Sheet #2

1. $2S + 3O_2 \longrightarrow 2SO_3$

$$9\,mol\,O_2 \times \frac{2\,mol\,S}{3\,mol\,O_2} = 6\,mol\,S$$

2. $4FeS + 7O_2 \longrightarrow 2Fe_2O_3 + 4SO_2$

$$7.81g\,O_2 \times \frac{1\,mol\,O_2}{32g\,O_2} \times \frac{4\,mol\,FeS}{7\,mol\,O_2} \times \frac{87.92g\,FeS}{1\,mol\,FeS} = 12.3g\,FeS$$

$$6.79\,mol\,FeS \times \frac{7\,mol\,O_2}{4\,mol\,FeS} = 11.88\,mol\,O_2$$

3. $CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$

$$6.4g\,CH_4 \times \frac{1\,mol\,CH_4}{16.05g\,CH_4} \times \frac{2\,mol\,O_2}{1\,mol\,CH_4} \times \frac{32g\,O_2}{1\,mol\,O_2} = 25.52g\,O_2$$

$$6.4g\,CH_4 \times \frac{1\,mol\,CH_4}{16.05g\,CH_4} \times \frac{1\,mol\,CO_2}{1\,mol\,CH_4} \times \frac{44.01g\,CO_2}{1\,mol\,CO_2} = 17.55g\,CO_2$$

4. $Na_2CO_3 + 2HCl_{(aq)} \longrightarrow 2NaCl + CO_2 + H_2O$

$$286g\,CO_2 \times \frac{1\,mol\,CO_2}{44.01g\,CO_2} \times \frac{1\,mol\,Na_2CO_3}{1\,mol\,CO_2} \times \frac{106.01g\,Na_2CO_3}{1\,mol\,Na_2CO_3} = 688.91g\,Na_2CO_3$$

$$286g\,CO_2 \times \frac{1\,mol\,CO_2}{44.01g\,CO_2} \times \frac{2\,mol\,HCl}{1\,mol\,CO_2} \times \frac{36.46g\,HCl}{1\,mol\,HCl} = 473.87g\,HCl$$

5. $2NaOH + H_2SO_4 \longrightarrow Na_2SO_4 + 2H_2O$

$$8.61\,mol\,Na_2SO_4 \times \frac{2\,mol\,NaOH}{1\,mol\,Na_2SO_4} = 17.22\,mol\,NaOH$$

$$4.77\,mol\,Na_2SO_4 \times \frac{1\,mol\,H_2SO_4}{1\,mol\,Na_2SO_4} \times \frac{98.09g\,H_2SO_4}{1\,mol\,H_2SO_4} = 467.9g\,H_2SO_4$$

6. $Zn + 2HCl \longrightarrow ZnCl_2 + H_2$

$$20g\,Zn \times \frac{1\,mol\,Zn}{65.41g\,Zn} \times \frac{1\,mol\,ZnCl_2}{1\,mol\,Zn} \times \frac{136.31g\,ZnCl_2}{1\,mol\,ZnCl_2} = 41.68g\,ZnCl_2$$

$$20g\,Zn \times \frac{1\,mol\,Zn}{65.41g\,Zn} \times \frac{1\,mol\,H_2}{1\,mol\,Zn} \times \frac{2.02g\,H_2}{1\,mol\,H_2} = 0.618\,g\,H_2$$

$$20\text{g Zn} \times \frac{1\text{mol Zn}}{65.39\text{g Zn}} \times \frac{2\text{mol HCl}}{1\text{mol Zn}} \times \frac{36.46\text{g HCl}}{1\text{mol HCl}} = 22.3\text{ g HCl}$$

7. $2KClO_3 \longrightarrow 2KCl + 3O_2$

$$.5\text{g } KClO_3 \times \frac{1\text{mol } KClO_3}{122.55\text{g } KClO_3} \times \frac{3\text{mol } O_2}{2\text{mol } KClO_3} \times \frac{32\text{g } O_2}{1\text{mol } O_2} = 1.96\text{g } O_2$$

8. $Cu + 2AgNO_3 \longrightarrow Cu(NO_3)_2 + 2Ag$

$$4\text{g } AgNO_3 \times \frac{1\text{mol } AgNO_3}{169.88\text{g } AgNO_3} \times \frac{1\text{mol Cu}}{2\text{mol } AgNO_3} \times \frac{63.55\text{g Cu}}{1\text{mol Cu}} = .748\text{g Cu}$$

9. $(NH_4)_2SO_4 + Ca(OH)_2 \longrightarrow CaSO_4 + 2NH_3 + 2H_2O$

$$20\text{g } Ca(OH)_2 \times \frac{1\text{mol } Ca(OH)_2}{74.1\text{g } Ca(OH)_2} \times \frac{2\text{mol } NH_3}{1\text{mol } Ca(OH)_2} \times \frac{17.04\text{g } NH_3}{1\text{mol } NH_3} = 9.2\text{g } NH_3$$

10. $H_2SO_4 + 2NaCl \longrightarrow 2HCl + Na_2SO_4$

$$30\text{g NaCl} \times \frac{1\text{mol NaCl}}{58.45\text{g NaCl}} \times \frac{2\text{mol HCl}}{2\text{mol NaCl}} \times \frac{36.46\text{g HCl}}{1\text{mol HCl}} = 18.7\text{g HCl}$$