

KEY

QUIZ #4, Chapter -15

ID #

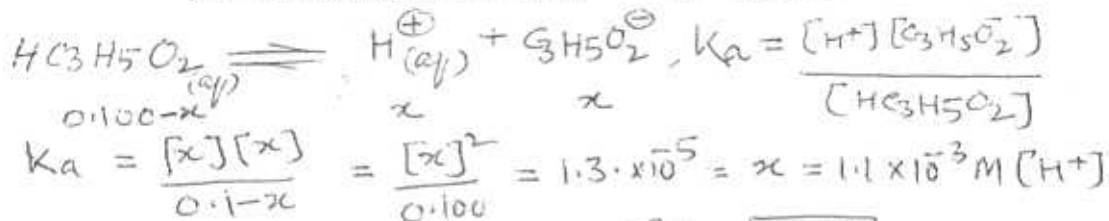
Name:

Date:

Attempt all questions.

[3]

Q.1 2 a) Calculate the pH of 0.100 M propionic acid ($\text{HC}_3\text{H}_5\text{O}_2$) and % dissociation of the acid. $K_a = 1.3 \times 10^{-5}$



$$\text{pH} = -\log[\text{H}^+] = -\log[1.1 \times 10^{-3}] = \boxed{2.96}$$

$$\% \text{ Dissociation} = \frac{1.1 \times 10^{-3}}{0.100} \times 100 = \boxed{1.1\%}$$

1 b) The common ions will drive the equilibrium towards *Left* and decrease the dissociation of *Reactant*.

[3]

Q.2. Calculate the pH a mixture containing 0.100 M of HONH_2 and 0.100 M of HONH_3Cl (weak acid) $K_b = 1.1 \times 10^{-8}$

$$\text{pH} = \text{p}K_a + \log \frac{[\text{Base}]}{[\text{Acid}]}$$

$$K_a = \frac{K_w}{K_b} = \frac{1.0 \times 10^{-14}}{1.1 \times 10^{-8}} = 9.1 \times 10^{-7}$$

$$\text{p}K_a = -\log[9.1 \times 10^{-7}] = 6.04$$

$$\text{pH} = 6.04 + \frac{[\text{HONH}_2]}{[\text{HONH}_3^+]} = \frac{0.100}{0.100}$$

$$\boxed{\text{pH} = 6.04}$$

[4]

Q.3. 3 a) Calculate the pH of buffer solution after addition of 0.02 mol of HCl to 1.00 L of a solution of 5.00 M $\text{HC}_2\text{H}_3\text{O}_2$, and 5.00 M of $\text{NaC}_2\text{H}_3\text{O}_2$.

$$K_a = 1.8 \times 10^{-5}$$

$$\text{p}K_a = -\log[K_a]$$

$$\text{pH} = \text{p}K_a + \log \frac{[\text{Base}]}{[\text{Acid}]}$$

$\text{HC}_2\text{H}_3\text{O}_2$	\rightleftharpoons	H^+	+	$\text{C}_2\text{H}_3\text{O}_2^-$
5.00 M		0.02		5.00 M
5.00 + 0.02		0		5.00 + 0.02 = 4.98
= 5.02				

$$= 4.74 + \log \frac{4.98}{5.02} = 4.74 - 0.00348$$

$$\boxed{\text{pH} = 4.73}$$

1 b) A buffer solution is made by dissolving NH_4Cl and NH_3 in H_2O . Write equation to show how this buffer neutralized added H^+ and OH^- . $[\text{NH}_4^+/\text{NH}_3]$

