



CHEMISTRY

BOOKS - A2Z CHEMISTRY (HINGLISH)

IONIC EQUILIBIUM

Type Of Acids And Bases And Ostwid'S Dilution Law

1. Dissociation constants of two acids HA and HB are respectively 4×10^{-10} and 1.8×10^{-5} , whose pH value will be higher for a given molarity:

A. HA

B. HB

C. Both same

D. Can't say

Answer: A



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2. A monoprotic acid in $1.00M$ solution is 0.01% ionised.

The dissociation constant of this acid is

A. 1×10^{-8}

B. 1×10^{-4}

C. 1×10^{-6}

D. 10^{-5}

Answer: A

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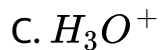
3. The dissociation constants of two acids HA_1 and HA_2 are 3.0×10^{-4} and 1.8×10^{-5} respectively. The relative strengths of the acids will be approximately

- A. 1 : 4
- B. 4 : 1
- C. 1 : 16
- D. 16 : 1

Answer: B

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4. Which of the following can act both as Bronsted acid and as Bronsted base ?



Answer: B



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5. pH of water is 7.0 at $25^{\circ}C$. If water is heated to $70^{\circ}C$, the:

- A. pH will decrease and solution becomes acidic
- B. pH will increase
- C. pH will remain constant as 7
- D. pH will decrease but solution will be neutral

Answer: D

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6. The equivalent conductance at infinite dilution of a weak acid such as HF

- A. Can be determined by measurement of very dilute HF solution
- B. Can be determined by extrapolation of measurements on dilute solutions of HCl , HBr and HI
- C. Can best be determined from measurements on dilute solutions of NaF , $NaCl$ and HCl
- D. Is an underfined quantity

Answer: C



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7. 100ml of $0.2\text{M}\text{H}_2\text{SO}_4$ is added to 100ml of $0.2\text{M}\text{NaOH}$

. The resulting solution will be

A. Acidic

B. Basic

C. Neutral

D. Slightly basic

Answer: A



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8. K_a for formic acid and acetic acid are 2.1×10^{-4} and

1.1×10^{-5} respectively. The relative strength of acids is:

A. 19: 1

B. 2.3: 1

C. 1: 2.1

D. 4.37: 1

Answer: D



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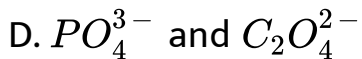
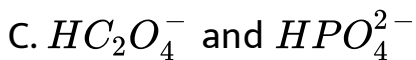
9. In the following reaction



, which are the two Bronsted bases?

A. $HC_2O_4^-$ and PO_4^{3-}

B. HPO_4^{2-} and $C_2O_4^{2-}$

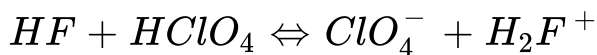


Answer: D



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10. The following equilibrium is established when $HClO_4$ is dissolved in weak acid HF ,



Which of the following is correct set of conjugate acid base pair?



C. HF and H_2F^+

D. $HClO_4$ and H_2F^+

Answer: C



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11. 10ml of $1M H_2SO_4$ will completely neutralise

A. 10ml of $1M NaOH$ solution

B. 10ml of $2M NaOH$ solution

C. 5ml of $2M KOH$ solution

D. 5ml of $1M Na_2CO_3$ solution

Answer: B

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12. Boric acid H_3BO_3 is a:

- A. Arrhenius acid
- B. Bronsted acid
- C. Lewis acid
- D. All of these

Answer: C

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13. The hydrogen ion concentration in weak acid of dissociation constant K_a and concentration c is nearly equal to

A. $\sqrt{K_a/c}$

B. c/K_a

C. $K_a c$

D. $\sqrt{K_a c}$

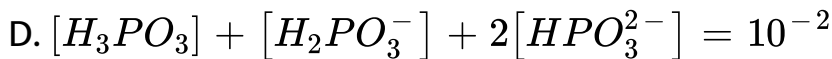
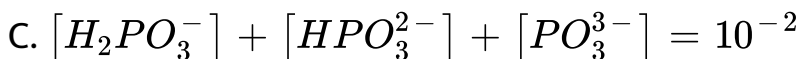
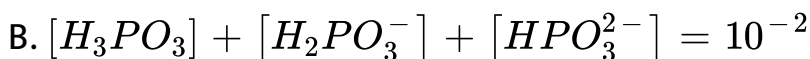
Answer: D



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14. For $10^{-2}(M)H_3PO_3$ solution which of the following relations is correct?

A.



Answer: B



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15. When 100ml of 1MNaOH solution is mixed with 10ml of $10\text{MH}_2\text{SO}_4$, the resulting mixture will be

- A. Acidic
- B. Alkaline
- C. Neutral
- D. Strongly alkaline

Answer: A

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16. What is the concentration of Ag^+ ion in a 1L solution containing 0.02mol of AgNO_3 and 0.14mol of NH_3 ? For

$$[Ag(NH_3)_2]^+, K_{Instab} = 10^8$$

A. $2 \times 10^{-7}(M)$

B. $10^{-8}(M)$

C. $2 \times 10^{-8}(M)$

D. $2 \times 10^{-9}(M)$

Answer: C



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17. In a solution total concentration of M^{3+} is $2 \times 10^{-3}(M)$ and total concentration of SCN^- is $1.51 \times 10^{-3}(M)$ and free SCN^- concentration $= 1 \times 10^{-5}(M)$

What is the dissociation constant of the complex



A. 2×10^5

B. 2×10^{-5}

C. 3.33×10^5

D. 3.33×10^{-6}

Answer: D



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18. The salt that forms neutral solution in water is



B. $NaCl$

C. Na_2CO_3

D. K_3BO_3

Answer: B



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19. The dissociation constant of a monobasic acid which is 3.5 % dissociated in $\frac{N}{20}$ solution at $20^\circ C$ is

A. 3.5×10^{-2}

B. 5×10^{-3}

C. 6.34×10^{-5}

D. 6.75×10^{-2}

Answer: C



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20. Which of the following substance is an electrolyte?

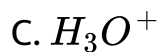
- A. Chloroform
- B. Benzene
- C. Toluene
- D. Magnesium chloride

Answer: D



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21. The species among the following which can act as an acid and as a base is



Answer: A

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22. The dissociation constant of weak acid HA is 4.9×10^{-8} . After making the necessary approximations,

calculate pH in $0.1M$ acid.

A. 1.155

B. 2.155

C. 3.155

D. 4.155

Answer: D



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23. The K_a for formic acid and acetic acid are 2×10^{-4} and 2×10^{-5} respectively. Calculate the relative strength of acids with same molar concentration

A. $\sqrt{10}$

B. $\sqrt{7}$

C. $\sqrt{8}$

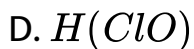
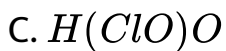
D. $\sqrt{5}$

Answer: A



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24. Which among the following is strongest acid ?



Answer: B



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25. Calculate pH of $0.002N NH_4OH$ having 2% dissociation

A. 7.6

B. 8.6

C. 9.6

D. 10.6

Answer: C



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26. What concentration of acetic acid is needed to give a hydrogen ion concentration of $3.5 \times 10^{-4} M$? ($K_a = 1.8 \times 10^{-5}$)?

A. $3.5 \times 10^{-4} M$

B. $6.80 \times 10^{-3} M$

C. $4.2 \times 10^{-4} M$

D. $7.2 \times 10^{-4} M$

Answer: B



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27. A solution of acetic acid is 1.0 % ionised. Determine the molar concentration of acid ($K_a = 1.8 \times 10^{-5}$) and also the $[H^+]$.

A. $1.8 \times 10^{-1} M$ and $1.8 \times 10^{-3} M$

B. $0.18 \times 10^{-1} M$ and $1.8 \times 10^{-4} M$

C. $0.18 \times 10^{-2} M$ and $1.8 \times 10^{-2} M$

D. $0.18 \times 10^{-3} M$ and $1.8 \times 10^{-1} M$

Answer: A



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28. BOH is a weak base, molar concentration of BOH that provides a $[OH]^-$ of $1.5 \times 10^{-3} M$ [$K_b(BOH) = 1.5 \times 10^{-5} M$] is

A. $0.15 M$

B. $0.1515 M$

C. $0.0015 M$

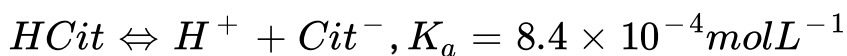
D. $1.5 \times 10^{-5} M$

Answer: A



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29. Lemon juice normally has a pH of 2. If all the acid the lemon juice is citric acid and there are no citrate salts present, then what will be the citric acid concentration $[HCit]$ in the lemon juice? (Assume that only the first hydrogen of citric acid is important)



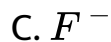
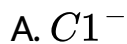
- A. $8.4 \times 10^{-4} M$
- B. $4.2 \times 10^{-4} M$
- C. $16.8 \times 10^{-4} M$
- D. $11.9 \times 10^{-2} M$

Answer: D



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30. Strongest conjugate base is



Answer: C

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31. $0.2M$ solution of a weak acid HA is 1% ionised $25^\circ C$.

K_a for the acid is equal to

A. $\frac{0.002 \times 0.002}{0.198}$

B. $\frac{0.02 \times 0.02}{0.18}$

C. $\frac{0.01 \times 0.01}{0.19}$

D. $\frac{0.19}{0.01 \times 0.01}$

Answer: A



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32. An aqueous solution of aluminium sulphate would show

A. An acidic reaction

B. An neutral reaction

C. An basic reaction

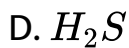
D. Both acidic and basic reaction

Answer: A



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33. Which of the following has highest proton affinity?

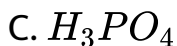
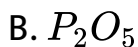


Answer: A



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34. The conjugate base of $H_2PO_4^-$ is :



Answer: A

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35. According to Bronsted principle, an aqueous solution of HNO_3 will contain



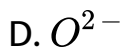
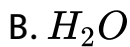


Answer: B



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36. The conjugate base of OH^- is :



Answer: D

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37. Would gaseous HCl be considered as an Arrhenius acid?

- A. Yes
- B. No
- C. Not known
- D. Gaseous HCl does not exist

Answer: B

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38. The first and second dissociation constant of an acid H_2A are 1.0×10^{-5} and 5.0×10^{-10} respectively. The overall dissociation constant of the acid will be

A. 5.0×10^{-5}

B. 5.0×10^{15}

C. 5.0×10^{-15}

D. 0.2×10^5

Answer: C



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39. An aqueous solution of sodium carbonate is alkaline because sodium carbonate is a salt of

- A. Weak acid and weak base
- B. Strong acid and weak base
- C. Weak acid and strong base
- D. Strong acid and strong base

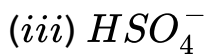
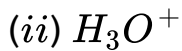
Answer: C



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40. Four species are listed below:





Which one of the following is the correct sequence of their acid strength?

A. $iv < ii < iii < i$

B. $ii < iii < i < iv$

C. $i < iii < ii < iv$

D. $iii < i < iv < ii$

Answer: C



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41. Ammonia gas dissolves in water to form NH_4OH . In this reaction water acts as

- A. A conjugate base
- B. A non-polar solvent
- C. An acid
- D. A base

Answer: C

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42. The pH of a 0.1 molar solution of the acid HQ is 3. The value of the ionisation constant, K_a of the acid is

A. 3×10^{-1}

B. 1×10^{-3}

C. 1×10^{-5}

D. 1×10^{-7}

Answer: C



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43. Orthoboric acid in aqueous medium is

A. Monobasic

B. Dibasic

C. Tribasic

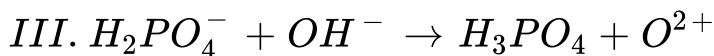
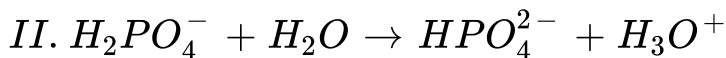
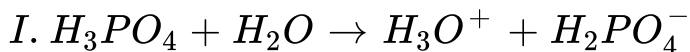
D. All are correct

Answer: A



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44. Three reactions involving $H_2PO_4^-$ are given below



In which of the above does $H_2PO_4^-$ act as an acid?

A. *II* only

B. *I* and *II*

C. *III* only

D. *I* only

Answer: A



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Ph, Pkw And Ph Mixture Of Acid And Bases

1. If the degree of ionization of water be 1.8×10^{-9} at $298K$. Its ionization constant will be

A. 1.8×10^{-16}

B. 1×10^{-14}

C. 1×10^{-16}

D. 1.67×10^{-14}

Answer: A



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2. 10^{-2} mole of $NaOH$ was added to 10 *litres* of water. The pH will change by

A. 4

B. 3

C. 11

D. 7

Answer: A



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3. For an aqueous solution to be neutral it must have

A. $pH = 7$

B. $[H^+] = [OH^-]$

C. $[H^+] = \sqrt{K_w}$

D. $[H^+] < [OH^-]$

Answer: B



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4. If an aqueous solution at $25^\circ C$ has twice as many OH^- as pure water its pOH will be

A. 6.699

B. 7.307

C. 7

D. 6.98

Answer: A



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5. The pH of an aqueous solution of $0.1M$ solution of a weak monoprotic acid which is 1% ionised is

A. 1

B. 2

C. 3

D. 11

Answer: C



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6. pH of a $10^{-10} M NaOH$ is nearest to

A. 10

B. 7

C. 4

D. 10

Answer: B



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7. The following reaction takes place in the body



escapes from the system

- A. pH decrease
- B. $[H^+]$ will decrease
- C. $[H_2CO_3]$ remains the same
- D. forward reaction will be promoted

Answer: B



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8. Equal volumes of two solutions of a strong acid having $pH3$ and $pH4$ are mixed together. The pH of the resulting solution will then be equal to

A. 3.5

B. 3.26

C. 7

D. 1.0

Answer: B



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9. Let K_w at $100^\circ C$ be $5.5 \times 10^{-13} M^2$. If an aqueous solution at this temperature has $pH = 6.2$. Its nature will be

A. acidic

B. alkaline

C. neutral

D. can't say

Answer: B



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10. pH value of pure water at $0^\circ C$ will be?

A. Greater than 7

B. Less than 7

C. 7

D. All of these

Answer: A



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11. If pK_b for fluoride ion at $25^\circ C$ is 10.83, the ionization constant of hydrofluoric acid in water at this temperature is

A. 1.74×10^{-5}

B. 3.52×10^{-3}

C. 6.95×10^{-4}

D. 5.38×10^{-2}

Answer: C



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12. $10^{-6} M HCl$ is diluted to 100 times. Its pH is:

A. 6.0

B. 8.0

C. 6.95

D. 9.5

Answer: C

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13. A certain weak acid has a dissociation constant 1.0×10^{-4} . The equilibrium constant for its reaction with a strong base is :

A. 1.0×10^{-4}

B. 1.0×10^{-10}

C. 1×10^{-10}

D. 1.0×10^{-14}

Answer: C

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14. 10mL of 10^{-6}M HCl solution is mixed with $90\text{mL H}_2\text{O}$.

pH will change approximately:

- A. By one unit
- B. By 0.3 unit
- C. By 0.7 unit
- D. By 0.1 unit

Answer: C



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15. At 25°C K_b for $\text{BOH} = 1.0 \times 10^{-12}$. 0.01M solution of

BOH has $[\text{OH}^-]$:

- A. $1.0 \times 10^{-6}\text{M}$

B. $1.0 \times 10^{-7} M$

C. $1.0 \times 10^{-5} M$

D. $2.0 \times 10^{-6} M$

Answer: B



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16. Which of the following is true

A. pK_b for OH^- is -1.74 at $25^\circ C$

B. The equilibrium constant for the reaction between

$HA(pK_a = 4)$ and $NaOH$ at $25^\circ C$ will be equal to

10^{10} .

C. The pH of a solution containing $0.1M HCOOH$

$(K_a = 1.8 \times 10^{-4})$ and $0.1M HOCN$

$(K_a = 3.2 \times 10^{-4})$ will be nearly $(3 - \log 7)$.

D. all the above are correct.

Answer: C



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17. pOH water is 7.0 at $298K$. If water is heated to $350K$, which of the following should be true?

A. pOH will decrease.

B. pOH will increase.

C. pOH will remain 7.0 .

D. concentration of H^+ ions will increase but that of OH^- will decrease.

Answer: A



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18. In pure liquid of $HCOOH$, concentration of $HCOO^- = 10^{-3} M$ at $27^\circ C$. What is the self- ionisation constant ($K = [HCOOH^{2+}][HCOO^-]$)

A. 10^{-3}

B. 10^3

C. 10^6

D. 10^{-6}

Answer: D



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19. At certain temperature K_w for water 4×10^{-14} which of the following is incorrect for pure water at the given temperature?

$$\log 2 = 0.3$$

- A. $pH = 6.7$ and water is acidic
- B. $pH = 6.7$ and water is neutral
- C. $pOH = 6.7$ and water is neutral
- D. $pH + pOH = 13.4$

Answer: A



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20. The pH of $Ba(OH)_2$ solution is 13. The number millimoles of $Ba(OH)_2$ present in $10ml$ of solution would be

A. 1.00

B. 0.50

C. 10.00

D. 15.00

Answer: B



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21. The pH of $0.01(M)KOH$ is 12, if the temperature of the given KOH solution is increased which of the following would occur?

- A. Both pH and pOH would remain constant
- B. pH would be decreased but pOH remains constant
- C. pH would be increased while pOH remains constant
- D. pH would be increased while pOH would be decreased

Answer: B



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22. The number of S^{2-} ions present in 1L of 0.1(M) H_2S solution having $[H^+] = 0.1(M)$ is

(Given $H_2S \rightleftharpoons 2H^+ + S^{2-} K_a = 1.1 \times 10^{-21}$)

A. 6.625×10^3

B. 6.625×10^4

C. 6.625×10^5

D. 6.625×10^6

Answer: A



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23. A 50ml solution of $pH = 1$ is mixed with a 50ml solution of $pH = 2$. The pH of the mixture will be nearly

A. 0.76

B. 1.26

C. 1.76

D. 2.26

Answer: B



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24. To make a solution of $pH = 12$, the amount of $NaOH$ dissolved in one litre of the solution should be

A. $0.1g$

B. $0.2g$

C. $0.4g$

D. $1.2g$

Answer: C



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25. The pH of $0.5M$ aqueous solution of HF

($K_a = 2 \times 10^{-4}$) is

A. 2

B. 4

C. 6

D. 10

Answer: A

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26. Equal volumes of three acid solutions of pH 3, 4 and 5 are mixed in a vessel. What will be the H^+ ion concentration in the mixture?

A. $3.7 \times 10^{-3} M$

B. $1.11 \times 10^{-3} M$

C. $1.11 \times 10^{-4} M$

D. $3.7 \times 10^{-4} M$

Answer: D



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27. The rate constant at $25^\circ C$ for the reaction of NH_4^+ and OH^- to form NH_4OH is $4 \times 10^{10} M^{-1} sec^{-1}$ and ionisation constant of aq. NH_3 is 1.8×10^{-5} . The rate constant of proton transfer to NH_3 is

A. 1.8×10^{-5}

B. 7.2×10^5

C. 3.6×10^5

D. 4.2×10^{-5}

Answer: B



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28. How many hydrogen ions are present in 1ml of a solution of $pH = 13$?

A. 6.02×10^{13}

B. 6.02×10^{12}

C. 6.02×10^7

D. 6.02×10^5

Answer: C



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29. The pH of a $0.05M$ solution of H_2SO_4 in water is nearly

A. 0.05

B. 1

C. -1

D. 0

Answer: B

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30. The pH of a $0.01M$ solution of a monobasic acid is four.

Which one of the following statement about the acid is incorrect

- A. When a little $NaOH$ is added, it will form a buffer solution
- B. It is a weak acid
- C. Its sodium salt will be acidic
- D. Its sodium salt will be basic

Answer: C

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31. Calculate the pH of solution obtained by mixing $10ml$ of $0.1M HCl$ and $40ml$ of $0.2M H_2SO_4$

- A. 0.3685
- B. 0.4685

C. 1.3685

D. 1.4684

Answer: B



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32. Find the pH of solution prepared by mixing $25ml$ of a $0.5M$ solution of HCl , $10ml$ of a $0.5M$ solution of $NaOH$ and $15ml$ of water

A. 0.8239

B. 1.0029

C. 1.0239

D. 1.8239

Answer: A



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33. Calculate the pH of a solution which contains $10ml$ of $1M HCl$ and $10ml$ of $2M NaOH$

A. 11.7

B. 12.7

C. 13.7

D. 10.7

Answer: C



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34. Calculate pH of a solution whose $100ml$ contains $0.2gNaOH$ dissolved in it.

A. 10.699

B. 11.699

C. 12.699

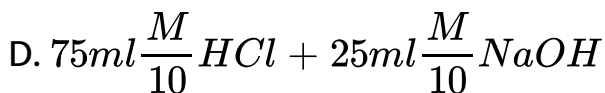
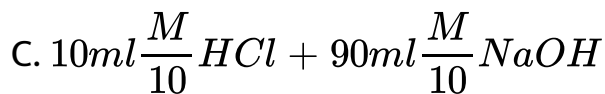
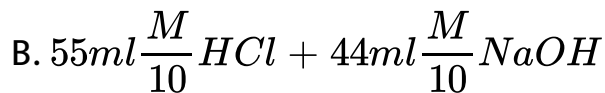
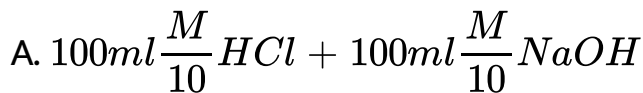
D. 13.699

Answer: C



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35. Which of the following has pH is equal to near about one?



Answer: D



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36. The hydrogen ion concentration of a 10^{-8}M HCl aqueous solution at 298K ($K_w = 10^{-14}$) is

A. $9.525 \times 10^{-8} \text{M}$

B. $1.0 \times 10^{-8} \text{M}$

C. $1.0 \times 10^{-6} \text{M}$

D. $1.0525 \times 10^{-7} M$

Answer: D

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37. A reaction $CaF_2 \rightleftharpoons Ca^{2+} + 2F^-$ is at equilibrium. If the concentration of Ca^{2+} is increased four times, what will be the change in F^- concentration as compared to the initial concentration of F^- ?

A. $\frac{1}{4}$ times

B. $\frac{1}{2}$ times

C. 4 times

D. 2 times

Answer: B

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38. What molar concentration of ammonia will provide a hydroxyl ion concentration of 1.5×10^{-3} ? ($K_b = 1.8 \times 10^{-5}$)

A. $0.125M$

B. $0.12M$

C. $0.13M$

D. $0.14M$

Answer: C

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39. An acid solution of $pH = 6$ is diluted 1000 times, the pH of the final solution is

A. 6.99

B. 6.0

C. 3.0

D. 9.0

Answer: A



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40. What will be the pH of a solution formed by mixing 40ml of 0.10M HCl with 10ml of 0.45M NaOH ?

A. 12.0

B. 10.0

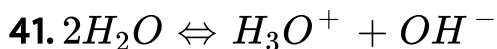
C. 8.0

D. 6.0

Answer: A



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$K_w = 1 \times 10^{-14}$ at 25°C . Hence, K_a is:

A. 1×10^{-14}

B. 5.55×10^{-13}

C. 1.8×10^{-16}

D. 1.00×10^{-7}

Answer: C



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42. Equal volumes of two solution, one having $pH6$ and the other having $pH4$ are mixed. The pH of the resulting solution would be

A. 5.7

B. 4.3

C. 5.0

D. 5.5

Answer: B



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43. A solution is prepared by dissolving $5.6g$ of KOH per litre of solution. pOH of the solution would be

A. $10^{-0.1}$

B. 10^{-1}

C. 1

D. 13

Answer: C



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44. $[OH^-]$ in a solution is 1molL^{-1} . The pH of the solution is

A. 1

B. 0

C. 14

D. 10^{-14}

Answer: C



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45. If $K_a = 10^{-5}$ for a weak acid, then pK_b for its conjugate base would be

A. 10^{-10}

B. 9

C. 10^{-9}

D. 5

Answer: B



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46. The dissociation constant of an acid is 1×10^{-5} . The pH of its $0.1M$ solution will be approximately

A. 6

B. 4

C. 3

D. 5

Answer: C



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47. For NH_3 , $K_b = 1.8 \times 10^{-5}$. K_a for NH_4^+ would be

A. 1.8×10^5

B. 5.56×10^5

C. 1.8×10^{10}

D. 5.56×10^{-10}

Answer: D



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48. A solution of HCl contains $0.1920g$ of an acid in 0.5litre of a solution. The degree of dissociation is 95% . The pH of the solution is

A. 4.0

B. 2.0

C. 2.192

D. 1.92

Answer: B



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49. $10^{-6} M NaOH$ is diluted by 100 times. The pH of diluted base is

- A. Between 6 and 7
- B. Between 10 and 11
- C. Between 7 and 8
- D. Between 5 and 6

Answer: C



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50. Which statement is not true?

A. pH of $1 \times 10^8 M HCl$ is 8

B. 96500 coulomb deposits 1g equivalent of copper

C. Conjugate base of $H_2PO_4^-$ is HPO_4^{2-}

D. $pH + pOh = 14$ for all aqueous solution

Answer: A

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51. When rain is accompanied by a thunderstorm, the collected rain water will have a pH :

A. Influenced by occurrence of thunder storm

B. Depends upon the amount of dust in water

C. Slightly lower than that of rain water without
thunderstorm

D. Slightly higher than that when thunderstorm is not
there

Answer: C

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52. Hydrogen ion concentration in mol/L in a solution of
 $pH = 5.4$ will be:

A. 3.98×10^8

B. 3.88×10^6

C. 3.68×10^8

D. 3.98×10^{-6}

Answer: D



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53. The pK_a of a weak acid, HA , is 4.80. The pK_b of a weak base, BOH , is 4.78. The pH of an aqueous solution of the corresponding salt, BA , will be:

A. 8.58

B. 4.79

C. 7.01

D. 9.22

Answer: C

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54. How many litres of water must be added to $1L$ of an aqueous solution of HCl with a pH of 1 to create an aqueous solution with pH of 2?

A. $0.1L$

B. $0.9L$

C. $2.0L$

D. $9.0L$

Answer: D

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55. An acid HA ionizes as $HA \rightleftharpoons H^+ + A^-$. The pH of $1.0M$ solution is 5. Its dissociation constant would be

A. 1×10^{-10}

B. 5

C. 5×10^{-8}

D. 1×10^{-5}

Answer: A



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Salt Hydrolysis

1. If K_h (hydrolysis constant) for anilinium ion is $2.4 \times 10^{-5} M$, then K_b for aniline will be

A. 4.1×10^{10}

B. 4.1×10^{-10}

C. 2.4×10^9

D. 2.4×10^{-19}

Answer: B



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2. The aqueous solution of $FeCl_3$ is acidic due to

A. Acidic impurities

B. Ionisation

C. Hydrolysis

D. Dissociation

Answer: C



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3. The aqueous solution of potash alum is acidic due to hydrolysis of

A. K^+

B. Al^{3+}

C. SO_4^{--}

D. presence of acid in its crystal as impurity

Answer: B



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4. Which is least soluble in water?

A. $AgCl$

B. AgF

C. AgI

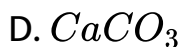
D. Ag_2S

Answer: D



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5. A white salt is readily soluble in water and gives a colourless solution with a pH of about 9. The salt would be



Answer: B



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6. If acetic acid mixed with sodium acetate, then H^+ ion concentration will be

- A. Increased
- B. Decreased
- C. Remains unchanged
- D. pH decreased

Answer: B

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7. pH for the solution of salt undergoing anionic hydrolysis (say CH_3COONa) is given by:

A. $pH = 1/2[pK_w + pK_a + \log C]$

B. $pH = 1/2[pK_w + pK_a - \log C]$

C. $pH = 1/2[pK_w + pK_b - \log C]$

D. None of these

Answer: A

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8. An aqueous solution of sodium carbonate has a pH greater than 7 because

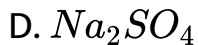
- A. It contains more carbonate ions than H_2O molecules
- B. It contains more hydroxide ions than carbonate ions
- C. Na^+ ions react with water
- D. Carbonate ions react with H_2O

Answer: B



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9. Which of the following salts when dissolved in water with get hydrolysed?



Answer: B



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10. pH of $0.01MHS^-$ will be:

$$\text{A. } pH = 7 + \frac{pK_a}{2} + \frac{\log C}{2}$$

$$\text{B. } pH = 7 - \frac{pK_a}{2} + \frac{\log C}{2}$$

$$\text{C. } pH = 7 + \frac{pK_1 + pK_2}{2}$$

$$\text{D. } pH = 7 + \frac{(pK_a + pK_b)}{2}$$

Answer: A



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11. An aqueous solution of CH_3COONa will be

A. Acidic

B. alkaline

C. neutral

D. None of these

Answer: B

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12. In which of the following salt hydrolysis takes place

A. KCl

B. $NaNO_3$

C. CH_3COOK

D. K_2SO_4

Answer: C

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13. When 0.1mmole of solid $NaOH$ is added in 1L of 0.1M $NH_3(aq)$ then which statement is going to be wrong?

$$(K_b = 2 \times 10^{-5}, \log 2 = 0.3)$$

A. degree of dissociation of NH_3 approaches to zero.

B. change in pH would be 1.85

C. concentration of $[Na^+] = 0.1M$, $[NH_3] = 0.1M$,

$$[OH^-] = 0.2M$$

D. on addition of OH^- , K_b of NH_3 does not changes

Answer: C



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14. Hydrolysis of sodium acetate will give

- A. Acidic solution
- B. Basic solution
- C. Neutral solution
- D. Normal solution

Answer: B

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15. From separate solutions of sodium salts, NaW , NaX , NaY and NaZ have pH 7.0, 9.0, 10.0 and 11.0 respectively.

When each solution was $0.1M$, the strongest acid is:

A. HW

B. HX

C. HY

D. HZ

Answer: A



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16. Which is the correct alternate for hydrolysis constant of

NH_4CN ?

A. $\sqrt{\frac{K_w}{K_a}}$

B. $\frac{K_w}{K_a \times K_b}$

C. $\sqrt{\frac{K_b}{c}}$

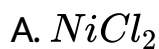
D. $\frac{K_a}{K_b}$

Answer: B



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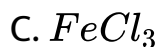
17. Which one of the following salt is most acidic in water?



Answer: D

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18. Which of the following aqueous solution will have a pH less than 7.0 ?



Answer: C

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19. Hydrolysis constant for a salt of weak acid and weak base would be

A. $K_h = \frac{K_w}{K_a}$

B. $K_h = \frac{K_w}{K_b}$

C. $K_h = \frac{K_w}{K_a K_b}$

D. None of these

Answer: C



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20. Which of salt will give basic solution on hydrolysis?

A. KCN

B. KCl

C. NH_4Cl

D. CH_3COONH_4

Answer: A



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21. Which salt can be classified as an acid salt?

A. Na_2SO_4

B. $BiOCl$

C. $Pb(OH)Cl$

D. Na_2HPO_4

Answer: D



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22. HA is a weak acid and BOH is a weak base. For which of the following salts the extent of hydrolysis is independent of the concentration of the salt in its aqueous solution

A. NaA

B. NaB

C. BCl

D. BA

Answer: D



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23. pH of water is 7. When a substance Y is dissolved in water, the pH becomes 13. The substance Y is a salt of

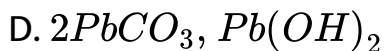
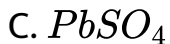
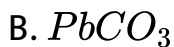
- A. Strong acid and strong base
- B. Weak acid and weak base
- C. Strong acid and weak base
- D. Weak acid and strong base

Answer: D



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24. Which is a basic salt



Answer: D

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25. The pH of $0.02M NH_4Cl(aq)$ ($pK_b = 4.73$) is equal to

A. 3.78

B. 4.73

C. 5.48

D. 7.00

Answer: C



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26. 100ml of $0.1\text{MCH}_3\text{COOH}$ are mixed with 100ml of 0.1MNaOH , the pH of the resulting solution would be

A. zero

B. 7

C. > 7

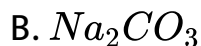
D. < 7

Answer: C



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27. A compound whose aqueous solution will have the highest pH



Answer: B



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28. Baking soda is

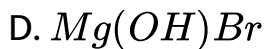
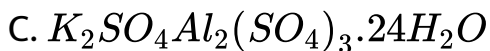
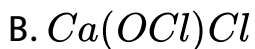
- A. Basic salt
- B. Acidic salt
- C. Complex salt
- D. Double salt

Answer: B

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29. Which one of the following substances will be a mixed salt?

- A. $NaHCO_3$



Answer: B



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30. $0.5M$ ammonium benzoate is hydrolysed to 0.25 percent, hence its hydrolysis constant is

A. 2.5×10^{-5}

B. 1.5×10^{-4}

C. 3.125×10^{-6}

D. 6.25×10^{-4}

Answer: C



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31. The compound whose $0.1M$ solution is basic is

- A. Ammonium acetate
- B. Calcium carbonate
- C. Ammonium sulphate
- D. Sodium acetate

Answer: D



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32. A weak base, B , has basicity constant $K_b = 2 \times 10^{-5}$.

The pH of any solution in which $[B] = [BH^+]$ is

A. 4.7

B. 7.0

C. 9.3

D. 9.7

Answer: C



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33. Which of the following will not be hydrolysed?

A. Potassium nitrate

B. Potassium cyanide

C. Potassium succinate

D. Potassium carbonate

Answer: A

 [Watch Video Solution](#)

34. In hydrolysis of a salt of weak acid and strong base,

$A^- + H_2O \rightleftharpoons HA + OH^-$, the hydrolysis constant (K_h)

is equal to

A. $\frac{K_w}{K_a}$

B. $\frac{K_w}{K_b}$

C. $\sqrt{\frac{K_a}{C}}$

D. $\frac{K_w}{K_a \times K_b}$

Answer: A

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35. Which of the following $0.1M$ solution will contain the largest concentration of hydronium ions?



Answer: C



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36. $1MNaCl$ and $1MHCl$ are present in an aqueous solution. The solution is

- A. Not a buffer solution and with $pH < 7$
- B. Not a buffer solution with $pH > 7$
- C. A buffer solution with $pH < 7$
- D. A buffer solution with $pH > 7$

Answer: A



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1. The solubility of A_2X_5 is x mole dm^{-3} . Its solubility product is

A. $36x^6$

B. $64 \times 10^4 x^7$

C. $126x^7$

D. $1.25 \times 10^4 x^7$

Answer: D



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2. When equal volumes of following solution are mixed, precipitation of $AgCl$?

$(K_{sp} = 1.8 \times 10^{-10})$ will occur only with

A. $10^{-4} M, Ag^+$ and $10^{-4} M, Cl^-$

B. $10^{-5} M, Ag^+$ and $10^{-5} M, Cl^-$

C. $10^{-6} M, Ag^+$ and $10^{-6} M, Cl^-$

D. $10^{-10} M, Ag^+$ and $10^{-10} M, Cl^-$

Answer: A



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3. If K_{sp} for $HgSO_4$ is 6.4×10^{-5} , then solubility of this substance in mole per m^3 is

A. 8×10^{-3}

B. 6.4×10^{-5}

C. 8×10^{-6}

D. None of these

Answer: A



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4. The solubility of CaF_2 ($K_{sp} = 3.4 \times 10^{-11}$) in $0.1M$ solution of NaF would be

A. $3.4 \times 10^{-12} M$

B. $3.4 \times 10^{-10} M$

C. $3.4 \times 10^{-9} M$

D. $3.4 \times 10^{-13} M$

Answer: C



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5. Let the solubilities of $AgCl$ in H_2O , and in $0.01M CaCl_2$, $0.01M NaCl$, and $0.05M AgNO_3$ be s_1, s_2, s_3, s_4 , respectively. What is the correct relationship between these quantities.

A. $s_1 > s_2 > s_3 > s_4$

B. $s_1 > s_2 = s_3 > s_4$

C. $s_1 > s_3 > s_2 > s_4$

D. $s_4 > s_2 > s_3 > s_1$

Answer: C



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6. Which of the following statements is correct for a solution saturated with $AgCl$ and $AgBr$ if their solubilities in moles per litre in separate solutions are x and y respectively?

A. $[Ag^+] = x + y$

B. $[Ag^+] = [Br^-] + [Cl^-]$

C. $[Br^-] = y$

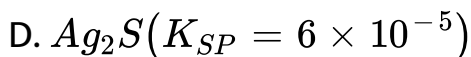
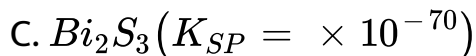
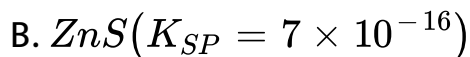
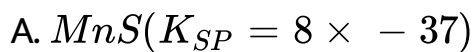
D. $[Cl^-]$

Answer: B



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7. Which of the following is most soluble in water ?

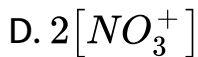
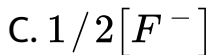


Answer: B

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8. Solubility of BaF_2 in a solution of $Ba(NO_3)_2$, will be represented by the concentration term:





Answer: C



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9. At $30^\circ C$ the solubility of Ag_2CO_3 ($K_{SP} = 8 \times 10^{-12}$)

would be greatest in one litre of:



C. pure water



Answer: C

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10. The volume of the water needed to dissolve 1g of $BaSO_4$ ($K_{SP} = 1.1 \times 10^{-10}$) at $25^\circ C$ is:

A. 280litre

B. 410litre

C. 205litre

D. None of these

Answer: B

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11. A solution of Na_2CO_3 is added drop by drop to litre of a solution containing 10^{-4} mole of Ba^{2+} and 10^{-5} mole of Ag , if K_{SP} for $BaCO_3$ is 8.1×10^{-9} and K_{SP} for Ag_2CO_3 is 6.9×10^{-12} , then which is not true ?

- A. No precipitate of $BaCO_3$ will appear until $[CO_3^{2-}]$ reaches 8.1×10^{-5} mol per litre
- B. A precipitate of Ag_2CO_3 will appear when $[CO_3^{2-}]$ reaches 6.9×10^{-5} mol litre⁻¹
- C. No precipitate of Ag_2CO_3 will appear until $[CO_3^{2-}]$ reaches 6.9×10^{-2} mol per litre
- D. $BaCO_3$ will be precipitated first

Answer: B

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12. $M(OH)_x$ has $K_{SP} 4 \times 10^{-12}$ and solubility $10^{-4} M$.

The value of x is:

A. 1

B. 2

C. 3

D. 4

Answer: B

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13. The solubility products of MA , MB , MC and MD are 1.8×10^{-10} , 4×10^{-3} , 4×10^{-8} and 6×10^{-5} respectively. If a $0.01M$ solution of MX is added dropwise to a mixture containing A^- , B^- , C^- and D^- ions, then the one to be precipitated first will be:

A. MA

B. MB

C. MC

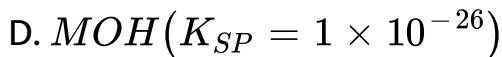
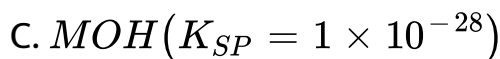
D. MD

Answer: A



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14. Which of the following species is more soluble in water ?



Answer: A



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15. Silver nitrate solution is gradually added to an aqueous solution containing 0.01 M each of chloride, bromide and

iodine ions. The correct sequence in which the halides will be precipitated is :

- A. Bromide, chloride iodide
- B. Iodide, chloride, bromide
- C. Iodide, bromide, chloride
- D. Bromide chloride

Answer: C



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16. K_{sp} of $SrF_2 (s)$ in water is 3.2×10^{-11} . The solubility $SrF_2 (s)$ in $0.1(M)NaCl$ solution is

- A. $3.2 \times 10^{-9}(M)$

B. $2 \times 10^{-4}(M)$

C. $4 \times 10^{-4}(M)$

D. slightly higher than $2 \times 10^{-4}(M)$

Answer: D



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17. Sodium chromate solution is gradually added to a mixture containing $0.05MPb^{2+}$ ions and $0.10MBa^{2+}$ ions. The concentration of the ion precipitating first when the second ion begins to form a precipitate is [Note: K_{sp} of $BaCrO_4 = 2.4 \times 10^{-10}$ and K_{sp} of $PbCrO_4 = 1.8 \times 10^{-14}$]

A. 7.5×10^{-6}

B. 2.5×10^{-5}

C. 8.2×10^{-3}

D. 5.0×10^{-4}

Answer: A



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18. Solubility of calcium phosphate (molecular mass, M) in water is Wg per $100mL$ at $25^\circ C$. Its solubility product at $25^\circ C$ will be approximately

A. $10^9 \left(\frac{W}{M} \right)^5$

B. $10^7 \left(\frac{W}{M} \right)^5$

C. $10^5 \left(\frac{W}{M} \right)^5$

D. $10^3 \left(\frac{W}{M} \right)^5$

Answer: B



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19. The K_{sp} of $Mg(OH)_2$ is 1×10^{-12} . $0.01M Mg(OH)_2$ will precipitate at the limiting pH

A. 3

B. 9

C. 5

D. 8

Answer: B



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20. A salt M_2X_3 dissolves in water such that its solubility is x g. mole / litre. Its K_{SP} is:

A. x^5

B. $6x^2$

C. $108x^5$

D. $6x^5$

Answer: C



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21. Solubility product of $AgCl$ is 2.8×10^{-10} at $25^\circ C$.

Calculate solubility of the salt in $0.1M AgNO_3$ solution

- A. $2.8 \times 10^{-9} mol / litre$
- B. $2.8 \times 10^{-10} mol / litre$
- C. $3.2 \times 10^{-9} mol / litre$
- D. $3.2 \times 10^{-12} mol / litre$

Answer: A



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22. The solubility product of chalk is 9.3×10^{-8} . Calculate its solubility in gram per litre

A. 0.3040gram / litre

B. 0.0304gram / litre

C. 2.0304gram / litre

D. 4.0304gram / litre

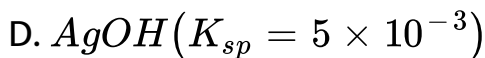
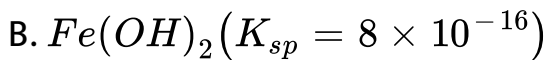
Answer: B



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23. A solution containing NH_4Cl and NH_4OH has $[OH] = 10^{-6} molL^{-1}$, which of the following hydroxides would be precipitated when this solution is added in equal volume to a solution containing $0.1M$ of metal ions?

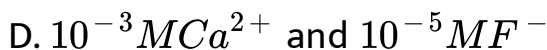
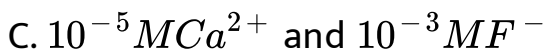
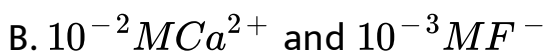
A. $Mg(OH)_2$ ($K_{sp} = 3 \times 10^{-11}$)



Answer: B

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24. The precipitate of CaF_2 ($K_{sp} = 1.7 \times 10^{-10}$) is obtained when equal volumes of the following are mixed



Answer: B

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25. K_{sp} of a sparingly soluble salt AB_2 is $4 \times 10^{-12} \text{ mol}^3 \text{ L}^{-3}$. The solubility of the salt is

A. $2 \times 10^{-6} M$

B. $4 \times 10^{-4} M$

C. $1 \times 10^{-12} M$

D. $1 \times 10^{-4} M$

Answer: D

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26. If the solubility product of MOH is $1 \times 10^{-10} \text{ mol}^2 \text{ dm}^{-6}$ then pH of its aqueous solution will be

A. 12

B. 9

C. 6

D. 3

Answer: B



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27. The solubility product of $AgCl$ is 1.8×10^{-10} at $18^\circ C$.

The solubility of $AgCl$ in $0.1M$ solution of sodium chloride would be

A. $1.8 \times 10^{-9} M$

B. $1.8 \times 10^{-10} M$

C. $1.8 \times 10^{-11} M$

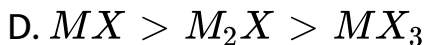
D. $4.2 \times 10^{-5} M$

Answer: A



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28. Three sparingly soluble salts M_2X , MX and MX_3 have the same solubility product. Their solubilities will be in the order



Answer: D



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29. The solubility of a sparingly soluble compound MX_2 at $25^\circ C$ is $5.0 \times 10^{-3} \text{ mol/L}$. Its solubility product at that temperature is

A. 25×10^{-6}

B. 5.0×10^{-11}

C. 5.0×10^{-7}

D. 1.25×10^{-9}

Answer: C



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30. The solubility product (K_{sp}) of the sparingly soluble salt MX at $25^\circ C$ is 2.5×10^{-9} . The solubility of the salt (in $molL^{-1}$) at this temperature is

A. 1.0×10^{-14}

B. 5.0×10^{-8}

C. 1.25×10^{-9}

D. 5.0×10^{-5}

Answer: D



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31. The solubility of a sparingly soluble salt AB_2 in water is $1.0 \times 10^{-5} \text{ mol L}^{-1}$. Its solubility product is:

A. 10^{-15}

B. 10^{-10}

C. 4×10^{-15}

D. 4×10^{-10}

Answer: C



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32. K_{SP} of MX_4 and solubility of MX_4 is $S \text{ mol/L}$ is related by:

A. $S = [K_{SP} / 256]^{1/5}$

B. $S = [128K_{SP}]^{1/4}$

C. $S = [256K_{SP}]^{1/5}$

D. $S = [K_{SP} / 128]^{1/4}$

Answer: A



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33. The solubility product of a salt having general formula MX_2 in water is 4×10^{-12} . The concentration of M^{2+} ions in the aqueous solution of the salt is:

A. $2 \times 10^{-6} M$

B. $1 \times 10^{-4} M$

C. $1.6 \times 10^{-4} M$

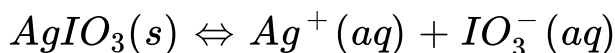
D. $4.0 \times 10^{-6} M$

Answer: B



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34. In a saturated solution of the sparingly soluble strong electrolyte $AgIO_3$ (molecular mass = 283) the equilibrium which sets in is



If the solubility product constant K_{SP} of $AgIO_3$ at a given temperature is 1.0×10^{-8} , what is the mass of $AgIO_3$ contained in $100mL$ of its saturated solution?

A. $28.3 \times 10^{-2} g$

B. $28.3 \times 10^{-3} g$

C. $1.0 \times 10^{-7} g$

D. $1.0 \times 10^{-4} g$

Answer: B



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35. The K_{SP} for $Cr(OH)_3$ is 1.6×10^{-30} . The molar solubility of this compound in water is

A. $2\sqrt{1.6 \times 10^{-30}}$

B. $4\sqrt{1.6 \times 10^{-30}}$

C. $4\sqrt{\frac{1.6 \times 10^{-30}}{27}}$

D. $1.6 \times 10^{-30} / 27$

Answer: C

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36. Solubility product of silver bromide is 5.0×10^{-13} . The quantity of potassium bromide (molar mass taken as 120 g mol^{-1}) to be added to 1 L of 0.05 M solution of silver nitrate to start the precipitation of AgBr is

A. $1.2 \times 10^{-10} \text{ g}$

B. $1.2 \times 10^{-9} \text{ g}$

C. $6.2 \times 10^{-5} \text{ g}$

D. $5.0 \times 10^{-8} \text{ g}$

Answer: B



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37. At 25°C , the solubility product of $\text{Mg}(\text{OH})_2$ is 1.0×10^{-11} . At which pH , will Mg^{2+} ions start precipitating in the form of $\text{Mg}(\text{OH})_2$ from a solution of 0.001M Mg^{2+} ions ?

A. 9

B. 10

C. 11

D. 8

Answer: B



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38. Solid $Ba(NO_3)$ is gradually dissolved in a $1.0 \times 10^{-4} M Na_2CO_3$ solution. At what concentrations of Ba^{2+} , will a precipitate begin to form?

(K_{SP} for $BaCO_3 = 5.1 \times 10^{-9}$)

A. $4.1 \times 10^{-5} M$

B. $5.1 \times 10^{-5} M$

C. $8.1 \times 10^{-8} M$

D. $8.1 \times 10^{-7} M$

Answer: B



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1. When a solution of benzoic acid was titrated with $NaOH$ the pH of the solution when half the acid neutralized was

4.2. Dissociation constant of the acid is

A. 6.31×10^{-5}

B. 3.2×10^{-5}

C. 8.7×10^{-8}

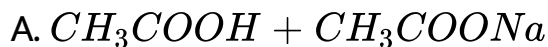
D. 6.42×10^{-4}

Answer: A



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2. Which is a buffer solution?



Answer: A

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3. The pH of a buffer is 6.745. When 0.01 mole of $NaOH$ is added to 1 litre of it, the pH changes to 6.832. Its buffer capacity is

A. 0.187

B. 0.115

C. 0.076

D. 0.896

Answer: B



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4. A buffer solution contains 1 mole of $(NH_4)_2SO_4$ and 1 mole of NH_4OH ($K_b = 10^{-5}$). The pH of solution will be:

A. 5

B. 9

C. 5.3

D. 8.7

Answer: D

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5. For preparing a buffer solution of $pH6$ by mixing sodium acetate and acetic, the ratio of the concentration of salt and acid should be ($K_a = 10^{-5}$)

A. 1:10

B. 10:1

C. 100:1

D. 1:100

Answer: B



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6. The total number of different kind of buffers obtained during the titration of H_3PO_4 with $NaOH$ are:

A. 3

B. 1

C. 2

D. zero

Answer: A



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7. Which may be added to one litre of water to act a buffer?

A. One mole of CH_3COOH and one mole of HCl

B. One mole of NH_4OH and one mole of $NaOH$

C. One mole of NH_4Cl and one mole of HCl

D. One mole of CH_3COOH and 0.5 mole of $NaOH$

Answer: D

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8. pH of a solution of $10ml$. $1N$ sodium acetate and $50ml2N$ acetic acid ($K_a = 1.8 \times 10^{-5}$) is approximately

A. 4

B. 5

C. 6

D. 7

Answer: A



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9. The pH of an acidic buffer mixture is:

A. > 7

B. < 7

C. $= 7$

D. Depends upon K_a of acids

Answer: D

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10. pH of a mixture containing $0.10M X^-$ and $0.20MHX$

is: $[pK_b(X^-) = 4]$

A. $4 + \log 2$

B. $4 - \log 2$

C. $10 + \log 2$

D. $10 - \log 2$

Answer: D

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11. What % of the carbon in the $H_2CO_3 - HCO_3^-$ buffer should be in the form of HCO_3^- so as to have a neutral solution? ($K_a = 4 \times 10^{-7}$)

A. 20 %

B. 40 %

C. 60 %

D. 80 %

Answer: D



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12. An acidic buffer solution can be prepared by mixing solution of

- A. Ammonium acetate and acetic acid
- B. Ammonium chloride and hydrochloric acid
- C. Sulphuric acid and sodium sulphate
- D. Acetic acid and sulphuric acid

Answer: A

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13. Buffer capacity of a buffer solution is x , the volume of $1MNaOH$ added to $100mL$ of this solution if the change

of pH by 1 is

A. $0.1x mL$

B. $10x mL$

C. $100x mL$

D. $x mL$

Answer: C



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14. $100mL$ of a buffer solution contains $0.1M$ each of weak acid HA and salt NaA . How many gram of $NaOH$ should be added to the buffer so that its pH will be 6 ?

(K_a of $HA = 10^{-5}$).

A. 4.19

B. 0.458

C. 0.328

D. None

Answer: C



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15. Calculate the amount of $(NH_4)_2SO_4$ in grams which must be added to $500ml$ of $0.2M NH_3$ to yield a solution of $pH = 9$, K_b for $NH_3 = 2 \times 10^{-5}$

A. $3.248g$

B. $4.248g$

C. 1.320g

D. 6.248g

Answer: C



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16. The buffer solution of 100ml having a pH value 4 when added to 1ml dilute HCl , then the pH of buffer solution

A. Converts to 7

B. Does not change

C. Converts to 2

D. Changes to 10

Answer: B



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17. What amount of solution propanoate should be added to one litre of an aqueous solution containing 0.02 mole of propanoic acid ($K_a = 1.0 \times 10^{-5}$ at $25^\circ C$) to obtain a buffer solution of $pH6$

A. $0.1M$

B. $0.2M$

C. $0.3M$

D. $1.3M$

Answer: B



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18. 20ml of 0.2MNaOH is added to 50ml , of $0.2\text{MCH}_3\text{COOH}$ to give 70ml , of the solution. What is the pH of the solution? The ionization constant of acetic acid is 2×10^{-5}

A. 4.522

B. 5.568

C. 6.522

D. 7.568

Answer: A



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19. The concentration of H^+ ion in a $0.2M$ solution of $HCOOH$ is $6.4 \times 10^{-3} \text{moleL}^{-1}$. To this solution $HCOONa$ is added so as to adjust the concentration of $HCOONa$ to one mole per litre. What will be the pH of this solution? K_a for $HCOOH$ is 2.4×10^{-4} and the degree of dissociation of $HCOONa$ is 0.75

A. 3.19

B. 4.19

C. 5.19

D. 6.19

Answer: B



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20. What amount of HCl will be required to prepare one litre of a buffer solution of $pH 10.4$ using 0.01 mole of $NaCN$? Given $K_{ion}(HCN) = 4.1 \times 10^{-10}$.

A. 8.55×10^{-3} moles

B. 8.65×10^{-3} moles

C. 8.75×10^{-3} moles

D. 9.9×10^{-4} moles

Answer: D



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21. Calculate pH of a solution of given mixture ($0.1\text{mol } CH_3COOH + 0.2\text{mol } CH_3COONa$) in 100ml of mixture. $K = 2 \times 10^{-5}$.

A. 4.6

B. 5.6

C. 6.6

D. 7.6

Answer: A



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22. Calculate the pH of a buffer solution prepared by dissolving $10.6g$ of Na_2CO_3 in $500ml$ of an aqueous solution containing $80ml$ of $1MHCl$. K_a for $HCO_3^- = 6 \times 10^{-11}$

A. 8.6

B. 9.6

C. 11.6

D. 12.6

Answer: B



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23. What volume of $0.1M HCOONa$ solution should be added to $50ml$ of $0.05M$ formic acid to produce a buffer solution of $pH = 4.0$, pK_a of formic acid = 3.7 ?

A. $50ml$

B. $40ml$

C. $30ml$

D. $60ml$

Answer: A



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24. 0.1 mole of CH_3NH_2 ($K_b = 5 \times 10^{-4}$) is mixed with 0.08 mole of HCl and diluted to one liter. The $[H^+]$ in solution is

A. $8 \times 10^{-2} M$

B. $8 \times 10^{-11} M$

C. $1.6 \times 10^{-11} M$

D. $8 \times 10^{-5} M$

Answer: B



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25. The pK_a of a weak acid (HA) is 4.5. The pOH of an aqueous buffered solution of HA in which 50% of the acid is ionized is:

A. 4.5

B. 2.5

C. 9.5

D. 7.0

Answer: C



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Indicators

1. A volume of 50.00mL of a weak acid of unknown concentration is titrated with 0.10M solution of NaOH . The equivalence point is reached after 39.30mL of NaOH solution has been added. At the half-equivalence point (19.65mL), the pH is 4.85. Thus, initial concentration of the acid and its $\text{p}K_a$ values are

- A. $[\text{HA}]_{\text{initial}} = 0.1\text{M}, \text{p}K_a = 4.85$
- B. $[\text{HA}]_{\text{initial}} = 0.079\text{M}, \text{p}K_a = 2.93$
- C. $[\text{HA}]_{\text{initial}} = 0.1\text{M}, \text{p}K_a = 3.70$
- D. $[\text{HA}]_{\text{initial}} = 0.079\text{M}, \text{p}K_a = 4.85$

Answer: D



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2. What fraction of an indicator H_{in} is in the basic form at a pH of 6 if pK_a of the indicator is 5?

A. $\frac{1}{2}$

B. $\frac{1}{11}$

C. $\frac{10}{11}$

D. $\frac{1}{10}$

Answer: C



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3. Strong acids are generally used as standard solution in acid-base titrations because:

- A. The pH at equivalence point will be 7
- B. They titrate both strong and weak base
- C. They form more stable solutions than weak acids
- D. The salts of strong acids do not hydrolyse

Answer: B

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4. At $25^{\circ}C$ pH range of phenolphthalein is 8 – 10. At $100^{\circ}C$ pH range of phenolphthalein would be

- A. pH range remains unaffected by the temperature
- B. pH range is altered to 8 to 9
- C. pH range is altered to 7 to 11

D. pH range is altered to 8 to 11

Answer: B

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5. An indicator is a weak acid and pH range of its colour is 3 to 5. If the neutral point of the indicator lies in the centre of the $[H^+]$ corresponding to given pH range, then pH at the equivalence point is

A. 7.0

B. 4.0

C. 3.3

D. 5.0

Answer: C

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6. 100mL of 0.02M benzoic acid ($pK_a = 4.2$) is titrated using 0.02M NaOH . pH values after 50mL and 100mL of NaOH have been added are

A. 3.50, 7

B. 4.2, 7

C. 4.2, 8.1

D. 4.2, 8.25

Answer: C

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7. What will be the pH at the equivalence point during the titration of a $100\text{ mL } 0.2\text{ M}$ solution of CH_3COONa with 0.2 M solution of HCl ? $K_a = 2 \times 10^{-5}$

A. $3 - \log \sqrt{2}$

B. $3 + \log \sqrt{2}$

C. $3 - \log 2$

D. $3 + \log 2$

Answer: A



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8. 20mL of a weak monobasic acid (HA) requires $20\text{mL } 0.2\text{M NaOH}$ for complete titration. If pH of solution upon addition of 10mL of this alkali to 25mL of the above solution of HA is 5.8 . The pK_a of the weak acid is

- A. 6.1
- B. 5.8
- C. 5.98
- D. 5.58

Answer: C



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9. An acid-base indicator which is a weak acid has a pK_{In} value =5.45. At what concentration ratio of sodium acetate to acetic acid would the indicator show a colour half-way between those of its acid and conjugate base forms ?

[pK_a of acetic acid =4.75, $\log 2=0.3$]

A. 4 : 1

B. 6 : 1

C. 5 : 1

D. 3 : 1

Answer: C



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10. When 10ml of 0.1M acetic acid ($pK_a = 5.0$) is titrated against 10ml of 0.1M ammonia solution ($pK_b = 9.0$), the equivalence point occurs at pH

A. 5.0

B. 6.0

C. 7.0

D. 9.0

Answer: C



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11. An indicator has $pK_{In} = 5.3$. In a certain titration, this indicator is found to be 80% ionized in its acid form. Thus,

pH of the solution is

A. 4.7

B. 5.3

C. 5.9

D. 6.2

Answer: A



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12. A certain indicator (an organic dye) has $pK_a = 5$. For which of the following titrations may it be suitable

A. acetic acid against $NaOH$

B. aniline hydrochloride against $NaOH$

C. sodium carbonate against HCl

D. barium hydroxide against oxalic acid

Answer: C

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13. An acid-base indicator which is a weak acid has a pK_a value = 5.5. At what concentration ratio of sodium acetate to acetic acid would the indicator show a colour half-way between those of its acid and conjugate base forms?

A. 4.93: 1

B. 6.3 : 1

C. 5.62 : 1

D. 2.37 : 1

Answer: C



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14. K_b of an acid-base indicator HIn is 10^{-9} . The pH at which its $10^{-3}(M)$ solution shows the colour change

A. 9

B. 7

C. 5

D. 3

Answer: C



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15. A certain mixture of HCl and $CH_3 - COOH$ is $0.1M$ in each of the acids. $20ml$ of this solution is titrated against $0.1MNaOH$. By how many units does the pH change from the start to the stage when the HCl is almost completely neutralised and acidic acid remains unreacted?

K_a for acetic acid = 2×10^{-5} .

A. 1.5

B. 3

C. 2

D. 3.25

Answer: B



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16. A weak acid (HA) after treatment with 12mL of 0.1M strong base (BOH) has a pH of 5. At the end point, the volume of same base required is 27mL . K_a of acid is $(\log 2 = 0.3)$

A. 1.8×10^{-5}

B. 8×10^{-6}

C. 1.8×10^{-6}

D. 8×10^{-5}

Answer: B



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17. To a 200ml of 0.1M weak acid HA solution 90ml of 0.1M solution of $NaOH$ be added. Now, what volume of 0.1M $NaOH$ be added into above solution so that pH of resulting solution be 5. [$K_a(HA) = 10^{-5}$]

A. 2ml

B. 20ml

C. 10ml

D. 15ml

Answer: C



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18. What is the difference in pH for $1/3$ and $2/3$ stages of neutralization of $0.1MCH_3COOH$ with $0.1MNaOH$?

A. $2 \log 3$

B. $2 \log(1/4)$

C. $2 \log(2/3)$

D. $2 \log 2$

Answer: D



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Section B - Assertion Reasoning

1. Assertion : A ionic product is used for any types of electrolytes whereas solubility product is applicable only to sparingly soluble salts.

Reason : ionic product is defined at any stage of the reaction whereas solubility product is only applicable to the saturation stage

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: B



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2. Assertion : The pH of pure water is less than 7 at $60^{\circ}C$.

Reason : As the temperature increases, pure water becomes slightly acidic.

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: C



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3. Assertion : The pH of human blood at body temperature is found to be 6.9.

Reason : Blood is alkaline in nature.

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: D



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4. Assertion : The pH of a basic buffer mixture is given by:

$$pH = pK_a + \log\left(\frac{[Base]}{[conjugateacid]}\right)$$

Reason : The pH of an acidic buffer mixture is given by:

$$pH = pK_a + \log\left(\frac{[conjugateacid]}{[Acid]}\right)$$

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

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5. Assertion : On passing $HCl(g)$ through a saturated solution of $BaCl_2$, a white turbidity appears.

Reason : The common ion effect is responsible for white turbidity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: C



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6. Assertion : Degree of hydrolysis and pH of a salt, e.g.

NH_4CN is independent of concentration of NH_4CN

Reason : The solution of NH_4CN in water has pH slightly greater than 7.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: B



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7. Assertion : In a pair of two electrolytes one having higher value of K_{SP} is more soluble in water than the other having lower value of K_{sp} .

Reason : Solubility of electrolyte depends upon K_{sp} as well as on the nature of electrolyte.

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: D



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8. Assertion : $HgCl_2$ and $SnCl_2$ cannot coexist in a solution.

Reason : Increase in concentration of Cl^- in solution brings in precipitation of either of them.

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: C



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9. Assertion : The solubility of HgI_2 in water decreases in presence of KI .

Reason : HgI_2 is insoluble in water but it becomes soluble in $KI(aq)$.

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: D



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10. Assertion : The dissociation constant of water at $60^{\circ}C$ is 10^{-13} .

Reason : The pH of water is 6.5 and that it behaves as acid at $60^{\circ}C$.

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: C



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11. Assertion : Salting out action of sodium soap in presence of $NaCl$ is based on common ion effect.

Reason : Salting out action of soap is based on the fact that as the concentration of Na^+ increases, the $RCOONa$ shows precipitation because

$$[RCOO^-][Na^+] > K_{sp}.$$

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: D



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12. Assertion : In a titration of weak monoprotic acid with strong base, the pH at the half equivalent point is pK_a .

Reason : At half equivalence point, it will form acidic buffer at its maximum capacity where $[acid] = [salt]$.

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: A

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13. Assertion : Solubility of $AgCl$ in $NH_3(aq)$ is greater than in pure water.

Reason : When $AgCl$ dissolve in $NH_3(aq)$, complex ion [$Ag(NH_3)_2^+$] formation takes place and solubility equilibrium of $AgCl_3$ shifted in forward direction.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: A

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14. Assertion : The H_3O^+ has additional water molecules closely associated with it.

Reason : In solid state the species $H_5O_2^+$ and $H_9O_4^+$ have been found to exist.

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: B



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15. Assertion : The proton transfer reaction between NH_3 and H_2O proceeds only to a slight extent.

Reason : Proton transfer reaction is virtually complete in the case of HCl in dilute solution.

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: B



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16. Assertion : Aqueous solutions of all strong acids contain only the same acid, the hydronium ion.

Reason : Hydronium ion is the strongest acid that can exist in any significant concentration in dilute aqueous solution.

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: A



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17. Assertion : Acids that have more than one proton that can be donated to base are called polyprotic acids.

Reason : For all diprotic acids, the equilibrium constant K_{a2} for the second stage of ionisation is smaller than the equilibrium constant, K_{a1} , for the first stage of ionisation.

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: B



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18. Assertion : $0.20M$ solution of $NaCN$ is more than basic than $0.20M$ solution of NaF .

Reason : K_a of HCN is very much less than that of HF .

- A. Both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. Both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. Assertion is true but reason is false.
- D. Assertion is false but reason is true.

Answer: A

19. Assertion : A substance that can either act as an acid a base is called ampholyte.

Reason : Bisulphide ion (HS^-) and bicarbonate ion (HCO_3^-) are ampholytes.

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: B



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20. Assertion : Addition of $HCl(aq)$ to $HCOOH(aq)$ decreases the ionization of $HCOOH(aq)$

Reason : Due to common ion effect of H^+ , ionization of $HCOOH$ decreased.

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: A



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21. Assertion : pH of $10^{-7} M HCl$ is less than 7 at $25^{\circ} C$.

Reason : At very low concentration of HCl , contribution of H^{+} from water is considerable.

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.
- D. If assertion is false but reason is true.

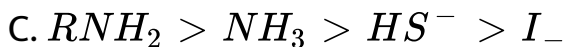
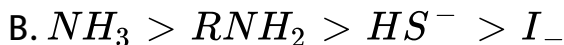
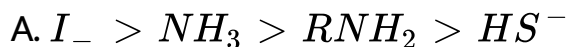
Answer: A



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AIPMT/ NEET/ AIIMS Questions

1. In HS^- , I^- , $R-NH_2$, NH_3 order of proton accepting tendency will be



Answer: C



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2. NH_3 gas dissolves in water to give NH_4OH . In this reaction, water acts as

- A. an acid
- B. a base
- C. a salt
- D. a conjugate base

Answer: A



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3. Ionisation constant of CH_3COOH is 1.7×10^{-5} and concentration of H^+ ions is 3.4×10^{-4} . Then, find out initial concentration of CH_3COOH molecules.

A. 3.4×10^{-4}

B. 3.4×10^{-3}

C. 6.8×10^{-4}

D. 6.8×10^{-3}

Answer: D



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4. Solubility of M_2S type salt is 3.5×10^{-6} , then find out its solubility product

A. 1.7×10^{-6}

B. 1.7×10^{-16}

C. 1.7×10^{-18}

D. 1.7×10^{-12}

Answer: B



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5. Solubility of MX_2 type electrolytes is $0.5 \times 10^{-4} \text{ mol/L}$, then find out K_{sp} of electrolytes.

A. 5×10^{-12}

B. 25×10^{-10}

C. 1×10^{-13}

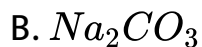
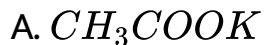
D. 5×10^{-13}

Answer: D



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6. Which has the highest pH ?



D. NaNO_3

Answer: B



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7. Solution of $0.1\text{N NH}_4\text{OH}$ and $0.1\text{N NH}_4\text{Cl}$ has $\text{pH} 9.25$, then find out K_b of NH_4OH .

A. 9.25

B. 4.75

C. 3.75

D. 8.25

Answer: B

8. The solubility product of AgI at $25^{\circ}C$ is $1.0 \times 10^{-16} mol^2 L^{-2}$. The solubility of AgI in $10^{-4}N$ solution of KI at $25^{\circ}C$ is approximately (in $molL^{-1}$)

A. 1.0×10^{-10}

B. 1.0×10^{-8}

C. 1.0×10^{-16}

D. 1.0×10^{-12}

Answer: D

9. The rapid change of pH near the stoichiometric point of an acid-base titration is the basis of indicator detection. pH of the solution is related to the ratio of the concentration of conjugate acid (HIn) and base (In^-) forms of the indicator by the expression

A. $\log \left[\frac{[In^-]}{[HIn]} \right] = pK_a + pH$

B. $\log \left[\frac{[HIn]}{[In^-]} \right] = K_a + pH$

C. $\log \left[\frac{[In^-]}{[HIn]} \right] = pH + pK_a$

D. $\log \left[\frac{[In^-]}{[HIn]} \right] = pH - pK_a$

Answer: D



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10. The solubility product of a sparingly soluble salt AX_2 is 3.2×10^{-11} . Its solubility (in mo/L) is

A. 5.6×10^{-6}

B. 3.1×10^{-4}

C. 2×10^{-4}

D. 4×10^{-4}

Answer: C



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11. The correct relationship between the pH of isomolar solutions of sodium oxide (pH_1), sodium sulphide (pH_2), sodium selenide (pH_3) and sodium telluride (pH_4) is

A. $pH_1 > pH_2 > pH_3 > pH_4$

B. $pH_1 < pH_2 < pH_3 < pH_4$

C. $pH_1 < pH_2 < pH_3 > pH_4$

D. $pH_1 > pH_2 < pH_3 > pH_4$

Answer: A



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12. At $25^\circ C$ K_b for $BOH = 1.0 \times 10^{-12}$. $0.01M$ solution of

BOH has $[OH^-]$:

A. $2.0 \times 10^{-6} molL^{-1}$

B. $1.0 \times 10^{-5} molL^{-1}$

C. $1.0 \times 10^{-6} molL^{-1}$

D. $1.0 \times 10^{-7} \text{ mol L}^{-1}$

Answer: D

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13. H_2S gas when passed through a solution of cations containing HCl precipitates the cations of second group in qualitative analysis but not those belonging to the fourth group. It is because

A. the presence of HCl decreases the sulphide ion concentration

B. the presence of HCl increases the sulphide ion concentration

C. the solubility product of group *II* sulphides is more than that of group *IV* sulphides

D. The sulphides of group *IV* cations are unstable in *HCl*

Answer: A

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14. Which of the following pairs constitutes buffer?

A. HNO_3 and NH_4NO_3

B. HCl and KCl

C. HNO_2 and $NaNO_2$

D. $NaOH$ and $NaCl$

Answer: C

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15. The hydrogen ion concentration of a $10^{-8}M HCl$ aqueous solution at $298K$ ($K_w = 10^{-14}$) is

A. $1.0 \times 10^{-6}M$

B. $1.0525 \times 10^{-7}M$

C. $9.525 \times 10^{-8}M$

D. $1.0 \times 10^{-8}M$

Answer: B



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16. Calculate the pOH of solution at $25^\circ C$ that contains $1 \times 10^{-10} M$ of hydronium ions, i.e., H_3O^+

A. 4

B. 9

C. 1

D. 7

Answer: A



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17. A monoprotic acid in $0.1M$ solution has $K_a = 1.0 \times 10^{-5}$. The degree of dissociation for acid is

A. 1.0 %

B. 99.9 %

C. 0.1 %

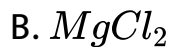
D. 99 %

Answer: A

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18. Equimolar solution of the following were prepared in water separately. Which one of the solutions will record the

highest pH ?



Answer: A



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19. Equal volumes of three acid solutions of pH 3, 4 and 5 are mixed in a vessel. What will be the H^+ ion concentration in the mixture?



B. $3.7 \times 10^{-3} M$

C. $1.11 \times 10^{-3} M$

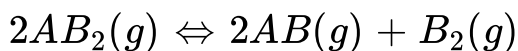
D. $1.11 \times 10^{-4} M$

Answer: A



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20. At temperature T , a compound $AB_2(g)$ dissociates according to the reaction



with degree of dissociation α , which is small compared with unity. The expression for K_p in terms of α and the total pressure P_T is

A. $(2K_p/p)$

B. $(2K_p/p)^{1/3}$

C. $(2K_p/p)^{1/2}$

D. (K_p/p)

Answer: B



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21. The equilibrium constants K_{p1} and K_{p2} for the reactions $X \rightleftharpoons 2Y$ and $Z \rightleftharpoons P + Q$, respectively, are in the ratio of 1 : 9 . If the degree of dissociation at these equilibria is:

A. 3 : 1

B. 1 : 9

C. 36:1

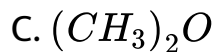
D. 1:1

Answer: C



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22. Which of the following molecules acts as a Lewis acid?



Answer: B

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23. What is the $[OH^-]$ in the final solution prepared by mixing 20.0mL of 0.050M HCl with 30.0mL of 0.10M Ba(OH)_2 ?

A. 0.10M

B. 0.40M

C. 0.0050M

D. 0.12M

Answer: A

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24. The ionization constant of ammonium hydroxide is 1.77×10^{-5} at $298K$. Hydrolysis constant of ammonium chloride is

A. 5.65×10^{-12}

B. 5.65×10^{-10}

C. 6.50×10^{-12}

D. 5.65×10^{-13}

Answer: B



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25. The dissociation constants for acetic acid and HCN at $25^\circ C$ are 1.5×10^{-5} and 4.5×10^{-10} , respectively. The

equilibrium constant for the equilibrium

$CN^- + CH_3COOH \rightleftharpoons HCN + CH_3COO^-$ would be

- A. 3.0×10^4
- B. 3.0×10^{-5}
- C. 3.0×10^5
- D. 3.0×10^{-4}

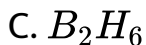
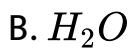
Answer: A



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26. Which of the following molecular hydride act as a Lewis acid ?

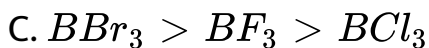
- A. NH_3



Answer: A

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27. Which of the following describes correct sequence for decreasing Lewis acid nature?



Answer: B

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28. What is $[H^+]$ in mol/L of a solution that is $0.20M$ in CH_3COONa and $0.1M$ in CH_3COOH ? K_a for CH_3COOH is 1.8×10^{-5} ?

A. 3.5×10^{-4}

B. 1.1×10^{-5}

C. 1.8×10^{-5}

D. 9.0×10^{-6}

Answer: D

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29. In a buffer solution containing equal concentration of B^- and HB , the K_b for B^- is 10^{-10} . The pH of buffer solution is

A. 10

B. 7

C. 6

D. 4

Answer: D



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30. A buffer solution is prepared in which the concentration of NH_3 is $0.30M$ and the concentration of NH_4^+ is $0.20M$. If the equilibrium constant, K_b for NH_3 equals 1.8×10^{-5} , what is the pH of this solution? ($\log 2.7 = 0.43$)

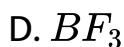
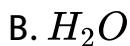
- A. 8.73
- B. 9.08
- C. 9.43
- D. 11.72

Answer: C



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31. Which of the following is least likely to behave as Lewis acid?



Answer: D



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32. Buffer solutions have constant acidity and alkalinity because

- A. they have large excess of H^+ or OH^- ions
- B. they have fixed value of pH
- C. these give unionized acid or base on reaction with added acid or alkali
- D. acids and alkalies in these solutions are shielded from attack by other ions

Answer: C

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33. pH of saturated solution of $Ba(OH)_2$ is 12. The value of solubility product (K_{sp}) of $Ba(OH)_2$ is

A. 4.0×10^{-6}

B. 5.0×10^{-6}

C. 3.3×10^{-7}

D. 5.0×10^{-7}

Answer: D



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34. Equimolar solutions of the following substances were prepared separately. Which one of these will record the highest pH value?



D. $AlCl_3$

Answer: C

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35. In which of the following arrangements the given sequence is not strict according to the property indicated against it?

A. $HF < HCl < HBr < HI$: increasing acidic strength

B. $H_2O < H_2S < H_2Se < H_2Te$: increasing pK_a values

C. $NH_3 < PH_3 < AsH_3 < SbH_3$: increasing acidic character

D. $CO_2 < SiO_2 < SnO_2 < PbO_2$: increasing oxidizing power.

Answer: B

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36. Which of the following strongest acid in the following?

A. $HClO_3$

B. $HClO_4$

C. H_2SO_3

D. H_2SO_4

Answer: B

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37. Identify the correct order of solubility in aqueous medium

A. $ZnS > Na_2S > CuS$

B. $Na_2S > CuS > ZnS$

C. $Na_2 > ZnS > CuS$

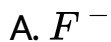
D. $CuS > ZnS > Na_2S$

Answer: C



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38. Which of these is least likely to act as Lewis base?



Answer: B



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39. Which of the following salts will give highest pH in water?

A. KCl

B. $NaCl$

C. Na_2CO_3

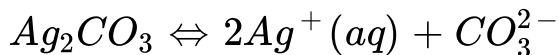
D. $CuSO_4$

Answer: C



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40. Using the Gibbs energy change, $\Delta G^\circ = + 63.3kJ$, for the following reaction,



the K_{sp} of $Ag_2CO_3(s)$ in water at $25^\circ C$ is

$$(R = 8.314JK^{-1}mol^{-1})$$

A. 3.2×10^{-26}

B. 8.0×10^{-12}

C. 2.9×10^{-3}

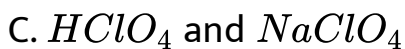
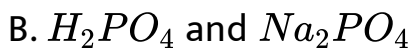
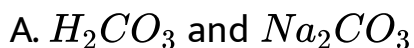
D. 7.9×10^{-2}

Answer: B



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41. Which one of the following pairs of solution is not an acidic buffer?



D. CH_3COOH and CH_3COONa

Answer: C



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42. What is the pH of the resulting solution when equal volumes of $0.1MNaOH$ and $0.01MHCl$ are mixed?

A. 7.0

B. 1.04

C. 12.65

D. 2.0

Answer: C

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43. Concentration of the Ag^+ ions in a saturated solution of Ag_2CO_3 is $2.2 \times 10^{-4} molL^{-1}$ Solubility product of $Ag_2C_2O_4$ is:

A. 2.66×10^{-12}

B. 4.5×10^{-11}

C. 5.3×10^{-12}

D. 2.42×10^{-8}

Answer: C

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44. The solubility of $BaSO_4$ in water is $2.42 \times 10^{-3} gL^{-1}$ at $298K$. The value of its solubility product (K_{sp}) will be (Given molar mass of $BaSO_4 = 233 gmol^{-1}$)

A. $1.08 \times 10^{-10} mol^2 L^{-2}$

B. $1.08 \times 10^{-12} mol^2 L^{-2}$

C. $1.08 \times 10^{-14} mol^2 L^{-2}$

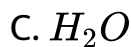
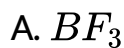
D. $1.08 \times 10^{-8} mol^2 L^{-2}$

Answer: A



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45. Which of the following is Lewis acid?



Answer: A



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46. Solubility product of $BaCl_2$ is 4×10^{-9} . Its solubility in moles//litre would be

A. 1×10^{-3}

B. 1×10^{-9}

C. 4×10^{-27}

D. 1×10^{-27}

Answer: A

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47. If K_{sp} for $HgSO_4$ is 6.4×10^{-5} , then solubility of this substance in mole per m^3 is

A. 8×10^{-3}

B. 8×10^{-6}

C. 6.4×10^{-5}

D. 6.4×10^{-27}

Answer: A



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48. The solubility of $BaSO_4$ in water is $2.33 \times 10^{-3} g/litre$. Its solubility product will be (molecular weight of $BaSO_4 = 233$)

A. 1×10^{-5}

B. 1×10^{-10}

C. 1×10^{-15}

D. 1×10^{-20}

Answer: B



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49. The precipitation occurs if ionic concentration is

- A. less than solubility product
- B. more than solubility product
- C. equal to solubility product
- D. None of these

Answer: B

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50. In the reaction : $H_2S \rightleftharpoons 2H^+ + S^{2-}$, when NH_4OH is added, then

- A. S^{2-} is precipitated

B. no action takes place

C. concentration of S^{2-} decreases

D. concentration of S^{2-} increases

Answer: D



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51. Solubility of a salt M^2X^3 is $Y \text{ mol dm}^{-3}$. The solubility product of the salt will be

A. $6y^4$

B. $64y^4$

C. $36y^5$

D. $108y^5$

Answer: D



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52. pH value of a solution , whose hydronium ion concentration is $6.2 \times 10^{-9} mol/l$, is

A. 6.21

B. 7.21

C. 7.75

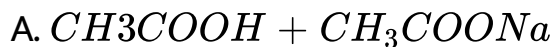
D. 8.21

Answer: D



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53. Which is a buffer solution?



Answer: A

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54. A solution has $pH = 5$, it is diluted 100 times, then it will become

A. neutral

B. basic

C. unaffected

D. more acidic

Answer: A



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55. When 10ml of 0.1M acetic acid ($pK_a = 5.0$) is titrated against 10ml of 0.1M ammonia solution ($pK_b = 5.0$), the equivalence point occurs at pH

A. 5.0

B. 6.0

C. 7.0

D. 9.0

Answer: C

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56. The pH of solution having $[OH^-] = 10^{-7}$ is

A. 7

B. 14

C. zero

D. -7

Answer: A

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57. At 80°C distilled water has $[\text{H}_3\text{O}^+]$ concentration equal to 1×10^{-6} mole/litre. The value of K_w at this temperature will be

A. 1×10^{-6}

B. 1×10^{-9}

C. 1×10^{-12}

D. 1×10^{-15}

Answer: C



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58. A base dissolved in water yields a solution with a hydroxide ion concentration of $0.05 \text{ mol litre}^{-1}$. The solution is

A. basic

B. acid

C. neutral

D. both (a) and (b)

Answer: A



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59. The pH of 10^{-8} molar aqueous solution of HCl is

A. -8

B. 8

C. $6 > 7$ (between 6 and 7)

D. $7 > 8$ (between 7 and 8)

Answer: C



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60. The H^+ ion concentration is 1.0×10^{-6} mole/litre in solution. Its pH value will be

A. 12

B. 6

C. 18

D. 24

Answer: B

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61. If pH of A , B , C and D are 9.5, 2.5, 3.5 and 5.5 respectively, then strongest acid is

A. A

B. C

C. D

D. B

Answer: D

62. One weak acid (like CH_3COOH) and its strong base together with salt (like CH_3COONa) is a buffer solution.

In which pair this type of characteristic is found?

- A. HCl and $NaCl$
- B. $NaOH$ and $NaNO_3$
- C. KOH and KCl
- D. NH_4OH and NH_4Cl

Answer: D

63. The hydrogen ion concentration of $0.001MNaOH$ solution is

A. $1 \times 10^{-2} mol / litre$

B. $1 \times 10^{-11} mol / litre$

C. $1 \times 10^{-14} mol / litre$

D. $1 \times 10^{-12} mol / litre$

Answer: B



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64. The strongest Bronsted base in the following anion is

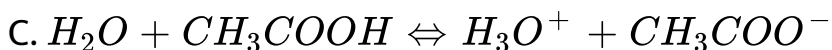
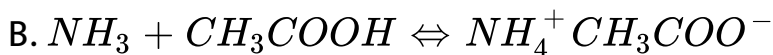
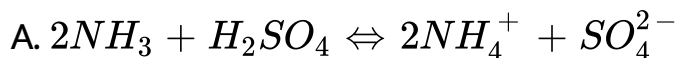




Answer: A

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65. Which equilibrium can be described as an acid- base reaction using the Lewis acid-base definition but not using the Bronsted-Lowry definition



D.



Answer: D



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66. The solubility of $CuBr$ is 2×10^{-4} at $25^\circ C$. The K_{sp} value for $CuBr$ is

A. $4 \times 10^{-8} mol^2 l^{-2}$

B. $4 \times 10^{-11} mol^2 L^{-1}$

C. $4 \times 10^{-4} mol^2 l^{-2}$

D. $4 \times 10^{-15} mol^2 l^{-2}$

Answer: A

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67. Solubility of $AgCl$ at $20^{\circ}C$ is 1.435×10^{-3} gperlitre.

The solubility product of $AgCl$ is

A. 1×10^{-5}

B. 1×10^{-10}

C. 1.435×10^{-5}

D. 108×10^{-3}

Answer: B

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68. The pH of a solution at $25^\circ C$ containing $0.10m$ sodium acetate and $0.03m$ acetic acid is (pK_a for $CH_3COOH = 4.57$)

A. 4.09

B. 5.09

C. 6.10

D. 7.09

Answer: B



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69. What is the pH of $0.01M$ glycine solution? For glycine,

$K_{a_1} = 4.5 \times 10^{-3}$ and $K_{a_2} = 1.7 \times 10^{-10}$ at $298K$

A. 3.0

B. 10.0

C. 6.1

D. 7.2

Answer: C



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70. At $298K$ a $0.01MCH_3COOH$ solution is 1.34%

ionized. The ionization constant K_a for acetic acid will be

A. 1.82×10^{-5}

B. 18.2×10^{-5}

C. 0.182×10^{-5}

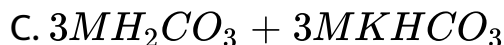
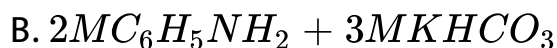
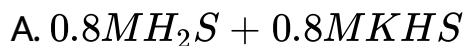
D. None of these

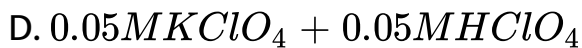
Answer: A



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71. Which one of the following is not a buffer solution?





Answer: D

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72. When a solution of benzoic acid was titrated with $NaOH$ the pH of the solution when half the acid neutralized was 4.2. Dissociation constant of the acid is

A. 6.31×10^{-5}

B. 3.2×10^{-5}

C. 8.7×10^{-8}

D. 6.42×10^{-4}

Answer: A

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73. Amount of $(NH_4)_2SO_4$ which must be added to $50mL$ of $0.2M NH_4OH$ solution to yield a solution of $pH 9.26$ is (pK_b of $NH_4OH = 4.74$)

A. $0.10mol$

B. $0.20mol$

C. $0.05mol$

D. $0.40mol$

Answer: C

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74. When $NH_3(0.1M)50ml$ mix with $HCl(0.1M)10ml$ then what is pH of resultant solution ($pK_b = 4.75$)

A. 9.25

B. 10

C. 9.85

D. 4.15

Answer: C



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75. When $CH_3COOCH_3 + HCl$ is titrated with $NaOH$ then at neutral point the colour of phenolphthalein becomes colourless from pink due to:

- A. due to formation of CH_3OH
- B. due to formation of CH_3COOH which act as a weak acid.
- C. Phenolphthalein vaporizes.
- D. due to presence of HCl

Answer: B

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76. Which of the following have maximum pH ?

A. Black coffee

B. blood

C. Gastric juice

D. Saliva

Answer: B

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77. Assertion: Addition of silver ions to a mixture of aqueous sodium chloride and sodium bromide solution will

first precipitate $AgBr$ rather than $AgCl$.

Reason : K_{sp} of $AgCl$ $<$ K_{sp} of $AgBr$.

- A. If both the assertion and reason are true and reason is the true explanation of the assertion.
- B. If both the assertion and reason are true but the reason is not the correct explanation of assertion.
- C. If the assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: C



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78. Assertion: Heat given out during neutralisation of $NaOH$ and HF is $-13.7kcal/eq$.

Reason : F^- ion is more easily hydrated and thus heat of neutralisation of HF and $NaOH$ is more.

- A. If both the assertion and reason are true and reason is the true explanation of the assertion.
- B. If both the assertion and reason are true but the reason is not the correct explanation of assertion.
- C. If the assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: D



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79. Assertion: $0.1MNaCN + 0.05MHCl$ solution on mixing in equal volume forms a buffer solution.

Reason : The solution after mixing contains a weak acid and its conjugate base and thus acts as buffer.

- A. If both the assertion and reason are true and reason is the true explanation of the assertion.
- B. If both the assertion and reason are true but the reason is not the correct explanation of assertion.
- C. If the assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: A



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80. Assertion: The pH of NH_4OH remains unchanged on addition of NH_4Cl .

Reason : Addition of NH_4Cl suppresses the dissociation of NH_4OH due to common ion effect.

- A. If both the assertion and reason are true and reason is the true explanation of the assertion.
- B. If both the assertion and reason are true but the reason is not the correct explanation of assertion.
- C. If the assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: D



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Section D - Chapter End Test

1. If the degree of ionization of water be 1.8×10^{-9} at $298K$. Its ionization constant will be

A. 1.8×10^{-16}

B. 1×10^{-14}

C. 1×10^{-16}

D. 1.67×10^{-14}

Answer: A



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2. When a solution of benzoic acid was titrated with NaOH the pH of the solution when half the acid neutralized was 4.2. Dissociation constant of the acid is

A. 6.31×10^{-5}

B. 3.2×10^{-5}

C. 8.7×10^{-8}

D. 6.42×10^{-4}

Answer: A



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3. 10^{-2} mole of $NaOH$ was added to 10 litres of water. The pH will change by

A. 4

B. 3

C. 11

D. 7

Answer: A



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4. If an acidic indicator HIn ionises as $HIn \rightleftharpoons H^+ + In^-$.

To which maximum pH value its solution has distinct

colour characteristic of HIn

A. $pK_{in} - 1$

B. $pK_{in} \pm 1$

C. pK_{in}

D. 7

Answer: B



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5. Let the solubilities of $AgCl$ in pure water be $0.01M CaCl_2$, $0.01M NaCl$ and $0.05M AgNO_3$ be s_1 , s_2 , s_3 and s_4 respectively. What is the correct order of these quantities? Neglect any complexation.

A. $S_1 > S_2 > S_3 > S_4$

B. $S_1 > S_3 > S_2 > S_4$

C. $S_1 > S_2 = S_3 > S_4$

D. $S_1 > S_3 > S_4 < S_2$

Answer: B



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6. What would be the pH of an ammonia solution if that of an acetic acid solution of equal strength is 3.2? Assume dissociation constants for NH_3 and acetic acid are equal.

A. 3.2

B. 6.4

C. 9.6

D. 10.8

Answer: D



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7. pH of saturated solution of $Ba(OH)_2$ is 12. The value of solubility product (K_{sp}) of $Ba(OH)_2$ is

A. $10^{-6} M^3$

B. $4 \times 10^{-6} M^3$

C. $0.5 \times 10^{-7} M^3$

D. $5 \times 10^{-7} M^3$

Answer: D

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8. The hydrolysis constant for $ZnCl_2$ will be

where K_b is effective dissociation constant of base Zn^{++}

A. $K_h = \frac{K_w}{K_b}$

B. $K_h = \frac{K_w^2}{K_b}$

C. $K_h = \frac{K_w^2}{K_b^2}$

D. $K_h = \frac{K_b}{K_w^2}$

Answer: B

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9. In which case pH will not change on dilution

A. $0.01MCH_3COONa + 0.01MCH_3COOH$ buffer

B. $0.01MCH_3COONH_4$

C. $0.01MNaH_2PO_4$

D. in all cases

Answer: D



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10. $M(OH)_x$ has $K_{SP} 4 \times 10^{-12}$ and solubility $10^{-4}M$.

The value of x is:

A. 1

B. 2

C. 3

D. -4

Answer: B



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11. 1 M benzoic acid ($pK_a = 4.20$) and 1 M C_6H_5COONa solutions are given separately. What is the volume of benzoic acid required to prepare a 300 ml buffer solution of pH = 4.5? [$\log 2 = 0.3$]

A. 200ml

B. 150ml

C. 100ml

D. 50ml

Answer: C



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12. The pH of an aqueous solution of $0.1M$ solution of a weak monoprotic acid which is 1% ionised is

A. 1

B. 2

C. 3

D. 11

Answer: C



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13. pH of a $10^{-10} M NaOH$ is nearest to

A. 10

B. 7

C. 4

D. 10

Answer: B



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14. The dissociation constant of a weak acid is 1.0×10^{-5} , the equilibrium constant for the reaction with strong base is

A. 1.0×10^{-5}

B. 1.0×10^{-9}

C. 1.0×10^9

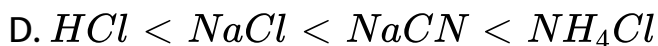
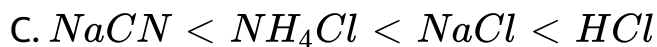
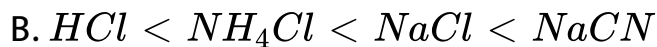
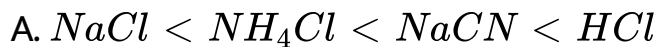
D. 1.0×10^{14}

Answer: C



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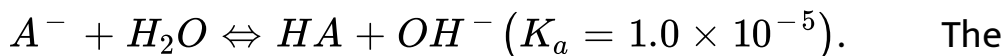
15. The pH of $0.1M$ solution of the following salts increases in the order



Answer: D

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16. In the equilibrium



degree of hydrolysis of $0.001M$ solution of the salt is

A. 10^{-3}

B. 10^{-4}

C. 10^{-5}

D. 10^{-6}

Answer: A



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17. The sulphide ion concentration $[S^{2-}]$ in saturated H_2S solution is 1×10^{-22} . Which of the following sulphides should be quantitatively precipitated by H_2S in the presence

of dil. HCl ?

Sulphide	Solubility Product
(I)	1.4×10^{16}
(II)	1.2×10^{-22}
(III)	8.2×10^{-46}
(IV)	5.0×10^{-34}

A. *I,II*

B. *III,IV*

C. *II,III,IV*

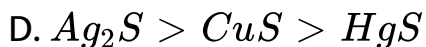
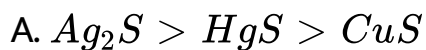
D. Only *I*

Answer: B



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18. The K_{sp} of CuS , Ag_2S and HgS are 10^{-31} , 10^{-44} and 10^{-54} respectively. The solubility of these sulphides are in the order.



Answer: D



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19. For a weak acid HA with dissociation constant 10^{-9} , pOH of its $0.1M$ solution is

A. 9

B. 3

C. 11

D. 10

Answer: D



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20. The concentration of $[H^+]$ and concentration of $[OH^-]$ of a 0.1 aqueous solution of 2% ionised weak acid

is [Ionic product of water = 1×10^{-14}]

A. $2 \times 10^{-3} M$ and $5 \times 10^{-12} M$

B. $1 \times 10^{-3} M$ and $3 \times 10^{-11} M$

C. $0.02 \times 10^{-3} M$ and $5 \times 10^{-11} M$

D. $3 \times 10^{-2} M$ and $4 \times 10^{-13} M$

Answer: A



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21. If $50ml$ of $0.2M KOH$ is added to $40ml$ of $0.05M HCOOH$, the pH of the resulting solution is (

$K_a = 1.8 \times 10^{-4}$)

A. 3.4

B. 7.5

C. 5.6

D. 3.75

Answer: A



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22. What is the pH of a $1MCH_3COOH$ a solution K_a of acetic acid $= 1.8 \times 10^{-5}$?

$$K = 10^{-14} \text{ mol}^2 \text{ litre}^{-2}$$

A. 9.4

B. 4.8

C. 3.6

D. 2.4

Answer: A

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23. What will be the pH of a solution formed by mixing 40ml of 0.10M HCl with 10ml of 0.45M NaOH ?

A. 12

B. 10

C. 8

D. 6

Answer: A



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24. By adding $20\text{ml } 0.1\text{N HCl}$ to $20\text{ml } 0.001\text{N KOH}$, the pH of the obtained solution will be

A. 2

B. 1.3

C. 0

D. 7

Answer: B



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25. The solubility product of a sparingly soluble salt AB at room temperature is 1.21×10^{-6} . Its molar solubility is

A. 1.21×10^{-6}

B. 1.21×10^{-3}

C. 1.1×10^{-4}

D. 1.1×10^{-3}

Answer: D



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26. According to Bronsted principle, an aqueous solution of HNO_3 will contain



Answer: B



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27. Orthoboric acid in aqueous medium is

A. Monobasic

B. Dibasic

C. Tribasic

D. All are correct

Answer: A

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28. Assertion: A solution of $FeCl_3$ in water produces brown precipitate on standing.

Reason: Hydrolysis of $FeCl_3$ takes place in water.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both the assertion and reason are true and reason is not the correct explanation of assertion.

C. If the assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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29. Assertion (A): $BaCO_3$ is more soluble in HNO_3 than in water.

Reason (R): Carbonate is a weak base and reacts with H^{\oplus} ions to form strong acid causing barium salt to dissociate.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both the assertion and reason are true and reason is not the correct explanation of assertion.

C. If the assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A



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30. Assertion: $CHCl_3$ is more acidic than CHF_3 .

Reason: The conjugate base of $CHCl_3$ is more stable than CHF_3 .

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both the assertion and reason are true and reason is not the correct explanation of assertion.

C. If the assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A



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Others

1. Dissociation constants of two acids HA and HB are respectively 4×10^{-10} and 1.8×10^{-5} , whose pH value will be higher for a given molarity:

A. HA

B. HB

C. Both same

D. Can't say

Answer: A



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2. A monoprotic acid in $1.00M$ solution is 0.01% ionised.

The dissociation constant of this acid is

A. 1×10^{-8}

B. 1×10^{-4}

C. 1×10^{-6}

D. 10^{-5}

Answer: A

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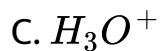
3. The dissociation constants of two acids HA_1 and HA_2 are 3.0×10^{-4} and 1.8×10^{-5} respectively. The relative strengths of the acids will be approximately

- A. 1:4
- B. 4:1
- C. 1:16
- D. 16:1

Answer: B

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4. Which of the following can act both as Bronsted acid and as Bronsted base ?



Answer: B



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5. pH of water is 7.0 at $25^{\circ}C$. If water is heated to $70^{\circ}C$, the:

- A. pH will decrease and solution becomes acidic
- B. pH will increase
- C. pH will remain constant as 7
- D. pH will decrease but solution will be neutral

Answer: D



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6. The equivalent conductance at infinite dilution of a weak acid such as HF

- A. Can be determined by measurement of very dilute HF solution
- B. Can be determined by extrapolation of measurements on dilute solutions of HCl , HBr and HI
- C. Can best be determined from measurements on dilute solutions of NaF , $NaCl$ and HCl
- D. Is an underfined quantity

Answer: C



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7. 100ml of $0.2\text{M}\text{H}_2\text{SO}_4$ is added to 100ml of $0.2\text{M}\text{NaOH}$

. The resulting solution will be

A. Acidic

B. Basic

C. Neutral

D. Slightly basic

Answer: A



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8. K_a for formic acid and acetic acid are 2.1×10^{-4} and

1.1×10^{-5} respectively. The relative strength of acids is:

A. 19: 1

B. 2.3: 1

C. 1: 2.1

D. 4.37: 1

Answer: D



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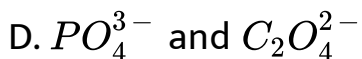
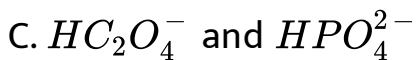
9. In the following reaction



, which are the two Bronsted bases?

A. $HC_2O_4^-$ and PO_4^{3-}

B. HPO_4^{2-} and $C_2O_4^{2-}$

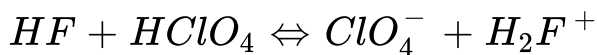


Answer: D



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10. The following equilibrium is established when $HClO_4$ is dissolved in weak acid HF ,



Which of the following is correct set of conjugate acid base pair?



C. HF and H_2F^+

D. $HClO_4$ and H_2F^+

Answer: C



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11. 10ml of $1M H_2SO_4$ will completely neutralise

A. 10ml of $1M NaOH$ solution

B. 10ml of $2M NaOH$ solution

C. 5ml of $2M KOH$ solution

D. 5ml of $1M Na_2CO_3$ solution

Answer: B



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12. Boric acid H_3BO_3 is a:

A. Arrhenius acid

B. Bronsted acid

C. Lewis acid

D. All of these

Answer: C



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13. The hydrogen ion concentration in weak acid of dissociation constant K_a and concentration c is nearly equal to

A. $\sqrt{K_a/c}$

B. c/K_a

C. $K_a c$

D. $\sqrt{K_a c}$

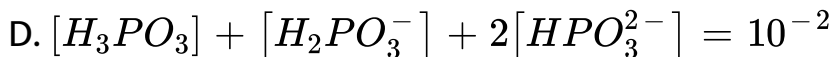
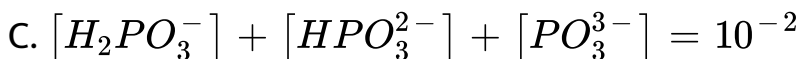
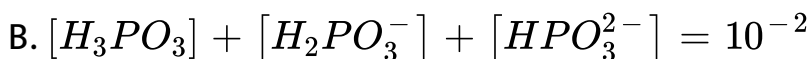
Answer: D



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14. For $10^{-2}(M)H_3PO_3$ solution which of the following relations is correct?

A.



Answer: B

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15. When 100ml of 1MNaOH solution is mixed with 10ml of $10\text{MH}_2\text{SO}_4$, the resulting mixture will be

- A. Acidic
- B. Alkaline
- C. Neutral
- D. Strongly alkaline

Answer: A

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16. What is the concentration of Ag^+ ion in a 1L solution containing 0.02mol of AgNO_3 and 0.14mol of NH_3 ? For

$$[Ag(NH_3)_2]^+, K_{Instab} = 10^8$$

A. $2 \times 10^{-7}(M)$

B. $10^{-8}(M)$

C. $2 \times 10^{-8}(M)$

D. $2 \times 10^{-9}(M)$

Answer: C



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17. In a solution total concentration of M^{3+} is $2 \times 10^{-3}(M)$ and total concentration of SCN^- is $1.51 \times 10^{-3}(M)$ and free SCN^- concentration $= 1 \times 10^{-5}(M)$

What is the dissociation constant of the complex



A. 2×10^5

B. 2×10^{-5}

C. 3.33×10^5

D. 3.33×10^{-6}

Answer: D



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18. The salt that forms neutral solution in water is



B. $NaCl$

C. Na_2CO_3

D. K_3BO_3

Answer: B



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19. The dissociation constant of a monobasic acid which is 3.5 % dissociated in $\frac{N}{20}$ solution at $20^\circ C$ is

A. 3.5×10^{-2}

B. 5×10^{-3}

C. 6.34×10^{-5}

D. 6.75×10^{-2}

Answer: C



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20. Which of the following substance is an electrolyte?

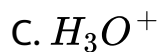
- A. Chloroform
- B. Benzene
- C. Toluene
- D. Magnesium chloride

Answer: D



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21. The species among the following which can act as an acid and as a base is



Answer: A

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22. The dissociation constant of weak acid HA is 4.9×10^{-8} . After making the necessary approximations,

calculate pH in $0.1M$ acid.

A. 1.155

B. 2.155

C. 3.155

D. 4.155

Answer: D



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23. The K_a for formic acid and acetic acid are 2×10^{-4} and 2×10^{-5} respectively. Calculate the relative strength of acids with same molar concentration

A. $\sqrt{10}$

B. $\sqrt{7}$

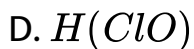
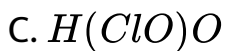
C. $\sqrt{8}$

D. $\sqrt{5}$

Answer: A

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24. Which among the following is strongest acid ?



Answer: B



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25. Calculate pH of $0.002N NH_4OH$ having 2% dissociation

A. 7.6

B. 8.6

C. 9.6

D. 10.6

Answer: C



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26. What concentration of acetic acid is needed to give a hydrogen ion concentration of $3.5 \times 10^{-4} M$? ($K_a = 1.8 \times 10^{-5}$)?

A. $3.5 \times 10^{-4} M$

B. $6.80 \times 10^{-3} M$

C. $4.2 \times 10^{-4} M$

D. $7.2 \times 10^{-4} M$

Answer: B



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27. A solution of acetic acid is 1.0 % ionised. Determine the molar concentration of acid ($K_a = 1.8 \times 10^{-5}$) and also the $[H^+]$.

A. $1.8 \times 10^{-1} M$ and $1.8 \times 10^{-3} M$

B. $0.18 \times 10^{-1} M$ and $1.8 \times 10^{-4} M$

C. $0.18 \times 10^{-2} M$ and $1.8 \times 10^{-2} M$

D. $0.18 \times 10^{-3} M$ and $1.8 \times 10^{-1} M$

Answer: A



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28. BOH is a weak base, molar concentration of BOH that provides a $[OH]^-$ of $1.5 \times 10^{-3} M$ [$K_b(BOH) = 1.5 \times 10^{-5} M$] is

A. $0.15 M$

B. $0.1515 M$

C. $0.0015 M$

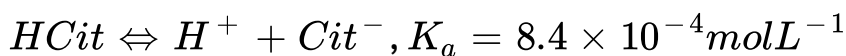
D. $1.5 \times 10^{-5} M$

Answer: A



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29. Lemon juice normally has a pH of 2. If all the acid the lemon juice is citric acid and there are no citrate salts present, then what will be the citric acid concentration $[Hcit]$ in the lemon juice? (Assume that only the first hydrogen of citric acid is important)



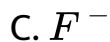
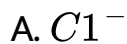
- A. $8.4 \times 10^{-4} M$
- B. $4.2 \times 10^{-4} M$
- C. $16.8 \times 10^{-4} M$
- D. $11.9 \times 10^{-2} M$

Answer: D



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30. Strongest conjugate base is



Answer: C



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31. $0.2M$ solution of a weak acid HA is 1% ionised $25^\circ C$.

K_a for the acid is equal to

A.
$$\frac{0.002 \times 0.002}{0.198}$$

B. $\frac{0.02 \times 0.02}{0.18}$

C. $\frac{0.01 \times 0.01}{0.19}$

D. $\frac{0.19}{0.01 \times 0.01}$

Answer: A



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32. An aqueous solution of aluminium sulphate would show

A. An acidic reaction

B. An neutral reaction

C. An basic reaction

D. Both acidic and basic reaction

Answer: A



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33. Which of the following has highest proton affinity?

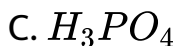
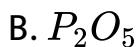


Answer: A



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34. The conjugate base of $H_2PO_4^-$ is :



Answer: A



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35. According to Bronsted principle, an aqueous solution of HNO_3 will contain



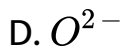
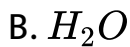


Answer: B



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36. The conjugate base of OH^- is :



Answer: D

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37. Would gaseous HCl be considered as an Arrhenius acid?

A. Yes

B. No

C. Not known

D. Gaseous HCl does not exist

Answer: B

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38. The first and second dissociation constant of an acid H_2A are 1.0×10^{-5} and 5.0×10^{-10} respectively. The overall dissociation constant of the acid will be

A. 5.0×10^{-5}

B. 5.0×10^{15}

C. 5.0×10^{-15}

D. 0.2×10^5

Answer: C



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39. An aqueous solution of sodium carbonate is alkaline because sodium carbonate is a salt of

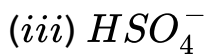
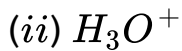
- A. Weak acid and weak base
- B. Strong acid and weak base
- C. Weak acid and strong base
- D. Strong acid and strong base

Answer: C

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40. Four species are listed below:

(i) HCO_3^-



Which one of the following is the correct sequence of their acid strength?

A. $iv < ii < iii < i$

B. $ii < iii < i < iv$

C. $i < iii < ii < iv$

D. $iii < i < iv < ii$

Answer: C



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41. Ammonia gas dissolves in water to form NH_4OH . In this reaction water acts as

- A. A conjugate base
- B. A non-polar solvent
- C. An acid
- D. A base

Answer: C

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42. The pH of a 0.1 molar solution of the acid HQ is 3. The value of the ionisation constant, K_a of the acid is

A. 3×10^{-1}

B. 1×10^{-3}

C. 1×10^{-5}

D. 1×10^{-7}

Answer: C



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43. Orthoboric acid in aqueous medium is

A. Monobasic

B. Dibasic

C. Tribasic

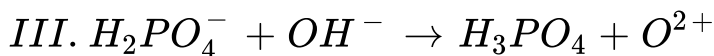
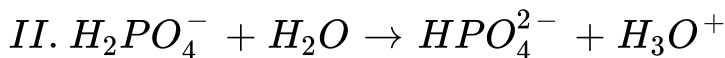
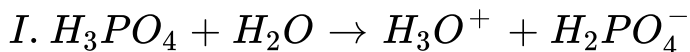
D. All are correct

Answer: A



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44. Three reactions involving $H_2PO_4^-$ are given below



In which of the above does $H_2PO_4^-$ act as an acid?

A. *II* only

B. *I* and *II*

C. *III* only

D. *I* only

Answer: A



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