DPP No: 39

Maximum Time
50 Min

Chemistry
TARGET
JEE-MAINS

SYLLABUS : Ionic Equilibrium

1. Which of the following has the maximum degree of ionisation ?

(A) 1 M NH_3 (B) 0.001 M NH_3

(C) 0.1 M NH_3 (D) 0.0001 M NH_3.

2. 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) $\sqrt{5}$

3. At 25°C, K_b for BOH = 1.0×10^{-12}. A 0.01 M solution of BOH has what value of $[OH^-]$?

(A) 1.0×10^{-6} M (B) $\sqrt{2} \times 10^{-7}$ M

(C) 1.0×10^{-5} M (D) 2.0×10^{-6} M

4. The dissociation constant of weak acid HA is 4.9×10^{-8}. After making the necessary approximations. Calculate pH in 0.1 M acid –

(A) 1.155 (B) 2.155 (C) 3.155 (D) 4.155

5. K_a for formic acid and acetic acid are 1.8×10^{-4} and 1.8×10^{-5} respectively. The relative strength of acids is :

(A) 10 : 1 (B) 1 : 10 (C) 1 : $\sqrt{10}$ (D) $\sqrt{10}$: 1

6. K_a for a monobasic acid, whose 0.1 M solution has pH of 4.5, is :

(A) 10^{-10} (B) 10^{-8} (C) $\sqrt{10} \times 10^{-4}$ (D) $\sqrt{10} \times 10^{-6}$

7. Aqueous solution of NH_4Cl is ____ in nature due to behaviour of ____ ion in solution :

(A) acidic ; NH_4^+ (B) alkalline ; NH_4^+ (C) acidic ; Cl^- (D) alkalline ; Cl^-

8. What is the pH of 0.10 M CH_3COONa solution. Hydrolysis constant of sodium acetate is 5.6×10^{-10} :

(A) 8.874 (B) 88.74 (C) 887.4 (D) 0.88

9. The chloride salt of a certain weak monoacidic organic base is hydrolysed to an extent of 3% in its 0.1M solution at 25^0C. Given that the ionic product of water is 10^{-14} at this temperature, what is the dissociation constant of the base?

(A) $\approx 1 \times 10^{-10}$ (B) $\approx 1 \times 10^{-9}$ (C) 3.33×10^{-9} (D) 3.33×10^{-10}

10. The pH of 0.1 M solution of the following salts increases in the order :

(A) NaCl < NH_4Cl < NaCN < HCl (B) HCl < NH_4Cl < NaCl < NaCN

(C) NaCN < NH_4Cl < NaCl < HCl (D) HCl < NaCl < NaCN < NH_4Cl

11. The pH of 0.1 M NH_4Cl solution is 5.13. What will be the dissociation constant of NH_4OH –

(A) 1.8×10^{-7} (B) 1.8×10^{-9} (C) 1.8×10^{-5} (D) None

12. The degree of hydrolysis of a salt of weak monobasic acid and weak monoacidic base in its 0.1 M solution is found to be 50%. If the molarity of the solution is 0.2 M, the percentage hydrolysis of the salt should be :

(A) 100 % (B) 50 % (C) 25 % (D) None of these

13. Which of the following ions or compounds in a solution tend to produce an acidic, a basic or a neutral solution ?

(a) $C_2H_5O^-$ (b) Cu^{+2} (c) SO_3^{2-} (d) F^- (e) NH_4^+

(f) CH_3COONa (g) KNO_3 (h) NaOCl (i) Na_2CO_3 (j) $ZnCl_2$

14. On adding 100 mL of 10^{-2} M NaOH solution to 100 mL of 0.01 M Triethyl amine solution ($K_b = 6.4 \times 10^{-5}$), change in pH of solution will be :

(A) – 0.8 (B) + 0.8 (C) + 1.1 (D) – 1.1

15. In above question, concentration of Triethyl ammonium ion ($[C_6NH_{16}^+]$) in resulting solution will be :

(A) 100 K_b (B) 200 K_b (C) 10 K_b (D) K_b

16. For a BH_2Cl_2 solution (chloride salt of a diacidic base B) : (Dissociation constants of base are K_{b_1} & K_{b_2})

(A) $K_{h_1} << K_{h_2}$ (B) $K_{h_1} = \frac{K_w}{K_{b_1}}$ (C) $K_{h_1} = \frac{K_w}{K_{b_2}}$ (D) $K_{h_2} = \frac{K_{b_1}}{K_w}$

17. Select the correct statement regarding above solution :

(A) Anion will undergo hydrolysis producing OH^- & solution is expected to be basic.

(B) Anion will not undergo hydrolysis & solution is expected to be basic.

(C) Cation will undergo hydrolysis producing H_3O^+ & solution is expected to be acidic.

(D) Cation will undergo hydrolysis producing OH^- & solution is expected to be acidic.

18. pH of 0.1 M Na_2HPO_4 and 0.2 M NaH_2PO_4 are respectively : (pK_a for H_3PO_4 are 2.2, 7.2 and 12)

(A) 4.7, 9.6 (B) 9.6, 4.7 (C) 9.3, 4.4 (D) 4.4, 9.3

19. The pH of which salt solution is independent of its concentration ?

1. $(CH_3COO)C_5H_5NH$ 2. NaH_2PO_4 3. Na_2HPO_4 4. NH_4CN

(A) 1, 2, 3, 4 (B) 1, 4 (C) 2, 3 (D) 1, 2, 3

20. A solution is 0.1 M in CH_3COOH and 0.1 M in CH_3COONa. Which of the following will change its pH significantly?

(A) Addition of small amount of water (B) Addition of small amount of HCl

(C) Addition of small amount of NaOH (D) None will change the pH significantly.

21. What will be the pH of the buffer solution containing 0.15 moles of NH_4OH and 0.25 moles of NH_4Cl. K_b for NH_4OH is 1.8×10^{-5} –

(A) 4.96 (B) 10.03 (C) 9.04 (D) 7.0

22. Which of the following 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

23. Calculate the pH of a buffer prepared by mixing 300 cc of 0.3 M NH_3 and 500 cc of 0.5 M NH_4Cl. K_b for $NH_3 = 1.8 \times 10^{-5}$–

(A) 8.11 (B) 9.81 (C) 8.82 (D) None of these

24. 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

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

(A) x^5 (B) $6x^2$ (C) $108\ x^5$ (D) $6x^5$

ANSWER KEY

1.	**(D)**	**2.**	**(A)**	**3.**	**(B)**	**4.**	**(D)**	**5.**	**(D)**	**6.**	**(B)**
7.	**(A)**	**8.**	**(A)**	**9.**	**(A)**	**10.**	**(B)**	**11.**	**(C)**	**12.**	**(B)**
13.	(a) Basic			(b) acidic			(c) basic			(d) basic	(e) acidic
	(f) basic			(g) neutral			(h) basic			(i) basic	(j) acidic
14.	**(B)**	**15.**	**(D)**	**16.**	**(C)**	**17.**	**(C)**	**18.**	**(B)**	**19.**	**(A)**
20.	**(D)**	**21.**	**(C)**	**22.**	**(D)**	**23.**	**(C)**	**24.**	**(A)**	**25.**	**(C)**