

SHOW ALL WORK!!!!

1. Given the reaction,

to produce 0.800 moles of  $\text{H}_2\text{O}_{(l)}$ :

- a.) how many moles of
- $\text{H}_{2(g)}$
- are needed?

$$\text{H}_2\text{O} : \text{H}_2 = 1 : 1$$

$$\therefore \boxed{0.800 \text{ mole H}_2}$$

- b.) how many liters of
- $\text{O}_{2(g)}$
- are needed?

$$\text{H}_2\text{O} : \text{O}_2 = 2 : 1$$

$$\therefore \underline{0.400 \text{ mole O}_2} \left( \frac{22.4 \text{ L}}{1 \text{ mol}} \right) = \boxed{8.96 \text{ L O}_2}$$

2. For the reaction,

how many moles of  $\text{SO}_3$  liquid will be formed reacting with  $3.1973 \times 10^{20}$  molecules of  $\text{O}_{2(g)}$ ?

$$3.1973 \times 10^{20} \left( \frac{1 \text{ mole}}{6.02 \times 10^{23}} \right) = \underline{5.31 \times 10^{-4} \text{ mole O}_2}$$

$$\text{mole O}_2 \left( \frac{2 \text{ SO}_3}{1 \text{ O}_2} \right) = \boxed{1.06 \times 10^{-3} \text{ mole SO}_3}$$



3. If the following reaction occurs,



how many grams of barium chloride will be needed to react with 376 grams of aluminum sulfate?

$$\begin{array}{ccc} 376 \text{ g} & & \boxed{687 \text{ g}} \\ \downarrow \div 342.14 \text{ g/mol} & & \uparrow \times 208.23 \text{ g/mol} \end{array}$$

$$1.099 \text{ mole} \xrightarrow{\times 3} 3.297 \text{ mole}$$

4. If the following reactions occurs,



How many grams of aluminum hydroxide are produced along with 16.0 liters of  $\text{CH}_4$ ?

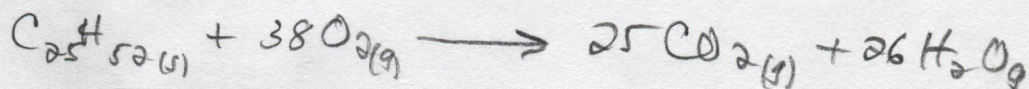
$$16.0 \text{ L CH}_4 \left( \frac{1 \text{ mole}}{22.4 \text{ L}} \right) = 0.7143 \text{ mole CH}_4$$

$$0.7143 \text{ mole CH}_4 \left( \frac{4 \text{ Al}(\text{OH})_3}{3 \text{ CH}_4} \right) = 0.9524 \text{ mole Al}(\text{OH})_3$$

$$0.9524 \text{ mole Al}(\text{OH})_3 \left( \frac{78.00 \text{ g}}{1 \text{ mole}} \right) = \boxed{74.3 \text{ g Al}(\text{OH})_3}$$



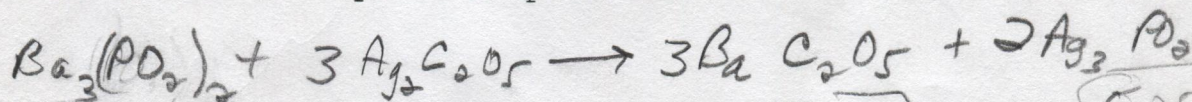
5. If 68.0 liters of oxygen are consumed when a candle made from paraffin ( $C_{25}H_{52}$ ) is burned, what volume of carbon dioxide is produced? (Water is the other product.)



$$68.0 L O_2 \left( \frac{25 CO_2}{38 O_2} \right) = \boxed{44.7 L CO_2}$$

6. In a double replacement reaction, when 6.52 grams of barium hypophosphite reacts with 6.52 g of silver peroxalate, what mass of silver compound is produced?

$$\begin{aligned} 3 \times 137.33 &= 411.99 \\ 2 \times 302.97 &= 605.94 \\ &64.00 \end{aligned}$$



$$\begin{aligned} &6.52g \quad 6.52g \\ &\downarrow \div 537.93g/mol \quad \downarrow \div 319.76g/mol \\ &0.01212 \text{ mol} \quad 0.02039 \text{ mol} \\ &\downarrow \quad \downarrow \times 3 \\ &0.01212 \text{ mol} \quad 0.06117 \text{ mol} \\ &\text{Not 1:3} \\ &\therefore \text{(Limiting)} \\ &\quad \quad \quad \times 1 \rightarrow 0.02039 \text{ mol} \\ &\quad \quad \quad \times 2 \rightarrow 0.04078 \text{ mol} \\ &\quad \quad \quad \times 386.58 \rightarrow 15.76g \end{aligned}$$

What reactant, and what mass of it, is in excess?

$$\text{For } Ba_3(PO_2)_2 \quad 0.01212 - (0.02039 \div 3) = \text{mole remain}$$

start                      used

$$0.01212 - 0.006797 = 0.00532 \text{ mole } Ba_3(PO_2)_2$$

$$\boxed{2.86g \text{ Left}}$$

$$\leftarrow \times 537.93$$