JEE CHEMISTRY

Topic: Ionic Equilibrium

Q.1 **Find the percentage ionisation of 0.2 M acetic acid solution, whose dissociation constant is 1.8×10^{-5}**

(A) 0.198 **(B) 0.290**

(C) 0.950 **(D) None of these**

Q.2 **What will be the hydrogen ion concentration (moles L^{-1}) of 0.01 M HCN solution if it is 20% ionised**

(A) 0.002 M **(A) 0.02 M**

(C) 0.2 M **(D) 0.1 M**

Q.3 **The dissociation constant of a weak acid is 1.0×10^{-4} .The equilibrium constant of its reaction with strong base is –**

(A) 1.0×10^{-4} **(B) 1.0×10^{-10}** **(C) 1.0×10^{10}** **(D) 1.0×10^{-14}**

Q.4 **The $[H^+]$ of a solution is 0.03 M. The pOH of this solution is –**

(A) 12.48 **(B) 10.48** **(C) 9.48** **(D) 13.48**

Q.5 **The pH of a solution is 6.0. In this solution –**

(A) $[H^+] = 100\ [OH^-]$ **(B) $[H^+] = 10\ [OH^-]$** **(C) $[H^+] = \frac{1}{10}\ [OH^-]$** **(D) $[H^+] = [OH^-]$**

Q.6 **At 298 K, the ratio of number of pure water molecules to number of hydroxyl ions is –**

(A) 1.8×10^{-9} **(B) 5.55×10^{8}** **(C) 10^{7}** **(D) 6.02×10^{23}**

Q.7 **A sufficient quantity of acid is added to change its pH from 5 to 2. Its hydrogen ion concentration is increased by –**

(A) 100 times,

(B) 1000 times,

(C) 2.50 times,

(D) 5 times,

Q.8 A 0.01 M acetic acid solution is 1.0% ionised. An another acetic acid is 10% ionised. What will be the concentration of another acetic acid -

(A) 0.001 M (B) 0.0001 M

(C) 0.01 M (D) 0.1 M

Q.9 For a 100 ml solution of 10^{-2} M NaOH the ratio pH: pOH would be –

(A) 6 : 1 (B) 1 : 6

(C) 2 :1 (D) 10^{10} : 1

Q.10 How many moles of HCl must be removed from 1 litre of aqueous HCl solution to change its pH from 2 to 3 -

(A) 1 (B) 0.02 (C) 0.009 (D) 0.01

Q.11 0.01 M Acetic acid is 12.5 % dissociated. Its pH will be –

(A) 4.509 (B) 3.723 (C) 2.903 (D) 5.623

Q.12 10^{-2} mole of KOH is dissolved in 10 litres of water. The pH of the solution is –

(A) 12 (B) 2

(C) 3 (D) 11

Q.13 % hydrolysis of 0.1M CH_3COONH_4, when $K_a = K_b = 1.8 \times 10^{-5}$ is -

(A) 0.55 (B) 7.63

(C) 0.55×10^{-2} (D) 7.63×10^{-3}

Q.14 Given the two concentration of HCN are 0.1 M & 0.001 M respectively. What will be the ratio of degree of dissociation -

(A) 1 (B) 0.1 (C) 0.003 (D) 0.01

Q.15 On hydrolysis of sodium carbonate, the reaction takes place between –

(A) Na^+ and water (B) Na^+ and OH^-

(C) CO_3^{-2} and water (D) CO_3^{-2} and H^+

Q.16 The pH of 0.001M sodium acetate solution is $[K_a(CH_3COOH) = 1.8 \times 10^{-5}]$ –

(A) ≈ 11 (B) ≈ 6.5

(C) ≈ 14 (D) ≈ 8.0

Q.17 The pH of a buffer solution containing 0.1 mole of acetic acid and 0.15 mole of sodium acetate is (K_a for acetic acid = 1.75×10^{-5})-

(A) 4.9 (B) 3.0

(C) 4.2 (D) 5.4

Q.18 A certain buffer solution contains equal concentration of X^- and HX. The K_b for X^- is 1×10^{-10}. The pH of the buffer is-

(A) 4 (B) 7

(C) 10 (D)14

Q.19 In a buffer solution of a weak acid and its salt, if the ratio of concentration of salt to acid is raised 10 times then pH of the solution will-

(A) Increase ten times

(B) Decrease by one unit

(C) Decrease ten times

(D) Increase by one unit

Q.20 500 ml of 0.2 M acetic acid are added to 500 ml of 0.30 M sodium acetate solution. If the dissociation constant of acetic acid is 1.5×10^{-5} then p^H of the resulting solution is –

(A) 5.0 (B) 9.0 (C) 3.0 (D) 4.0

Q.21 The pOH of a basic buffer (e.g. NH_4OH/NH_4Cl) is 5. If the concentration of the salt is tripled whereas that of base remains same. What is the new value of pOH (Given log 3 ≈ 0.48) –

(A) 4.52 (B) 5.48

(C) 6.48 (D) 3.52

Q.22 Let the solubility of AgCl in water, in 0.01 M $CaCl_2$, in 0.01 M NaCl and in 0.05 M $AgNO_3$ be s_1, s_2, s_3 and s_4 respectively. Which of the following relations between these quantities is correct –

(A) $s_1 > s_2 > s_3 > s_4$ (B) $s_1 > s_2 = s_3 > s_4$

(C) $s_4 > s_2 > s_3 > s_1$ (D) $s_1 > s_3 > s_2 > s_4$

Q.23 K_{sp} of AgCl is 1×10^{-10}. Its solubility in 0.1 M KNO_3 will be –

(A) 10^{-5} moles/litre (B)> 10^{-5} moles/litre (C) < 10^{-5} moles/litre (D) None of these

Q.24 At 298 K, how many milligrams of silver bromide can be dissolved in 20 litres of water – [$K_{sp\ (AgBr)} = 5.0 \times 10^{-13}$]
(Atomic wt. Ag = 108, Br = 80)

(A) 2.66 (B) 3.66

(C) 4.66 (D) None of these

Q.25 At 25ºC what will be the solubility of silver carbonate in 0.1 M Na_2CO_3 solution. At this temperature K_{sp} of silver carbonate is 4×10^{-13} –

(A) 2×10^{-7} (B) 2×10^{-6}

(C) 10^{-6} (D) 10^{-7}

Q.26 When equal volumes of the following solutions are mixed, precipitation of CaF_2 ($K_{sp} = 1.7 \times 10^{-10}$) will occur only with –

(A) 10^{-4} M Ca^{2+} and 10^{-4} M F^-

(B) 10^{-2} M Ca^{2+} and 10^{-3} M F^-

(C) 10^{-5} M Ca^{2+} and 10^{-3} M F^-

(D) 10^{-3} M Ca^{2+} and 10^{-5} M F^-

Q.27 At 25ºC, the solubility product of $Ca(OH)_2$ is 32×10^{-12}. What will be the pOH of its saturated solution at this temperature -

(A) 3.4990 (B) 3.3980

(C) 0.3010 (D) None of these

Q.28 In the hydrolysis of sodium acetate –

(A) Anions of the salt are hydrolysed

(B) Cations of the salt are hydrolysed

(C) Both of the above ions are not hydrolysed

(D) None of these

Q.29 When HCl gas is passed through a impure saturated solution of common salt, pure NaCl is precipitated because –

(A) The ionic product [Na^+] and [Cl^-] exceeds the solubility product of NaCl

(B) The impurities dissolve in HCl

(C) HCl is highly soluble in H_2O

(D) The solubility product of NaCl is lowered by the Cl^- ions from aqueous HCl

Q.30 At 298K, the solubility of $PbCl_2$ is 6.3×10^{-3} moles L^{-1}. Its solubility product at this temprature is –

(A) $(6.3 \times 10^{-3}) \times (6.3 \times 10^{-3})$

(B) $(6.3 \times 10^{-3}) \times (12.6 \times 10^{-3})$

(C) $(6.3 \times 10^{-3}) \times (12.6 \times 10^{-3})^2$

(D) $(12.6 \times 10^{-3}) \times (12.6 \times 10^{-3})$

ANSWER KEY

Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Ans.	C	A	C	A	A	B	B	B	A	C
Que.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	C	D	A	B	C	D	A	A	D	A
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Ans.	B	D	A	A	C	B	B	A	A	C