General Chemistry II
July 30, 2020

Exam 2 Review

1. **The pH of a 0.063 M solution of hypobromous acid (HOBr) is 4.95. Calculate K_a.**

2. **Arrange the following 0.10 M solutions in order from most acidic to most basic.**
   KOH, KCl, KCN, NH_4Cl, HCl

3. **An unknown salt is either NaCN, $NaC_2H_3O_2$, NaF, NaCl, or NaOCl. When 0.100 mol of the salt is dissolved in 1.00 L of water, the pH of the solution is 8.07. What is the identity of the salt?**

4. **100.0 mL of 0.10 M malonic acid (HOOC-CH2-COOH) is titrated with 0.10 M NaOH. $K_{a1} = 1.5 \times 10^{-3}$ and $K_{a2} = 2.0 \times 10^{-6}$.**
   a. **Write out the reactions and equilibrium expressions associated with K_{a1} and K_{a2}**

b. **Calculate the pH:**
    i. **Before any NaOH is added**

    ii. **After 50 mL of NaOH is added**

    iii. **After 100 mL of NaOH is added**

    iv. **After 150 mL of NaOH is added**

    v. **After 200 mL of NaOH is added**

5. **You are asked to prepare a pH = 3.00 buffer solution starting from 1.25 L of a 1.00 M solution of HF and any amount you need of NaF**
    a. **What is the pH of the HF solution prior to adding NaF?**

b. How many grams of NaF should be added to prepare the buffer solution? Neglect the small volume change that occurs when the NaF is added.

6. You titrate 25.0 mL of 0.10 M NH_3 with 0.10 M HCl. (NH_3 $K_b = 1.8 \times 10^{-5}$)

(a) What is the pH of the NH_3 solution before the titration begins?

(b) What is the pH at the equivalence point?

(c) What is the pH at the half equivalence point of the titration?

(d) Calculate the pH of the solution after adding 5.00, 15.0, 20.0, 22.0, and 30.0 mL of the acid.