## Rules for Stoichiometry Problems

1. Balance the equation.
2. Convert mass, volume or representative particles to moles, if necessary.
3. Set up mole ratios.
4. Use mole ratios to calculate moles of desired substituent.
5. Convert moles to mass, volume or representative particles, if necessary.

Practice

1. Determine the number of moles of oxygen gas produced when 3.76 moles of mercury (II) oxide decomposes.

   HgO (s) → Hg (l) + O_2 (g)
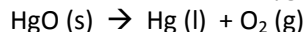
2. How many moles of lead (II) nitrate must react with excess aluminum in order to produce 2.54 moles of aluminum nitrate?

 Al (s) + $Pb(NO_3)_2$ (aq) → $Al(NO_3)_3$ (aq) + Pb (s)
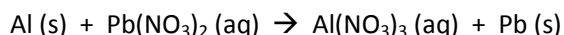
3. How many liters of iodine gas are produced from reacting 3.75 moles of chlorine gas with excess lithium iodide?

   Cl_2 (g) + LiI (aq) → $LiCl$ (aq) + I_2 (g)
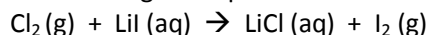
4. How many molecules of water are required to react with excess potassium to produce 7.99 moles of potassium hydroxide?

   K (s) + H_2O (l) → KOH (aq) + H_2 (g)
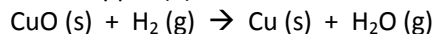
5. How many grams of sodium metal are needed to produce 4.77 moles of sodium chloride?

   Na (s) + Cl_2 (g) → $NaCl$ (s)
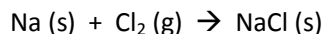
6. When 6.44 moles of hydrochloric acid react with manganese (IV) oxide, how many moles of chlorine gas are produced?

   MnO_2 (s) + HCl (aq) → $MnCl_2$ (aq) + Cl_2 (g) + H_2O(l)

7. How many grams of copper (II) oxide will react with 10 liters of hydrogen gas?
$$CuO \text{ (s)} + H_2 \text{ (g)} \rightarrow Cu \text{ (s)} + H_2O \text{ (g)}$$

8. How many moles of dinitrogen tetroxide are produced when 21.3 moles of ammonia react with plenty of oxygen gas?
$$NH_3 \text{ (g)} + O_2 \text{ (g)} \rightarrow N_2O_4 \text{ (g)} + H_2O \text{ (l)}$$
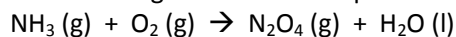
9. How many grams of silver will be produced when 2.42 moles of silver (I) nitrate react with excess copper metal?
$$Cu \text{ (s)} + AgNO_3 \text{ (aq)} \rightarrow Cu(NO_3)_2 \text{ (aq)} + Ag \text{ (s)}$$
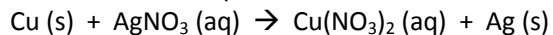
10. How many grams of chlorine gas must be reacted with excess sodium iodide if 10.0 g of sodium chloride are needed?
$$NaI \text{ (aq)} + Cl_2 \text{ (g)} \rightarrow NaCl \text{ (aq)} + I_2 \text{ (g)}$$
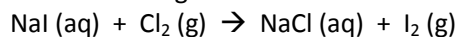
11. How many grams of sodium hydroxide are needed to completely neutralize 25.0 g of sulfuric acid?
$$NaOH \text{ (aq)} + H_2SO_4 \text{ (aq)} \rightarrow Na_2SO_4 \text{ (s)} + H_2O \text{ (g)}$$
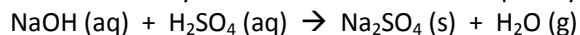
12. If 6.0 L of oxygen gas are available to burn carbon disulfide (CS_2), how many liters of carbon dioxide gas are produced?
$$CS_2 \text{ (l)} + O_2 \text{ (g)} \rightarrow CO_2 \text{ (g)} + SO_2 \text{ (g)}$$