Sheet #4

1. a) $2Cu_2S + 3O_2 \rightarrow 2Cu_2O + 2SO_2$

   b) $2C_2H_6 + 5F_2 \rightarrow 2C_2HF_5 + 5H_2$

   c) $Bi_2O_3 + 3H_2 \rightarrow 2Bi + 3H_2O$

   d) $Al_4C_3 + 12H_2O \rightarrow 3CH_4 + 4Al(OH)_3$

2. $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$

   $16.8g\ Fe \times \frac{1\ mol\ Fe}{55.845g\ Fe} \times \frac{4\ mol\ H_2}{3\ mol\ Fe} \times \frac{22.414\ L\ H_2}{1\ mol\ H_2} = 8.99\ L\ H_2$

3. $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$

   a) $11g\ C_4H_{10} \times \frac{1\ mol\ C_4H_{10}}{58.124g\ C_4H_{10}} \times \frac{13\ mol\ O_2}{2\ mol\ C_4H_{10}} \times \frac{31.998g\ O_2}{1\ mol\ O_2} = 39.36166g\ O_2$

   b) " $\times \frac{8\ mol\ CO_2}{2\ mol\ C_4H_{10}} \times \frac{22.414\ L\ CO_2}{1\ mol\ CO_2} = 16.967\ L\ CO_2$

4. $2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$

   $ZnO + C \rightarrow Zn + CO$
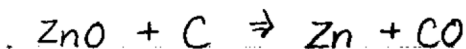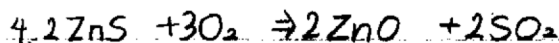
   $150.0g\ ZnS \times \frac{1\ mol\ ZnS}{97.46g\ ZnS} \times \frac{2\ mol\ ZnO}{2\ mol\ ZnS}$
   $\times \frac{1\ mol\ Zn}{1\ mol\ ZnO} \times \frac{65.39g\ Zn}{1\ mol\ Zn} = 100.64g\ Zn$

5. $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$
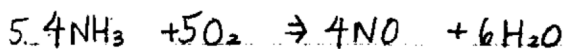
   $1\ mol\ NH_3 \times \frac{5\ mol\ O_2}{4\ mol\ NH_3} \times \frac{22.414\ L\ O_2}{1\ mol\ O_2} = 28.0175\ L\ O_2$

   $1\ mol\ NH_3 \times \frac{4\ mol\ NO}{4\ mol\ NH_3} \times \frac{22.414\ L\ O_2}{1\ mol\ O_2} = 22.414\ L\ NO$

6. $2C_6H_6 + 15O_2 \rightarrow 12CO_2 + 6H_2O$
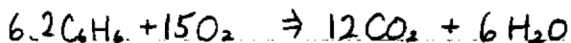
   $25.0\ L\ O_2 \times \frac{1\ mol\ O_2}{22.414\ L\ O_2} \times \frac{2\ mol\ C_6H_6}{15\ mol\ O_2} \times \frac{78.114g\ C_6H_6}{1\ mol\ C_6H_6} = 11.6168g\ C_6H_6$

7. $3H_2 + N_2 \rightarrow 2NH_3$
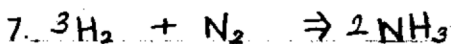
   $5.00\ L\ NH_3 \times \frac{1\ mol\ NH_3}{22.414\ NH_3} \times \frac{3\ mol\ H_2}{2\ mol\ NH_3} \times \frac{2.016g\ H_2}{1\ mol\ H_2} = 0.6746g\ H_2$

8. $2KClO_3 \rightarrow 2KCl + 3O_2$
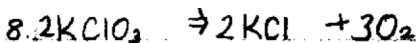
   $125g\ KClO_3 \times \frac{1\ mol\ KClO_3}{122.548g\ KClO_3} \times \frac{3\ mol\ O_2}{2\ mol\ KClO_3} = 1.53\ mol\ O_2$

   $P = 101.325\ kPa$

   $V = ?$

   $n = 1.53\ mol$

   $R = 8.314 \frac{kPa \cdot L}{mol \cdot K}$

   $T = 100°C + 273.15 = 373.15\ K$

   $V = \frac{nRT}{P}$

   $= \frac{1.53\ mol \times 8.314 \frac{kPa \cdot L}{mol \cdot K} \times 373.15K}{101.325\ kPa}$

   $= 46.8455\ L\ O_2$

9. $3Fe_2O_3 + CO \rightarrow 2Fe_3O_4 + CO_2$

   $14.0g\ CO \times \frac{1\ mol\ CO}{28.01g\ CO} \times \frac{3\ mol\ Fe_2O_3}{1\ mol\ CO} \times \frac{159.687g\ Fe_2O_3}{1\ mol\ Fe_2O_3} = 239.445g\ Fe_2O_3$