Note Title 2/22/2015

Solution #3

Equilibrium

100.0mL 1.00M NaC_2H_3COO Conj. base

Buffer

40.00 mL 1.00M CH_3COOH weak acid

Acetic Acid — hydronium — acetate

$CH_3COOH_{(aq)} + H_2O_{(l)} \rightleftharpoons H_3O^+_{(aq)} + CH_3COO^-_{(aq)}$ $\quad K_a = \frac{[H_3O^+][CH_3COO^-]}{[CH_3COOH]}$

initial (dilution)

$m_2 = \frac{m \cdot V_1}{V_2} = \frac{(1.00)(40.0mL)}{(140mL)}$ $\quad m_2 = \frac{m \cdot V_1}{V_2} = \frac{(1.00)(100.0mL)}{(140.0mL)}$

$m_2 = 0.28571\,M$ $\sim$ Shift $0.00M$ $m_2 = 0.71429\,M$

change $\quad -x \quad +x \quad +x$

equilibrium $\quad 0.28571 - x \quad +x \quad 0.71429 + x$

L.M.A.

$K_a = \frac{[H_3O^+][CH_3COO^-]}{[CH_3COOH]} = \frac{x\,(0.71429+x)}{(0.28571-x)}$ $\quad x$

$x = [H_3O^+]$ $\quad pH = -\log_{10}[H_3O^+]$

$x = [H_3O^+] = 10^{-pH}$ ← measure