Quiz VI General Chemistry II Lecture I Summer 13 Dr. Hahn 25 pts 6/24 M quiz # _____

Name ___Key___ Name ______________________
(print name) (sign name) Please **show all work** for full credit.

1. Which of the following is the correct other half of a buffer solution in which the weak acid is HCN ? (circle one and only one) (4 pts)

The other half of the buffer is: (a) F^- (b) CH_3COO^- **(c)** CN^- (d) H_2CN^+

2. For a buffer of 0.150 M of CH_3COOH (acid) and 0.200 M of CH_3COO^- (base), what is the pH ? The pK_a of acetic acid is 4.74. ~~Henderson Hasselbalch may be useful.~~ pH = pK_a + log { [base] / [acid] }

(7 pts)

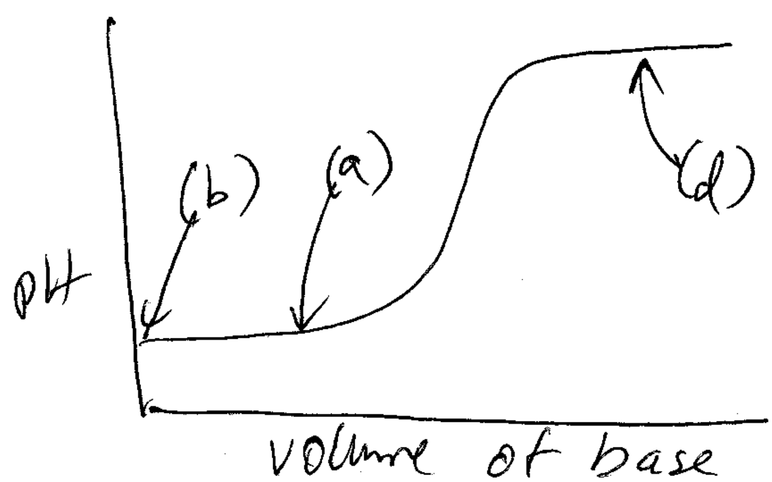
$$pH = pKa + \log\left\{\frac{[0.200M]}{[0.150M]}\right\}, \quad pKa = 4.74$$

$$pH = (4.74 + \log(1.333)) = 4.86$$

(2pt) (2pt) (2pts) (1pt)

3. In the following titration graph for a strong acid to which is added a strong base, match the letter with the appropriate parenthesis. (6 pts, 2 pts each)

(a) $[H^+]$ = (# moles acid - # moles base) / total volume in Liters (b) $[H^+]$ = concentration of the strong acid (c) $[H^+]$ = 1.0 x 10-7 (d) $[OH^-]$ = (# moles base - # moles acid)/total volume in Liters



4. For a titration of a strong acid to which you are adding a strong base, the volume at equivalence point is 7.5 mL. For 15 mL of an acid of concentration 0.255 and a base concentration of 0.500, what is the $[H_3O^+]$ concentration after the addition of 5 mL of base? You must show work for full credit. (8pts) Before equivalence point – attempt -6

$[H_3O^+] = \frac{\#\text{mole } H^+ - \#\text{moles NaOH}}{\text{total volume in } l}$

$\#\text{mole } H_3O^+ = (15 \text{ ml acid})\left(\frac{0.255 \text{ mol}}{1000 \text{ ml acid}}\right)$ 2pt

$\#\text{ mole } H_3O^+ = 3.83 \times 10^{-3} \text{ mol } H_3O^+$

$\#\text{moles } OH^- = 5 \text{ ml base} \times \frac{0.500 \text{ mol base}}{1000 \text{ ml base}} = 2.5 \times 10^{-3} \text{ mol}$ 2pts

$\text{total volume} = 15 \text{ ml acid} + 5 \text{ ml base} = 20 \text{ ml base} \times \frac{l}{1000 \text{ ml}} = 0.020\ l$

$[H_3O^+] = \frac{3.83 \times 10^{-3} \text{ mol } H_3O^+ - 2.5 \times 10^{-3} \text{ mol } OH^-}{0.020\ l}$ 2pt 2pt

$[H_3O^+] = \frac{1.33 \times 10^{-3} \text{ mol } H_3O^+}{0.020\ l} = 0.0665 \text{ M } H_3O^+$

Extra Credit: 1 pt

For the reaction

$Ag_2CO_3 \rightarrow 2\ Ag^{+1} + CO_3^{-2}$

left off $-\frac{1}{4}$ pt

a. Ksp = $[Ag^{+1}]^2[CO_3^{-2}]$ (use the molecular formula and molar concentration expression to answer this question) (1/2pt)

b. If the Ksp of Ag_2CO_3 is 8.46×10^{-12}, what is the solubility (S) ? (1/2pt)

	Ag_2CO_3	$2\ Ag^{+2}$	CO_3^{-2}
init	—	0	0
change		2s	s
eq.		2s	s

$K_{sp} = (2s)^2(s) = 8.46 \times 10^{-12}$

$4s^3 = 8.46 \times 10^{-12}$

$s^3 = \frac{8.46 \times 10^{-12}}{4} = 2.12 \times 10^{-12}$

$s = \sqrt[3]{2.12 \times 10^{-12}}$

$s = 1.28 \times 10^{-4}$

math + algebra $-\frac{1}{4}$ pt

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(7pts)

3. In the following titration graph for a strong acid to which is added a strong base, match the letter with the appropriate parenthesis. (6pts)

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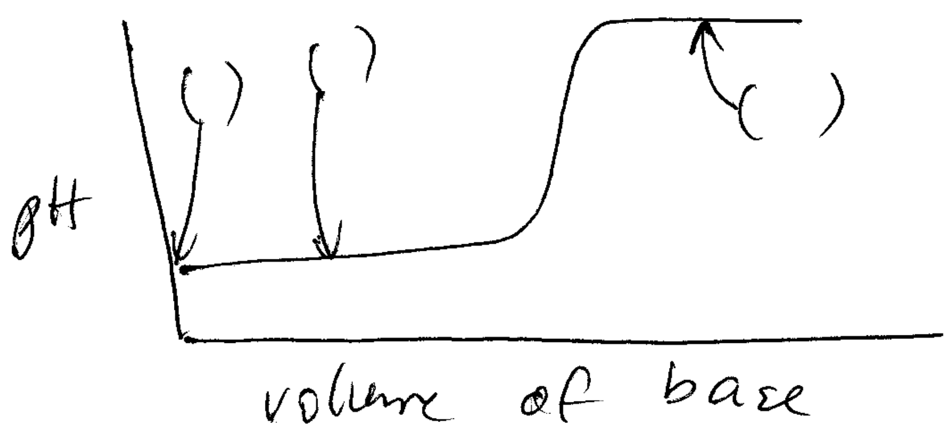

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