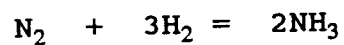


CHAPTER 11

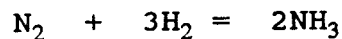
CALCULATIONS INVOLVING CHEMICAL EQUATIONS

In a balanced equation the number of atoms of each element on the right must equal the number on the left.



	N_2	H_2	NH_3
Molecules	1	3	2
Molecules	6×10^{23}	18×10^{23}	12×10^{23}
Moles	1	3	2
Grams	28	6	34

STOICHIOMETRY



1. How many moles of NH_3 can be formed from 9 moles of H_2 ?
2. How many moles of NH_3 can be formed from 123 g of H_2 ?
3. How many moles of H_2 will react with 12 moles of N_2 ?
4. How many grams of N_2 will react with 12 g of H_2 ?
5. How many grams of NH_3 will be produced from 18 g of hydrogen?
6. How many grams of nitrogen will react with 18 g of hydrogen?

CHAPTER 11



1. How many grams of H_2O are produced from 480 g of oxygen?
2. How many grams of C_3H_8 react with 480 g of oxygen?

LIMITING REACTANT

The reactant that is used up completely is the limiting reactant

The other reactant is present in excess and some will remain after the reaction is over



From the grams of A calculate the moles of A (mol A)

From the grams of B calculate the moles of B (mol B)

Compare the ratio

$$\frac{\text{mol A}}{\text{mol B}}$$

to the ratio

$$\frac{a}{b}$$

If mol A/mol B is less than a/b then A is limiting

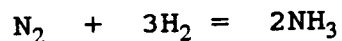
If mol A/mol B is greater than a/b then B is limiting

If mol A/mol B = a/b neither is limiting

CHAPTER 11

LIMITING REACTANT

For the reaction



1. If 1 mole of nitrogen and 4 moles of hydrogen are mixed
 - a. Which substance is limiting
 - b. How many moles of ammonia are produced

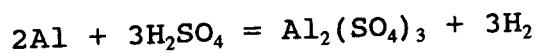
2. If 1 mole of nitrogen and 5 moles of hydrogen are mixed
 - a. Which substance is limiting
 - b. How many moles of ammonia are produced

3. If 1 mole of nitrogen and 2 moles of hydrogen are mixed
 - a. Which substance is limiting
 - b. How many moles of ammonia are produced

4. If 56 g of N_2 and 8.00 g of H_2 are mixed
 - a. Which substance is the limiting reactant
 - b. How many grams of NH_3 are produced

CHAPTER 11

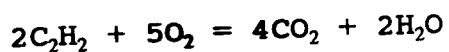
3. For the following reaction



a. How many moles of H_2 are formed from 1 mol of Al and 1 mol of H_2SO_4

b. How many moles of H_2 are formed from 3 mol of Al and 5 mol of H_2SO_4

4. For the following reaction



a. How many grams of carbon dioxide are produced from 52 g of C_2H_2 ?

b. How many grams of oxygen are needed to react with 52 g of C_2H_2 ?

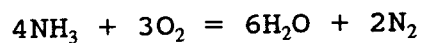
c. If 96 g of carbon dioxide are formed from 52 g of C_2H_2 , what is the percent yield?

CHAPTER 11

STOICHIOMETRY - I ANSWERS

1. a. 2
b. 1
c. 2
d. 2
e. 36
2. a. 4
b. 0.8
3. a. 1
b. 4.5
4. a. 176 g
b. 160 g
c. 54.5%

1. From the following balanced equation calculate:



a. the mass of nitrogen produced from 3.40 g of ammonia

b. the mass of oxygen required to react with 3.40 g of ammonia

2. From the following balanced equation calculate:

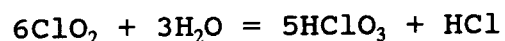


a. the mass of ammonium bromide produced from 8.00 g of ammonia

b. the mass of IBr required to react with 8.00 g of ammonia

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3. From the following balanced equation calculate:



- a. the mass of chloric acid produced from 6.00 g of chlorine dioxide
- b. the mass of water required to react with 6.00 g of chlorine dioxide

4. 1.97 g of water are produced from 2.00 g of ammonia according to the following balanced equation. Calculate the theoretical yield and the percent yield of water.



5. 6.00 g of ammonium bromide are produced from 2.00 g of ammonia according to the following balanced equation. Calculate the theoretical yield and the percent yield of ammonium bromide

