Chapter 3 Review Sheet

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1. Answer the following for 25[g] of sulfuric acid (H_2SO_4):

   (a) The number of grams of oxygen (1)

$$\begin{aligned} \frac{64}{98} &= .653 \\ .653 \cdot 25[\text{g}] &= 16.325[\text{g}_\text{O}] \end{aligned} \tag{1}$$

   (b) The number of molecules of sulfuric acid (2)

$$\begin{aligned} \frac{25}{98} &= .255[\text{mol}_{\text{H}_2\text{SO}_4}] \\ \text{H}_2\text{SO}_{4molecules} &= .255 \cdot 6.022 \cdot 10^{23} \\ &= 1.54 \cdot 10^{23}[\text{H}_2\text{SO}_4] \end{aligned} \tag{2}$$

   (c) The number of atoms of hydrogen (3)

$$\begin{aligned} &\text{2 H atoms in } \text{H}_2\text{SO}_4 \\ \text{H}_{atoms} &= 2 \cdot 1.54 \cdot 10^{23} \\ &= 3.08 \cdot 10^{23}[\text{H}_{atoms}] \end{aligned} \tag{3}$$

2. Calculate the mass percent of hydrogen in $(NH_4)_2SO_4$ (4)

$$\frac{8}{132} \cdot 100\% = 6\% \tag{4}$$

3. A sample of a compound that contains Cl and O reacts with excess hydrogen to give 0.233[g] of HCl and 0.403[g] of water. Determine the empirical formula (5)

$$\begin{aligned} \text{mol}_{\text{Cl}} &= \frac{.233}{36} \\ &= .0064[\text{mol}_{\text{Cl}}] \\ \text{mol}_{\text{O}} &= \frac{.403}{18} \\ &= .022[\text{mol}_{\text{O}}] \\ \text{Cl}_{\frac{.022}{.0064}}\,\text{O}_{\frac{.0064}{.0064}} &= \text{Cl}_2\text{O}_7 \end{aligned} \tag{5}$$