Stoichiometry Practice Problems

1. **A piece of magnesium burns in the presence of oxygen, forming magnesium oxide (MgO). How many moles of oxygen are needed to produce 12 moles of magnesium oxide? $2Mg(s) + O_2(g) \rightarrow 2MgO(s)$**

2. **The carbon dioxide exhaled by astronauts can be removed from a spacecraft by reacting it with lithium hydroxide (LiOH). The reaction is as follows: $CO_2(g) + 2LiOH(s) \rightarrow Li_2CO_3(s) + H_2O(l)$. An average person exhales about 20 moles of CO_2 per day. How many moles of LiOH would be required to maintain two astronauts in a spacecraft for three days?**

3. **Balance the following equation and answer the questions below. $KClO_3(s) \rightarrow KCl(s) + O_2(g)$**

   a. How many moles of O_2 are produced from 10 moles of $KClO_3$?

   b. How many moles of KCl are produced using 3 moles of $KClO_3$?

   c. How many moles of $KClO_3$ are needed to produce 50 moles of O_2?

4. **The following reaction occurs in plants undergoing photosynthesis. $6CO_2(g) + 6H_2O(l) \rightarrow C_6H_{12}O_6(s) + 6O_2(g)$ How many grams of glucose ($C_6H_{12}O_6$) are produced when 24.0 moles of carbon dioxide reacts in excess water?**

5. **Calculate the mass of sodium chloride (NaCl) produced when 5.50 moles of sodium reacts in excess chlorine gas.**

6. **How many grams of chlorine gas must be reacted with excess sodium iodide (NaI) to produce 6.00 moles of sodium chloride?**
   a. Balance the equation: $NaI(aq) + Cl_2(g) \rightarrow NaCl(aq) + I_2(s)$.

   b. Perform the calculation.

7. **Calculate the mass of hydrochloric acid (HCl) needed to react with 5.00 moles of zinc.**
   a. Balance the equation: $Zn(s) + HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$.

   b. Perform the calculation.

8. **How many grams of sodium hydroxide (NaOH) are needed to completely react with 50.0 grams of sulfuric acid (H_2SO_4) to form sodium sulfate (Na_2SO_4) and water? $2NaOH(aq) + H_2SO_4(aq) \rightarrow Na_2SO_4 + 2H_2O(g)$**

9. **Balance each equation and solve the problem.**

   a. If 40.0 g of magnesium reacts with excess hydrochloric acid (HCl), how many grams of magnesium chloride ($MgCl_2$) are produced?

$$Mg(s) + HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$$

   b. Determine the mass of copper needed to react completely with a solution containing 12.0 g of silver nitrate ($AgNO_3$).

$$Cu(s) + AgNO_3(aq) \rightarrow Cu(NO_3)_2(aq) + Ag(s)$$

   c. How many grams of hydrogen chloride (HCl) are produced when 15.0 g of sodium chloride (NaCl) reacts with excess sulfuric acid (H_2SO_4)?

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

   d. Calculate the mass of silver phosphate (Ag_3PO_4) produced if 30.0 g of silver acetate ($AgCH_3COO$) reacts with excess sodium phosphate (Na_3PO_4).

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