**Honors Chemistry II**

**Summer Assignment**

*Students: Use your notes packet to help you with the problems as needed. If you get stuck, you can always email Mrs. Ellis at* *julia\_ellis@bsin.k12.nm.us*

***THIS ASSIGNMENT IS DUE THE FIRST DAY OF SCHOOL!!!!! DO NOT WAIT TO THE LAST MINUTE TO BEGIN. SHOW WORK!***

**Sig Figs, Metrics, Dimensional Analysis**

1. How many significant figures in each of the following?
	1. 1.92
	2. 0.030100
	3. 6.022 x 1022
	4. 460.00
	5. 0.00036
	6. 100
	7. 1001
	8. 1010
	9. 0.0001
	10. 0.0202
2. Calculate the following to the correct number of significant figures. (REMEMBER, if you are having trouble using the correct sig figs, try using scientific notation to help)
	1. 1.27 g / 5.296 cm3
	2. 12.235 g / 1.01 L
	3. 12.2 g + 0.38 g
	4. 17.3 + 23
	5. 2.1 x 3.21
	6. 200.1 x 120
	7. 17.6 + 2.838 + 2.3 + 110.77
3. Complete the following using dimensional analysis (SHOW WORK)
	1. 515 m = \_\_\_\_\_\_\_\_\_\_ miles
	2. 200. in = \_\_\_\_\_\_\_\_\_\_ meters
	3. 325 days = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_seconds
	4. 3 meters in centimeters
	5. 10 kilometers into meters
	6. 3264 microliters into liters
	7. 8.176 x 1087 seconds into decades
	8. 350 ft2 into cm2
4. Use dimensional analysis for the following problem: A furlong is a unit used in horse racing, and the units chain and link are used in land surveying. There are 8 furlongs in a mile, 10 chains in a furlong, and 100 links in a chain. Calculate the length of 1 link in inches. (SHOW WORK)
5. Use dimensional analysis: How many miles could you drive for $7.90 if the gas mileage of your car is 14 km/liter of gas and the price of gas is $2.64 gallon? (1 km= 0.62 mi; 4 qt/gallon, 1.1 qt/L)

**Atom & Periodic Table**

1. Calculate the appropriate quantity in the chart below:



1. What does a period tell you about an atom? What does a group tell you about an atom?
2. In the following, rank the atoms from smallest to largest atomic radius:
	1. O, F, N
	2. K, Rb, Na
	3. K, Ca, Mg
	4. Br, As, S
	5. Si, C, N
	6. Na+, Na
	7. Cl, Cl-1
	8. Be+2, Na+1, Ne
	9. N-3, O-2, F-1, Ne
3. In the following, answer which has the lowest ionization energy:
	1. Rb, K, Cs
	2. O, F, N
	3. K, Na, Rb
	4. K, Ca, Mg
	5. B, N, C
4. Give the full electron configuration and the noble gas short hand configuration of the atoms below:

|  |  |  |
| --- | --- | --- |
|  | **Full**  | **Shorthand** |
| **Si** |  |  |
| **Br** |  |  |
| **V** |  |  |
| **Ag** |  |  |
| **Rb** |  |  |

**Nomenclature**

1. Write formulas for the following substances:

 a. Barium sulfate \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. Ammonium chloride \_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. Chlorine monoxide \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d. Silicone tetrachloride \_\_\_\_\_\_\_\_\_\_\_\_\_

e. Magnesium fluoride \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

f. Sodium oxide \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

g. Sodium peroxide\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

h. Copper (I) iodide \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

i. Zinc sulfide \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

j. Potassium carbonate \_\_\_\_\_\_\_\_\_\_\_\_\_\_

k. Hydrobromic acid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

l. Perchloric acid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

m. Lead (II) acetate \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

n. Sodium permanganate \_\_\_\_\_\_\_\_\_\_\_\_

o. Lithium oxalate \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

p. Potassium cyanide \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

q. Iron (III) hydroxide \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

r. Silicon dioxide \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

s. Nitrogen trifluoride \_\_\_\_\_\_\_\_\_\_\_\_\_\_

t. Chromium (III) oxide \_\_\_\_\_\_\_\_\_\_\_\_\_\_

u. Calcium chlorate \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

v. Sodium thiocyanate \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

w. Cobalt (III) nitrate \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

x. Nitrous acid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

y. Ammonium phosphate \_\_\_\_\_\_\_\_\_\_\_\_

z. Potassium chromate \_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Name each of the following compounds (don’t forget about acids)

a. CuSO4 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. PCl3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. Li3N \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d. BaSO3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

e. N2F4 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

f. KClO4 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

g. NaH \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

h. (NH4)2Cr2O7 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

i. HNO2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

j. Sr3P2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

k. Mg(OH)2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

l. Al2S3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

m. AgBr \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

n. P4O10 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

o. HC2H3O2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

p. CaI2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

q. MnO2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

r. Li2O \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

s. FeI3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

t. Cu3PO4 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

u. PCl3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

v. NaCN \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

w. Cs3N \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

x. Zn(NO3)2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

y. N2O \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Rxn Stuff/Solubility**

1. Write the balance equation for the following. Identify the type of reaction as synthesis, decomposition, single replacement, double replacement, combustion
	1. Magnesium + oxygen → magnesium oxide *Type:*
	2. Iron + sulfur → iron (III) sulfide *Type:*
	3. Sulfur dioxide + water → sulfurous acid *Type:*
	4. Dinitrogen pentoxide + water → nitric acid *Type:*
	5. Potassium oxide + water → potassium hydroxide *Type:*
	6. Ammonia + phosphoric acid → ammonium phosphate *Type:*
	7. Sodium chloride → sodium + Chlorine *Type:*
	8. Strontium bromide → strontium + bromine *Type:*
	9. Potassium chlorate → potassium chloride + oxygen *Type:*
	10. Copper (II) bromate → copper (II) bromide + oxygen *Type:*
	11. Sodium iodide + lead (IV) sulfate → lead (IV) iodide + sodium sulfate *Type:*
	12. Nitric acid + magnesium hydroxide → water + magnesium nitrate *Type:*
	13. Methane (CH4) + oxygen → carbon dioxide + water *Type:*
	14. Ethanol ( C2H5OH) + oxygen → carbon dioxide + water *Type:*
	15. Butanol (C4H9OH­) + oxygen → carbon dioxide + water *Type:*
2. Determine the precipitate in the following reactions:

 silver I nitrate + iron II chloride \_\_\_\_\_\_\_\_\_\_\_\_\_\_

 lead II nitrate + potassium iodide \_\_\_\_\_\_\_\_\_\_\_\_\_\_

 lead II nitrate + iron II chloride \_\_\_\_\_\_\_\_\_\_\_\_\_\_

 silver I nitrate + potassium iodide \_\_\_\_\_\_\_\_\_\_\_\_\_\_

silver I nitrate + sodium hydroxide \_\_\_\_\_\_\_\_\_\_\_\_\_\_

magnesium sulfate + sodium carbonate \_\_\_\_\_\_\_\_\_\_\_\_\_\_

copper II sulfate + sodium hydroxide \_\_\_\_\_\_\_\_\_\_\_\_\_\_

sodium carbonate + silver I nitrate \_\_\_\_\_\_\_\_\_\_\_\_\_\_

copper II sulfate + sodium phosphate \_\_\_\_\_\_\_\_\_\_\_\_\_\_

silver I nitrate + sodium hydroxide \_\_\_\_\_\_\_\_\_\_\_\_\_\_

copper II sulfate + sodium carbonate \_\_\_\_\_\_\_\_\_\_\_\_\_\_

sodium phosphate + silver I nitrate \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Stoichiometry Stuff (SHOW WORK ON ALL!)**

1. Calculate the mass of O2 produced if 2.50 g of KClO3 are completely decomposed by heating. KClO3 → KCl + O2
2. Determine the number of molecules in 2.23 mol of nitrogen molecules (N2)
3. What is the empirical formula of a compound that contains 53.73% Fe & 46.27% S?
4. Calculate the molecular formula of a compound if its empirical formula is C3H7 and it has a molecular mass of 129 g/mole
5. 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 Pt are required to combine with the gold to form this alloy?
6. A hydrated compound has 18.29% Ca, 32.37% Cl, and 49.34 % water. What is this hydrate’s formula?
7. What mass of copper is required to replace silver for 4.00 grams of silver nitrate dissolved in water? (balance rxn first)

Cu(s) + AgNO3 → Cu(NO3)2 + Ag

1. The molecular formula of morphine is C17H19NO3
	1. Calculate the molar mass.
	2. What fraction of atoms is carbon?
	3. Which element contributes least to the molar mass?
2. Calcium carbonate decomposes upon heating, producing calcium oxide and carbon dioxide gas.
	1. Write a balanced chemical equation for this reaction.
	2. How many grams of calcium oxide will be produced after 12.25 g of calcium carbonate is completely decomposed?
	3. What volume of carbon dioxide gas is produced from this amount of calcium carbonate at STP? (22.4 L =1 mole for gases)
3. Hydrogen gas and bromine gas react to from hydrogen bromide gas.
	1. Write a balanced chemical equation for this reaction.
	2. 3.2 g of hydrogen gas and 9.5 g of bromine gas react. Which is the limiting reactant?
	3. How many grams of excess reactant will be left unreacted?
	4. What volume of HBr, measured at STP, is produced in b?
4. When ammonia gas (NH3), oxygen gas, and methane gas (CH4) are combined, the products are hydrogen cyanide gas and water.
	1. Write a balanced chemical equation for this reaction
	2. Calculate the mass of each produce produced with 225 g of oxygen is reacted with an excess of the other 2 reactants.
	3. If the actual yield of the experiment is 105 g of HCN, calculate the percent yield.
5. When solutions of potassium iodide and lead (II) nitrate are combined, the products are potassium nitrate and bright yellow lead (II) iodide.
	1. Write a balance equation for this reaction, including (aq) and (s)
	2. Calculate the mass of precipitate produced with 50.0 mL of 0.45 M potassium iodide solution and 75 mL of 0.55 M lead (II) nitrate solution are mixed.
	3. Calculate the volume of 0.50 M potassium iodide required to react completely with 50.0 mL of 0.50 M lead (II) nitrate

**Acids & Bases / Oxidation #s**

1. List the following (you should have these memorized)
	1. Strong acids-
	2. Strong bases-
2. Give the common monatomic ion charge for the following representative elements:
	1. B
	2. Br
	3. Si
	4. K
	5. Se
	6. Ba
3. Determine the oxidation state of the underlined element in each of the following:
	1. P4
	2. Os8+
	3. OF2
	4. CH3OH
	5. H2O2
	6. MgH2
	7. H2O
	8. Cl2
	9. N3-
	10. CaO2
	11. HClO
	12. Na2O2
	13. AlH3
	14. H2S
4. Determine the oxidation state of the underlined element (fractions or zeros are possible)
	1. HNO2
	2. MnO42-
	3. H2CO
	4. Fe3O4
	5. H4SiO4
	6. Cr2O72-
	7. H2PtCl2
	8. Cr4S5

**Make sure you are working on basic organic nomenclature!!!!**