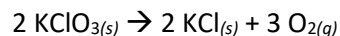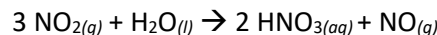**Chemistry – Chapter 12 book problems #2: Stoichiometry**

1. How many molecules of oxygen are produced by the decomposition of 6.54 g of potassium chlorate ($KClO_3$)?
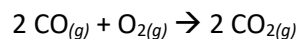
$$2\ KClO_{3(s)} \rightarrow 2\ KCl_{(s)} + 3\ O_{2(g)}$$

2. The last step in the production of nitric acid is the reaction of nitrogen dioxide with water.

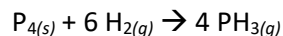$$3\ NO_{2(g)} + H_2O_{(l)} \rightarrow 2\ HNO_{3(aq)} + NO_{(g)}$$

How many grams of nitrogen dioxide must react with water to produce 5.00×10^{22} molecules of nitrogen monoxide?

3. The equation for the combustion of carbon monoxide is:
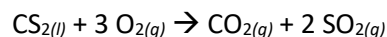
$$2\ CO_{(g)} + O_{2(g)} \rightarrow 2\ CO_{2(g)}$$

How many liters of oxygen are required to burn 3.86 L of carbon monoxide?

4. Phosphorus and hydrogen can be combined to form phosphine (PH_3).

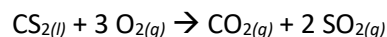$$P_{4(s)} + 6\ H_{2(g)} \rightarrow 4\ PH_{3(g)}$$

How many liters of phosphine are formed when 0.42 L of hydrogen reacts with phosphorus?

5. Calculate the volume of sulfur dioxide, in milliliters, produced when 27.9 mL O_2 reacts with carbon disulfide.

$$CS_{2(l)} + 3\ O_{2(g)} \rightarrow CO_{2(g)} + 2\ SO_{2(g)}$$

6. How many deciliters of carbon dioxide are produced when 0.38 L SO_2 is formed?

$$CS_{2(l)} + 3\ O_{2(g)} \rightarrow CO_{2(g)} + 2\ SO_{2(g)}$$

7. The combustion of acetylene gas is represented by this equation:

$$2\ C_2H_{2(g)} + 5\ O_{2(g)} \rightarrow 4\ CO_{2(g)} + 2\ H_2O_{(g)}$$

   a. How many grams of CO_2 and grams of H_2O are produced when 52.0 g C_2H_2 burn in oxygen?
   b. How many moles of H_2O are produced when 64.0 g C_2H_2 burn in oxygen?