Periodic Table of the Elements

1A 1	2A 2	3B 3	4B 4	5B 5	6B 6	7B 7	8B 8	9	10	1B 11	2B 12	3A 13	4A 14	5A 15	6A 16	7A 17	8A 18
1 H 1.0079																	2 He 4.0026
3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.0067	8 O 15.9994	9 F 18.9984	10 Ne 20.1797
11 Na 22.9898	12 Mg 24.3050											13 Al 26.9815	14 Si 28.0855	15 P 30.9738	16 S 32.066	17 Cl 35.4527	18 Ar 39.948
19 K 39.0983	20 Ca 40.078	21 Sc 44.9559	22 Ti 47.88	23 V 50.9415	24 Cr 51.9961	25 Mn 54.9380	26 Fe 55.847	27 Co 58.9332	28 Ni 58.69	29 Cu 63.546	30 Zn 65.39	31 Ga 69.723	32 Ge 72.61	33 As 74.9216	34 Se 78.96	35 Br 79.904	36 Kr 83.80
37 Rb 85.4678	38 Sr 87.62	39 Y 88.9059	40 Zr 91.224	41 Nb 92.9064	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.9055	46 Pd 106.42	47 Ag 107.8682	48 Cd 112.411	49 In 114.82	50 Sn 118.710	51 Sb 121.75	52 Te 127.60	53 I 126.9045	54 Xe 131.39
55 Cs 132.9054	56 Ba 137.327	57 La 138.9055	72 Hf 178.49	73 Ta 180.9479	74 W 183.85	75 Re 186.207	76 Os 190.2	77 Ir 192.22	78 Pt 195.08	79 Au 196.9665	80 Hg 200.59	81 Tl 204.3833	82 Pb 207.2	83 Bi 208.9804	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh (262)	108 Hs (265)	109 Mt (266)									

58 Ce 140.115	59 Pr 140.9076	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.965	64 Gd 157.25	65 Tb 158.9253	66 Dy 162.50	67 Ho 164.9303	68 Er 167.26	69 Tm 168.9342	70 Yb 173.04	71 Lu 174.967
90 Th 232.0381	91 Pa 231.0359	92 U 238.0289	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (260)

This print-out should have 30 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering. The due time is Central time.

Lyon E3 07

18:01, general, multiple choice, > 1 min, fixed.

001

Like all equilibrium constants, K_w varies somewhat with temperature.

Given that K_w is 4.95×10^{-13} at some temperature, what is the pH of a neutral aqueous solution at that temperature?

1. 6.15 **correct**

2. 6.06

3. 6.22

4. 6.34

5. 6.43

Explanation:

DAL 02 0303

18:01, general, multiple choice, < 1 min, fixed.

002

Which of the following statements is true with respect to the autodissociation of water when sipping a glass of ice water?

I. pH = pOH = 7
II. pH < 7
III. pH = pOH
IV. pH > 7

1. I and III only

2. III and IV only **correct**

3. II only

4. IV only

Explanation:

Since water autodissociates, $[H^+] = [OH^-]$. For any given temperature, the pH of pure water is defined as neutral and pH = pOH. At 25°C neutral pH = 7. K_a will be smaller than 1×10^{-7} at 0°C because water autodissociates less than 25°C. pH will therefore be greater than 7 at 0°C.

ChemPrin3e T10 19

18:99, general, multiple choice, < 1 min, fixed.

003

What is the pH of a 0.005 M aqueous solution of calcium hydroxide?

1. 11.40

2. 2.00

3. 12.00 **correct**

4. 12.70

5. 11.70

Explanation:

Msci 18 0408

18:01, general, multiple choice, > 1 min, fixed.

004

0.50 moles of HCN are added to a liter of water.

What is the pH? (K_a of HCN is 4.0×10^{-10})

1. 4.69

2. 5.35

3. 4.85 **correct**

4. 9.40

5. 4.35

Explanation:

HCN is *not* a strong acid so $[H^+]$ will *not* be 0.5 M. To figure it out, we must look at the K_a.

$$HCN \longrightarrow H^+ + CN^-$$

Initial	0.5	0	0
Change	$-x$	$+x$	$+x$
Equilibrium	$0.5 - x$ (but x is negligible)	x	x

x is negligible compared to 0.5 in this situation because the K_a is so small (which means the reaction isn't going to go very much. We leave in the other two x's in because they are not negligible compared to zero:

$$K_a = \frac{[CN^-][H^+]}{[HCN]}$$
$$4 \times 10^{-10} = \frac{x^2}{0.5}$$
$$x = 1.4 \times 10^{-5} = [H^+]$$
$$pH = -\log\left(1.4 \times 10^{-5}\right) = 4.85$$

Msci 19 0007
18:06, general, multiple choice, > 1 min, fixed.
005
Rank the following 1.0 M solutions
NaCN, H_2S, RbOH, $CaCl_2$, HI
in order of DECREASING pH.

1. RbOH, NaCN, $CaCl_2$, H_2S, HI **correct**

2. $CaCl_2$, NaCN, H_2S, HI, RbOH

3. H_2S, HI, NaCN, RbOH, $CaCl_2$

4. NaCN, $CaCl_2$, RbOH, HI, H_2S

5. RbOH, $CaCl_2$, HI, NaCN, H_2S

Explanation:

DAL Acid Base Type
11:04, general, multiple choice, < 1 min, .
006
For the reaction

$$Al^{3+} + 3\,NH_3 \rightarrow Al(NH_3)_3$$

Al^{3+} is best described as

1. a Lewis acid. **correct**

2. a Lewis base.

3. a Brønsted acid.

4. a Brønsted base.

5. neither an acid nor a base.

Explanation:

Msci 18 0835
18:08, general, multiple choice, > 1 min, fixed.
007
Calculate the pH of an aqueous solution containing 0.10 M NH_3 and 0.10 M NH_4Cl. K_b for NH_3 is 1.8×10^{-5}.

1. 9.26 **correct**

2. 9.40

3. 9.70

4. 11.11

5. 9.31

Explanation:
$[NH_3] = 0.10$ M $[NH_4^+] = 0.10$ M
$K_b = 1.8 \times 10^{-5}$

This is an ammonia buffer solution in which $[NH_3] = [NH_4^+]$, so

$$pOH = pK_b = -\log(1.8 \times 10^{-5}) = 4.74473$$
$$pH = 14.00 - pOH = 9.25527$$

Msci 18 0724
18:08, general, multiple choice, > 1 min, fixed.
008
Which of the following mixtures will be a buffer when dissolved in a liter of water?

1. 0.1 mol $Ca(OH)_2$ and 0.3 mol HI

2. 0.3 mol NaCl and 0.3 mol HCl

3. 0.4 mol NH_3 and 0.4 mol HCl

4. 0.2 mol HBr and 0.1 mol NaOH

5. 0.2 mol HF and 0.1 mol NaOH **correct**

Explanation:

Eliminate answers that are obviously incorrect. The choice with "0.2 mol HBr" and "0.1 mol $Ca(OH)_2$" are strong acids and strong bases respectively; therefore, NOT buffers. The choice with "0.3 mol NaCl" is a combination of spectator ions and a strong acid; this does not form a buffer. Remaining for calculation are choices with "0.4 mol NH_3" and "0.2 mol HF". Now perform the neutralizaton calculations on the remaining possibilities:
Choice with 0.4 mol NH_3

$$NH_3 + H^+ \rightleftharpoons {NH_4}^+$$

Initial	0.4	0.4	0
Change	−0.4	−0.4	0.4
Final	0	0	0.4

Choice with 0.2 mol HF

$$HF + OH^- \rightleftharpoons F^- + H_2O$$

Initial	0.2	0.1	0	–
Change	−0.1	−0.1	0.1	–
Final	0.1	0	0.1	–

The choice with 0.2 mol HF has both weak acid and weak conjugate base left over, so it is the buffer solution.

Sparks Kb 002
18:01, general, multiple choice, < 1 min, fixed.
009

Consider the following table:

Base	Ionization Constant K_b value
Aniline	4.2×10^{-10}
Hydroxylamine	6.6×10^{-9}
Trimethylamine	7.4×10^{-5}

Which would have the strongest conjugate acid?

1. aniline **correct**

2. hydroxylamine

3. trimethylamine

4. All are equally strong.

Explanation:

DAL Buffer Capacity
18:08, general, multiple choice, > 1 min, .
010

A buffer is formed by mixing 100 mL of 0.2 M $HClO_2$ and 200 mL of 0.7 M $KClO_2$.

What volume of 0.2 M KOH can be added before the buffer capacity is reached?

1. 700 mL

2. 300 mL

3. 100 mL **correct**

4. 150 mL

5. 10 mL

Explanation:

Msci 18 0883
18:08, general, multiple choice, > 1 min, fixed.
011

If 100 mL of 0.040 M NaOH solution is added to 100 mL of solution which is 0.10 M in CH_3COOH and 0.10 M in $NaCH_3COO$, what will the pH of the new solution be? ($K_a = 1.8 \times 10^{-5}$)

1. 4.74

2. 4.81

3. 4.89

4. 5.00

5. 5.11 **correct**

Explanation:

$[CH_3COOH] = 0.10$ M $\qquad [NaOH] = 0.040$ M

$[CH_3COO^-] = 0.10$ M $\qquad K_a = 1.8 \times 10^{-5}$

Initial condition (ini):

$n_{NaOH} = 100 \times 0.04 = 4$ mmol

$n_{CH_3COOH} = 100 \times 0.10 = 10$ mmol
$n_{Na^+} = 100 \times 0.10 = 10$ mmol
$n_{CH_3COO^-} = 100 \times 0.10 = 10$ mmol

	$NaOH$	$+CH_3COOH \rightarrow$	Na^+	$+CH_3COO^- + H_2O$
ini	4.0	10.0	10.0	10.0
Δ	−4.0	−4.0	4.0	4.0
fin	0	6.0	14.0	14.0

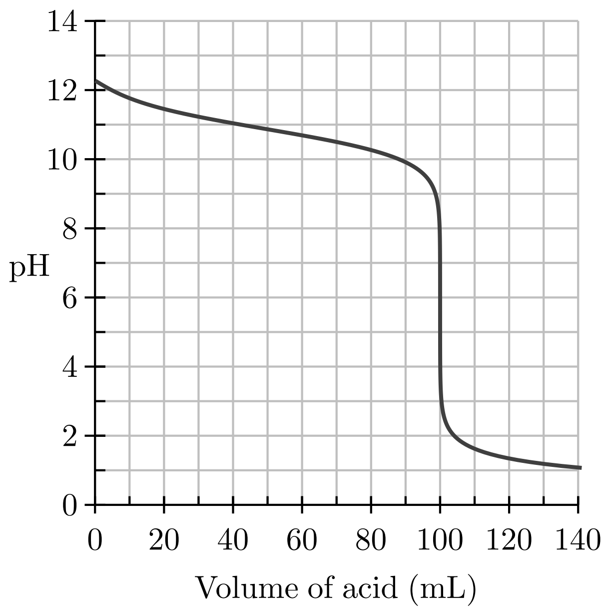
Na^+ is a spectator ion.
CH_3COOH/CH_3COO^- is a buffer system.

$$\begin{aligned} pH &= pK_a + \log\left(\frac{[CH_3COO^-]}{[CH_3COOH]}\right) \\ &= -\log\left(1.8 \times 10^{-5}\right) + \log\left(\frac{14.0}{6.0}\right) \\ &= 5.1127 \end{aligned}$$

ChemPrin3e T11 49 B
18:10, basic, numeric, > 1 min, wording-variable.

012

The curve for the titration of dimethylamine base ($(CH_3)_2NH$) with HF(aq) acid is given below.



Estimate the pK_b of dimethylamine base. $C_a = 0.5$, $C_b = 0.5$, and the volume of $(CH_3)_2NH$ is 100 mL.

1. 10.9 **correct**

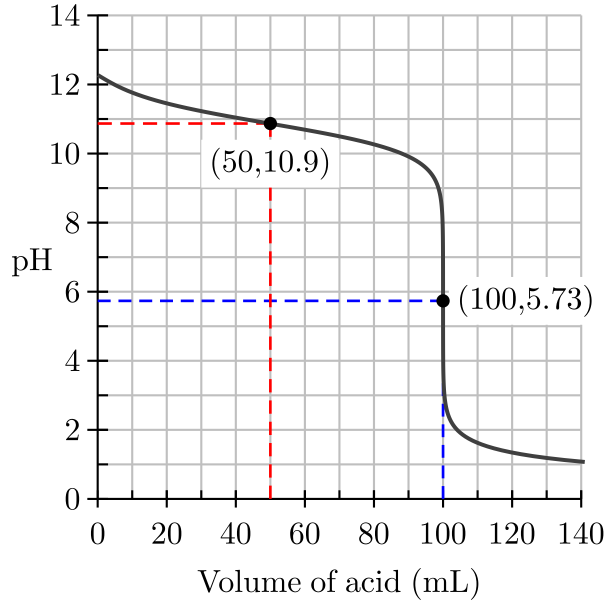
2. 100

3. 5.73

4. 50

5. None of these

Explanation:
$K_b = 7.4 \times 10^{-4}$ $K_w = 10^{-14}$
$C_a = 0.5$ $C_b = 0.5$
$V_{dimethylamine} = 100$ mL



The equivalence point of this titration is when the curve is at an inflection point; *i.e.*, at a volume of 100 mL.

The pH at the equivalence point of this titration is 5.73 pH.

The pK_b can be found at one-half the volume of the equivalence point; *i.e.*, at 50 mL. The pK_b is 10.9 pH from looking at the graph.

The formula is

$$\begin{aligned} pK_b &= -\log\left(\frac{K_w}{K_b}\right) \\ &= -\log\left(\frac{10^{-14}}{7.4 \times 10^{-4}}\right) \\ &= -\log\left(0.135135 \times 10^{-10}\right) \\ &= \boxed{10.8692 \text{ pH}}. \end{aligned}$$

Note: The pK_b is the pH when the mole fraction is 0.5.

Msci 19 0722
18:10, general, multiple choice, > 1 min, fixed.
013
How many endpoints would be observed in a titration of the triprotic acid (H_3A)?

1. 3 **correct**

2. 2

3. 1

4. None of these

5. 4

Explanation:

$$H_3A \rightarrow H^+ + H_2A^-$$

$$H_2A \rightarrow H^+ + HA^{2-}$$

$$HA^- \rightarrow H^+ + A^{3-}$$

These three dissociation equations show that three endpoints will be seen.

Msci 19 0611
18:10, basic, multiple choice, > 1 min, fixed.
014
Calculate the pH of a solution prepared by adding 80.0 mL of 0.100 M NaOH solution to 100 ml of 0.100 M HNO_3 solution.

1. 1.95 **correct**

2. 2.02

3. 2.08

4. 2.16

5. 2.24

Explanation:
$V_{NaOH} = 80.0$ mL $\quad V_{HNO_3} = 100$ mL
[NaOH] = 0.100 M $\quad [HNO_3] = 0.100$ M

Initial condition (ini):
$n_{NaOH} = 80.0 \times 0.100 = 8$ mmol
$n_{HNO_3} = 100 \times 0.100 = 10$ mmol

	NaOH	+ HNO_3 →	Na^+	+ NO_3^- + H_2O
ini	8	10	0	0
Δ	−8	−8	8	8
fin	0	2	8	8

HNO_3 is a strong acid, and Na^+ and NO_3^- are spectator ions.
Total volume = 180 mL

$$[H_3O^+] = \frac{2 \text{ mmol}}{180 \text{ mL}} = 0.0111111 \text{ M}$$

$$\text{pH} = -\log(0.0111111) = 1.95424$$

DAL Equiv Pt
18:10, general, multiple choice, > 1 min, .
015
What is the pH when 100 mL of 0.1 M HI is titrated with 50 mL of 0.2 M LiOH?

1. 7 **correct**

2. 1

3. 13.3

4. 1.2

5. 12.8

Explanation:

Msci 19 0734
18:10, general, multiple choice, > 1 min, fixed.
016
A 100 mL portion of 0.300 M acetic acid is being titrated with 0.200 M NaOH solution.

What is the $[H^+]$ of the solution after 50.0 mL of the NaOH solution has been added? The ionization constant of acetic acid is 1.8×10^{-5}.

1. 3.63×10^{-5} **correct**

2. 8.95×10^{-6}

3. 1.21×10^{-5}

4. 9.94×10^{-6}

5. 6.01×10^{-4}

Explanation:

$V_{CH_3COOH} = 100$ mL $V_{NaOH} = 50$ mL
$[CH_3COOH] = 0.300$ M $[NaOH] = 0.200$ M
$K_a = 1.8 \times 10^{-5}$

Initially,
$n_{CH_3COOH} = (100 \text{ mL})(0.3 \text{ M}) = 30$ mmol
$n_{NaOH} = (50 \text{ mL})(0.2 \text{ M}) = 10$ mmol

	CH_3COOH	$+NaOH\rightarrow$	$CH_3COO^-+Na^+$	$+H_2O$
ini	30	10	0	0
Δ	−10	−10	10	10
fin	20	0	10	10

Na^+ is a spectator ion. CH_3COOH and CH_3COO^- form a buffer.
Total volume = 150 mL

$$\begin{aligned} pH &= pK_a + \log\left(\frac{[CH_3COO^-]}{[CH_3COOH]}\right) \\ &= -\log(1.8 \times 10^{-5}) \\ &\quad + \log\left(\frac{10 \text{ mmol}/150 \text{ mL}}{20 \text{ mmol}/150 \text{ mL}}\right) \\ &= 4.4437 \end{aligned}$$

$$[H_3O^+] = 10^{-4.4437} = 3.6 \times 10^{-5} \text{ M}$$

DAL 02 0316

18:01, general, multiple choice, < 1 min, fixed.

017

A solution of 50 mL of 0.3 M acetic acid is titrated with 75 mL of 0.2 M NaOH.

What is the pH of the resulting solution? K_a for acetic acid is 1.8×10^{-5}.

1. 8.91 **correct**

2. 7.00

3. 5.1

4. 12.1

Explanation:

DAL Solubility

19:01, general, multiple choice, < 1 min, .

018

Given the following table

Cmpd	K_{sp}
Ag_2S	6.3×10^{-51}
ZnS	1.6×10^{-24}
CuS	1.3×10^{-36}
Cu_2S	2.0×10^{-47}

of K_{sp} values for sulfides, which is the least soluble? (Hint: You can find the correct answer by performing simple math in your head.)

1. Ag_2S **correct**

2. ZnS

3. CuS

4. Cu_2S

Explanation:

Msci 20 0308

19:01, general, multiple choice, > 1 min, fixed.

019

At slightly below room temperature, the solubility product constant for $Zn(OH)_2$ is 3.2×10^{-17}.

What is the molar solubility of $Zn(OH)_2$ in water at this temperature?

1. 2.8×10^{-9} M

2. 7.9×10^{-7} M

3. 2.0×10^{-6} M **correct**

4. 3.2×10^{-6} M

5. 1.0×10^{-3} M

Explanation:

ChemPrin3e T11 74

18:01, basic, multiple choice, < 1 min, fixed.

020

Calculate the solubility product of calcium hydroxide if the solubility of $Ca(OH)_2$(s) in water at 25°C is 0.011 M.

1. 1.5×10^{-8}

2. 1.1×10^{-5}

3. 2.7×10^{-6}

4. 5.3×10^{-6} **correct**

5. 1.2×10^{-4}

Explanation:

Msci 20 0315

19:01, basic, multiple choice, > 1 min, fixed.

021

Suppose CuBr(s) is added to a 0.050 M NaBr aqueous solution until saturation.

What is the concentration of Cu^+? ($K_{sp} = 5.3 \times 10^{-9}$ for CuBr.)

1. 1.1×10^{-7} **correct**

2. 7.3×10^{-5}

3. 1.6×10^{-5}

4. 2.5×10^{-3}

5. 2.2×10^{-1}

Explanation:

$K_{sp} = 5.3 \times 10^{-9}$ [NaBr] = 0.05 M

$$CuBr \rightleftharpoons Cu^+ + Br^+$$

$$K_{sp} = [Cu^+]\,[Br^-] = 5.3 \times 10^{-9}$$

Let $[Cu^+] = x$, and $[Br^-] = x + 0.05$

$$x\,(x + 0.05) = 5.3 \times 10^{-9}$$

$$x^2 + 0.05\,x - (5.3 \times 10^{-9}) = 0$$

Solving this quadratic equation gives

$$x = 1.06 \times 10^{-7}, \text{ or } x = -0.05\,.$$

Since the negative value is meaningless,

$$x = [Cu^+] = 1.1 \times 10^{-7}\,.$$

Msci 18 0906

18:02, general, multiple choice, > 1 min, fixed.

022

Suppose that a sample of pure water is saturated with gaseous CO_2 to form a solution of carbonic acid.

Which response has the following species arranged in the order of decreasing concentrations at equilibrium (from highest concentration to lowest concentration)?

1. H^+, H_2CO_3, HCO_3^-, CO_3^{2-}

2. H_2CO_3, HCO_3^-, H^+, CO_3^{2-}

3. CO_3^{2-}, H^+, HCO_3^-, H_2CO_3

4. HCO_3^-, H_2CO_3, CO_3^{2-}, H^+

5. H_2CO_3, H^+, HCO_3^-, CO_3^{2-} **correct**

Explanation:

Since carbonic acid is a weak acid, it is only partially dissociated, so in a solution of carbonic acid, the dominant species would be H_2CO_3. To the extent it does dissociate, it dissociates into H^+ and HCO_3^-. HCO_3^-, in turn, can dissociate into H^+ and CO_3^{2-}, but again this only happens to a very small extent. Thus more H^+ will be present than HCO_3^-, and very little CO_3^{2-} will be present.

PH 10 108a

18:01, general, multiple choice, > 1 min, normal.

023

Calculate the pH of 0.095 M NaH_2AsO_4(aq). $pK_{a1} = 2.25$, $pK_{a2} = 6.77$, and $pK_{a3} = 11.6$.

1. 4.51 **correct**

2. 5.62

3. 3.07

4. 9.18

5. None of these

Explanation:

Initially the salt dissociates into Na^+ and $H_2AsO_4^-$ ions. Na^+ is an extremely weak acid and does not affect the equilibrium. There are three equilibria to consider for the anion but as we start with $H_2AsO_4^-$, the first and second dissociations are most pertinent; we use these to calculate pH:

$$\begin{aligned} pH &= \frac{1}{2}(pK_{a1} + pK_{a2}) \\ &= \frac{1}{2}(2.25 + 6.77) \\ &= 4.51\,. \end{aligned}$$

DAL Mass Charge Balance

19:99, general, multiple choice, > 1 min, .

024

Which of the following is a correct mass balance expression for the addition of H_2CO_3 to water?

1. $C_{H_2CO_3} = [H_2CO_3] + [HCO_3^-] + [CO_3^{2-}]$ **correct**

2. $[H^+] = [HCO_3^-] + [CO_3^{2-}] + [OH^-]$

3. $C_{H_2CO_3} = [HCO_3^-] + [CO_3^{2-}]$

4. $K_w = [H^+] + [OH^-]$

Explanation:

ChemPrin3e T10 52

18:99, general, multiple choice, < 1 min, fixed.

025

Which equation represents K_{a2} for phosphoric acid?

1. $HPO_4^{2-}(aq) + H_2O(\ell) \rightarrow PO_4^{3-}(aq) + H_3O^+(aq)$

2. $H_2PO_4^-(aq) + H_2O(\ell) \rightarrow HPO_4^{2-}(aq) + H_3O^+(aq)$ **correct**

3. $H_3PO_4(aq) + 2\,H_2O(\ell) \rightarrow HPO_4^{2-}(aq) + 2\,H_3O^+(aq)$

4. $HPO_4^{2-}(aq) + H_2O(\ell) \rightarrow H_2PO_4^-(aq) + OH^-(aq)$

5. $H_3PO_4(aq) + H_2O(\ell) \rightarrow H_2PO_4^-(aq) + H_3O^+(aq)$

Explanation:

DAL H Concen

19:99, general, multiple choice, > 1 min, .

026

Which equation would be appropriate to find the H^+ concentration of a dilute solution of HBr in water?

1. $[H^+] = C_{HBr}$

2. $[H^+] = (K_a\,C_{HBr})^{0.5}$

3. $[H^+]^2 + C_{HBr}\,[H^+] + K_w = 0$ **correct**

4. $[H^+]^2 + K_a\,[H^+] - K_a\,C_{HBr} = 0$

5. $[H^+]^3 + K_a\,[H^+]^2 - (K_w + K_a\,C_{HBr})\,[H^+] - K_a\,K_w = 0$

Explanation:

DAL Equil

19:99, general, multiple choice, < 1 min, .

027

A solution is made in which 0.1 mole of H_2SO_4 is added to 1 liter of water.

Which statement about $[H^+]$ at equilibrium is true?

1. $0.2\text{ M} < [H^+]$

2. $[H^+] = 0.2\text{ M}$

3. $0.1\text{ M} < [H^+] < 0.2\text{ M}$ **correct**

4. $[H^+] = 0.1\text{ M}$

5. $[H^+] < 0.1\text{ M}$

Explanation:

Msci 18 0918

18:02, general, multiple choice, > 1 min, fixed.

028

What is the pH of a 0.020 M solution of hydrosulfuric acid, a diprotic acid?

$K_{a1} = 1.1 \times 10^{-7}$ $K_{a2} = 1.0 \times 10^{-14}$

1. 7.00

2. 9.67

3. 7.84

4. 4.33 **correct**

5. 3.65

6. 4.69

7. 5.22

Explanation:

Solve using ONLY the 1st ionization. So this works like any other monoprotic acid where the assumption

$[H^+] = \sqrt{(\text{Conc})(K_{a1})}$

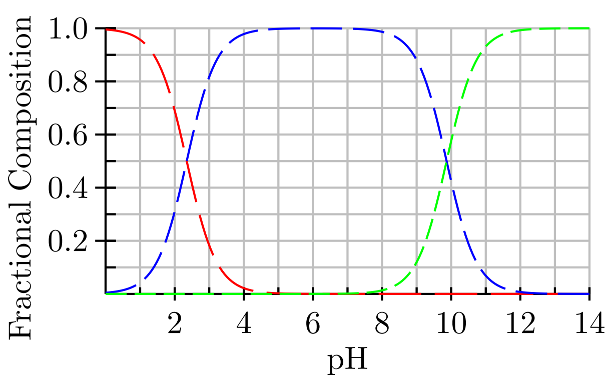
is valid.

ChemPrin3e T10 71

18:99, general, multiple choice, < 1 min, wording-variable.

029

Consider the fractional composition diagram for the amino acid alanine.



What is the structure of the dominant species at pH 2?

1. $HOOC — CH(CH_3)NH_3^+$ **correct**

2. $^-OOC — CH(CH_3)NH_3^+$

3. $^-OOC — CH(CH_3)NH_2$

Explanation:

To the left of 2.348, the red graph representing $HOOC — CH(CH_3)NH_3^+$ is dominant.

Between 2.348 and 9.867, the blue graph representing $^-OOC — CH(CH_3)NH_3^+$ is dominant.

To the right of 9.867, the green graph representing $^-OOC — CH(CH_3)NH_2$ is dominant.

DAL 02 0307

18:01, general, multiple choice, < 1 min, fixed.

030

For which of the following solutions of a weak acid would you feel most confident of an accurate answer in using the equation $[H^+] = \sqrt{K_a\, C_a}$?

1. 0.0005 M solution with a K_a of 2.7×10^{-8}

2. 0.2 M solution with a K_a of 2.3×10^{-3}

3. 0.2 M solution with a K_a of 2.7×10^{-8} **correct**

4. 0.0005 M solution with a K_a of 2.3×10^{-3}

Explanation:

For $K_a = \dfrac{x^2}{C_a - x}$, $x = [H^+]$, when K_a is a small, the acid dissociates very little, resulting in a small x. If C_a is large and x is small then $C_a - x \approx C_a$.