

Acid-Base Practice Worksheet

1.) For each of the following solutions, write the reaction that occurs when placed in water and compute $[H^+]$, $[OH^-]$, pH and pOH.

a.) 0.0080 M solution of HNO_3

b.) 0.020 M solution of HCN , ($K_a = 6.2 \times 10^{-10}$)

c.) 0.024 M solution of ethyl amine, $C_2H_5NH_2$. ($K_b = 6.4 \times 10^{-4}$)

d.) The concentration of citric acid in lemon juice is about 4.0 % m/v. Compute the $[H^+]$, $[OH^-]$, pH and pOH for lemon juice. ($K_a = 7.4 \times 10^{-4}$, $MW = 192.12$)

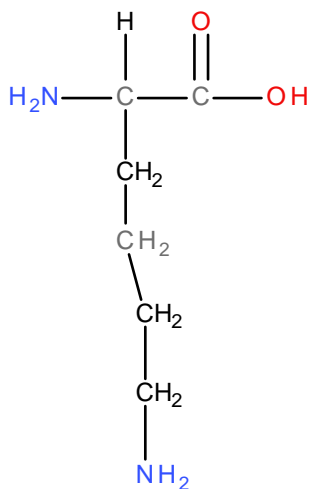
2.) Consider the following acids and their pK_a values.

Acid	pK_a
HIO_3	0.77
HIO	10.64
$H_2C_6H_6O_6$	4.10

a.) List the acids in order of increasing strength.

b.) Write the conjugate bases for each acid and list them in increase order of base strength.

3.) The following is the amino acid, lysine which has a pI of 10.0. Draw the structure of this amino acid in physiologic solution ($pH \sim 7.4$)



4.) You wish to make a buffer from butanoic acid, $HC_4H_7O_2$, ($K_a = 1.5 \times 10^{-5}$)

a.) Write the equilibrium in a buffer system using this acid and its' base.

b.) What is the pH of the buffer if the concentration of the acid and the base is 0.50 M.

c.) What will happen to the pH if the base is at a higher concentration than the acid?

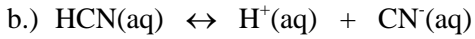
d.) Write the reaction that occurs if acid is added to this system.

Solutions

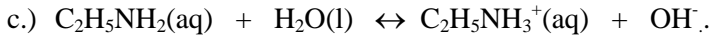
1.)



$[\text{H}^+] = 0.0080 \text{ M}, [\text{OH}^-] = 1.25 \times 10^{-12} \text{ M}, \text{pH} = 2.10, \text{pOH} = 11.90.$



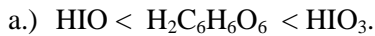
$[\text{H}^+] = 3.52 \times 10^{-6} \text{ M}, [\text{OH}^-] = 2.83 \times 10^{-9} \text{ M}, \text{pH} = 5.45, \text{pOH} = 8.55.$



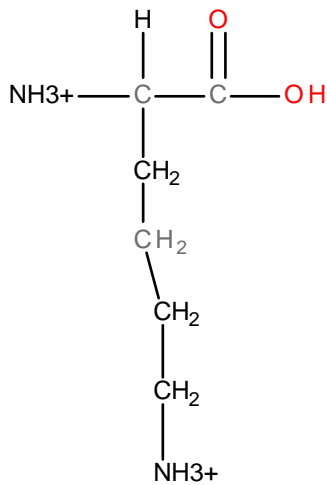
$[\text{H}^+] = 2.55 \times 10^{-12} \text{ M}, [\text{OH}^-] = 3.92 \times 10^{-3} \text{ M}, \text{pH} = 11.59, \text{pOH} = 2.41.$

d.) $[\text{H}^+] = 0.0124 \text{ M}, [\text{OH}^-] = 8.06 \times 10^{-13} \text{ M}, \text{pH} = 1.91, \text{pOH} = 12.09.$

2.)



3.)



4.)

