Quiz VI General Chemistry II Lecture Dr. Hahn 20 pts 4/5/13 F form A 9:30 am quiz # _____

Name Key (print) Name _____ (sign)

Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)

pH + pOH = 14 $[H_3O^+][OH^-] = 1.0 \times 10^{-14} = k_W$ p (anything) = - log (anything)

$pH = pK_a + \log \{ [base] / [acid] \}$ M = molarity = moles / liter

1. Calculate the pH of a buffer solution with a concentration of 0.3 M H CN and 0.2 M Na CN. pK_a of H CN is 9.31 Use the Henderson Hasselbalch. (10 pts)

$$pH = pKa + \log \frac{[NaCN]}{[HCN]}$$

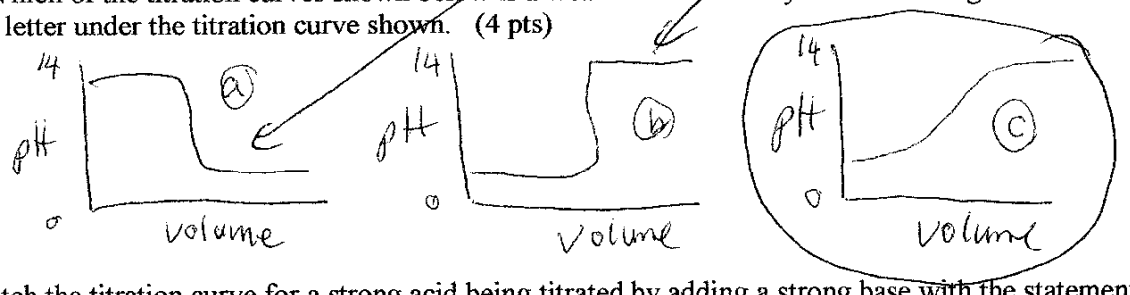
$$pH = 9.31 + \log\left(\frac{0.2}{0.3}\right)$$

$$pH = 9.31 - 0.176 = 9.13$$

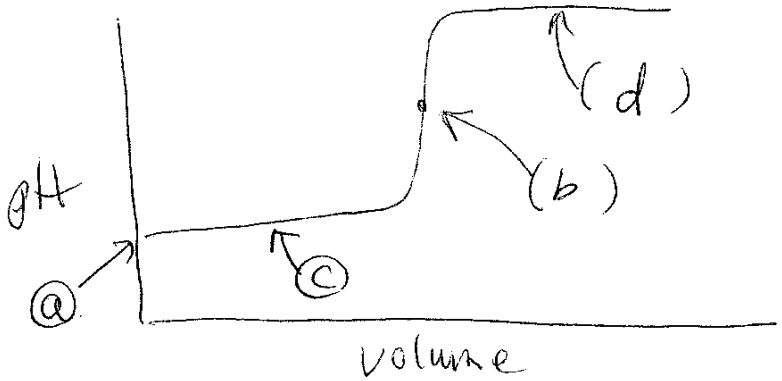
strong base - add strong acid

strong acid - add strong base

2. Which of the titration curves shown below is a weak acid to which you add a strong base ? Circle the letter under the titration curve shown. (4 pts)



3. Match the titration curve for a strong acid being titrated by adding a strong base with the statements below. You may use the letters one time, no time or many times. (a) $[H^+] = [H_3O^+] = [HA]$ (HA is a generic strong acid) (b) pH = 7 (c) M = (# moles acid - # moles base) / total volume (d) M = (# moles base - # moles acid) / total volume (6 pts)



Extra Credit (4 pts): For the reaction K OH (s) → K^+ + OH^- give the expression for Ksp

$K_{sp} = [K^+][OH^-]$ just equilibrium constant with solid reactant

Quiz VI General Chemistry II Lecture Dr. Hahn 20 pts 4/5/13 F form B 9:30 am quiz # _____

Name Key (print) Name _____ (sign)

Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)

pH + pOH = 14 $[H_3O^+][OH^-] = 1.0 \times 10^{-14} = k_W$ p (anything) = - log (anything)

$pH = pK_a + \log \{ [base] / [acid] \}$ M = molarity = moles / liter

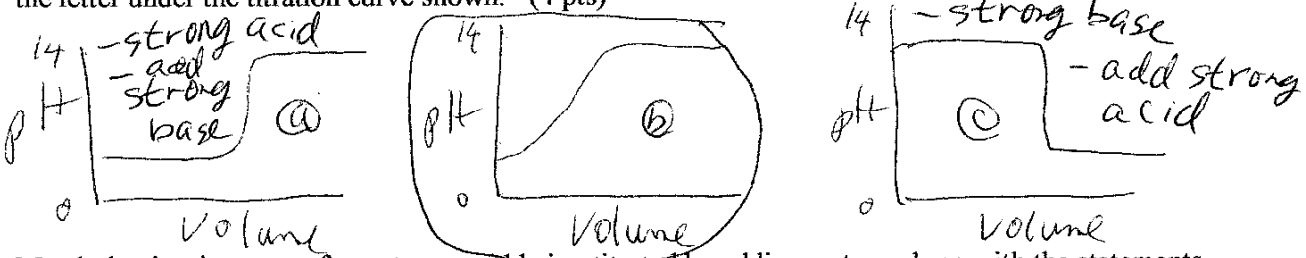
1. Calculate the pH of a buffer solution with a concentration of 0.25 M CH_3COOH and 0.15 M $CH_3COO\,Na$. pK_a of CH_3COOH is 4.74. Use the Henderson Hasselbalch. (10 pts)

$$pH = pKa + \log \frac{[CH_3COONa]}{[CH_3COOH]}$$

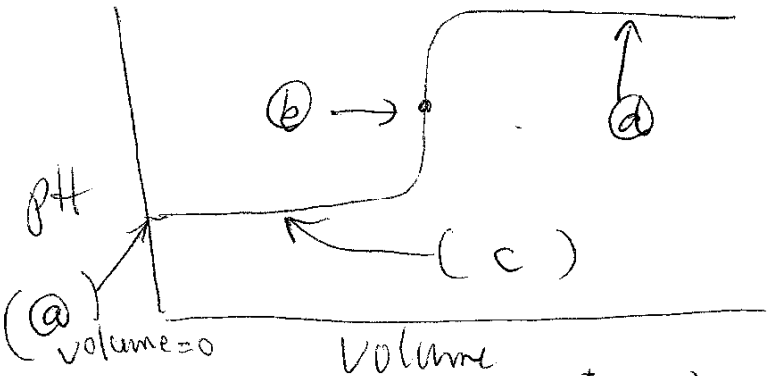
$$pH = 4.74 + \log\left(\frac{0.15}{0.25}\right)$$

$$pH = 4.74 - 0.22 = 4.52$$

2. Which of the titration curves shown below is a weak acid to which you add a strong base ? Circle the letter under the titration curve shown. (4 pts)



3. Match the titration curve for a strong acid ~~being titrated~~ by adding a strong base with the statements below. You may use the letters one time, no time or many times. (a) $[H^+] = [H_3O^+] = [HA]$ (HA is a generic strong acid) (b) pH = 7 (c) M = (# moles acid - # moles base) / total volume (d) M = (# moles base - # moles acid) / total volume (6 pts)



this is a strong acid to which you add strong base titration curve

Extra Credit (4 pts): For the reaction $Ag_2S_{(s)} \rightarrow 2Ag^+ + S^{-2}$ give the expression for Ksp

$$Ksp = [Ag^+]^2[S^{-2}]$$

this is just an equilibrium constant with a solid reactant

Quiz VI General Chemistry II Lecture Dr. Hahn 20 pts 4/5/13 F form A 11:30 am quiz # _____

Name Key (print) Name _____ (sign)

Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)

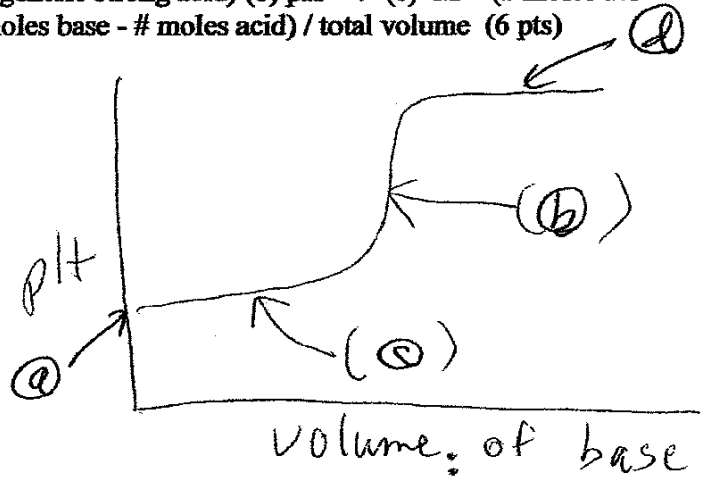
$pH + pOH = 14$ $[H_3O^+][OH^-] = 1.0 \times 10^{-14} = k_w$ p (anything) = - log (anything)

$pH = pK_a + \log \{ [base] / [acid] \}$ M = molarity = moles / liter

1. Which is the conjugate base for the following acid ? (4 pts)

   H CN CN^-

2. Match the titration curve for a strong acid being titrated by adding a strong base with the statements below. You may use the letters one time, no time or many times. (a) $[H^+] = [H_3O^+] = [HA]$ (HA is a generic strong acid) (b) pH = 7 (c) M = (# moles acid - # moles base) / total volume (d) M = (# moles base - # moles acid) / total volume (6 pts)



3. In a titration, if you add 20.0 mL of a strong base(NaOH) with a concentration of 0.25 M (NaOH) to a 30.0 mL solution of a strong acid (HCl) of concentration of 0.10 M, what is the $[H_3O^+]$? (This is a after equivalence point problem.) (10 pts)

$[OH^-] = \frac{\#\text{moles base} - \#\text{moles acid}}{\text{total volume}}$

$\#\text{moles base} = 20.0\text{ml NaOH} \times \frac{0.25\text{ mol NaOH}}{1000\text{ml}} = 5.00\times10^{-3}\text{ mol NaOH}$

$\#\text{moles acid} = 30.0\text{ml HCl} \times \frac{0.10\text{ mol HCl}}{1000\text{ml HCl}} = 3.00\times10^{-3}\text{ mol HCl}$

Total volume = 20.0ml + 30.0ml

Total volume = 50.0ml

$[OH^-] = \frac{(5.00\times10^{-3} - 3.00\times10^{-3})}{(50.0\text{ml} \times \frac{1}{1000\text{ml}})}$

$[OH^-] = \frac{2.00\times10^{-3}}{0.05}$

$[OH^-] = 0.04$

$[H^+] = \frac{1\times10^{-14}}{0.04}$

$[H^+] = 2.5\times10^{-13}$

Extra Credit (4 pts): For the reaction $PbI_2(s) \rightarrow Pb^{+2} + 2\,I^-$ give the expression for Ksp

$K_{sp} = [Pb^{+2}][I^-]^2$

Quiz VI General Chemistry II Lecture Dr. Hahn 20 pts 4/5/13 F form B 11:30 am quiz # _____

Name Key (print) Name _____ (sign)

Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)

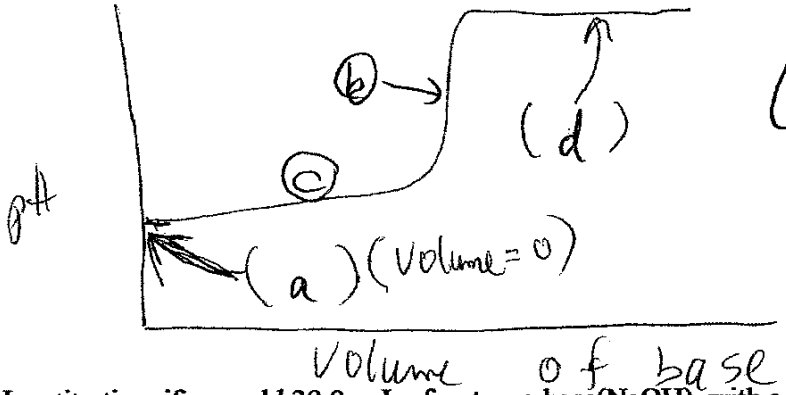
pH + pOH = 14 $[H_3O^+][OH^-] = 1.0 \times 10^{-14} = k_w$ p (anything) = - log (anything)

$pH = pK_a + \log \{ [base] / [acid] \}$ M = molarity = moles / liter

1. Which is the conjugate base for the following acid ? (4 pts)

   CH_3COOH CH_3COO^-

2. Match the titration curve for a strong acid being titrated by adding a strong base with the statements below. You may use the letters one time, no time or many times. (a) $[H^+] = [H_3O^+] = [HA]$ (HA is a generic strong acid) (b) pH = 7 (c) M = (# moles acid - # moles base) / total volume (d) M = (# moles base - # moles acid) / total volume (6 pts)



$[H^+] = 0.11\ M$

$[H^+] = \frac{5.5 \times 10^{-3}}{0.05}$

3. In a titration, if you add 30.0 mL of a strong base(NaOH) with a concentration of 0.15 M (NaOH) to a 20.0 mL solution of a strong acid (HCl) of concentration of 0.50 M, what is the $[H_3O^+]$? (This is a before equivalence point problem.) (10 pts)

$[H^+] = \frac{\#\ moles\ acid - \#\ moles\ base}{total\ volume}$ $[H^+] = \frac{\left[0.01\ mol\ HCl - 4.5 \times 10^{-3}\ mol\ NaOH\right]}{\left(50.0\ ml \times \frac{1\ l}{1000\ ml}\right)}$

$\#\ moles\ acid = 20.0\ ml\ HCl \times \frac{0.50\ mol\ HCl}{1000\ ml\ HCl} = 0.01\ mol\ HCl$

$\#\ moles\ base = 30.0\ ml\ NaOH \times \frac{0.15\ mol\ NaOH}{1000\ ml\ NaOH} = 4.5 \times 10^{-3}$

$total\ volume = 20.0\ ml\ HCl + 30.0\ ml\ NaOH = 50.0\ ml$

Extra Credit (4 pts): For the reaction $BaSO_4 \rightarrow Ba^{+2} + SO_4^{-2}$ give the expression for Ksp

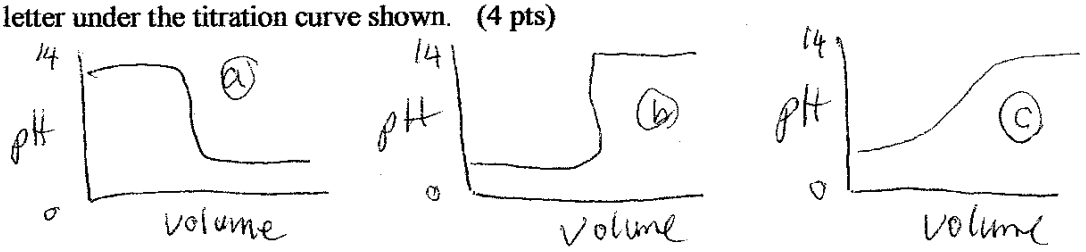
$K_{sp} = [Ba^{+2}][SO_4^{-2}]$ (s) just equilibrium constant with solid reactant

Quiz VI General Chemistry II Lecture Dr. Hahn 20 pts 4/5/13 F form A 9:30 am quiz # 1-9

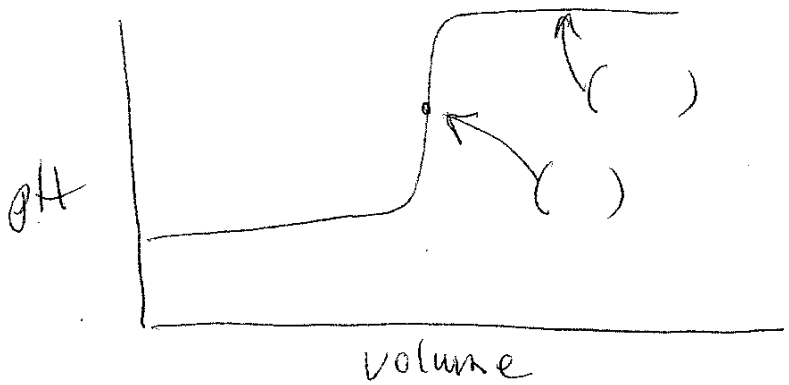
Name _____(print) Name _____(sign)
Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)
pH + pOH = 14 $[H_3O^+][OH^-] = 1.0 \times 10^{-14} = k_W$ p (anything) = - log (anything)
$pH = pK_a + \log \{ [base] / [acid] \}$ M = molarity = moles / liter

1. Calculate the pH of a buffer solution with a concentration of 0.3 M H CN and 0.2 M Na CN. pK_a of H CN is 9.31 Use the Henderson Hasselbalch. (10 pts)

2. Which of the titration curves shown below is a weak acid to which you add a strong base ? Circle the letter under the titration curve shown. (4 pts)



3. Match the titration curve for a strong acid being titrated by adding a strong base with the statements below. You may use the letters one time, no time or many times. (a) $[H^+] = [H_3O^+] = [HA]$ (HA is a generic strong acid) (b) pH = 7 (c) M = (# moles acid - # moles base) / total volume (d) M = (# moles base - # moles acid) / total volume (6 pts)



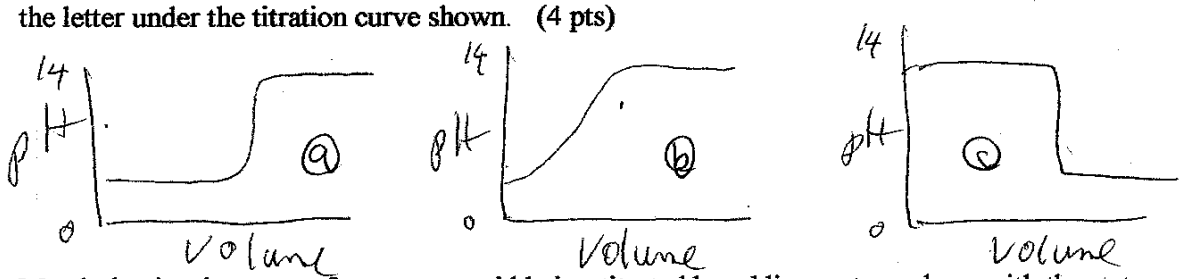
Extra Credit (4 pts): For the reaction K OH (s) → K^+ + OH^- give the expression for Ksp

Quiz VI General Chemistry II Lecture Dr. Hahn 20 pts 4/5/13 F form B 9:30 am quiz # 1-8

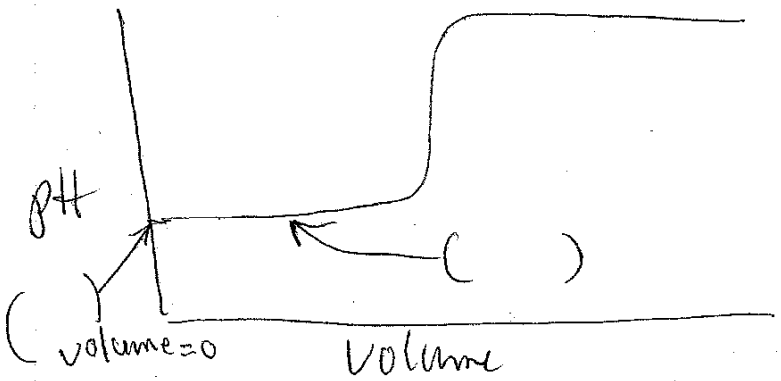
Name _____(print) Name _____(sign)
Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)
pH + pOH = 14 $[H_3O^+][OH^-] = 1.0 \times 10^{-14} = k_W$ p (anything) = - log (anything)
$pH = pK_a + \log \{ [base] / [acid] \}$ M = molarity = moles / liter

1. Calculate the pH of a buffer solution with a concentration of 0.25 M CH_3COOH and 0.15 M CH_3COO Na. pK_a of CH_3COOH is 4.74. Use the Henderson Hasselbalch. (10 pts)

2. Which of the titration curves shown below is a weak acid to which you add a strong base ? Circle the letter under the titration curve shown. (4 pts)



3. Match the titration curve for a strong acid being titrated by adding a strong base with the statements below. You may use the letters one time, no time or many times. (a) $[H^+] = [H_3O^+] = [HA]$ (HA is a generic strong acid) (b) pH = 7 (c) M = (# moles acid - # moles base) / total volume (d) M = (# moles base - # moles acid) / total volume (6 pts)



Extra Credit (4 pts): For the reaction $Ag_2S(s) \rightarrow 2\,Ag^+ + Cl^-$ give the expression for Ksp

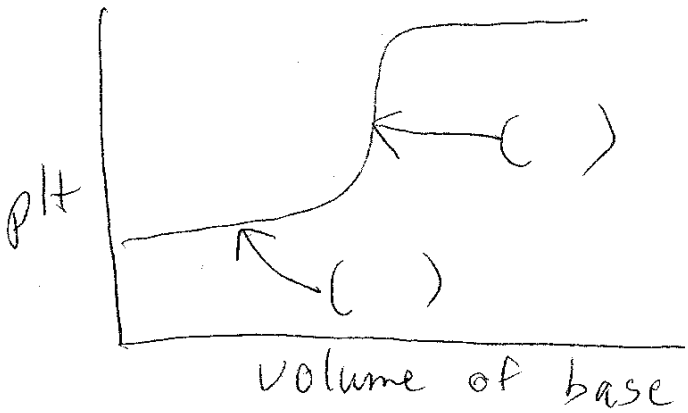
Quiz VI General Chemistry II Lecture Dr. Hahn 20 pts 4/5/13 F form A 11:30 am quiz # 2-11

Name _____(print) Name _____(sign)
Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)
pH + pOH = 14 $[H_3O^+][OH^-] = 1.0 \times 10^{-14} = k_W$ p (anything) = - log (anything)
$pH = pK_a + \log \{ [base] / [acid] \}$ M = molarity = moles / liter

1. Which is the conjugate base for the following acid ? (4 pts)

   H CN _____

2. Match the titration curve for a strong acid being titrated by adding a strong base with the statements below. You may use the letters one time, no time or many times. (a) $[H^+] = [H_3O^+] = [HA]$ (HA is a generic strong acid) (b) pH = 7 (c) M = (# moles acid - # moles base) / total volume (d) M = (# moles base - # moles acid) / total volume (6 pts)



3. In a titration, if you add 20.0 mL of a strong base(NaOH) with a concentration of 0.25 M (NaOH) to a 30.0 mL solution of a strong acid (HCl) of concentration of 0.10 M, what is the $[H_3O^+]$? (This is a after equivalence point problem.) (10 pts)

Extra Credit (4 pts): For the reaction $PbI_2 \rightarrow Pb^+ + 2\,I^-$ give the expression for Ksp
(s)

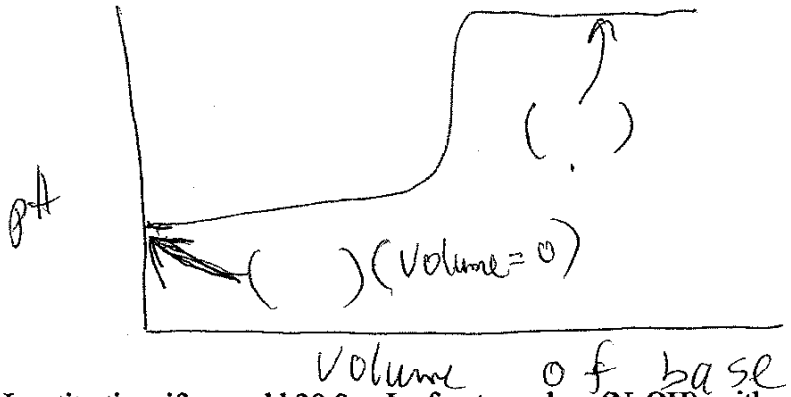
Quiz VI General Chemistry II Lecture Dr. Hahn 20 pts 4/5/13 F form B 11:30 am quiz # 2-12

Name _____(print) Name _____(sign)
Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)
pH + pOH = 14 $[H_3O^+][OH^-] = 1.0 \times 10^{-14} = k_W$ p (anything) = - log (anything)
$pH = pK_a + \log \{ [base] / [acid] \}$ M = molarity = moles / liter

1. Which is the conjugate base for the following acid ? (4 pts)

   $CH_3COO\,H$ _____

2. Match the titration curve for a strong acid being titrated by adding a strong base with the statements below. You may use the letters one time, no time or many times. (a) $[H^+] = [H_3O^+] = [HA]$ (HA is a generic strong acid) (b) pH = 7 (c) M = (# moles acid - # moles base) / total volume (d) M = (# moles base - # moles acid) / total volume (6 pts)



3. In a titration, if you add 30.0 mL of a strong base(NaOH) with a concentration of 0.15 M (NaOH) to a 20.0 mL solution of a strong acid (HCl) of concentration of 0.50 M, what is the $[H_3O^+]$? (This is a before equivalence point problem.) (10 pts)

Extra Credit (4 pts): For the reaction $BaSO_4 \rightarrow Ba^{+2} + SO_4^{-2}$ give the expression for Ksp
(s)