Review Problems For Tomorrows Stoichiometry Test

1. ___C_3H_8 + 5 O_2 → 3 CO_2 + 4 H_2O (balance first)

How many grams of CO_2 can be produced from 50 L of O_2?

$$50\text{L } O_2 \left(\frac{1\text{mol } O_2}{22.4\text{L } O_2}\right)\left(\frac{3\text{mol } CO_2}{5\text{mol } O_2}\right)\left(\frac{44\text{g } CO_2}{1\text{mol } CO_2}\right) = \boxed{58.93\text{ g } CO_2}$$

How many molecules of H_2O can be produced from 150 g of C_3H_8?

$$150\text{g } C_3H_8 \left(\frac{1\text{mol } C_3H_8}{44\text{g } C_3H_8}\right)\left(\frac{4\text{mol } H_2O}{1\text{mol } C_3H_8}\right)\left(\frac{6.02\times10^{23}\text{ molec.}}{1\text{mol } H_2O}\right) = \boxed{8.21\times10^{24}\text{ molec. } H_2O}$$

2. $3\ H_2 + N_2 \rightarrow 2\ NH_3$

If 10 grams of each reactant are used, how many grams NH_3 will be produced?

$$10\text{g } H_2 \left(\frac{1\text{mol } H_2}{2\text{g } H_2}\right)\left(\frac{2\text{mol } NH_3}{3\text{mol } H_2}\right)\left(\frac{17\text{g } NH_3}{1\text{mol } NH_3}\right) = 56.67\text{ g } NH_3$$

$$10\text{g } N_2 \left(\frac{1\text{mol } N_2}{28\text{g } N_2}\right)\left(\frac{2\text{mol } NH_3}{1\text{mol } N_2}\right)\left(\frac{17\text{g } NH_3}{1\text{mol } NH_3}\right) = \boxed{12.14\text{ g } NH_3}$$

3. Magnesium is added to hydrogen sulfate to produce magnesium sulfate and hydrogen gas. If 25 g of magnesium is used, how many grams of hydrogen gas are produced?

$$Mg + H_2SO_4 \longrightarrow MgSO_4 + H_2$$

$$25\text{g Mg} \left(\frac{1\text{mol Mg}}{24.3\text{g Mg}}\right)\left(\frac{1\text{mol } H_2}{1\text{mol Mg}}\right)\left(\frac{2\text{g } H_2}{1\text{mol } H_2}\right) = \boxed{2.06\text{g } H_2}$$

4. If 50 g of aluminum nitrate react with 75 g of potassium sulfate how much KNO_3 is produced?

$$2Al(NO_3)_3 + 3K_2SO_4 \longrightarrow Al_2(SO_4)_3 + 6KNO_3$$

$$50\text{g } Al(NO_3)_3 \left(\frac{1\text{mol}}{213\text{g } Al(NO_3)_3}\right)\left(\frac{6\text{mol } KNO_3}{2\text{mol } Al(NO_3)_3}\right)\left(\frac{101.1\text{g } KNO_3}{1\text{mol } KNO_3}\right) = \boxed{71.2\text{g } KNO_3}$$

$$75\text{g } K_2SO_4 \left(\frac{1\text{mol}}{174.2\text{g}}\right)\left(\frac{4\text{mol } KNO_3}{3\text{mol } K_2SO_4}\right)\left(\frac{101.1\text{g } KNO_3}{1\text{mol } KNO_3}\right) = 87.06\text{ g } KNO_3$$

If you really make 18.7 g of KNO_3, what is your percent yield?

$$\frac{18.7\text{g } KNO_3}{71.2\text{g } KNO_3} \times 100 = \boxed{26.3\%\text{ yield}}$$