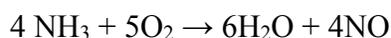


CHEMISTRY 11**UNIT 4 - CHEMICAL REACTIONS & STOICHIOMETRY - REVIEW PACKAGE****STOICHIOMETRY I:**

1. Given the following balanced equations, solve the stoichiometric problems (PLO-D5)

a. Ammonia combines with oxygen gas in the following reaction:



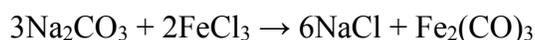
i. How many moles of NH_3 are needed to combine with 3.57 moles of O_2 gas?

2.86 moles NH_3

ii. If 1.5 grams of NO is produced in the above reaction, how many grams of NH_3 were reacted?

0.85 g NH_3

b. For the double replacement reaction:



i. How many grams of NaCl will be produced from the reaction of 0.080 moles of Na_2CO_3 with excess FeCl_3 ?

9.4 g NaCl

ii. How many grams of FeCl_3 would be needed to react with 4.2g of Na_2CO_3 ?

4.3 g FeCl_3

c. For the following reaction:



i. What volume of oxygen (STP) is required to react with 204.0 g of Si_4H_{10} ?

242.7 L O_2

ii. What mass of SiO_2 is formed when 345.0 g of H_2O are formed?

921.5 g SiO_2

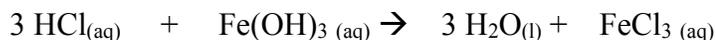
iii. How many molecules of H_2O are formed when 17.92 L of O_2 are used at STP?

3.705×10^{23} molecules of H_2O

- iv. How many moles of Si_4H_{10} are needed to just react with 1.204×10^{26} molecules of oxygen gas?

30.77 mole Si_4H_{10}

- d. For the following balanced equation:



- i. It takes 19.56 mL of 0.50 M HCl to titrate a 25.0 mL sample of a solution of $\text{Fe}(\text{OH})_3$. Calculate the $[\text{Fe}(\text{OH})_3]$?

0.13 M $\text{Fe}(\text{OH})_3$

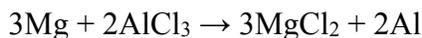
- ii. What mass of $\text{Fe}(\text{OH})_3$ is needed to completely react with 10.0 mL of 0.50M HCl solution?

0.18 g $\text{Fe}(\text{OH})_3$

- iii. What volume of 0.50M HCl is required to titrate a 21.36 gram sample of iron (III) hydroxide?

1.2 L HCl

- e. For the following balanced equation:



- i. How many grams of MgCl_2 would be formed if 50.0mL of 0.200M AlCl_3 is reacted with excess Mg?

1.43 g MgCl_2

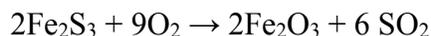
- ii. How many mL of 0.150M AlCl_3 would be needed to react completely with 2.00g of Mg?

3.66×10^3 mL of AlCl_3

STOICHIOMETRY II:

10. Given the following balanced equations, solve the stoichiometric problems (PLO-D5)

- a. In a chemical reaction 6.92g of Fe_2S_3 is combined with 4.54g of oxygen gas.



- i. Which reactant is the **LIMITING** reagent?

Oxygen gas is limiting reagent

- ii. How many grams of the **EXCESS** reactant will be **left over** after the reaction is complete?

0.365 g of Fe₂S₃

- iii. How many grams of Fe₂O₃ can be formed in this reaction?

0.0315 g Fe₂O₃



What mass of P₄ will be produced when 41.5g of Ca₃(PO₄)₂, 26.3g of SiO₂, and 7.80g of C are reacted according to the following balanced equation?

Limiting reactant: Carbon

8.06 g of Carbon

- c. Given the balanced equation:



- i. If 34.5 grams of Al₂C₆ is mixed with 72.0 grams of water, which reactant is in excess? Show by calculations.

Water (H₂O)

- ii. If 34.5 grams of Al₂C₆ is mixed with 72.0 grams of water, what mass of Al(OH)₃ is formed?

42.7 g Al(OH)₃

- iii. If 34.5 grams of Al₂C₆ is mixed with 72.0 grams of water, what volume of CH₄ is formed at STP?

13.1 g CH₄

- d. Given the equation:



When 51.0 grams of NH₃ is burned in an excess of oxygen, 52.65 g of water are produced.

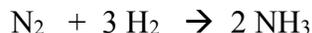
- i. Calculate the theoretical yield of H₂O.

81.0 g H₂O

- ii. Calculate the % yield of H₂O.

65%

- e. Given the equation:



When 4.0 grams of hydrogen gas is combined with an excess of nitrogen, a 92% yield of NH₃ is obtained.

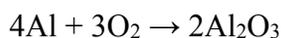
- i. Calculate the theoretical yield of NH₃

2.3x10¹ g NH₃

- ii. Calculate the actual yield of NH₃

2.1x10¹ g NH₃

- f. For the following reaction:



- i. How many grams of aluminum oxide, Al₂O₃, would be expected to form in the reaction of 15.0g Al with 18.43g of oxygen gas?

28.3 g Al₂O₃

- ii. If the actual yield of Al₂O₃ produced in the reaction was only 22.4g Al₂O₃, what would the PERCENT YIELD of the reaction be?

79.2%