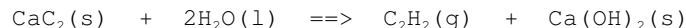


## STOICHIOMETRIC PROBLEMS

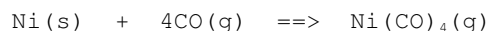
### SHEET #6 - LIMITING EXCESS REAGENT PROBLEMS

1. 16.0 g of  $\text{CaC}_2$  reacts with 42.0 g of  $\text{H}_2\text{O}$  according to the following reaction:



- a) Determine which reactant is the limiting reagent.  
b) What mass of  $\text{C}_2\text{H}_2(\text{g})$  and  $\text{Ca}(\text{OH})_2(\text{s})$  is produced.  
c) Calculate the excess mass of the excess reagent.
2. Consider the following reaction at S.T.P.
- $$\text{WO}_3(\text{s}) + 3\text{H}_2(\text{g}) \Rightarrow \text{W}(\text{s}) + 3\text{H}_2\text{O}(\text{l})$$
- If 35 g of tungsten trioxide reacts with 15 L of  $\text{H}_2$  at S.T.P., what mass of tungsten is produced?
3. What mass of  $\text{H}_2\text{SO}_4$  can be produced from 50.0 g of  $\text{SO}_2$ , 15.0 g  $\text{O}_2$  and an unlimited amount of  $\text{H}_2\text{O}$ ? The equation is:
- $$2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l}) \Rightarrow 2\text{H}_2\text{SO}_4(\text{aq})$$
4. 40.0 L of  $\text{O}_2$  react with 19.6 L of methane ( $\text{CH}_4$ ) at S.T.P. according to the reaction shown below. What volume of water and carbon dioxide are produced at S.T.P.
- $$\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \Rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$$

5. What is the maximum mass of carbon dioxide that can be produced by the reaction between 15.0 g of propane ( $\text{C}_3\text{H}_8$ ) with 60.0 g of oxygen gas?
6. What mass of iron (III) oxide is produced when 20.9 g of iron (II) sulphide reacts with 10.0 L of oxygen gas at 105.5 kPa and a temperature of 42 °C? What volume of sulphur dioxide is produced at S.T.P.?
7. Nickel metal can be highly purified using the Mond Process:



In the first step of this process nickel metal is reacted with carbon monoxide under high pressure and heat to produce a gas product known as nickel carbonyl ( $\text{Ni}(\text{CO})_4$ ). If 40.0 g of nickel metal is reacted with 5.00 L of carbon monoxide at 60.75 atm. pressure and a temperature of 875 K, calculate the resulting total pressure of all gases at 25 °C and total volume 5.00 L. Hints: nickel is the limiting reagent, Dalton's Law of Partial Pressures could be used to solve this problem

- Answers:
- |   |  |
|---|--|
| 1. a) $\text{CaC}_2$ , b) 6.5 g $\text{C}_2\text{H}_2$ , 18.5 g $\text{Ca}(\text{OH})_2$ , c) 33 g $\text{H}_2\text{O}$ |  |
| 2. 27.8 g W   | 5. 44.9 g $\text{CO}_2$                                  |
| 3. 76.6 g $\text{H}_2\text{SO}_4$   | 6. 18.4 g $\text{Fe}_2\text{O}_3$ , 5.16 L $\text{SO}_2$ |
| 4. 39.2 L $\text{H}_2\text{O}$ , 19.6 L $\text{CO}_2$   | 7. 10.7 atm.   |