ANSWERS TO "TRY YOURSELF" PROBLEMS FROM STUDY SECTIONS 4.1 TO 4.3

Try Yourself 4.1

Consider the following unbalanced equation.

$$\mathbf{BaCl_2(aq) + AgNO_3(aq) \rightarrow AgCl(s) + Ba(NO_3)_2(aq)}$$

1. Write the balanced equation
2. What mass of $AgNO_3$, in grams, is required for complete reaction with 0.156 g of $BaCl_2$?
3. What mass of AgCl in grams, is produced?

Try Yourself 4.2 a

$TiCl_4$ is an important industrial chemical that can be prepared from TiO_2 during a reaction with carbon and chlorine gas. In the preparation of $TiCl_4$ equal amounts of chlorine gas and carbon (125 g each) and an excess of TiO_2 was used.

1. Identify the limiting reagent.
2. What is the mass $TiCl_4$ that can be formed?

Try Yourself 4.2 b

Aluminium chloride, $AlCl_3$, is an inexpensive reagent used in many industrial processes. It is made by treating scrap aluminium with chlorine according to the following balanced equation:

$$2Al(s) + 3Cl_2(g) \rightarrow 2AlCl_3(s)$$

a) Which reactant is limiting if 2.70 g of Al and 4.05 g of Cl_2 are mixed?
b) What mass of $AlCl_3$ can be produced?
c) What mass of the excess reagent remains when the reaction is completed?

Try Yourself 4.3a

Methanol can decompose to hydrogen gas that can be used as a fuel.

$$CH_3OH(\ell) \rightarrow 2H_2(g) + CO(g)$$

(a) If 125 g methanol decomposes, what is the theoretical yield of hydrogen?

(b) If only 13.6 g hydrogen is obtained, what is the percentage yield of the gas?

Try Yourself 4.3b

If 454 g of NH_4NO_3 decomposes, theoretically 204 g of H_2O should be formed. Determine the theoretical yield of N_2O. Calculate the percent yield of N_2O if 131 g is the actual yield.