Advanced Chem. Amino Acids & pH   Name:

1. A solution has a hydroxide-ion concentration of 1.5×10^{-5}M. (a) What is the concentration of the hydronium ions in this solution? (b) What is the pH of this solution? (c) Is the solution acidic, basic, or neutral?
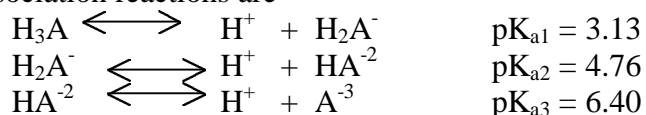
2. Calculate the [H+] for a solution with a pOH of 4.75

3. Calculate the pH of a 0.125 M HNO_3 solution.

4. Calculate the percentage of benzoic acid ionized in a 0.020 M benzoic acid solution. K_a is 6.6×10^{-5} for benzoic acid.

5. Calculate the pH for a 0.015 M acetic acid solution. The K_a is 1.8×10^{-5} for acetic acid.

6. Citric acid, a tricarboxylic acid important in intermediary metabolism, can be symbolized as H_3A. Its dissociation reactions are

$$H_3A \longleftrightarrow H^+ + H_2A^- \qquad pK_{a1} = 3.13$$
$$H_2A^- \longleftrightarrow H^+ + HA^{-2} \qquad pK_{a2} = 4.76$$
$$HA^{-2} \longleftrightarrow H^+ + A^{-3} \qquad pK_{a3} = 6.40$$

If the total concentration of the acid and its anion forms is 0.02 M, what are the individual concentrations of H_3A, H_2A^-, HA^{-2} and A^{-3} at pH 5.2?

7. The Ka for formic acid is 1.78×10^{-4}.
   a. What is the pH of a 0.1 M solution of formic acid

   b. 150 mL of 0.1 M NaOH is added to 200 mL of 0.1 M formic acid, and water is added to give a final volume of 1L. What is the pH of the final solution?

8. What concentrations of acetic acid and sodium acetate are required to prepare a buffer solution with a pH of 4.60? Ka is 1.8×10^{-5} for acetic acid