Exercise # 5 Part # I [Previous Year Questions] [AIEEE/JEE-MAIN]

1. The conjugate base of $H_2PO_4^-$ is [AIEEE-2004]

(1) PO_4^{3-} (2) P_2O_5 (3) H_3PO_4 (4) HPO_4^{2-}

2. The molar solubility (in mol L^{-1}) of a sparingly soluble salt MX_4 is s. The corresponding solubility product is $K_{sp.}$. s is given in terms of K_{sp} by the relation [AIEEE-2004]

(1) $s = (K_{sp}/128)^{1/4}$ (2) $s = (128K_{sp})^{1/4}$ (3) $s = (256K_{sp})^{1/5}$ (4) $s = (K_{sp}/256)^{1/5}$

3. 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 saturated aqueous solution of the salt is : [AIEEE-2005]

(1) 2.0×10^{-6} M (2) 1.0×10^{-4} M (3) 1.6×10^{-4} M (4) 4.0×10^{-10} M

4. What is the conjugate base of OH^- ? [AIEEE-2005]

(1) O_2 (2) H_2O (3) O^- (4) O^{2-}

5. Hydrogen ion concentration in mol/L in a solution of pH = 5.4 will be [AIEEE-2005]

(1) 3.98×10^8 (2) 3.88×10^6 (3) 3.68×10^{-6} (4) 3.98×10^{-6}

6. The first and second dissociation constants 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 [AIEEE-2007]

(1) 5.0×10^{-15} (2) 0.2×10^5 (3) 5.0×10^{-5} (4) 5.0×10^{15}

7. 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 : [AIEEE-2007]

(1) 9.5 (2) 7.0 (3) 4.5 (4) 2.5

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

$$AgIO_3(s) \rightleftharpoons Ag^+(aq) + IO^-_3(aq)$$

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 100 ml of its saturated solution? [AIEEE-2007]

(1) 1.0×10^{-7} g (2) 1.0×10^{-4} g (3) 28.3×10^{-2} g (4) 2.83×10^{-3} g

9. 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 [AIEEE-2008]

(1) 4.79 (2) 7.01 (3) 9.22 (4) 9.58

10. Solid $Ba(NO_3)_2$ is gradually dissolved in 1.0×10^{-4} M Na_2CO_3 solution. At what concentration of Ba^{2+} will a precipitate begin to form ? (K_{sp} for $BaCO_3 = 5.1 \times 10^{-9}$) : [AIEEE-2009]

(1) 5.1×10^{-5} M (2) 8.1×10^{-8} M (3) 8.1×10^{-7} M (4) 4.1×10^{-5} M

11. Solubility product of silver bromide is 5.0×10^{-13} . This quantity of potassium bromide (molar mass taken as 120 g mol^{-1}) to be added to 1 litre of 0.05 M solution of silver nitrate to start the precipitation of AgBr is : [AIEEE-2010]

(1) 1.2×10^{-10} g (2) 1.2×10^{-9} g (3) 6.2×10^{-5} g (4) 5.0×10^{-8} g

12. At 25°C, the solubility product of $Mg(OH)_2$ is 1.0×10^{-11}. At Which pH, will Mg^{2+} ions start precipitating in the form of $Mg(OH)_2$ from a solution of 0.001 M Mg^{2+} ions ? **[AIEEE-2010]**

(1) 9 **(2)** 10 **(3)** 11 **(4)** 8

13. Three reactions involving $H_2PO_4^-$ are given below : **[AIEEE-2010]**

(i) $H_3PO_4 + H_2O \rightarrow H_3O^+ + H_2PO_4^-$

(ii) $H_2PO_4^- + H_2O \rightarrow HPO_4^{2-} + H_3O^+$

(iii) $H_2PO_4^- + OH^- \rightarrow H_3PO_4 + O^{2-}$

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

(1) (ii) only **(2)** (i) and (ii) **(3)** (iii) only **(4)** (i) only

14. In aqueous solution the ionization constants for carbonic acid are **[AIEEE-2010]**

$K_1 = 4.2 \times 10^{-7}$ and $K_2 = 4.8 \times 10^{-11}$

Select the correct statement for a saturated 0.034 M solution of the carbonic acid.

(1) The concentration of CO_3^{2-} is 0.034 M.

(2) The concentration of CO_3^{2-} is greater than that of HCO_3^-.

(3) The concentration of H^+ and HCO_3^- are approximately equal.

(4) The concentration of H^+ is double that of CO_3^{2-}.

15. How many litres of water must be added to 1 litre an aqueous solution of HCl with a pH of 1 to create an aqueous solution with pH of 2 ? **[JEE(Main) 2013]**

(1) 0.1 L **(2)** 0.9 L **(3)** 2.0 L **(4)** 9.0 L

16. Which of the following salts is the most basic in aqueous solution ? **[JEE(Main) 2018]**

(1) CH_3COOK **(2)** $FeCl_3$ **(3)** $Pb(CH_3COO)_2$ **(4)** $Al(CN)_3$

17. An aqueous solution contains 0.10 M H_2S and 0.20 M HCl. If the equilibrium constants for the formation of HS^- from H_2S is 1.0×10^{-7} and that of S^{2-} from HS^- ions is 1.2×10^{-13} then the concentration of S^{2-} ions in aqueous solution is: **[JEE(Main) 2018]**

(1) 3×10^{-20} **(2)** 6×10^{-21} **(3)** 5×10^{-19} **(4)** 5×10^{-8}

Part # II [Previous Year Questions][IIT-JEE ADVANCED]

1. A weak acid HX has the dissociation constant 1×10^{-5} M. It forms a salt NaX on reaction with alkali. The percentage hydrolysis of 0.1 M solution of NaX is : **[JEE-2004]**

(A) 0.0001% **(B)** 0.01 % **(C)** 0.1 % **(D)** 0.15 %

2. 0.1 M NaOH is titrated with 0.1 M HA till the end point; K_a for HA is 5.6×10^{-6} and degree of hydrolysis is less compared to 1. Calculate pH of the resulting solution at the end point. **[JEE-2004]**

3. 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 litre. What will be the H^+ concentration in the solution? What will be the H^+ concentration in the solution? **[JEE-2005]**

(A) 8×10^{-2} M **(B)** 8×10^{-11} M **(C)** 1.6×10^{-11} M **(D)** 8×10^{-5} M

4. 2.5 mL of $\frac{2}{5}$ M weak monoacidic base ($K_b = 1 \times 10^{-12}$ at 25° C) is titrated with $\frac{2}{15}$ M HCl in water at 25°C. The concentration of H^+ at equivalence point is ($K_w = 1 \times 10^{-14}$ at 25°C) **[JEE-2008]**

(A) 3.7×10^{-14} M **(B)** 3.2×10^{-7} M **(C)** 3.2×10^{-2} M **(D)** 2.7×10^{-2} M

5. Solubility product constant (K_{sp}) of salts of types MX, MX_2 and M_3X at temperature T are 4.0×10^{-8}, 3.2×10^{-14} and 2.7×10^{-15}, respectively. Solubilities (mol dm^{-3}) of the salts at temperature T are in the order: **[JEE-2008]**

(A) $MX > MX_2 > M_3X$ **(B)** $M_3X > MX_2 > MX$

(C) $MX_2 > M_3X > MX$ **(D)** $MX > M_3X > MX_2$

6. The dissociation constant of a substituted benzoic acid at 25ºC is 1.0×10^{-4}. The pH of 0.01 M solution of its sodium salt is **[JEE-2009]**

7. Amongst the following, the total number of compounds whose aqueous solution turns red litmus paper blue is : **[JEE-2010]**

KCN	K_2SO_4	$(NH_4)_2C_2O_4$	NaCl	$Zn(NO_3)_2$
$FeCl_3$	K_2CO_3	NH_4NO_3	LiCN	

8. Aqueous solutions of HNO_3, KOH, CH_3COOH, and CH_3COONa of identical concentrations are provided. The pair (s) of solutions which form a buffer upon mixing is (are) : **[JEE-2010]**

(A) HNO_3 and CH_3COOH **(B)** KOH and CH_3COONa

(C) HNO_3 and CH_3COONa **(D)** CH_3COOH and CH_3COONa

9. In 1 L saturated solution of AgCl [K_{sp}(AgCl) = 1.6×10^{-10}], 0.1 mol of CuCl [K_{sp}(CuCl) = 1.0×10^{-6}] is added. The resultant concentation of Ag^+ in the solution is 1.6×10^{-x}. The value of "x" is : **[JEE-2011]**

10. The initial rate of hydrolysis of methyl acetate (1M) by a weak acid (HA, 1M) is $1/100^{th}$ of that of a strong acid (HX, 1M), at 25°C. The K_a of HA is : **[JEE(Advanced)-2013]**

(A) 1×10^{-4} **(B)** 1×10^{-5} **(C)** 1×10^{-6} **(D)** 1×10^{-3}

11. MX_2 dissociates into M^{2+} and X^- ions in an aqueous solution, with a degree of dissociation **(A)** of 0.5. The ratio of the observed depression of freezing point of the aqueous solution to the value of the depression of freezing point in the absence of ionic dissociation is **[JEE(Advanced)-2014]**

12. The correct statement(s) about the oxoacids, $HClO_4$ and HClO, is(are) **[JEE(Advanced)-2017]**

(A) The central atom in both $HClO_4$ and HClO is sp^3 hybridized

(B) $HClO_4$ is formed in the reaction between Cl_2 and H_2O

(C) The conjugate base of $HClO_4$ is weaker base than H_2O

(D) $HClO_4$ is more acidic than HClO because of the resonance stabilization of its anion

13. The solubility of a salt of weak acid (AB) at pH 3 is $Y \times 10^{-3}$ mol L^{-1}. The value of Y is ____.

(Given that the value of solubility product of AB(K_{sp}) = 2×10^{-10} and the value of ionization constant of HB (K_a) = 1×10^{-8}) **[JEE(Advanced)-2018]**

14. Dilution processes of different aqueous solutions, with water, are given in LIST-I. The effects of dilution of the solution on $[H^+]$ are given in LIST-II.

(Note : degree of dissociation (α) of weak acid and weak base is <<1; degree of hydrolysis of salt <<1; $[H^+]$ represents the concentration of H^+ ions) **[JEE(Advanced)-2018]**

LIST - I	**LIST-II**
(P) (10 mL of 0.1 M NaOH + 20 mL of 0.1 M acetic acid) diluted to 60 mL	**(1)** The value of $[H^+]$ does not change on dilution
(Q) (20 mL of 0.1 M NaOH + 20 mL of 0.1 M acetic dilution acid) diluted to 80 mL	**(2)** The value of $[H^+]$ changes to held of its initial value on dilution
(R) (20 mL of 0.1 M HCl + 20 mL of 0.1 M ammonia solution) diluted to 80 mL	**(3)** The value of $[H^+]$ changes to two times of its initial value on dilution
(S) 10 mL saturated solution of $Ni(OH)_2$ in equilibrium with excess solid $Ni(OH)_2$ is diluted to 20 mL (solid $Ni(OH)_2$ is still present after dilution).	**(4)** The value of $[H]^+$ changes to $\frac{1}{\sqrt{2}}$ times of its initial value on dilution
	(5) The value of $[H^+]$ changes to $\sqrt{2}$ times of its initial value on dilution

Match each process given in LIST-I with one or more effect(s) in LIST-II, the correct option is

(A) $P \rightarrow 4, 5 ; Q \rightarrow 2 ; R \rightarrow 3 ; S \rightarrow 1$

(B) $P \rightarrow 4, 4 ; Q \rightarrow 3 ; R \rightarrow 2 ; S \rightarrow 3$

(C) $P \rightarrow 1 ; Q \rightarrow 4 ; R \rightarrow 5 ; S \rightarrow 3$

(D) $P \rightarrow 1, 5 ; Q \rightarrow 5 ; R \rightarrow 4 ; S \rightarrow 1$

MOCK TEST

SECTION - I : STRAIGHT OBJECTIVE TYPE

1. The following equilibrium is established when hydrogen chloride is dissolved in acetic acid

$$HCl\,(aq) + CH_3COOH\,(aq) \rightleftharpoons Cl^-\,(aq) + CH_3COOH_2^+(aq).$$

The set that characterises the conjugate acid-base pairs is

(A) (HCl, CH_3COOH) and $(CH_3COOH_2^+, Cl^-)$ **(B)** $(HCl, CH_3COOH_2^+)$ and (CH_3COOH, Cl^-)

(C) $(CH_2COOH_2^+, HCl)$ and (Cl^-, CH_3COOH) **(D)** (HCl, Cl^-) and $(CH_3COOH_2^+, CH_3COOH)$.

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

$$HF + HClO_4 \rightleftharpoons ClO_4^- + H_2F^+$$

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

(A) HF and $HClO_4$ **(B)** HF and ClO_4^- **(C)** HF and H_2F^+ **(D)** $HClO_4$ & H_2F^+

3. Identify the amphoteric species from the following :

(I) H_2O (II) NH_3 (III) $H_2PO_4^-$ (IV) HCO_3^-

(A) I, II **(B)** III, IV **(C)** I, II, III **(D)** I, II, III, I

4. Which of the following relations is correct ?

(A) $\Delta G^\circ = RT \ln K_{eq}$ **(B)** $[H_3O^+] = 10^{pH}$

(C) $\log \dfrac{Kw_2}{Kw_1} = \dfrac{\Delta H^\circ}{2.303R}\left(\dfrac{1}{T_1} - \dfrac{1}{T_2}\right)$ **(D)** $[OH^-] = 10^{-7}$, for pure water at all temperatures.

5. Which of the following is incorrect ?

(A) K_a (weak acid). K_b (conjugate weak base) = K_w

(B) K_a (strong acid). K_b (conjugate weak base) = K_w

(C) K_a (weak acid). K_b (weak base) = K_w

(D) K_a (weak acid). K_b (conjugate strong base) = K_w

6. K_a for the acid HA is 1×10^{-6}. The value of K for the reaction $A^- + H_3O^+ \rightleftharpoons HA + H_2O$ is

(A) 1×10^{-6} **(B)** 1×10^{12} **(C)** 1×10^{-12} **(D)** 1×10^{6}

7. The pK_a value of NH_4^+ is 9. The pK_b value of NH_4OH would be :

(A) 9 **(B)** 5 **(C)** 7 **(D)** 8

8. Which of the following solution will have a pH exactly equal to 8 ?

(A) 10^{-8} M HCl solution at 25°C **(B)** 10^{-8} M H^+ solution at 25°C

(C) 2×10^{-6} M $Ba(OH)_2$ solution at 25°C **(D)** 10^{-5} M NaOH solution at 25°C

9. Which of the following solution will have pH close to 1.0 ?

(A) 100 ml of M/10 HCl + 100 ml of M/10 NaOH **(B)** 55 ml of M/10 HCl + 45 ml of M/10 NaOH

(C) 10 ml of M/10 HCl + 90 ml of M/10 NaOH **(D)** 75 ml of M/5 HCl + 25 ml of M/5 NaOH.

10. 0.1mol HCl is dissolved in distilled water of volume V then at $\lim_{V\to\infty}$ $(pH)_{solution}$ is equal to

(A) zero **(B)** 1 **(C)** 7 **(D)** 14

11. Dissociation constant of mono basic acids A, B, C and D are 6×10^{-4}, 5×10^{-5}, 3.6×10^{-6} and 7×10^{-10} respectively. The pH values of their 0.1M aqueous solution are in the order.

(A) D> C > B > A **(B)** A > B > C > D **(C)** D > C > A > B **(D)** None

12. Which statement/relationship is correct?

(A) pH of 0.1 M HNO_3, 0.1M HCl, 0.1M HI is not equal. **(B)** pH $= -\log \frac{1}{[H^+]}$

(C) At 25°C the pH of pure water is 7. **(D)** The value of pK_w at 25 °C is 7.

13. Approximate pH of 0.1 M aqueous H_2S solution when K_1 and K_2 for H_2S at 25°C are 1×10^{-7} and 1.3×10^{-13} respectively :

(A) 4 **(B)** 5 **(C)** 6 **(D)** 8

SECTION - II : MULTIPLE CORRECT ANSWER TYPE

14. Which of the following solutions when added to 1L of a 0.01 M CH_3COOH solution will cause no change in the degree of dissociation of CH_3COOH and pH of the solution ? $K_a = 1.6 \times 10^{-5}$ for CH_3COOH?

(A) 0.6 mM HCOOH ($K_a = 8 \times 10^{-4}$) **(B)** 0.1 M CH_3COONa

(C) 0.4 mM HCl **(D)** 0.01 M CH_3COOH

15. Equal volumes of following solutions are mixed, in which case the pH of resulting solution will be average value of pH of two solutions.

(A) Aqeous HCl of pH = 2, aqueous NaOH of pH = 12

(B) Aqeous HCl of pH = 2, aqueous HCl of pH = 4

(C) Aqeous NaOH of pH = 12, aqueous NaOH of pH = 10

(D) Aqeous CH_3COOH of pH = 5, aqueous NH_3 of pH = 9. [K_a (CH_3COOH) = K_b (NH_3)]

16. K_a values for HA, HB and HD are 10^{-5}, 10^{-7} and 10^{-9} respectively. Which of the following will be correct for decimolar aqueous solutions of NaA, NaB and NaD at 25°C?

(A) $(pH)_{NaA} < (pH)_{NaB}$ **(B)** $(pH)_{NaD} < (pH)_{NaB}$ **(C)** $(pH)_{NaA} < (pH)_{NaD}$ **(D)** $(pH)_{NaB} = 7$

17. 0.1 M CH_3COOH is diluted at 25°C ($K_a = 1.8 \times 10^{-5}$), then which of the following will be found correct

(A) $[H^+]$ will increase **(B)** pH will increase

(C) number of H^+ will increase **(D)** all the above are correct

SECTION - III : ASSERTION AND REASON TYPE

Each question has 5 choices (A), (B), (C), (D) and (E) out of which only one is correct.

(A) Statement-1 is true, Statement-2 is true and Statement-2 is correct explanation for Statement-1.

(B) Statement-1 is true, Statement-2 is true and Statement-2 is not correct explanation for Statement-1.

(C) Statement-1 is true, Statement-2 is false

(D) Statement-1 is false, Statement-2 is true

(E) Both Statements are false

18. **Statement-1 :** Aqueous solutions of all strong acids contain only the same acid, the hydronium ion.

Statement-2 : 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.

19. **Statement-1 :** 0.20 M solution of NaCN is more basic than 0.20 M solution of NaF.

Statement-2 : K_a of HCN is very much less than that of HF.

20. **Statement-1 :** A substance that can either act as an acid as well as a base is called ampholyte.
Statement-2 : Bisulphide ion (HS^-) and biscarbonate ion (HCO_3^-) are ampholytes.

21. **Statement-1 :** Addition of HCl(aq) to HCOOH(aq), decrease the ionization of HCOOH(aq)
Statement-2 : Due to common ion effect of H^+, ionization of HCOOH decreased.

SECTION - IV : COMPREHENSION TYPE

Read the following comprehensions carefully and answer the questions.

Comprehension # 1

Consider a solution of CH_3COONH_4 which is a salt of weak acid & weak base.
The equilibrium involved in the solutions are :

$$CH_3COO^- + H_2O \rightleftharpoons CH_3COOH + OH^- \quad .....(1)$$
$$NH_4^+ + H_2O \rightleftharpoons NH_4OH + H^+ \quad .....(2)$$
$$H^+ + OH^- \rightleftharpoons H_2O \quad .....(3)$$

If we add these three reactions, then the net reaction is

$$CH_3COO^- + NH_4^+ + H_2O \rightleftharpoons CH_3COOH + NH_4OH \quad .....(4)$$

Both CH_3COO^- and NH_4^+ get hydrolysed independently and their hydrolysis depends on
(i) their initial concentration
(ii) the value of K_h which is $\frac{K_w}{K_a}$ for CH_3COO^- and $\frac{K_w}{K_b}$ for NH_4^+.

Since both of the ions were produced from the same salt, their initial concentrations are same. Therefore unless & untial the value of $\frac{K_w}{K_a}$ and $\frac{K_w}{K_b}$ or K_a and K_b is same, the degree of hydrolysis of ion can't be same.

To explain why we assume that degree of hydrolysis of cation and anion is same, we need to now look at the third reaction i.e., combination of H^+ and OH^- ions. It is obvious that this reaction happens only because one reaction produced H^+ ion and the other produced OH^- ions. We can also note that this reaction causes both the hydrolysis reaction to occur more since their product ions are being consumed. Keep this thing in mind that the equilibrium which has smaller value of equilibrium conxtant is affected more by the common ion effect. For the same reason if for any reason a reaction is made to occur to a greater extent by the comsumption of any one of the product ion, the reaction with the smaller value of equilibrium constant tends to get affected more.

Therefore we conclude that firstly the hydrolysis of both the ions ocurs more in the presence of each other (due to consumption of the product ions) than in each other is absence. Secondly the hydrolysis of the ion which occurs to a lesser extent (due to smaller value of K_h) is affected more than the one whose K_h is greater. Hence we can see that the degree of hydrolysis of both the ions would be close to each other when they are getting hydrolysed in the presence of each other.

22. In the hydrolysis of salt of weak acid & weak base :
(A) degree of hydrolysis of cation and anion is different
(B) degree of hydrolysis of cation and anion is same
(C) degree of hydrolysis of cation and anion is different and they can never be assumed same.
(D) degree of hydrolysis of cation and anion is different but they are very close to each other when they are getting hydrolysed in the presence of each other.

23. For 0.1 M CH_3COONH_4 salt solution given, $K_a(CH_3COOH) = K_b(NH_4OH) = 2 \times 10^{-5}$.
In this case : degree of hydrolysis of cation and anion are
(A) exactly same **(B)** slightly different
(C) can't say **(D)** different but can be take approximatly same

SECTION - V : MATRIX - MATCH TYPE

24. (Use log 1.8 = 0.26, Ka of formic acid = 1.8×10^{-4}, Ka of acetic acid = 1.8×10^{-5}, K_b of ammonia=1.8×10^{-5}, Ka_1 of H_2S = 10^{-7} and Ka_2 of H_2S = 10^{-14}, for the following matchings)

Match the entries of column II for which the equality or inequality given in the column I are satisfied.

Column I	Column II
(A) 10^{-5} M HCl solution > 0.1 M H_2S solution	**(p)** α_{water} (degree of dissociation of water)
(B) CH_3COOH solution at pH equal to 4.74 = NH_4OH solution at pH equal to 9.26	**(q)** $[OH^-]$
(C) 0.1 M CH_3COOH solution = 1.0 M HCOOH solution	**(r)** α (degree of dissociation)
(D) 0.1 M of a weak acid HA_1($Ka = 10^{-5}$) solution < 0.01 M of a weak acid HA_2($Ka = 10^{-6}$) solution	**(s)** pH

SECTION - VI : SUBJECTIVE TYPE

25. If both the functional groups of salicylic acid, HOC_6H_4COOH, ionise in water, with $K_a = 1 \times 10^{-3}$ for the –COOH group and 4.2×10^{-13} for the –OH group, calculate pH of the saturated solution of the acid. (Solubility of salicylic acid in water = 1.725 g/L, log 2 = 0.3).

26. A solution is prepared by mixing of acetic acid ($K_a = 2 \times 10^{-5}$) and HCl. In the mixture acetic acid is 0.2 M and HCl is 0.1 M. Calculate

(i) pH of 0.2 M acetic acid and its degree of dissociation.

(ii) pH of final solution.

(iii) CH_3COO^- ion concentration in final solution.

(iv) % decrease of α of acetic acid due to common ion effect.

27. If the equilibrium constant for the reaction of weak acid HA with strong base is 10^9, then pH of 0.1 M Na A is

28. The ionization constant of nitrous acid is 4.5×10^{-4}. Calculate the pH of 0.04 M sodiums nitrite solution and also its degree of hydrolysis.

29. K_a for ascorbic acid (HAsc) is 5×10^{-5}. Calculate the hydrogen ion concentration and percentage hydrolysis in an aqueous solution in which concentration of Asc^- ions is 0.02 M .

ANSWER KEY

EXERCISE - 1

1. D	**2.** C	**3.** C	**4.** D	**5.** D	**6.** C	**7.** A	**8.** D	**9.** D	**10.** C	**11.** D	**12.** B	**13.** D
14. B	**15.** C	**16.** B	**17.** A	**18.** B	**19.** C	**20.** C	**21.** C	**22.** D	**23.** C	**24.** C	**25.** A	**26.** D
27. D	**28.** B	**29.** C	**30. (i)** B	**(ii)** A	**(iii)** C	**(iv)** B	**(vi)** B		**31.** C	**32.** A	**33.** D	**34.** C
35. B	**36.** B	**37.** B	**38.** A	**39.** D	**40.** A	**41.** D	**42.** C	**43.** B	**44.** A	**45.** A	**46.** C	**47.** D
48. C	**49.** D	**50.** D	**51.** B	**52.** D	**53.** A	**54.** B	**55.** C	**56.** D	**57.** D	**58.** A	**59.** C	**60.** D
61. B	**62.** C	**63.** D	**64.** B	**65.** C	**66.** A	**67.** C	**68.** B	**69.** D	**70.** B	**71.** D	**72.** D	**73.** D
74. C	**75.** B	**76.** D	**77.** D	**78.** B	**79.** C	**80.** B	**81.** D	**82.** C	**83.** D	**84.** D	**85.** C	**86.** C
87. B	**88.** C	**89.** A	**90.** B	**91.** D	**92.** C	**93.** A	**94.** C	**95.** C	**96.** C	**97.** B	**98.** B	**99.** C
100. A	**101.** C	**102.** D	**103.** B	**104.** D	**105.** A	**106.** D						

EXERCISE - 2 : PART # I

1. A, B, D	**2.** A, C, D	**3** A, C	**4** B, C	**5** B, C, D	**6** A, D	**7** D	**8** A, C, D
9 A, C	**10** A, B, C, D	**11** B, D	**12** A, B, C	**13** A, B	**14** C, D	**15** B, C, D	**16** A, B, C
17 B, C	**18** B, C, D	**19** A, B	**20** A, B, C	**21** A, D	**22** C, D	**23** A, C, D	**24** C, D
25 A, B	**26** A, C, D	**27.** D	**28.** A	**29.** D	**30.** B	**31.** B	**32.** D	**33.** A	**34.** A	**35.** B	**36.** B
37. A	**38.** A	**39.** C	**40.** C	**41.** A	**42.** C	**43.** D	**44.** A	**45.** A	**46.** D	**47.** D	**48.** A	**49.** A
50. B	**51.** B	**52.** B	**53.** C	**54.** B	**55.** C	**56.** A	**57.** C	**58.** A	**59.** C	**60.** B	**61.** D	**62.** C
63. A	**64.** C	**65.** B	**66.** D	**67.** B	**68.** B	**69.** B	**70.** B	**71.** C	**72.** A	**73.** A	**74.** B	**75.** A
76. C												

PART # II

1. A	**2.** B	**3.** A	**4.** B	**5.** B	**6.** B	**7.** A	**8.** A	**9.** A	**10.** A	**11.** A	**12.** B	**13.** D
14. C	**15.** B	**16.** C	**17.** A									

EXERCISE - 3 : PART # I

1. A → (p, q, r, s), B → (p, r), C → (r), D → (p, q, s)
2. A → (p, q), B → (q, r), C → (p, q, s), D → (r, s)
3. A → (r), B → (s), C → (q), D → (p)
4. A → (r), B → (p), C → (q), D → (s)
5. A → (s), B → (p), C → (r), D → (q)

PART # II

Comprehension # 1 : **1.** D **2.** A

Comprehension # 2 : **1.** B **2.** A **3.** B **4.** A

Comprehension # 3 : **1.** A **2.** C **3.** B

Comprehension # 4 : **1.** D **2.** B **3.** B

Comprehension # 5 : **1.** C **2.** A **3.** B **4.** B

EXERCISE - 5 : PART # I

1. 4 **2.** 4 **9.** 3 **4.** 4 **5.** 4 **6.** 1 **7.** 1 **8.** 4 **9.** 2
10. 1 **11.** 2 **12.** 2 **13.** 1 **14.** 3 **15.** 4 **16.** 1 **17.** 1

PART # II

1. B **2.** 8.98 ≈ 9 **3.** B **4.** D **5.** D **6.** 8 **7.** 3 **8.** C, D **9.** 7 **10.** A **11.** 2
12. A, C, D **13.** 4.47×10^{-3} **14.** D

MOCK TEST

1. D **2.** C **3.** D **4.** C **5.** C **6.** D **7.** B
8. B **9.** D **10.** C **11.** A **12.** C **13.** A **14.** (A,C,D)
15. (A,D) **16.** (A,C) **17.** (B,C) **18.** A **19.** A **20.** B **21.** A
22. D **23.** A
24. A → (p, q, r, s) ; B → (p, r) ; C → (r) ; D → (p, q, s)