

Name: \_\_\_\_\_  
AP Chemistry Summer Assignment

Date: \_\_\_\_\_

Worksheet #1 - Math Skills

**Significant Figures (Sig Figs)**

1. How many sig figs are in the following numbers?

a) 0.0450      3  
b) 790      2  
c) 32.10      4

2. Solve the following problems. Round your answer to the correct number of sig figs (and use the correct unit on your answer).

a)  $825 \text{ cm} \times 32 \text{ cm} \times 0.248 \text{ cm}$        $6500 \text{ cm}^3$   
b)  $\frac{15.68 \text{ g}}{2.885 \text{ mL}}$        $5.435 \text{ g/mL}$

**Density** (round your answers to correct number of sig figs and show all work with units)

3. A cube of ruthenium metal 1.5 cm on a side has a mass of 42.0 g. What is the density in  $\text{g/cm}^3$ ? Will ruthenium metal float on water?

$$V = (1.5 \text{ cm})^3 = 3.375 \text{ cm}^3$$

$$D = \frac{m}{V} = \frac{42.0 \text{ g}}{3.375 \text{ cm}^3} = \boxed{12.4 \text{ g/cm}^3}$$

ruthenium will not  
float on water

4. The density of bismuth metal is  $9.8 \text{ g/cm}^3$ . What is the mass of a sample of bismuth that displaces 65.8 mL of water?

$$65.8 \text{ mL H}_2\text{O} = 65.8 \text{ cm}^3$$

$$9.8 \text{ g/cm}^3 = \frac{m}{65.8 \text{ cm}^3}$$

$$m = 644.84 = \boxed{640 \text{ g}}$$

Conversions (round answers correctly and show work with units)

5. Make the following conversions:

a) 16.2 m to km

$$\frac{16.2 \text{ m}}{1000 \text{ m}} = 0.0162 \text{ km} = 1.62 \times 10^{-2} \text{ km}$$

b) 5.44 nL to mL

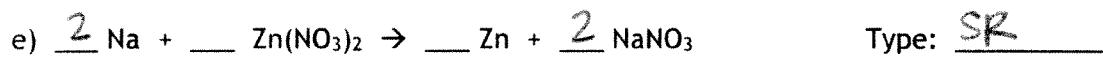
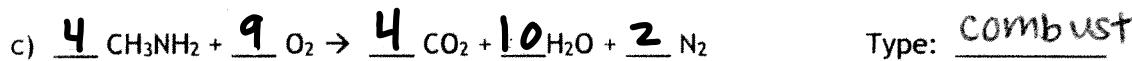
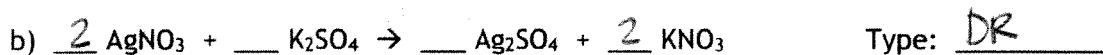
$$\frac{5.44 \text{ nL}}{10^9 \text{ nL}} = 5.44 \times 10^{-6} \text{ mL}$$

c) 45.7 mL/s to kL/hr

$$\frac{45.7 \text{ mL}}{1 \text{ s}} = \frac{1 \text{ kL}}{1000 \text{ mL}} = \frac{60 \text{ s}}{1 \text{ min}} = \frac{60 \text{ min}}{1 \text{ hr}} = 0.165 \text{ kL/hr}$$

### Reactions

6. Balance the following equations and tell what type of reaction it is (synthesis, decomposition, single replacement, double replacement, or combustion)



7. What are diatomic molecules? List the 7.

### Average Atomic Mass

8. Magnesium consists of 3 naturally occurring isotopes with the masses 23.98504, 24.98584, and 25.98259 amu. The relative abundances of these three isotopes are 78.70%, 10.13 %, and 11.17% respectively. Calculate the average atomic mass.

$$\begin{aligned} & [(23.98504)(0.7870) + (24.98584)(0.1013) + (25.98259)(0.1117)] \\ & = \boxed{24.30955 \text{ amu}} \end{aligned}$$

### Percent Composition

9. Calculate the percent composition of  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$  (sugar). (Give Percent of each element.) Show all work.

$$\begin{aligned} \% \text{ C} &= \frac{144.12 \text{ g C}}{342.34 \text{ g } \text{C}_{12}\text{H}_{22}\text{O}_{11}} \times 100 = \boxed{42.098 \% \text{ C}} & \% \text{ O} &= \frac{176 \text{ g O}}{342.34 \text{ g}} \times 100 \\ \text{Moles} \quad \% \text{ H} &= \frac{22.22 \text{ g H}}{342.34 \text{ g}} \times 100 = \boxed{6.491 \% \text{ H}} & & = \boxed{51.411 \% \text{ O}} \end{aligned}$$

10. Calculate the number of moles of the following: (SHOW WORK)

a) 42.8 g of  $\text{KNO}_3$

$$\frac{42.8 \text{ g } \text{KNO}_3}{101.11 \text{ g } \text{KNO}_3} \left| \begin{array}{c} 1 \text{ mol KNO}_3 \\ \hline \end{array} \right. = \boxed{0.423 \text{ mol KNO}_3}$$

b) 155.7 L of  $\text{CO}_2$  at STP

$$\frac{155.7 \text{ L CO}_2}{22.4 \text{ L CO}_2} \left| \begin{array}{c} 1 \text{ mol CO}_2 \\ \hline \end{array} \right. = \boxed{6.951 \text{ mol CO}_2}$$

c)  $9.25 \times 10^{26}$  molecules of  $\text{CaCl}_2$

$$\frac{9.25 \times 10^{26} \text{ molec CaCl}_2}{6.02 \times 10^{23} \text{ molec CaCl}_2} \left| \begin{array}{c} 1 \text{ mol CaCl}_2 \\ \hline \end{array} \right. = \boxed{1.54 \times 10^3 \text{ molec CaCl}_2}$$

## Stoichiometry

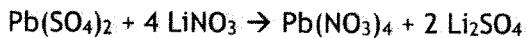
11. Using the following equation:



How many grams of sodium sulfate will be formed if you start with 200 grams of sodium hydroxide and you have an excess of sulfuric acid?

$$\begin{array}{c|c|c|c|c} 200 \text{ g NaOH} & | 1 \text{ mol NaOH} & | 1 \text{ mol Na}_2\text{SO}_4 & | 142.04 \text{ g Na}_2\text{SO}_4 & = 355.1 \\ \hline & | 40 \text{ g NaOH} & | 2 \text{ mol NaOH} & | 1 \text{ mol Na}_2\text{SO}_4 & \\ & & & & = 400 \text{ g Na}_2\text{SO}_4 \end{array}$$

12. Using the following equation:



How many grams of lithium nitrate will be needed to make 250 grams of lithium sulfate, assuming that you have an adequate amount of lead (IV) sulfate to do the reaction?

$$\begin{array}{c|c|c|c|c} 250 \text{ g Li}_2\text{SO}_4 & | 1 \text{ mol Li}_2\text{SO}_4 & | 4 \text{ mol LiNO}_3 & | 68.95 \text{ g LiNO}_3 & \\ \hline & | 109.94 \text{ g Li}_2\text{SO}_4 & | 2 \text{ mol Li}_2\text{SO}_4 & | 1 \text{ mol LiNO}_3 & \\ & & & & \\ & = 313.58 & = 310 \text{ g LiNO}_3 & & \end{array}$$

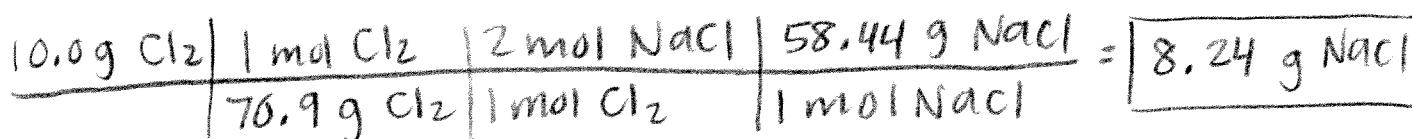
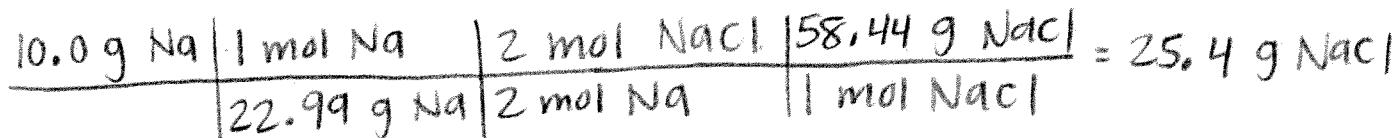
13. Using the following equation:  $\text{Fe}_2\text{O}_3 + 3 \text{ H}_2 \rightarrow 2 \text{ Fe} + 3 \text{ H}_2\text{O}$

Calculate how many grams of iron can be made from 16.5 grams of  $\text{Fe}_2\text{O}_3$ .

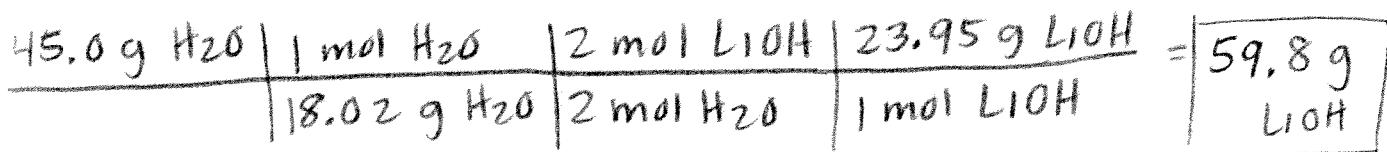
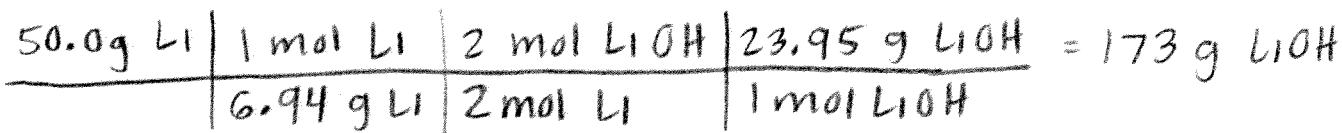
$$\begin{array}{c|c|c|c|c} 16.5 \text{ g Fe}_2\text{O}_3 & | 1 \text{ mol Fe}_2\text{O}_3 & | 2 \text{ mol Fe} & | 55.85 \text{ g Fe} & \\ \hline & | 159.7 \text{ g Fe}_2\text{O}_3 & | 1 \text{ mol Fe}_2\text{O}_3 & | 1 \text{ mol Fe} & \\ & & & & \\ & = 11.5407 & = 11.5 \text{ g Fe} & & \end{array}$$

### Limiting Reactant & Percent Yield

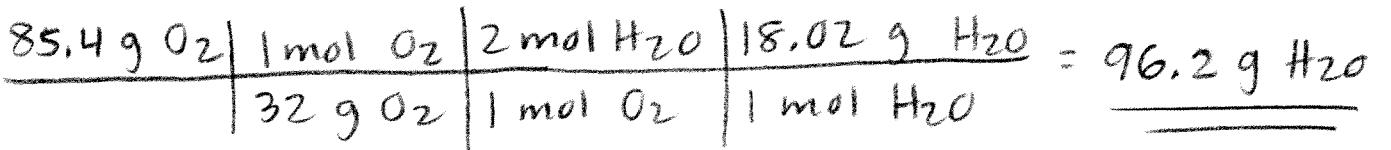
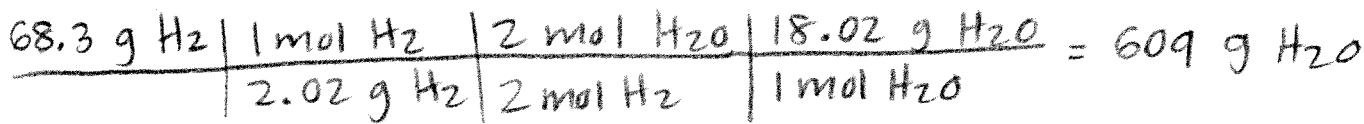
1. Determine the grams of sodium chloride produced when 10.0 g of sodium react with 10.0 g of chlorine gas according to the equation:  $2 \text{ Na} + \text{Cl}_2 \rightarrow 2 \text{ NaCl}$



2. Determine the mass of lithium hydroxide produced when 50.0g of lithium are reacted with 45.0g of water according to the equation:  $2 \text{ Li} + 2 \text{ H}_2\text{O} \rightarrow 2 \text{ LiOH} + \text{H}_2$



3. Determine the percent yield of water produced when 68.3 g of hydrogen reacts with 85.4g of oxygen and 86.4g of water are collected.  $2 \text{ H}_2 + \text{O}_2 \rightarrow 2 \text{ H}_2\text{O}$



Theoretical Yield

$$\% \text{ yield} = \frac{86.4 \text{ g H}_2\text{O}}{96.2 \text{ g H}_2\text{O}} \times 100 = 89.8 \% \text{ yield}$$

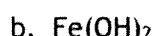


### Worksheet #2: Practice Naming Compounds

1. Provide names for the following ionic compounds:



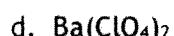
Aluminum fluoride



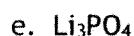
Iron (II) hydroxide



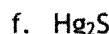
Copper (II) nitrate



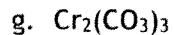
Barium perchlorate



Lithium phosphate



Mercury (I) sulfide



Chromium (III) carbonate

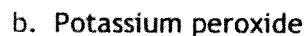


Ammonium sulfate

2. Write the chemical formulas for the following compounds:



$\text{Cu}_2\text{O}$



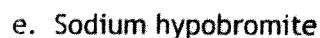
$\text{K}_2\text{O}_2$



$\text{Fe}_2(\text{CO}_3)_3$



$\text{Zn}(\text{NO}_3)_2$



$\text{NaBrO}$

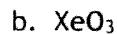


$\text{Al}(\text{OH})_3$

3. Give the name or chemical formula for each of the following molecular substances:



Sulfur hexafluoride



Xenon trioxide



$\text{N}_2\text{O}_4$



$\text{HCN}$



Iodine pentafluoride



$\text{H}_2\text{O}$

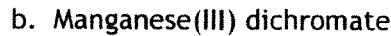


$\text{P}_4\text{S}_6$

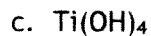
4. Give the name or chemical formula for the following compounds:



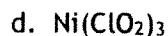
$(\text{NH}_4)_2\text{C}_2\text{O}_4$



$\text{Mn}_2(\text{Cr}_2\text{O}_7)_3$



Titanium (IV) hydroxide



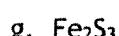
Nickel (III) chlorite



$\text{N}_2\text{O}_5$



$\text{Al}_2\text{O}_3$



Iron (III) sulfide

5. Name the following acids

- a.  $\text{H}_2\text{C}_2\text{O}_4$
- b.  $\text{HBrO}_3$
- c.  $\text{HBr}$
- d.  $\text{HNO}_2$
- e.  $\text{H}_2\text{SO}_4$
- f.  $\text{HClO}$

Oxalic acid  
Bromic acid  
Hydrobromic acid  
Nitrous acid  
Sulfuric acid  
Hypochlorous acid

6. Write formulas for the following acids.

- a. hydrochloric acid
- b. sulfuric acid
- c. nitric acid
- d. phosphoric acid
- e. carbonic acid
- f. acetic acid

$\text{HCl}$   
 $\text{H}_2\text{SO}_4$   
 $\text{HNO}_3$   
 $\text{H}_3\text{PO}_4$   
 $\text{H}_2\text{CO}_3$   
 $\text{HC}_2\text{H}_3\text{O}_2$