Quiz 10.2 – Buffers and Titrations

Name: Key

Question 1

You need to prepare a buffer with $pH = 10.45$. Use table 10.2 from your book to determine the best acid/base conjugate pair for this buffer. $pH = pK_A + \log \frac{B}{A}$ Find acid with pK_A closest to 10.45

$pK_a = -\log K_A$

HCO_3^- has $pK_A = 10.25$ use HCO_3^-/CO_3^{2-}

Question 2

A buffer is made using the formic acid/formate ion conjugate pair. Find the buffer pH when $[HCHO_2] = 0.76M$ and $[CHO_2^-] = 0.32M$

$pK_A = -\log 1.8 \cdot 10^{-4} = 3.74$

$pH = pK_A + \log \frac{B}{A}$ $pH = 3.74 + \log \frac{0.32\,M}{0.76\,M} = 3.36$

Question 3

A buffer is made using the HF/F^- conjugate pair. The buffer has $pH = 4.15$ and $[F^-] = 0.76M$. Find [HF]

$pK_A = -\log 3.5 \cdot 10^{-4} = 3.46$

$pH = pK_A + \log \frac{B}{A}$ $4.15 = 3.46 + \log \frac{0.76\,M}{[A]} \rightarrow 0.69 = \log \frac{0.76\,M}{[A]}$

$\frac{0.76\,M}{[A]} = 10^{0.69} = 4.90 \rightarrow [A] = 0.16\,M$

Question 4

A $25ml$ sample of HCl with unknown concentration is titrated using $0.125M$ NaOH. Titrating to the end point required $36ml$ of the NaOH titrant. What was the original unknown concentration?

$N_A V_A = N_B V_B$

$N_A \cdot 25\,ml = 0.125\,M \cdot 36\,ml$

$N_A = 0.18\,M$