Extra Practice for Quiz!
(Not required - just extra)

Stoichiometry Practice: Mixed Conversions

1) Translate: Aluminum is added to a copper (I) chloride solution, aluminum chloride and copper are produced.

$$Al + 3CuCl \rightarrow AlCl_3 + 3Cu$$

A) 3.5 grams of aluminum would result in how many grams of copper being produced?

$$3.5\,g\,Al \times \frac{1\,mol\,Al}{26.98\,g\,Al} \times \frac{3\,mol\,Cu}{1\,mol\,Al} \times \frac{63.55\,g\,Cu}{1\,mol\,Cu} = \boxed{25\,g\,Cu}$$

B) If 1.25 moles of aluminum chloride were produced, how many grams of copper (I) chloride solution were required?

$$1.25\,mol\,AlCl_3 \times \frac{3\,mol\,CuCl}{1\,mol\,AlCl_3} \times \frac{99\,g\,CuCl}{1\,mol\,CuCl} = \boxed{371\,g\,CuCl}$$

2) Translate: Magnesium ribbon reacts with oxygen to produce magnesium oxide.

$$2Mg + O_2 \rightarrow 2MgO$$

A) If 3.5 grams of Magnesium ribbon were used, how many moles of magnesium oxide were produced?

$$3.5\,g\,Mg \times \frac{1\,mol\,Mg}{24.31\,g\,Mg} \times \frac{2\,mol\,MgO}{2\,mol\,Mg} = \boxed{0.14\,mol\,MgO}$$

B) Assuming 0.35 moles of magnesium oxide were produced, how many moles of Oxygen were required?

$$0.35\,mol\,MgO \times \frac{1\,mol\,O_2}{2\,mol\,MgO} = \boxed{0.18\,mol\,O_2}$$

3) Translate: Potassium Chloride and Sodium Carbonate react in a double replacement reaction.

$$2KCl + Na_2CO_3 \rightarrow 2NaCl + K_2CO_3$$

A) 5.5 grams of potassium chloride are used, how many moles of potassium carbonate is created?

$$5.5\,g\,KCl \times \frac{1\,mol\,KCl}{74.55\,g\,KCl} \times \frac{1\,mol\,K_2CO_3}{2\,mol\,KCl} = \boxed{0.037\,mol\,K_2CO_3}$$

B) If 18 grams of sodium chloride are produced, how many grams of sodium carbonate were required?

$$18\,g\,NaCl \times \frac{1\,mol\,NaCl}{58.44\,g\,NaCl} \times \frac{1\,mol\,Na_2CO_3}{2\,mol\,NaCl} \times \frac{105.99\,g\,Na_2CO_3}{1\,mol\,Na_2CO_3} = \boxed{10\,g\,Na_2CO_3}$$

(Butane)

4) The complete combustion of tetracarbon decahydride in oxygen.

$$2C_4H_{10} + 13O_2 \longrightarrow 8CO_2 + 10H_2O$$

A) 6.0 moles of oxygen will produce how many moles of each of the products?

$$6.0\,mol\,O_2 \times \frac{8\,mol\,CO_2}{13\,mol\,O_2} = \boxed{3.7\,mol\,CO_2} \qquad 6.0\,mol\,O_2 \times \frac{10\,mol\,H_2O}{13\,mol\,O_2} = \boxed{4.6\,mol\,H_2O}$$

B) 135.0 grams of tetracarbon decahydride will produce how many moles of carbon dioxide

$$135.0\,g\,C_4H_{10} \times \frac{1\,mol\,C_4H_{10}}{58.14\,g\,C_4H_{10}} \times \frac{8\,mol\,CO_2}{2\,mol\,C_4H_{10}} = \boxed{9.288\,mol\,CO_2}$$

5) The reaction of $AlBr_3$ with $Mg(OH)_2$

$$2AlBr_3 + 3Mg(OH)_2 \longrightarrow 2Al(OH)_3 + 3MgBr_2$$

A) 1.05 moles of aluminum bromide produces how many moles of magnesium bromide

$$1.05\,mol\,AlBr_3 \times \frac{3\,mol\,MgBr_2}{2\,mol\,AlBr_3} = \boxed{1.58\,mol\,MgBr_2}$$

B) 2.75 moles of magnesium hydroxide would yield how many grams of aluminum hydroxide

$$2.75\,mol\,Mg(OH)_2 \times \frac{2\,mol\,Al(OH)_3}{3\,mol\,Mg(OH)_2} \times \frac{78.01\,g\,Al(OH)_3}{1\,mol\,Al(OH)_3} = \boxed{143\,g\,Al(OH)_3}$$

6) The decomposition of hydrogen peroxide (H_2O_2) to form water and oxygen.

$$2H_2O_2 \longrightarrow 2H_2O + O_2$$

A) 25.0 grams of oxygen gas would be produced from how many grams of hydrogen peroxide?

$$25.0\,g\,O_2 \times \frac{1\,mol\,O_2}{32.00\,g\,O_2} \times \frac{2\,mol\,H_2O_2}{1\,mol\,O_2} \times \frac{34.02\,g\,H_2O_2}{1\,mol\,H_2O_2} = \boxed{53.2\,g\,H_2O}$$

B) 2.5 moles of hydrogen peroxide would produce how many moles of oxygen gas?

$$2.5\,mol\,H_2O_2 \times \frac{1\,mol\,O_2}{2\,mol\,H_2O_2} = \boxed{1.25\,mol\,O_2}$$

7) The reaction of nitric acid with potassium hydroxide to form postassium nitrate and water.

$$HNO_3 + KOH \longrightarrow KNO_3 + H_2O$$

A) 35.0 grams of nitric acid would produce how many moles of water?

$$35.0\,g\,HNO_3 \times \frac{1\,mol\,HNO_3}{63.02\,g\,HNO_3} \times \frac{1\,mol\,H_2O}{1\,mol\,HNO_3} = \boxed{0.555\,mol\,H_2O}$$

B) 70.0 grams of potassium hydroxide will produce how many grams of potassium nitrate?

$$70.0\,g\,KOH \times \frac{1\,mol\,KOH}{56.11\,g\,KOH} \times \frac{1\,mol\,KNO_3}{1\,mol\,KOH} \times \frac{101.11\,g\,KNO_3}{1\,mol\,KNO_3} = \boxed{3.05\,g\,KNO_3}$$