04/01/14
Workshop 8 part 1 and 2
Chem. 103, Spring 2014
Chapter 8 and 9
(Full points group quiz: 20)

No submission required

Chapter 8: Stoichiometry in aqueous solution

A. Precipitation Reaction

i) **Type 1: Reactant to reactant calculations**

Variation types

a) What is the molarity of the $AgNO_3$ solution if 5.00 mL was required to completely precipitate 30.094 mmol AgCl? (mmol stands for 10^{-3} mol)
b) How many mL of 0.200 M NaCl will be needed to completely precipitate 25.00 mL 0.100M $AgNO_3$?
c) What is the molarity of the NaCl solution if 5.00 mL was required to completely precipitate 25.00 mL 0.100M $AgNO_3$?

ii) **Type 2: Reactant to product calculations**

Variation types

d) What is the molarity of the NaCl solution if 25.00 mL was required to obtain 2.03 mol of AgCl solid?
e) How many g of AgCl will be produced if 25.00 mL 0.100M $AgNO_3$ is completely precipitated?
f) What is the molarity of the NaCl solution if 25.00 mL of the NaCl solution was required to obtain 5.094 g of AgCl solid as precipitate?

iii) **Type 3: Limiting reactant calculations (when one reactant is available in less than the stoichiometric amount, that reactant (limiting) dictates how much product will be formed)**

Variation types

g) How many g of AgCl will be produced if 25.00 mL 0.200M $AgNO_3$ and 25.00 mL of 0.100M NaCl?
h) How many moles of AgCl will be produced if 25.00 mL 0.100M $AgNO_3$ and 25.00 mL of 0.200M NaCl?
i) Which one of these is the limiting if 25.00 mL 0.500 M NaCl solution added to 25.00 mL 1.00M $AgNO_3$ to yield 1.7925 g of AgCl solid as precipitate?

Home-assigned reading

Section 8.4 (page 280) due at the beginning of your next lab
Answer qns 8.4.1-8.4.5 on page 286 and bring it to your next lab (2.5 points)

B. Gas-forming Reaction

i) **Type 1: Reactant to reactant calculations**

Variation types

a) What is the molarity of the Na_2CO_3 solution if 5.00 mL was required to completely react to 50.01 mmol HCl? (mmol stands for 10^{-3} mol)
b) How many mL of 0.200 M Na_2CO_3 will be needed to completely react to 25.00 mL 0.100M HNO_3?
c) What is the mass of the $CaCO_3$ solid will be needed to completely react to 25.00 mL 0.100M HNO_3?
d) How many mL of 0.200 M H_2SO_4 will be needed to completely react to 25.0 g of K_2CO_3?

ii) **Type 2: Reactant to product calculations**

Variation types

e) What is the mass of the CO_2 will be produced and lost if 2.00g of lithium carbonate reacts to sufficient amount of hydrochloric acid?
f) What is the mass lost in the form of hydrofluoric acid if 2.00g of calcium fluoride reacts to sufficient amount of sulfuric acid?
g) What is the masses and formulae of the products formed in the above two reactions?

iii) **Type 3: Limiting reactant calculations (when one reactant is available in less than the stoichiometric amount, that reactant (limiting) dictates how much product will be formed)**

Variation types

h) How many moles of CO_2 will be produced and lost if 25.00 mL 0.200M Na_2CO_3 reacted to 25.00 mL of 0.100M HCl?
i) How many g of CO_2 will be produced and lost if 25.00 mL 0.100M Na_2CO_3 reacted to 50.00 mL of 0.200M HCl?
j) How many g of CO_2 will be produced and lost if 2.50g Na_2CO_3 reacted to 250.00 mL of 0.200M HCl?
k) How many g of CO_2 will be produced and lost if 25.00 mL 1.00M Na_2CO_3 reacted to 50.00 mL of 0.200M HCl?

iv) **Type 4: Reactant to product (gaseous) volume at STP (standard temperature (273.15 K) and pressure (1.000 atm))**

Variation types

a) What is the molarity of the Na_2CO_3 solution if 5.00 mL was required to completely react to obtain 4.48 L of gas at STP?
b) How many mL of 0.200 M H_2SO_4 will be needed to produce 4.48 L of CO_2 from sufficient amount of $CaCO_3$ at STP?
c) What is the mass of the $CaCO_3$ solid will be needed to completely react to obtain 6.72 L of gas at STP?
d) What is the volume of the gas at STP, will be produced and lost if 25.00 mL 1.00M Na_2CO_3 reacted to 50.00 mL of 0.200M HCl?

Workshop 8 part 2
Chem. 103, Spring 2014
Chapter 8 and 9

C. Acid-base Reactions

i) Type 1: Reactant to reactant calculations

Variation types

a) What is the molarity of the NaOH solution if 5.00 mL was required to completely react to 50.01 mmol HCl? (mmol stands for 10^{-3} mol)
b) How many mL of 0.200 M $Ca(OH)_2$ will be needed to completely react to 25.00 mL 0.100M HNO_3?
c) What is the mass of the KOH solid will be needed to completely react to 25.00 mL 0.100M HNO_3?
d) How many mL of 0.200 M H_2SO_4 will be needed to completely react to 25.0 g of RbOH?

ii) Type 2: Approximate pH (-log(H^+)) calculations

Variation types

e) What is the pH of the solution 2.394g of lithium hydroxide reacts to sufficient amount of hydrochloric acid?
f) What is the pH of the solution 2.394 g of lithium hydroxide reacts to 100. mL of 0.900 M of hydrochloric acid?
g) What is the pH of the solution 2.394 g of lithium hydroxide reacts to 115. mL of 0.900 M of hydrochloric acid?