Lactic Acid (Hlac) has an Acid Dissociation Constant of 1.4×10^{-4}

What is the pH of 0.03 M Potassium Lactate (KLac)?

Answer: pH=8.2

Aniline (Anil) has a Base Equilibrium Constant of 4.3×10^{-10}

What is the pH of 0.05 M Anilinium Chloride (AnilHCl)?

Answer: pH=3.0

Formic Acid (HForm) has an Acid Dissociation Constant of 1.8×10^{-4}

What is the pH of 0.10 M Lithium Formate (LiForm)?

Answer: pH=8.4

Quinoline (Quin) has a Base Equilibrium Constant of 6.0×10^{-10}

What is the pH of 0.002 M Anilinium Chloride (AnilHCl)

Answer: pH=3.7

TEXTBOOK HOMEWORK

18.15 Which solution has the higher pH? Explain.

(a) A 0.1 M solution of an acid with $Ka = 1 \times 10^{-4}$ or one with $Ka = 4 \times 10^{-5}$

(b) A 0.1 M solution of an acid with $pKa = 3.0$ or one with $pKa = 3.5$

(c) A 0.1 M solution or a 0.01 M solution of a weak acid

(d) A 0.1 M solution of a weak acid or a 0.1 M solution of a strong acid

(e) A 0.1 M solution of an acid or a 0.01 M solution of a base

(f) A solution of pOH 6.0 or one of pOH 8.0

18.16 (a) What is the pH of 0.0111 M NaOH? Is the solution neutral, acidic, or basic?

(b) What is the pOH of 1.35×10^{-3} M HCl? Is the solution neutral, acidic, or basic?

18.18 (a) What are [H_3O^+], [OH^-], and pOH in a solution with a pH of 9.85?

(b) What are [H_3O^+], [OH^-], and pH in a solution with a pOH of 9.43?

18.20 How many moles of H_3O^+ or OH^- must you add to 5.6 L of HA solution to adjust its pH from 4.52 to 5.25? Assume a negligible volume change.

18.45 A 0.035 M solution of a weak acid (HA) has a pH of 4.88. What is the Ka of the acid?

18.48 Chloroacetic acid, $ClCH_2COOH$, has a pKa of 2.87. What are $[H3O^+]$, pH, $[ClCH_2COO^-]$, and $[ClCH_2COOH]$ in 1.25 M $ClCH_2COOH$?

18.50 In a 0.20 M solution, a weak acid is 3.0% dissociated.

(a) Calculate the $[H3O^+]$, pH, $[OH^-]$, and pOH of the solution.

(b) Calculate Ka of the acid.

18.54 Acetylsalicylic acid (aspirin), $HC_9H_7O_4$, is the most widely used pain reliever and fever reducer. Find the pH of 0.018 M aqueous aspirin at body temperature (Ka at 37 °C = $3.6x10^{-4}$).

18.55 Formic acid, HCOOH, the simplest carboxylic acid, is used in the textile and rubber industries and is secreted as a defense by many species of ants (family Formicidae). Calculate the percent dissociation of 0.75 M HCOOH.

18.65 (a) What is the pH of 0.150 M KCN?

(b) What is the pH of 0.40 M triethylammonium chloride, $(CH_3CH_2)_3NHCl$?

18.67 Sodium hypochlorite solution, sold as chlorine bleach, is potentially dangerous because of the basicity of ClO^-, the active bleaching ingredient. What is $[OH^-]$ in an aqueous solution that is 6.5% NaClO by mass? What is the pH of the solution? (Assume d of solution = 1.0 g/mL.)

SUPPLEMENTARY HOMEWORK

S1. Which of the following is not a conjugate acid-base pair?

    a. CH_3COOH and CH_3COO^-

    b. $CH_3NH_3^+$ and CH_3NH_2

    c. H_2SO_3 and HSO_4^-

    d. HPO_4^{2-} and PO_4^{3-}

    e. $HCOOH$ and $HCOO^-$

S2. Which of the following represents the most acidic solution?

    a. $[H^+] = 0.15$ M

    b. $[H^+] = 1.0 \times 10^{-14}$ M

    c. pH = 3.6

    d. $[OH^-] = 1.0 \times 10^{-13}$ M

    e. pOH = 13.4

S3. Arrange the solutions in order of increasing acidity:

    I   a solution with $[H_3O^+] = 4.2 \times 10^{-6}$ M

    II lemonade, pH = 2.65

    III 0.25 M nitric acid

    IV pickle juice, pH = 3.10

    a. I-IV-II-III

    b. II-IV-III-I

    c. III-II-IV-I

    d. IV-I-II-III

    e. III-II-I-IV

S4. Write the acid ionization constant expression for the ionization of the hydrogen sulfate ion, HSO_4^-, in aqueous solution.

S5. Lactic Acid is a weak acid with $K_a = 1.4 \times 10^{-4}$. Calculate the pH, pOH and percent protonation of a 0.05 M solution of sodium lactate.

S6. Aniline is a weak base with $K_b = 4.3 \times 10^{-10}$. Calculate the pH, pOH and percent dissociation (of the Anilium ion) of a solution of 0.07 M Anilinium Bromide.

S7. Tellurous Acid, H_2TeO_3, is a diprotic acid with acid dissociation constants,
$$K_a' = 3.0 \times 10^{-3} \text{ and}$$
$$K_a'' = 2.0 \times 10^{-8}$$

a) Calculate the pH and pOH of a 1.20 M solution of Tellurous Acid (H_2TeO_3).

b) Calculate the pH and pOH of a 0.25 M solution of potassium tellurite (Na_2TeO_3)

S8. The pH of a 0.15 M solution of Morphine $(C_{17}H_{19}O_3N)$ is 10.5. Calculate the Base Equilibrium Constant, K_b, for Morphine.