This print-out should have 32 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

Msci 20 0317
001 10.0 points

How many mL of a 0.001 M chloride solution must be added to a 100 mL solution of 7.2×10^{-5} M Ag^+ solution for AgCl to precipitate? $K_{sp}(AgCl) = 1.8 \times 10^{-10}$ (Neglect dilution by the added Cl^- solution.)

1. Need to know the solution pH to solve this problem

2. 0.03 mL

3. 2.6 mL

4. 0.25 mL

5. 40.6 mL

Msci 20 0604
002 10.0 points

AgCl would be least soluble in

1. 0.1 M $CaCl_2$.

2. 0.1 M HNO_3.

3. 0.1 M NH_3.

4. 0.1 M HCl.

5. pure water.

Holt da 18 review 35
003 10.0 points

Calculate whether a precipitate will form (and why) if 0.35 L of 0.0044 M $Ca(NO_3)_2$ and 0.17 L of 0.00039 M NaOH are mixed at 25°C. K_{sp} for $Cu(OH)_2$ is equal to 5.5×10^{-6}.

1. $Cu(OH)_2$ precipitates because $Q > K$.

2. $Cu(OH)_2$ does not precipitate because $Q < K$.

3. $Cu(OH)_2$ precipitates because $Q < K$.

4. $Cu(OH)_2$ does not precipitate because $Q > K$.

LDE Selective Precipitation 003
004 10.0 points

Consider the following K_{sp} values for lead salts:

$PbCO_3 = 7.4 \times 10^{-14}$ $PbSO_4 = 1.6 \times 10^{-8}$
$PbS = 3.0 \times 10^{-28}$ $PbCrO_4 = 2.8 \times 10^{-13}$

Which pair would be most difficult to separate by fractional precipitation?

1. SO_4^{2-} and CO_3^{2-}

2. S^{2-} and CrO_4^{2-}

3. CrO_4^{2-} and CO_3^{2-}

4. SO_4^{2-} and CrO_4^{2-}

Msci 18 0411
005 10.0 points

Assume that five weak acids, identified only by numbers (1, 2, 3, 4, and 5), have the following ionization constants.

Acid	Ionization Constant K_a value
1	1.0×10^{-3}
2	3.0×10^{-5}
3	2.6×10^{-7}
4	4.0×10^{-9}
5	7.3×10^{-11}

The anion of which acid is the strongest base?

1. 3

2. 1

3. 4

4. 2

5. 5

Msci 19 5010
006 10.0 points

What is the concentration of hydroxide ion in a 0.10 M solution of NaCN? The ionization constant of the weak acid HCN is 4.0×10^{-10}.

1. 1.6×10^{-9} M

2. 1.6×10^{-3} M

3. 2.5×10^{-6} M

4. 6.3×10^{-6} M

5. None of these

ChemPrin3e T10 28
007 10.0 points

The pH of 0.80 M benzenesulfonic acid is 0.51. What is the percentage ionization of benzenesulfonic acid?

1. 51%

2. 39%

3. 5.0%

4. 64%

5. 25%

LDE Simple Strong Base Calculation 001
008 10.0 points

What would be the pOH of a solution of $Sr(OH)_2$ (strontium hydroxide) prepared by dissolving 122 g of the base into 10 L of pure water (H_2O)?

1. 13

2. 13.3

3. 1

4. 0.7

LDE Water Auto-protolysis Theory 001
009 10.0 points

Consider a glass of water at 80 °C, which of the following statements is true?

1. The water is acidic because its pH is slightly lower than 7

2. The water is neutral because its pH is 7

3. The auto-protolysis of water is an exothermic process

4. The concentrations of H^+ and OH^- are equal

Molar sol in pH8
010 10.0 points

What is the molar solubility of $Zn(OH)_2$ in a solution buffered at pH of 8.0?
($Zn(OH)_2$, $K_{sp} = 3.0 \times 10^{-17}$)

1. 3.0×10^{-5}

2. 4.0×10^{-9}

3. 5.0×10^{-6}

4. 8.0×10^{-4}

5. 2.0×10^{-6}

ChemPrin3e T10 22
011 10.0 points

Which of the following 0.10 M aqueous solutions gives the LOWEST pH?

1. H_3PO_4 ($pK_{a1} = 2.12$)

2. CCl_3COOH ($pK_a = 0.52$)

3. HF ($pK_a = 3.45$)

4. CH_3COOH ($pK_a = 4.75$)

5. Because all are acids, the pH is the same for all solutions.

Buffer conj ratio 01
012 10.0 points

A solution containing an unspecified amount of HCl and ammonia (NH_3) has a pH of 8.78 What is the ratio of NH_3 to NH_4^+ in the solution? (For NH_3, $K_b = 1.8 \times 10^{-5}$)

1. 2.21

2. 0.452

3. cannot be determined

4. 0.335

5. 2.99

6. 0.218

7. 5.6×10^{-10}

LDE Simple Buffer Calc 002
013 10.0 points

What would be the pH of a solution prepared from 200 mL of 5 M HOBr and 200 mL of 1 M NaOBr? The K_a of hypobromous acid is 2×10^{-9}.

1. 4

2. 6

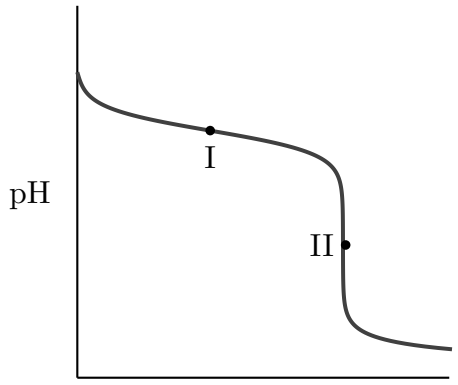
3. 7

4. 10

5. 8

Titration Curve 02
014 10.0 points

Consider the titration curve of a weak base with a strong acid



The pOH at point I is equal to the ___ and the pH at point II is ___ pH 7.

1. pK_b of the base, greater than

2. pH of the base, greater than

3. pK_b of the base, equal to

4. pK_b of the base, less than

5. pH of the base, less than

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triprotic titration 01
015 (part 1 of 2) 10.0 points

Citric acid is a triprotic acid (pK_{a1} = 3.13, pK_{a2} = 4.76, pK_{a3} = 6.40). 50 mL of 0.020 M citric acid is titrated with 0.050 M NaOH. How many mL of base solution are needed to reach the first equivalence point?

1. 50.0 mL

2. 60.0 mL

3. 5.0 mL

4. 2.0 mL

5. 20.0 mL

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016 (part 2 of 2) 10.0 points

Which answer best approximates the pH of the solution half way to the first equivalence point of this titration?

1. 8.6

2. 4.8

3. 2.2

4. 7.0

5. 4.0

6. 3.1

7. 6.4

ChemPrin3e T11 57
017 10.0 points

Consider the titration of 50.0 mL of 0.0200 M HClO(aq) with 0.100 M NaOH(aq). What is the formula of the main species in the solution after the addition of 10.0 mL of base?

1. NaOH

2. ClO_2

3. ClOH

4. $HClO_2$

5. ClO^-

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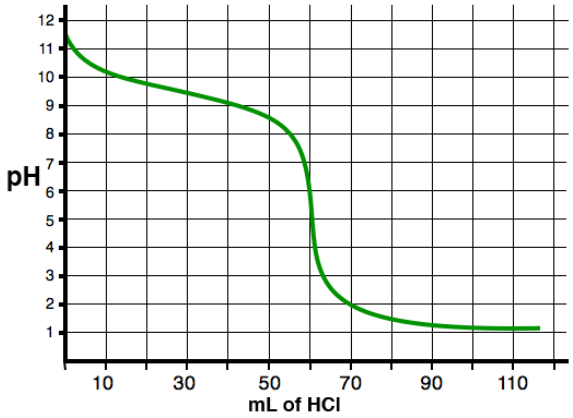
pH curve 02
018 10.0 points

Below is the pH curve for a titration of a weak base with 0.10 M HCl. What is the pK_b of the weak base?



1. 7.00

2. 2.7

3. 4.6

4. 11.3

5. 8.7

6. 9.4

7. 5.3

LDE Polyprotic Amphiprotic Calc 003
019 10.0 points

Determine the pH of a 0.03 M solution of NaH_2PO_4? Assume H_3PO_4 has a pK_{a1} of 2.1 and a pK_{a2} of 7.2 and a pK_{a3} of 12.7.

1. 1.81

2. 7.40

3. 7.11

4. 4.36

5. 4.65

6. 9.95

LDE Polyprotic Conj Base Calc 001
020 10.0 points

What would be the pH of a 0.4 M Na_2CO_3 solution? Carbonic acid has $K_{a1} = 2.5 \times 10^{-4}$, $K_{a2} = 5.6 \times 10^{-11}$.

1. 2.07

2. 5.40

3. 7.00

4. 11.93

5. 8.60

LDE Polyprotic Species Concentration 001
021 10.0 points

For a triprotic acid, H_3A, with pK_a values of 2.5, 6.5 and 10.5, what species is present in highest concentration when 1M H_3A is buffered at pH 7?

1. HA^{2-}

2. H^+

3. A^{3-}

4. H_2A^-

5. H_3A

Strong Acid or Base
022 10.0 points

Which of

I) HCl II) HF III) LiOH
IV) $HClO_2$ V) HNO_3

are strong acids or strong bases in water?

1. I, III, and V only

2. I, II, III, and V only

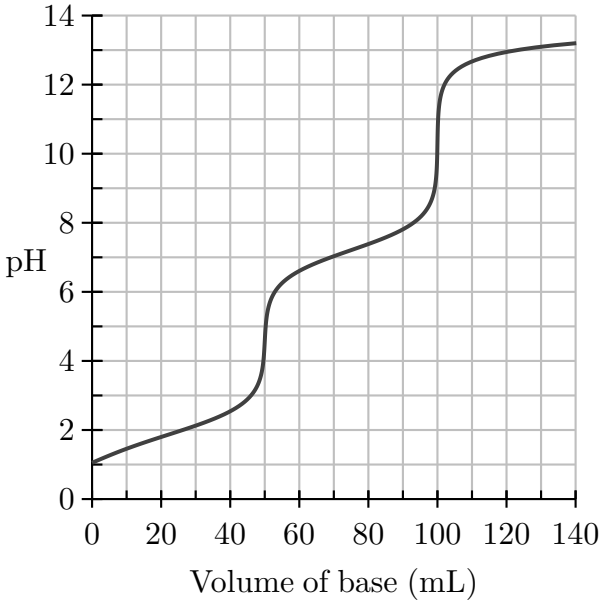
3. I, III, IV, and V only

4. All of the compounds

5. I, II, IV, and V only

ChemPrin3e T11 61 62
023 (part 1 of 2) 10.0 points

The titration curve for the titration of 0.75 M H_2SO_3(aq) with 0.75 M KOH(aq) is given below.



What are the major species in solution after 100 mL of KOH(aq) have been added?

1. SO_3^{2-}(aq) and K^+(aq)

2. SO_3^{2-}(aq), OH^-(aq), and K^+(aq)

3. HSO_3^-(aq) and K^+(aq)

4. H_2SO_3(aq), HSO_3^-, and K^+(aq)

5. HSO_3^-(aq), SO_3^{2-}(aq), and K^+(aq)

024 (part 2 of 2) 10.0 points

What are the major species in solution after 75 mL of KOH(aq) have been added?

1. HSO_3^-(aq), SO_3^{2-}(aq), and K^+(aq)

2. SO_3^{2-}(aq), OH^-(aq), and K^+(aq)

3. H_2SO_3(aq), HSO_3^-, and K^+(aq)

4. HSO_3^-(aq) and K^+(aq)

5. SO_3^{2-}(aq), and K^+ (aq)

Identify Buffer and Capacity 001
025 10.0 points

WITHDRAWN

Ksp and colligative 001

026 10.0 points

Thallium(I) iodide and lead(II) iodide have nearly identical K_{sp} values. If you had a saturated solution of each compound, which do you think would have the higher osmotic pressure?

TlI	$K_{sp} = 5.54 \times 10^{-8}$
PbI_2	$K_{sp} = 9.8 \times 10^{-9}$

1. TlI will be higher by more than a factor of 2

2. they will be within a factor of 2 of each other

3. PbI_2will be higher by more than a factor of 2

Temperature Dependence of Ka

027 10.0 points

Given that the dissociation of a weak acid is endothermic, as the temperature is raised for a weak acid solution one would expect the pH to

1. increase

2. be unaffected

3. decrease

4. there is no way to know since K_w is also temperature dependent

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Msci 18 0338

028 10.0 points

What is $[H_3O^+]$ when $[OH^-] = 3.3 \times 10^{-9}$ M?

1. 1.0×10^{-7} M

2. 3.3×10^{-9} M

3. 6.6×10^{-5} M

4. 3.3×10^{-5} M

5. 3.0×10^{-6} M

Extra credit

029 13.0 points

If more points are awarded on this assignment, would you like them added to your score?

1. NO, leave my score alone, I prefer the lower score

2. YES, I would like the points and the higher score.

DAL 19 003

030 10.0 points

Derivation of the weak monoprotic acid equation yields a quadratic solution of the form $K_a = \dfrac{[H^+]^2}{C_{HA} - [H^+]}$. With two assumptions this equation can be further simplified to a first order equation of the form $K_a = \dfrac{[H^+]^2}{C_{HA}}$. Under what conditions is this simplification most valid?

1. small C_{HA} and small K_a

2. large C_{HA} and large K_a

3. small C_{HA} and large K_a

4. large C_{HA} and small K_a

Msci 18 0404

031 10.0 points

How much acetic acid ($K_a = 1.8 \times 10^{-5}$) must be used to prepare a liter of solution having a pH of 2.75?

1. 0.435 moles

2. 0.0101 moles

3. 0.178 moles

4. 9.88 moles

5. 5.69 moles

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032 10.0 points

What is the pH at the stoichiometric point for the titration of 0.100 M CH_3COOH(aq) with 0.100 M KOH(aq)? The value of K_a for acetic acid is 1.8×10^{-5}.

1. 9.26

2. 7.00

3. 8.89

4. 8.72

5. 5.28