# Limiting Reagent Worksheet #2

1. Consider the reaction

$$I_2O_5(g) + 5\ CO(g) \text{ -------> } 5\ CO_2(g) + I_2(g)$$

a) 80.0 grams of iodine(V) oxide, $I_2O_5$, reacts with 28.0 grams of carbon monoxide, CO.

Determine the mass of iodine $I_2$, which could be produced?

b) If, in the above situation, only 0.160 moles, of iodine, $I_2$ was produced.

i) what mass of iodine was produced?

ii) what percentage yield of iodine was produced.

2. Zinc and sulphur react to form zinc sulphide according to the equation.

$$Zn + S \text{ ---------> } ZnS$$

If 25.0 g of zinc and 30.0 g of sulphur are mixed,

a) Which chemical is the limiting reactant?

b) How many grams of ZnS will be formed?

c) How many grams of the excess reactant will remain after the reaction is over?

3. Which element is in excess when 3.00 grams of Mg is ignited in 2.20 grams of pure oxygen?

What mass is in excess? What mass of MgO is formed?

4. How many grams of $Al_2S_3$ are formed when 5.00 grams of Al is heated with 10.0 grams S?

5. When $MoO_3$ and Zn are heated together they react

$$3\ Zn(s) + 2\ MoO_3(s) \text{ ----------> } Mo_2O_3(s) + 3\ ZnO(s)$$

What mass of ZnO is formed when 20.0 grams of $MoO_3$ is reacted with 10.0 grams of Zn?

6. Silver nitrate, $AgNO_3$, reacts with ferric chloride, $FeCl_3$, to give silver chloride, AgCl, and ferric nitrate, $Fe(NO_3)_3$. In a particular experiment, it was planned to mix a solution containing 25.0 g of $AgNO_3$ with another solution containing 45.0 grams of $FeCl_3$.

a) Write the chemical equation for the reaction.

b) Which reactant is the limiting reactant?

c) What is the maximum number of moles of AgCl that could be obtained from this mixture?

d) What is the maximum number of grams of AgCl that could be obtained?

e) How many grams of the reactant in excess will remain after the reaction is over?

7. Solid calcium carbonate, $CaCO_3$, is able to remove sulphur dioxide from waste gases by the reaction (balanced as written):

$$CaCO_3 + SO_2 + \text{other reactants ------> } CaSO_3 + \text{other products}$$

In a particular experiment, 255 g of $CaCO_3$ was exposed to 135 g of $SO_2$ in the presence of an excess amount of the other chemicals required for the reaction.

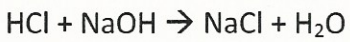
a) What is the theoretical yield of $CaSO_3$?

b) If only 198 g of $CaSO_3$ was isolated from the products, what was the percentage yield of $CaSO_3$ in this experiment?

Name:_____ Date:_____

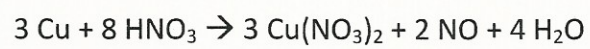
Chemistry 11: Extra Assignment # 3

1. If 50 mL of 0.100 M HCl is allowed to react with 30 mL of 0.200 M NaOH according to the following reaction, which reactant is in excess?



$$HCl + NaOH \rightarrow NaCl + H_2O$$

2. What mass of NO is produced when 87.0 g of Cu are reacted with 225 g of $HNO_3$ according to the reaction:



$$3\ Cu + 8\ HNO_3 \rightarrow 3\ Cu(NO_3)_2 + 2\ NO + 4\ H_2O$$

What mass of the excess reactant will be left over?

3. For the balanced equation shown below, if the reaction of 0.112 grams of $H_2$ produces 0.745 grams of $H_2O$, what is the percent yield?

$$Fe_3O_4 + 4\ H_2 \rightarrow 3\ Fe + 4\ H_2O$$

Name:_____ Date:_____

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PRACTICE TEST

Show all your work. Clearly identify your final answer. Include units and appropriate sig digs.

1. Find the volume of 0.15 M hydrochloric acid needed to fully neutralize 25.0 mL of 3.5 M calcium hydroxide.

2. If 25.0 mL of phosphoric acid of unknown molarity were fully neutralized by 37.8 mL of 0.50 M potassium hydroxide, what is the molar concentration of the phosphoric acid?

3. How much potassium hydroxide is produced if 185.0 g of potassium chloride reacted with 45.0 g of water in the reaction: $2KCl + 2H_2O \rightarrow 2KOH + Cl_2 + H_2$

Name:_____ Date:_____

4.

a. What mass of $MgSO_4$ is produced if 45.0 g of $Mg(OH)_2$ reacts with 27.5 g of $H_2SO_4$?

b. What mass of the excess reactant is left over?

5. For the balance equation below, if the reaction of 40.8 g of $C_6H_6O_3$ produces a 39% yield, how many grams would be produced?

a. $C_6H_6O_3 + 6O_2 \rightarrow 6CO_2 + 3H_2O$

6. For the balanced chemical reaction below, if the reaction of 20.7 grams of $CaCO_3$ produces 6.81 grams of CaO, what is the percent yield?

a. $CaCO_3 \rightarrow CaO + CO_2$

Name:_____ Date:_____

7. Take the reaction: $NH_3 + O_2 \rightarrow NO + H_2O$. In an experiment, 3.25 g of $NH_3$ are allowed to react with 3.50 g of $O_2$
   a. Which reactant is the limiting reactant?

   b. How many grams of NO are formed?

   c. How much of the excess reactant remains after the reaction?

Name:_____ Date:_____

Chemistry 11: Solutions Quiz

1. List 2 substance that are conductive in solution, and 2 substances that are not conductive in solution.

2. Label the following substances as either polar or non polar.
   a. H – H
   b. H – O
   c. O – Cl
   d. Cl – Cl

3. Use a diagram to show to correct intermolecular bonding force between multiple molecules of $NH_2$.

4. A mystery solute labeled "Solute X" fully dissolves in water but does not dissolve in a second solvent labeled as "Solvent Y". Describe the polarity of Solvent Y and Solute X.

5. Show how $K_2CrO_4$ will break down in solution. Is this an example of ionization or dissociation?

6. What is the concentration of all the ions in a solution produced by mixing 15.0 ml of 0.325 M $Na_3PO_4$ with 35.0 ml of 0.225 M $K_2SO_4$?