correct number of significant figures.

   a) 1.27 g / 5.296 cm3 = _____

   b) 12.235 g / 1.01 L = _____

   c) 12.2 g + 0.38 g = _____

   d) 17.3 g + 2.785 g = _____

   e) 200.1 x 120 = _____

   f) 17.6 + 2.838 + 2.3 + 110.77 = _____

CHEMICAL SYMBOLS AND NAMES

9. Give the chemical symbols for the following elements:

a.) carbon ____ b). sulfur _____ c.) titanium _____ d.) nitrogen _____ e.) helium ____

10. Write the Latin and Common names for each of the elements symbol:

a) Na _____

b) Au _____

c) Ag _____

d) Sn _____

e) Fe _____

f) Hg _____

11. Label each of the following as either a **P** (physical process) or **C** (chemical process).

_____a) Corrosion of aluminum metal.

_____b) Melting of ice.

_____c) Pulverizing an aspirin.

_____d) Digesting a candy bar.

_____e) Explosion of nitroglycerin.

_____f) Milk turning sour.

_____g) Burning of paper.

_____h) Forming of frost on a cold night.

_____i) Bleaching of hair with hydrogen peroxide.

_____j) A copper wire is hammered flat.

12. A solid white substance A is heated strongly in the absence of air. It decomposes to form a new white substance B and a gas C. The gas has exactly the same properties as the product obtained when carbon is burned in an excess of oxygen. Based on these observations, can we determine whether solids A and B and the gas C are elements or compounds? Explain your conclusions for each substance.

13. Write the formula of the following compounds?

a) calcium sulfate _____

b) ammonium phosphate_____

c) lithium nitrite _____

d) potassium perchlorate _____

e) barium oxide _____

f) zinc sulfide _____

14. State the contribution of the following chemist in one line.

a.) Democritus

b.) Mendeleev

c.) Henry Becquerel

d.) Roentgen

e.) J.J Thompson

f.) Faraday

g.) Chadwick

h.) Millikan

i.) Proust

j.) Cavendish

k.) Madam Curie

15. On a separate paper define the following:
atomic number, atomic mass, mass number, molecular formula, structural formula, empirical formula, isotopes, cation, anion, metalloid, allotrope, stoichiometry

Molecular, Structural and Empirical Formulas

16. Determine number of protons and neutrons in each of the following.

a. $^{23}_{11}\mathbf{Na}$

b. $^{39}_{19}\mathbf{K}$

c. $^{208}_{82}\mathbf{Pb}$

d. $^{33}_{15}\mathbf{P}$

17. White gold is an alloy that typically contains 60.0% by mass gold and the remainder is platinum. If 175 g of gold are available, how many grams of platinum are required to combine with the gold to form this alloy?

18. What is the empirical formula of a compound that contains 53.73% Fe and 46.27% of S ?

19. Determine the number of molecules in 2.23 moles of nitrogen (N_2) molecules.

20. List the following has **D**iatomic molecule, **M**olecular compound, **I**onic compound, **A**tomic element.

_____a)	F_2	_____f)	CO_2	_____k)	O_2
_____b)	Cl_2	_____g)	H_2	_____l)	Rust (Fe_2O_3)
_____c)	C	_____h)	Ag		
_____d)	NaCl	_____i)	I_2		
_____e)	KF	_____j)	MgO		

21. What is the difference between

a. chlorine atom and chloride ion?

b. sodium atom and sodium ion.?

22. How many grams of nitrogen are present in 2.3 moles of nitrogen gas?

23. Calculate the mass in grams of each of the following:

a. 6.02×10^{23} atoms of Mg.

b. 3.01×10^{23} Formula units of $CaCl_2$.

24. In an experiment, a student gently heated a hydrated copper compound to remove the water of hydration. The following data was recorded:

1. Mass of crucible, cover, and contents before heating	23.54 g.
2. mass of empty crucible and cover	18.82 g.
3. mass of crucible, cover, and contents after heating to constant mass	20.94 g.

Calculate the experimental percent of water in the compound.

25. A hydrated compound has an analysis of 18.29% Ca, 32.37% Cl, and 49.34% water. What is its formula?

26. How do you distinguish?

a. An element from a compound.
b. An element from a mixture.
c. A true solution from a heterogeneous mixture.

27. Describe distillation and filtration.

Complete 28-34 on a separate piece of paper.

28. Name the types of **general inorganic reactions** with example of each i.e. Synthesis, Decomposition,

29. Define Acid, base and salt? Give some examples of each.

30. What is the difference between the Bronsted-Lowry, Lewis and Arrhenius definition of a base and an acid?

31. Define a. Law of conservation of mass. b. Law of multiple proportion.

32. Define solubility. Prepare a list of solubility rules for ionic compounds in water. (Use online resources) (IMPORTANT)

33. Define limiting reagent, theoretical yield, and actual yield.

34. Define: Electrochemistry, Electrolysis, Voltaic Cell

Naming

35. Write the chemical formulas for the following compounds:

a. Calcium Carbonate

b. Ammonium Phosphate

c. Sodium Chloride

d. Sodium Oxide

e. Calcium Sulfate

f. Sodium Nitrite

g. Magnesium Acetate

h. Potassium cyanide

i. Zinc (II) Nitrate

j. Iron (III) Phosphate

k. Nickel (II) Fluoride

36. Give the name or formula for the following ionic compounds

a. Cupric Hydroxide

b. Strontium Chromate

c. Ammonium Per chlorate

d. NaHCO3

e. Fe2 (CO3)3

f. Sodium Hydroxide.

g. Potassium Chloride.

37. Name the following: (Think about ionic compounds, metals, nonmetals, and organics.)

a. CO_2

b. P_4S_{10}

c. NI_3

d. PCl_5

e. CCl_4

f. SF_6

g. CH_4

h. C_2H_6

i. C_3H_8

38. Write the number of protons and electrons?

a.) P_4 molecule

b.) PCl_5 molecule

c.) P^{3-} Ion

d.) P^{5+} ion.

39. Strontium consists of four isotopes with masses and their percent abundance of 83.9134 amu (0.5%), 85.9094 amu (9.9%) , 86.9089 amu (7.0 %) , and 87.9056 amu (82.6 %).
Calculate the atomic mass of Sr?

40. Nitrogen has two isotopes, N-14 and N-15, with atomic masses of 14.00031 amu and 15.001 amu, respectively. What is the percent abundance of N-15?

41. Mercury has an atomic mass of 200.59 amu. Calculate the

a. Mass of 3.0×10^{10} atoms.

b. Number of atoms in one nanogram of Mercury

42. Calculate the molar masses (g/ mol) of

a. Ammonia (NH_3)

b. Baking soda ($NaHCO_3$))

c. Osmium Metal (Os)

43. Convert the following to moles

a. 3.86 grams of Carbon dioxide.

b. 6.0×10^5g of Hydrazine ($N_2 H_4$), a rocket propellant.

44. The molecular formula of morphine, a pain-killing narcotic, is $C_{17}H_{19}NO_3$.

a. What is the molar mass?

b. What fraction of atoms in morphine is accounted for by carbon?

c. Which element contributes least to the molar mass?

45. Determine the empirical formula of the compounds with the following compositions by mass:

a. 10. 4 % C, 27. 8% S , 61. 7 % Cl

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

46. Arsenic reacts with chlorine to form a chloride. If 1.587 g of arsenic reacts with 3.755 g of chlorine, what is the simplest formula of the chloride?

47. Vanillin, a flavoring agent, is made up of carbon, hydrogen, and Oxygen atoms.
When a sample of Vanillin weighing 2.500g burns in Oxygen, 5.79 g of carbon dioxide and 1.18 g of water are obtained. What is the empirical formula of Vanillin?

48. Washing soda is a hydrate of sodium carbonate. Its formula is $Na_2CO_3 . \underline{x}\ H_2O$.
A 2.714 g Sample of washing soda is heated until a constant mass of 1.006 g of Na_2CO_3 is reached. What is x the coefficient of H_2O?

49. . What is the molecular formula of each of the following compounds?
   a) Empirical formula CH_2 , molar mass =84g/mol.

   b) Empirical formula NH_2Cl, Molar mass = 51.5 g/ mol

50. Define **Oxidation number**.

51. Find the **Oxidation number** for
   a. Carbon in CO_2.
   b. Sulfur in H_2SO_4.
   c. Phosphorus in PO_4^{3-}
   d. Manganese in MnO_4^{2-}

52. Which of the following statements are always true? Never true? Not always true?

   a. A compound with the molecular formula C_6H_6 has the same simplest formula.
   b. The mass percent of copper in CuO is less than in Cu_2O.
   c. The limiting reactant is the one present in the smallest number of grams.
   d. Since $C_3H_6O_3$ and $C_6H_{12}O_6$ reduce to the same formula, they represent the same compound.

53. Define:
strong electrolyte

weak electrolyte

precipitation reactions

solubility

54. What is an **Activity series** of metal? How does it help us in studying properties of elements?

55. Write balanced chemical equations for the reactions of sodium with the following nonmetals to form ionic solids.

a. Nitrogen

b. Oxygen

c. Sulfur

d. Bromine

56. A volatile liquid (one that evaporates) is put into a jar and the jar is then sealed. Does the mass of the sealed jar and its contents change upon the vaporization of the liquid?

57. Identify each of the following as being most like an **observation, a law, or a theory.**

a. All coastal areas experience two high tides and two low tides each day.

b. The tides in Earth's oceans are caused mainly by the gravitational attraction of the moon.

c. Yesterday, high tide in San Francisco Bay occurred at 2.43 a.m. and 3.07 p.m.

d. Tides are higher at the full moon than at other times of the month.

58. Define the terms:

Exothermic

endothermic reactions

How much heat is required to raise the temperature of 100 grams of water from 250C to 820C?

59. A piece of unknown metal with mass 14.9 g is heated to 1000C and dropped into 75.0 g of water at 200C. The final temperature of the system is 28 degree Celsius. What is the specific heat of the metal?

60. Define:
Solute

Solvent

Molarity

Molality Mole-fraction of a solution

Mass percent of a solution?

61. Calculate the molarity of a solution that contains 20.0grams of sodium hydroxide in 200ml?

62. How many grams of solute are present in 50.0 ml of 0.360 M sodium chloride?

63. On a separate piece of paper. Write a **balanced equation** for the following:
a. Reaction of boron trifluoride gas with water to give liquid hydrogen fluoride and solid boric acid, (H_3BO_3).
b. Reaction of magnesium Oxide with Iron to form Iron (III) Oxide and Magnesium.
c. The decomposition of dinitrogen Oxide gas to its elements.
d. The reaction of Calcium Carbide solid with water to form calcium hydroxide and acetylene (C_2H_2) gas.
e. The reaction of solid calcium cyan amide ($CaCN_2$) with water to from calcium carbonate and ammonia gas.
f. Ethane burns in air (Oxygen).
g. Hydrogen reacts with oxygen to from Water.
h. Nitrogen gas reacts with Hydrogen to form Ammonia.
i. Hydrogen reacts with Iodine gas to form Hydrogen Iodide.
j. Sodium reacts with Iodine gas to form Sodium Iodide.
k. Sodium Oxide reacts with water to form sodium hydroxide and hydrogen.
l. Carbon dioxide combines with water to form carbonic acid.
m. Magnesium and nitrogen gas combine to form magnesium nitride.
n. Conc. Hydrochloric acid reacts with Conc. Sodium hydroxide to form sodium chloride and water.