

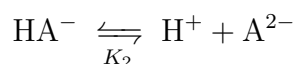
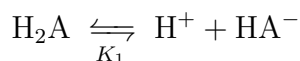


DPP-6 [Polyprotic Acids, Ostwald's Dilution law, Common ion Effect]

Chapter: Ionic Equilibrium

"You don't have to be great to start, but you have to start to be great"

Q1. In the dissociation



which is correct?

- (1) $K_1 = K_2$
 - (2) $K_1 < K_2$
 - (3) $K_1 > K_2$
 - (4) K_1 is negligible
- Q2. Which of the following is right for diprotic acid?**
- (1) $K_{a2} > K_{a1}$
 - (2) $K_{a1} = K_{a2}$
 - (3) $K_{a2} = \frac{1}{K_{a1}}$
 - (4) $K_{a1} > K_{a2}$
- Q3. The first and second dissociation constants of an acid H_2A are 1.0×10^{-5} and 5.0×10^{-10} . The overall dissociation constant will be:**
- (1) 5.0×10^{-15}
 - (2) 2.0×10^5
 - (3) 5.0×10^{-5}
 - (4) 5.0×10^{15}
- Q4. What is H^+ ion concentration of 5×10^{-3} M H_2CO_3 solution having a 10% dissociation?**
- (1) 10^{-3}
 - (2) 10^{-2}
 - (3) 10^{-1}
 - (4) 5×10^{-2}
- Q5. A metal hydroxide $\text{M}(\text{OH})_4$ is 50% ionised. Its 0.0025 M solution will have the pH approximately:**
- (1) 12
 - (2) 2
 - (3) 4
 - (4) 11.7
- Q6. What are the concentrations of H^+ , HC_2O_4^- , $\text{HC}_2\text{O}_4^{2-}$ and $\text{C}_2\text{O}_4^{2-}$ in a 0.1 M solution of oxalic acid? ($K_1 = 10^{-2}$, $K_2 = 10^{-5}$)**
- (1) 0.047 M, 0.013 M, 0.027 M, 10^{-5} M

- (2) 0.10 M, 0.01 M, 0.001 M, 10^{-5} M
- (3) 0.030 M, 0.020 M, 0.010 M, 10^{-6} M
- (4) 0.060 M, 0.005 M, 0.030 M, 10^{-4} M

Q7. Calculate the pH of 2.0×10^{-4} M H_3X solution assuming: First dissociation = 100%, second = 50%, third = negligible.

- (1) 3.00
- (2) 3.30
- (3) 3.52
- (4) 3.80

Q8. K_{a1} , K_{a2} and K_{a3} values for H_3PO_4 are 10^{-3} , 10^{-8} and 10^{-12} respectively. If $K_w = 10^{-14}$, which option is correct?

- (1) $K_b(HPO_4^{2-}) = 10^{-12}$, $K_b(PO_4^{3-}) = 10^{-6}$, Order: $K_b(PO_4^{3-}) > K_b(HPO_4^{2-}) > K_b(H_2PO_4^-)$
- (2) $K_b(HPO_4^{2-}) = 10^{-6}$, Order: $K_b(HPO_4^{2-}) > K_b(PO_4^{3-}) > K_b(H_2PO_4^-)$
- (3) $K_b(H_2PO_4^-) = 10^{-11}$, order reversed
- (4) All given values incorrect

Ostwald's Dilution law

Q9. Which of the following has the maximum degree of ionisation? As concentration of solution decreases, degree of dissociation of weak electrolyte increases.

- (1) 1 M NH_3
- (2) 0.001 M NH_3
- (3) 0.1 M NH_3
- (4) 0.0001 M NH_3

Q10. Calculate the ratio of degree of dissociation (α_2/α_1) when 1 M acetic acid solution is diluted 100 times. Given $K_a = 10^{-5}$ M.

- (1) 10
- (2) 5
- (3) 100
- (4) 50

Q11. Which of the following will occur if a 1.0 M solution of a weak acid is diluted to 0.01 M at constant temperature:

- (1) Percentage ionisation will increase
- (2) H^+ will decrease to 0.01 M
- (3) K_a will increase
- (4) pH will decrease by 2 units

Q12. The extent of ionisation increases (weak electrolytes):

- (1) With the increase in concentration of solute
- (2) On decreasing the temperature of solution
- (3) On addition of excess of water to the solution
- (4) On stirring the solution vigorously

Q13. Two monobasic weak acids have the same concentration of H^+ ions. What is the relationship between dissociation constant and dilution?

- (1) $K_{a1}V_1 = K_{a2}V_2$

- (2) $K_{a2}V_2 = K_{a2}V_1$
- (3) $(K_{a1}V_1)^2 = K_{a2}V_2$
- (4) $K_{a1}V_1 = (K_{a2}V_2)^{1/2}$

Q14. Ostwald's dilution law is not applicable for strong electrolytes because:

- (1) Strong electrolytes are completely ionised
- (2) Strong electrolytes are volatile
- (3) Strong electrolytes are unstable
- (4) Strong electrolytes often contain metal ions

Q15. Two samples of CH_3COOH each of 10 g were taken separately into two vessels containing water of 6 litre and 12 litre respectively at 27°C . The degree of dissociation of CH_3COOH will be:

- (1) More in 12 litre vessel
- (2) More in 6 litre vessel
- (3) Equal in both vessels
- (4) Half in 6 litre vessel than in 12 litre vessel

Q16. For which, dilution law is applicable:

- (1) NaCl (SASB salt)
- (2) HCl (SA)
- (3) CH_3COONa (WASB salt)
- (4) None

COMMON ION EFFECT

Q17. Assertion : $\text{NaCl} + \text{HCl}$ does not experience common ion effect.

Reason : Both NaCl and HCl are strong electrolytes.

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

Q18. Which pair will show common ion effect?

- (1) $\text{BaCl}_2 + \text{Ba}(\text{NO}_3)_2$
- (2) $\text{NaCl} + \text{HCl}$
- (3) $\text{NH}_4\text{OH} + \text{NH}_4\text{Cl}$
- (4) $\text{NaCN} + \text{KCN}$

Q19. When 0.01 M HCl is added in aqueous solution of acetic acid, then :-

- (1) $[\text{CH}_3\text{COO}^-]$ decreases
- (2) $[\text{CH}_3\text{COOH}]$ decreases
- (3) $[\text{CH}_3\text{COO}^-]$ increases
- (4) NOT