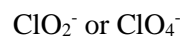
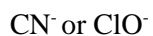


Chapter 16: Acids and Bases

Strength of Acids and Bases

1) Which is a stronger base?



2) Which of the anions below would be the strongest base?



3) Arrange by increasing basicity



4) Arrange by increasing acidity



5) Arrange by increasing acid strength



6) Arrange by increasing acid strength



7)

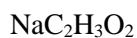
HA and HB are both weak acids in water, and HA is a stronger acid than HB. Which of the following correctly ranks the strength of the bases starting with the strongest?



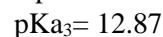
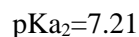
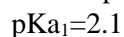
8) True or False:

 BrO_3^- is a weaker base than BrO_4^- an aqueous solution of CH_3NH_3Cl is acidic H_2O is a stronger acid than H_2S an aqueous solution of $Cu(ClO_4)_2$ is basic CH_4 is a weaker acid than HF an aqueous solution of $(CH_3)_3NHNO_2$ is acidic

9) Will the following salts form a solution that is acidic, basic, or pH-neutral?



10) Phosphate, H_3PO_4 is present in cells. What is the predominant form of phosphate in cells if at a physiological pH of 7.0?



Chemistry 233 Quest 1 Review

pH calculations

1) Mark drinks coffee. Caffeine ($\text{C}_8\text{H}_{10}\text{N}_4\text{O}_2$) is a weak base. Calculate the pH of caffeine with a concentration 530 mg/L and a pK_b of 9.8.

2) Determine the pH of a solution that is 0.250 M in HCO_3^-

3) What mass of HClO_4 must be present in 0.500 L of solution to obtain a pH of 0.50?

4) Determine the pH of 0.20 M $\text{CH}_3\text{NH}_3\text{I}$

5) Determine the pH of a solution that is 0.125 M in CO_3^{2-}

6) Find the K_b of Jamesoninium if it is a weak base and that a 0.150M solution of Jamesoninium has a pH of 10.7.

7) Find the pH of 0.20 M KCHO_2

8) A 52.60 mL of aqueous Jamesoninium acid has a pH of 7.5. How many hydronium ions were present?

Chapter 17: Aqueous Ionic equilibrium

Buffers

1) James prepares a buffered system by mixing solid NaF with 50.0 mL of a 0.500 M HF solution. $K_a = 6.8 \times 10^{-4}$

a) What mass of NaF must be added to achieve a pH of 2.75?

b) If 10.00 mL of 0.150 M $\text{NaOH}_{(\text{aq})}$ is added to the buffer, what is the resulting pH?

2) Alex wants to create a buffer for NaF. Which will be the best choice for a buffer solution for this compound?

NaF

HCl

$\text{K}(\text{C}_2\text{H}_3\text{O}_2)$

NH_3

NaOH

3) Given equal volumes of 0.10M HCl and another compound, which will produce a buffer solution?

0.05M NaOH

0.05M NH_3

0.20M NaCl

0.10M NH_3

0.20M CH_3COOH

4) Naomi creates a buffer by adding 0.5 mol of solid sodium hydroxide to 1.0 L of 1.0 M acetic acid. What can be said about the pH of the buffer?

- a) The pH will be equal to the $\text{p}K_a$ for acetic acid
- b) The pH will be greater than the $\text{p}K_a$ for acetic acid
- c) The pH will be less than the $\text{p}K_a$ for acetic acid
- d) The pH will be equal to the $\text{p}K_a$ of acetic acid minus 0.30
- e) The pH will be less than the value in answer d.
- f) Not enough info

5) Blood is buffered by 0.012M carbonic acid, H_2CO_3 , and 0.024M bicarbonate ion. ($\text{p}K_a = 6.1$).

Assuming that the volume of blood in an adult is 5 liters, what mass of HCl can be neutralized by the buffer before the system reaches a fatal pH of below 7.0

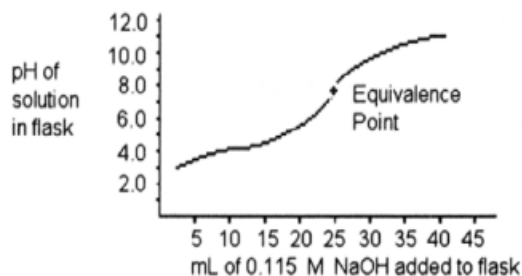
Chemistry 233 Quest 1 Review

Titration

- 1) Consider 25.0 ml of 0.100M HCHO_2 titrated with 0.150 M NaOH
- Draw what a titration curve of this should look like and designate the relative pH at the equivalence point
 - Calculate the volume of titrant required to reach the equivalence point
 - Calculate the initial pH before any of the titrant is added
 - Calculate the pH after 5.00 mL of titrant is added
 - Calculate the pH at the half-equivalence point
 - Calculate the pH when 15.00 mL of titrant is added
 - For the volume in part f, what is the ratio of base to acid? Would this be an effective buffer?
 - Calculate the pH at the equivalence point
 - Calculate the pH after 20.00 mL of titrant is added

Chemistry 233 Quest 1 Review

2) James reacts 2.50 grams of hydroiodic acid (HI) and some concentrated barium hydroxide. If the concentration of barium hydroxide is 0.800 M, then what is the volume required to reach the equivalence point when titrating 100.00 mL of hydroiodic acid?



3) An unknown analyte is titrated with NaOH. The unknown analyte was most likely:

HCl CH₃COOH KOH Na₂CO₃ H₂O

Molar Solubility

4) Will the following solids be more soluble in an acidic solution or in pure water?

BaCO₃ CuS AgCl HgBr AgI

5) Calculate the molar solubility for metal compound MX ($K_{sp} = 3.27 \times 10^{-11}$ M)

6) What is the molar solubility of calcium hydroxide buffer solution at a pH of 7?

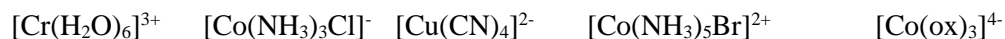
7) The K_{sp} of BaSO₄ is 1.5×10^{-9} . What is the molar concentration of Ba²⁺(aq) in a saturated solution of BaSO₄?

8) A solution is prepared by mixing 1.00 L of 4.50 M NaOH with 1.00 L of 1.00 M Co(NO₃)₂. What is the equilibrium concentration of cobalt ions? The K_{sp} for Co(OH)₄²⁻ is 5.0×10^{-9} M

Chapter 22: Coordination Compounds

(it may be wise to have a separate sheet of paper to draw on)

1) For the following coordination compounds, give the oxidation state and coordination number of the metal ion.



Structure and Isomerism

2) Draw two linkage isomers of $[\text{Mn}(\text{NH}_3)_5(\text{NO}_2)]^{2+}$

3) Provide all the isomers for the following coordination compounds:

