pH Calculations of Buffers

Example One

Calculate the pH of a buffer solution made by adding 2.0 g of $NaC_2H_3O_2$ (MW: 82.0 g/mol) to 250.0 mL 1.00 M $HC_2H_3O_2$. Assume that the total volume of the buffer solution remains unchanged. The K_a for $HC_2H_3O_2$ is Ka=$1.8x10^{-5}$

Example Two

What mass of $NaC_2H_3O_2$ (MW: 82.0 g/mol) must be dissolved in 2.00 L of 0.080 M $HC_2H_3O_2$ to produce a solution with pH=4.95? K_a= $1.8x10^{-5}$
Assume the volume remains constant.
Video & Written Solutions

Example Three

Determine the pH of the buffer solution if 600.0 mL of 1.00 M of the base pyridine, C_5H_5N and 500.0 mL of 2.00 M of its chloride salt, C_5H_5NHCl are combined. The K_b of C_5H_5N is 1.7×10^{-9} .

Example Four

What is the pH of a solution made by mixing equal moles of NH_3 and NH_4Cl. The K_b of NH_3 is $1.8x10^{-5}$.

Example Five

Which of the following buffer systems would be the best choice to create a buffer with pH of 7.20?

a. $HC_2H_3O_2$ / $KC_2H_3O_2$ (K_a $HC_2H_3O_2 = 1.8 \times 10^{-5}$)
b. NH_3 / NH_4Br (K_b $NH_3 = 1.76 \times 10^{-5}$)
c. $HClO_2$ / $NaClO_2$ (K_a $HClO_2 = 1.1 \times 10^{-2}$)
d. HClO / NaClO (K_a $HClO = 2.9 \times 10^{-8}$)