Stoichiometry Practice
"gA → gB"

4.85 How many g of B_2H_6 will react with 3.00 mol of O_2?

$$B_2H_6(l) + 3O_2(g) \longrightarrow B_2O_3(s) + 3H_2O(l)$$

4.86 How many g of Al will react with 3.00 mol of O_2?

$$4Al(s) + 3O_2(g) \longrightarrow 2Al_2O_3(s)$$

4.87 Calculate the amount of $CrCl_3$ that could be produced from 50.0 g Cr_2O_3 according to the equation

$$Cr_2O_3(s) + 3CCl_4(l) \longrightarrow 2CrCl_3(s) + 3COCl_2(aq)$$

4.88 A 3.5-g sample of water reacts with PCl_3 according to the following equation:

$$3H_2O(l) + PCl_3(g) \longrightarrow H_3PO_3(aq) + 3HCl(aq)$$

How many g of H_3PO_3 are produced?

4.93 Joseph Priestley discovered oxygen in the eighteenth century by using heat to decompose mercury(II) oxide:

$$2HgO(s) \xrightarrow{\Delta} 2Hg(l) + O_2(g)$$

How much oxygen is produced from 1.00×10^2 g HgO?

4.94 Dinitrogen monoxide (also known as nitrous oxide and used as an anesthetic) can be made by heating ammonium nitrate:

$$NH_4NO_3(s) \longrightarrow N_2O(g) + 2H_2O(g)$$

How much dinitrogen monoxide can be made from 1.00×10^2 g of ammonium nitrate?

4.95 The burning of acetylene (C_2H_2) in oxygen is the reaction in the oxyacetylene torch. How much CO_2 is produced by burning 20.0 kg of acetylene in an excess of O_2? The unbalanced equation is

$$C_2H_2(g) + O_2(g) \longrightarrow CO_2(g) + H_2O(g)$$

Stoichiometry Practice "g A → g B"

4.85 $B_2H_6(l) + 3O_2(g) \longrightarrow B_2O_3(s) + 3H_2O(l)$

$$3.00\ mol\ O_2 \left| \frac{1\ mol\ B_2H_6}{3\ mol\ O_2} \right| \frac{27.68\ g\ B_2H_6}{1\ mol\ B_2H_6} = 27.68\ g \rightarrow \boxed{27.7\ g\ B_2H_6}$$

4.86 $4Al(s) + 3O_2(g) \longrightarrow 2Al_2O_3(s)$

$$3.00\ mol\ O_2 \left| \frac{4\ mol\ Al}{3\ mol\ O_2} \right| \frac{26.98\ g\ Al}{1\ mol\ Al} = \boxed{108\ g\ Al}$$

4.87 $Cr_2O_3(s) + 3CCl_4(l) \longrightarrow 2CrCl_3(s) + 3COCl_2(aq)$

$$50.0\ g\ Cr_2O_3 \left| \frac{1\ mol\ Cr_2O_3}{151.99\ g\ Cr_2O_3} \right| \frac{2\ mol\ CrCl_3}{1\ mol\ Cr_2O_3} \left| \frac{158.35\ g\ CrCl_3}{1\ mol\ CrCl_3} \right| = \boxed{104\ g\ CrCl_3}$$

4.88 $3H_2O(l) + PCl_3(g) \longrightarrow H_3PO_3(aq) + 3HCl(aq)$

$$3.5\ g\ H_2O \left| \frac{1\ mol\ H_2O}{18.02\ g\ H_2O} \right| \frac{1\ mol\ H_3PO_3}{3\ mol\ H_2O} \left| \frac{82\ g\ H_3PO_3}{1\ mol\ H_3PO_3} \right| = \boxed{5.3\ g\ H_3PO_3}$$

4.93 $2HgO(s) \xrightarrow{\Delta} 2Hg(l) + O_2(g)$ $\qquad 1.00 \times 10^2\ g = 100.\ g$

$$100.\ g\ HgO \left| \frac{1\ mol\ HgO}{216.59\ g\ HgO} \right| \frac{1\ mol\ O_2}{2\ mol\ HgO} \left| \frac{32\ g\ O_2}{1\ mol\ O_2} \right| = \boxed{7.39\ g\ O_2}$$

4.94 $NH_4NO_3(s) \longrightarrow N_2O(g) + 2H_2O(g)$

$$100.\text{ g } NH_4NO_3 \left| \frac{1\text{ mol } NH_4NO_3}{80.06\text{ g } NH_4NO_3} \right| \frac{1\text{ mol } N_2O}{1\text{ mol } NH_4NO_3} \left| \frac{44.02\text{ g } N_2O}{1\text{ mol } N_2O} \right| = \boxed{55.0\text{ g } N_2O}$$

4.95 $2C_2H_2(g) + 5O_2(g) \longrightarrow 4CO_2(g) + 2H_2O(g)$

$$20.0\text{ kg} \left| \frac{1000\text{ g}}{1\text{ kg}} \right| \frac{1\text{ mol } C_2H_2}{26.04\text{ g } C_2H_2} \left| \frac{4\text{ mol } CO_2}{2\text{ mol } C_2H_2} \right| \frac{44.01\text{ g } CO_2}{1\text{ mol } CO_2} = 67603.68664$$

$$\boxed{6.76 \times 10^4\text{ g } CO_2}$$