STOICHIOMETRY WORKSHEET 3, ALL TYPES.

1. _____ N_2 + ___**3**___ H_2 → ___**2**___ NH_3

   How many moles of hydrogen are needed to react with two moles nitrogen?

$$\frac{2\ mol\ N_2}{} \times \frac{3\ mol\ H_2}{1\ mol\ N_2} = 6\ mol\ H_2$$

2. _____ $AgNO_3$ + _____ $BaCl_2$ → _____ AgCl + _____ $Ba(NO_3)_2$

   How many grams of silver chloride are produced from 5.0 grams of silver nitrate reacting with excess barium chloride?

3. How many grams of magnesium chloride are produced from the reaction of 34 grams of magnesium and excess hydrochloric acid, HCl? Hydrogen gas is also produced.

$$\overset{34\ grams}{Mg} + 2\ HCl \rightarrow \overset{?\ grams}{MgCl_2} + H_2$$

$$\frac{34\ g\ Mg}{} \times \frac{1\ mol\ Mg}{24.3\ g} \times \frac{1\ mol\ MgCl_2}{1\ mol\ Mg} \times \frac{95.2\ g}{1\ mol\ MgCl_2} = 133\ g\ MgCl_2$$

4. _____ PCl_5 + _____ H_2O → _____ H_3PO_4 + _____ HCl

   When Mike goes into the lab and has 4.70 grams of phosphorus pentachloride react with excess water - Mike recovers 1.75 grams of phosphoric acid, H_3PO_4.

   a) Calculate the theoretical yield of phosphoric acid (in grams)

   b) Calculate the percent yield of phosphoric acid

$$\%\ Yield = \frac{lab\ amount}{stoichiometric\ amount} \times 100$$

5. a) How many grams of copper(II)nitrate is produced when excess copper metal is reacted with and replaces Ag in 700 mL of a 0.60 *M* $AgNO_3$ solution? Ag is the other product.

$$\underset{0.60\ M}{\overset{700\ mL}{}} Cu + 2\ AgNO_3 \rightarrow \overset{?\ grams}{} Cu(NO_3)_2 + 2\ Ag$$

$$\frac{700\ mL}{} \times \frac{L}{1000\ mL} \times \frac{0.6\ mol\ AgNO_3}{L} \times \frac{1\ mol\ Cu(NO_3)_2}{2\ mol\ AgNO_3} \times \frac{187.57\ g}{1\ mol\ Cu(NO_3)_2} = 39.4\ g\ Cu(NO_3)_2$$

b) How many grams of silver would be produced?

$$\frac{700\ mL}{} \times \frac{L}{1000\ mL} \times \frac{0.6\ mol\ AgNO_3}{L} \times \frac{2\ mol\ Ag}{2\ mol\ AgNO_3} \times \frac{107.9\ g}{1\ mol\ Ag} = 45.3\ g\ Ag$$

6) a) Zinc metal completely replaces hydrogen in a 4.0 *M* HCl solution to form hydrogen gas and zinc chloride. Calculate the volume (in mL) of the 4.0 *M* HCl solution when 73.0 grams of zinc is used.

b) How many grams of $ZnCl_2$ are produced?