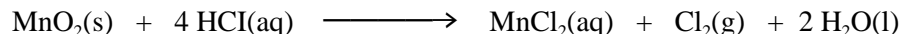


## Stoichiometry Problems II

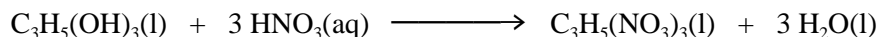
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1. Consider the chemical reaction below:



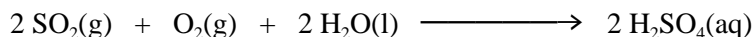
- (a) What are the mol ratios of all products to all reactants?  
(b) How many moles of  $\text{Cl}_2(\text{g})$  are produced if 2 mol of  $\text{HCl}$  are consumed?  
(c) How many molecules of  $\text{HCl}$  are consumed if  $3.01 \times 10^{23}$  molecules of  $\text{H}_2\text{O}$  are formed?

2. A chemist makes nitroglycerin,  $\text{C}_3\text{H}_5(\text{NO}_3)_3$  from glycerol  $\text{C}_3\text{H}_5(\text{OH})_3$  and  $\text{HNO}_3$ . The balanced chemical reaction is listed below:



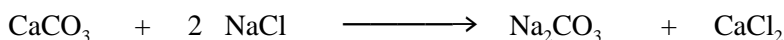
If 4.11 g of glycerol and an excess of  $\text{HNO}_3$  is used, what mass of nitroglycerin is produced by the chemist?

3. Sulfuric acid can be prepared by reacting sulfur dioxide, oxygen, and water.  
The chemical reaction is:



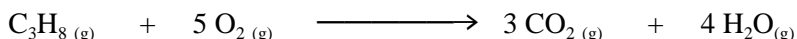
If 50.0 g of sulfur dioxide are reacted with an unlimited quantity of water and an excess of oxygen, what mass of sulphuric acid will be produced?

4. Sodium carbonate,  $\text{Na}_2\text{CO}_3$ , is used in the manufacture of glass and is made from calcium carbonate,  $\text{CaCO}_3$ , and sodium chloride,  $\text{NaCl}$ , according to the equation:



- a) What mass in kg of  $\text{NaCl}$  is required to completely react with 1.00 kg of  $\text{CaCO}_3$  ?  
b) What mass of  $\text{Na}_2\text{CO}_3$  could be produced from the reaction of 1.00 kg of  $\text{CaCO}_3$  ?
5. Iron (II) sulphide,  $\text{FeS}$ , reacts in air,  $\text{O}_2$ , to produce  $\text{Fe}_2\text{O}_3$ , and  $\text{SO}_2$
- a) Write a balanced equation for the reaction of  $\text{FeS}$  in air.  
b) How many grams of  $\text{Fe}_2\text{O}_3$  are produced when 20.9 g of  $\text{FeS}$  react with an excess of  $\text{O}_2$  ?

6. Propane burns in excess oxygen according to the following equation:



- a. What mass of water is produced when 25.0 g propane,  $\text{C}_3\text{H}_{8(\text{g})}$  undergoes combustion?  
b. What mass of oxygen is required if 444.0 g of carbon dioxide gas is produced?