**16.** The first and second dissociation constant of an acid $H_2A$ are $1.0 \times 10^{-5}$ and $5.0 \times 10^{-10}$ respectively. The overall dissociation constant of the acid will be :

(A) $5.0 \times 10^{-5}$    (B) $5.0 \times 10^{15}$    (C) $5.0 \times 10^{-15}$    (D) $0.2 \times 10^5$

**17.** The pH value of 0.001 M aqueous solution of NaCl is :

(A) 7    (B) 4    (C) 11    (D) unpredictable

**18.** A solution contains 10 mL 0.1 N NaOH and 10 mL 0.05 N $H_2SO_4$, pH of this solution is :

(A) less than 7    (B) 7    (C) zero    (D) greater than 7

**19.** When 200 mL of aqueous solution of HCl (pH = 2) is mixed with 300 mL of an aqueous solution of NaOH (pH = 12), the pH of the resulting mixture is :

(A) 10    (B) 2.7    (C) 4.0    (D) 11.3

**20.** 100 mL of 0.015 M HCl solution is mixed with 100 mL of 0.005 M HCl. What is the pH of the resultant solution ?

(A) 2.5    (B) 1.5    (C) 2    (D) 1

**21.** Calculate pH of 0.001 M $NH_4OH$, when it is 1% dissociated in the solution :

(A) 5    (B) 2.96    (C) 9.04    (D) 11.4

**22.** An aqueous solutions of 1 M NaCl and 1 M HCl is :

(A) not a buffer but pH < 7      (B) not a buffer but pH > 7

(C) a buffer with pH < 7      (D) a buffer with pH > 7

**23.** Addition of sodium acetate to 0.1 M acetic acid will cause :

(A) increases in pH      (B) decrease in pH

(C) no change in pH      (D) change in pH that cannot be predicted

**24.** A buffer solution contains 0.1 mole of sodium acetate dissolved in $1000\,cm^3$ of 0.1 M acetic acid. To the above buffer solution, 0.1 mole of sodium acetate is further added and dissolved. The pH of the resulting buffer is :

(A) $pK_a$    (B) $pK_a + 2$    (C) $pK_a - \log 2$    (D) $pK_a + \log 2$

**25.** The pH of an aqueous solution of CH₃COONa of concentration C(M) is given by :

(A) $7 - \dfrac{1}{2}pK_a - \dfrac{1}{2}\log C$      (B) $\dfrac{1}{2}pK_w + \dfrac{1}{2}pK_b + \dfrac{1}{2}\log C$

(C) $\dfrac{1}{2}pK_w - \dfrac{1}{2}pK_b + \dfrac{1}{2}\log C$      (D) $\dfrac{1}{2}pK_w + \dfrac{1}{2}pK_a + \dfrac{1}{2}\log C$

**26.** Which buffer solution comprising of the following has its pH value greater than 7 ?

(A) $CH_3COOH + CH_3COONa$      (B) $HCOOH + HCOOK$

(C) $CH_3COONH_4$      (D) $NH_4OH + NH_4Cl$

**27.** The buffering action of an acidic buffer is maximum when its pH is equal to :

(A) 5    (B) 7    (C) 1    (D) $pK_a$

**28.** A buffer solution is prepared by mixing 0.1 M ammonia and 1.0 M ammonium chloride. At 298 K, the $pK_b$ of $NH_4OH$ is 5.0. The pH of buffer is :

(A)  10.0          (B)  9.0          (C)  6.0          (D)  8.0

**29.** Which one of the following salts will produce an alkaline solution while dissolving in water ?

(A)  $NH_4Cl$          (B)  $Na_2CO_3$          (C)  $NaNO_3$          (D)  $Na_2SO_4$

**30.** The aqueous solutions of HCOONa, $C_6H_5 \overset{+}{N}H_3 \overset{-}{Cl}$ and KCN are respectively.

(A)  acidic, acidic, basic          (B)  acidic, basic, neutral

(C)  basic, neutral, neutral          (D)  basic, acidic, basic