**Stoichiometric Problems**

÷ M of A

X Mole Ratio

Mass of B  
(grams) m

Moles of B  
(mol) n

Mass of A  
(grams) m

Moles of A  
(mol) n

X B  
 A

x M of B

Mass (m)  
grams

Amount (n)  
mol

Mass (m)  
grams

Amount (n)  
mol

Mass (m)  
grams

Amount (n)  
mol

Mass (m)  
grams

Amount (n)  
mol

1. Write a balanced equation for the reaction between nitrogen dioxide gas and water to produce nitric acid and nitrogen monoxide gas. State all the mole ratios.
2. Consider the following reaction: Mg(s) + 2HCl(aq) 🡪 MgCl2(aq) + H2(g)

a) Write the all the mole ratios

b) How many moles of HCl are required to react with 2.0 moles of Mg?

c) How many moles of hydrogen are formed when 3.5 moles of Mg react?

d) How many moles of HCl are required to react completely with 8.6 moles of Mg?

1. How many moles of hydrogen gas are produced from the decomposition of 12.0 g of water into its elements?
2. Fe2O3(s) + 6HCl(aq) 🡪 2FeCl3(aq) + 3H2O(l)

What mass of hydrochloric acid is required to react with 234 g of rust (Fe2O3)?

1. 2N2O5(s) 🡪 4NO2(g) + O2(g)

How many grams of oxygen will be produced in this reaction when 1.76 g of nitrogen dioxide are made?

1. 8Zn(s) + S8(s) 🡪 8ZnS(s)

What mass of zinc sulfide is expected when 54.0 g of S8 reacts?

1. Potassium metal reacts with hydrochloric acid to produce aqueous potassium chloride and hydrogen gas. How many grams of potassium are required to produce 5.00 g of hydrogen gas.
2. 2NaN3(s) 🡪 3 N2(g) + 2Na(s)

What mass of sodium azide (NaN3) is required to produce 1.72x1024 molecules of nitrogen gas? (Hint: how do you convert molecules to moles?)

Answers: 2b) 4.0mol c) 3.5mol d) 17mol 3. 0.666mol 4. 3.20x102g 5. 0.306g   
6. 164g 7. 194g 8. 124g