6. In the reaction that follows, how many molecules of sulfuric acid are needed to react with 15 grams of ammonium hydroxide? Balance the equation first.

$2\ NH_4OH + \_\_\ H_2SO_4 \rightarrow \_\_\ (NH_4)_2SO_4 + 2\ H_2O$

$$\frac{15\text{g } NH_4OH}{1}\left(\frac{1\text{mol } NH_4OH}{35.06\text{g } NH_4OH}\right)\left(\frac{1\text{mol } H_2SO_4}{2\text{mol } NH_4OH}\right)\left(\frac{6.02\times10^{23}\text{ molecules } H_2SO_4}{1\text{mol } H_2SO_4}\right)$$

1.3×10^{23} molecules H_2SO_4

7. How many grams of magnesium nitrate are needed to react with 549.6 g of potassium carbonate? The *unbalanced* equation for the reaction is the following:

$\_\_\ K_2CO_3 + \_\_\ Mg(NO_3)_2 \rightarrow 2\ KNO_3 + \_\_\ MgCO_3$

$$\frac{549.6\text{g } K_2CO_3}{1}\left(\frac{1\text{mol } K_2CO_3}{138.21\text{g } K_2CO_3}\right)\left(\frac{1\text{mol } Mg(NO_3)_2}{1\text{mol } K_2CO_3}\right)\left(\frac{148.33\text{g } Mg(NO_3)_2}{1\text{mol } Mg(NO_3)_2}\right) =$$

589.8 g $Mg(NO_3)_2$

8. Determine the empirical formula of a compound containing 2.644 grams of gold and 0.476 grams of chlorine.

$$\frac{2.644\text{g Au}}{1}\left(\frac{1\text{mol Au}}{197.0\text{g Au}}\right) = \frac{.0134\text{ mol}}{.0134\text{ mol}} = 1$$

$$\frac{0.476\text{g Cl}}{1}\left(\frac{1\text{mol Cl}}{35.45\text{g Cl}}\right) = \frac{.0134\text{ mol}}{.0134\text{ mol}} = 1$$

AgCl

9. Determine the empirical formula of a compound containing 1.723 grams of carbon, 0.289 grams of hydrogen and 0.459 grams of oxygen.

$$\frac{1.723\text{g C}}{1}\left(\frac{1\text{mol C}}{12.01\text{g C}}\right) = \frac{.1435\text{ mol}}{.0287\text{ mol}} = 5$$

$$0.289\text{g H}\left(\frac{1\text{mol H}}{1.01\text{g H}}\right) = \frac{.2861\text{ mol}}{.0287\text{ mol}} = 10$$

$$0.459\text{g O}\left(\frac{1\text{mol O}}{16.00\text{g O}}\right) = \frac{.0287\text{ mol}}{.0287\text{ mol}} = 1$$

$C_5H_{10}O$

10. Determine the empirical formula for the compound using the data listed below.
32.4% sodium, 22.5% sulfur, and 45.1% oxygen

$$\frac{32.4\text{g Na}}{1}\left(\frac{1\text{mol Na}}{22.99\text{g Na}}\right) = \frac{1.41\text{ mol}}{.702\text{ mol}} = 2$$

$$\frac{22.5\text{g S}}{1}\left(\frac{1\text{mol S}}{32.07\text{g S}}\right) = \frac{.702\text{ mol}}{.702\text{ mol}} = 1$$

$$\frac{45.1\text{g O}}{1}\left(\frac{1\text{mol O}}{16.00\text{g O}}\right) = \frac{2.82\text{ mol}}{.702\text{ mol}} = 4$$

Na_2SO_4