Stoichiometry Warm-Up

1) 55.0g of iron is placed into a solution of copper (II) nitrate. How many grams of copper will form on the outside of the piece of iron?

$$2Fe(s) + 3Cu(NO_3)_2(aq) \rightarrow 2Fe(NO_3)_3(aq) + 3Cu(s)$$

$$55.0\ g\ Fe \left(\frac{1\ mol\ Fe}{55.85\ g}\right)\left(\frac{3\ mol\ Cu}{2\ mol\ Fe}\right)\left(\frac{63.55\ g}{1\ mol\ Cu}\right) = \boxed{93.9\ g\ Cu}$$

2) Your body converts glucose (sugar) into carbon dioxide and water during cellular respiration. How many grams of glucose would you need to burn to exhale 25.0g of CO_2?

$$C_6H_{12}O_6(aq) + 6O_2(g) \rightarrow 6CO_2(g) + 6H_2O(l)$$

$$25.0\ g\ CO_2 \left(\frac{1\ mol\ CO_2}{44.01\ g}\right)\left(\frac{1\ mol\ C_6H_{12}O_6}{6\ mol\ CO_2}\right)\left(\frac{180.16\ g}{1\ mol\ C_6H_{12}O_6}\right) = \boxed{17.1\ g\ C_6H_{12}O_6}$$

3) A 300ml bottle of store bought hydrogen peroxide (3%) contains about 9.50g of hydrogen peroxide. If it is allowed to completely decompose into water and oxygen, how many grams of oxygen will be released when you open the cap?

$$2H_2O_2(aq) \longrightarrow 2H_2O(l) + O_2(g)$$

$$9.50\ g\ H_2O_2 \left(\frac{1\ mol\ H_2O_2}{34.02\ g}\right)\left(\frac{1\ mol\ O_2}{2\ mol\ H_2O_2}\right)\left(\frac{32.00\ g}{1\ mol\ O_2}\right) = \boxed{4.47\ g\ O_2}$$

Check yourself and think about how are you doing. Can you consistently...

1) Predict products for reactions?
2) Write out complete balanced equations?
3) Calculate molar mass?
4) Know when to use molar mass and molar ratios as conversion factors?
5) Remember to report final answers with proper sig figs and units?

Percent Yield Practice

The following values are obtained experimentally for reactions 1 & 3 on the front page. Determine the percent yield and percent error of the experiments.

1) 91.2 g of copper forms and is collected.

$$\%\ \text{Yield} = \left(\frac{91.2\ \text{g}}{93.9\ \text{g}}\right)(100)$$

$$= \boxed{97.1\ \%}$$

$$\%\ \text{Error} = \left(\frac{|91.2\ \text{g} - 93.9\ \text{g}|}{93.9\ \text{g}}\right)(100)$$

$$= \boxed{2.9\ \%}$$

3) 3.90g of O_2 escapes the bottle and is collected.

$$\%\ \text{Yield} = \left(\frac{3.90\ \text{g}}{4.47\ \text{g}}\right)(100)$$

$$= \boxed{87.2\ \%}$$

$$\%\ \text{Error} = \left(\frac{|3.90\ \text{g} - 4.47\ \text{g}|}{4.47\ \text{g}}\right)(100)$$

$$= \boxed{12.8\ \%}$$