12.2 USING MOLES MASS- MASS *Supplemental Practice Problems*

MASS-MASS EQUATIONS

Solve the following problems. The reactions may not be balanced.

1. If 28.0 g of magnesium react with excess hydrochloric acid, how many grams of hydrogen gas are produced? $Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$

$$\frac{28.g\ Mg}{1} \times \frac{1\ mol\ Mg}{24.3\ g\ Mg} \times \frac{1\ mol\ H_2}{1\ mol\ Mg} \times \frac{2\ g\ H_2}{1\ mol\ H_2} = ?\ (g)\ H_2$$

2. How many grams of sodium iodide must be reacted with excess chlorine gas if 15.0 g of sodium chloride are needed?

$$2NaI(aq) + Cl_2(g) \rightarrow 2NaCl(aq) + I_2(s)$$

$$\frac{15g\ NaCl}{1} \times \frac{1\ mol\ NaCl}{58.5\ (g)\ NaCl} \times \frac{2\ mol\ NaI}{2\ mol\ NaCl} \times \frac{150\ g\ NaI}{1\ mol\ NaI} = ?g\ NaI$$

3. How many grams of potassium chloride are produced in the decomposition of 11.00 g of potassium chlorate? $2KClO_3(s) \rightarrow 2KCl(s) + 3O_2(g)$

$$\frac{11\ g\ KClO_3}{1} \times \frac{1\ mol\ KClO_3}{122.4\ g\ KClO_3} \times \frac{2\ mol\ KCl}{2\ mol\ KClO_3} \times \frac{74.4\ g\ KCl}{1\ mol\ KCl} = ?g\ KCl$$

4. What mass of silver is produced from 33.0 g of silver nitrate dissolved in water? $Cu(s) + 2AgNO_3(aq) \rightarrow Cu(NO_3)_2(aq) + 2Ag(s)$

$$\frac{33.0\ g\ AgNO_3}{1} \times \frac{1\ mol\ AgNO_3}{170\ g\ AgNO_3} \times \frac{2\ mol\ Ag}{2\ mol\ AgNO_3} \times \frac{108\ g\ Ag}{1\ mol\ Ag} = ?g\ Ag$$

5. If excess calcium hydroxide reacts with 40.0 g of ammonium sulfate, how many grams of calcium sulfate are produced?

$$(NH_4)_2SO_4(aq) + Ca(OH)_2(s) \rightarrow CaSO_4(s) + 2NH_3(s) + 2H_2O(l)$$

$$\frac{40\ g\ (NH_4)_2SO_4}{1} \times \frac{1\ mol\ (NH_4)_2SO_4}{132\ g\ (NH_4)_2SO_4} \times \frac{1\ mol\ CaSO_4}{1\ mol\ (NH_4)_2SO_4} \times \frac{136\ g\ CaSO_4}{1\ mol\ CaSO_4} = ?g\ CaSO_4$$

6. If excess sulfuric acid reacts with 17.0 g of sodium chloride, how many grams of sodium sulfate are produced?

$$2NaCl(aq) + H_2SO_4(aq) \rightarrow 2HCl(g) + Na_2SO_4(aq)$$

$$\frac{17.0\ g\ NaCl}{1} \times \frac{1\ mol\ NaCl}{58.5\ g\ NaCl} \times \frac{1\ mol\ Na_2SO_4}{2\ mol\ NaCl} \times \frac{142\ g\ Na_2SO_4}{1\ mol\ Na_2SO_4} = ?g\ Na_2SO_4$$

7. How much silver phosphate is produced if 32.0 g of sodium phosphate react with excess silver acetate?

$3AgCH_3COO(aq) + Na_3PO_4(aq) \rightarrow Ag_3PO_4\ Ag_3PO_4(s) + 3NaCH_3COO(aq)$

$$\frac{32\text{ g } Na_3PO_4}{1} \times \frac{1\text{ mol } Na_3PO_4}{164\text{ g of } Na_3PO_4} \times \frac{1\text{ mol } Ag_3PO_4}{1\text{ mol } Na_3PO_4} \times \frac{419\text{ g } Ag_3PO_4}{1\text{ mol } Ag_3PO_4} = ?\text{g } Ag_3PO_4$$

8. How many grams of sulfuric acid are needed to completely neutralize 55.0 g of sodium hydroxide?

$2NaOH(aq) + H_2SO_4(aq) \rightarrow Na_2SO_4(s) + 2H_2O(g)$

$$\frac{55\text{ g NaOH}}{1} \times \frac{1\text{ mol NaOH}}{40\text{ g NaOH}} \times \frac{1\text{ mol } H_2SO_4}{2\text{ mol NaOH}} \times \frac{98\text{ g } H_2SO_4}{1\text{ mol } H_2SO_4} = ?\text{g } H_2SO_4$$