DPP-1 [Classification of Acid and Base]

Chapter: Ionic Equilibrium

"Yeh questions tera test nahi—teri training hai."

GROUP–1 : Arrhenius Concept

Q1. **Gaseous hydrogen chloride is a very poor conductor of electricity but a solution of hydrogen chloride in water is a good conductor. This is due to the fact :-**

(1) Water is a good conductor of electricity

(2) Hydrogen chloride ionises in water

(3) A gas cannot conduct electricity but a liquid can

(4) HCl does not obey Ohm's law where as the solution does

Q2. **Which is acid in the following pairs according to Arrhenius concept?**

(1) HCl(g) and HCl(aq)

(2) $CH_3COOH(l)$ and $CH_3COOH(aq)$

Q3. **Arrhenius theory does not explain acidic nature of $AlCl_3$.**

(1) True

(2) False

GROUP–2 : Bronsted–Lowry Theory

Q4. **In the process: $NH_3 + NH_3 \rightleftharpoons NH_2^- + NH_4^+$, the nature of ammonia is :-**

(1) Acidic

(2) Basic

(3) Amphoteric

(4) None

Q5. **Which of the following is a Bronsted acid?** (i) HCN (ii) $H_2PO_4^-$ (iii) NH_4^+ (iv) HCl

(1) (i),(ii),(iii)

(2) (i),(ii),(iii),(iv)

(3) (ii),(iii)

(4) (i),(iii),(iv)

Q6. **Which of the following can act both as a Bronsted acid as well as Bronsted base?**

(1) H_2SO_4

(2) HCO_3^-

(3) O^{2-}

(4) NH_4^+

Q7. **Which of the following is not a Bronsted acid :-**

(1) $CH_3NH_4^+$

(2) CH_3COO^-

(3) H_2O

(4) HSO_4^-

Q8. Which of the following is Bronsted–Lowry acid :-

(1) SO_4^{2-}

(2) H_3O^+

(3) OH^-

(4) Cl^-

Q9. According to Bronsted concept, the acids in $NH_3 + H_2O \rightleftharpoons NH_4^+ + OH^-$ are :-

(1) NH_3 and NH_4^+

(2) H_2O and OH^-

(3) H_2O and NH_4^+

(4) NH_3 and OH^-

Q10. In $HC_2O_4^- + PO_4^{3-} \rightleftharpoons HPO_4^{2-} + C_2O_4^{2-}$ the Bronsted bases are :-

(1) $HC_2O_4^-$ and PO_4^{3-}

(2) HPO_4^{2-} and $C_2O_4^{2-}$

(3) $HC_2O_4^-$ and HPO_4^{2-}

(4) PO_4^{3-} and $C_2O_4^{2-}$

Q11. Which explains the nature of boric acid in water?

(1) $H_3BO_3 + H_2O \rightarrow H_3O^+ + H_2BO_3^-$

(2) $H_3BO_3 + 2H_2O \rightarrow 2H_3O^+ + HBO_3^{2-}$

(3) $H_3BO_3 \rightarrow 3H_3O^+ + BO_3^{3-}$

(4) $H_3BO_3 + H_2O \rightarrow B(OH)_4^- + H^+$

Q12. Which of the following behave both as Bronsted acid as well as Bronsted bases? H_2O, HCO_3^-, H_2SO_4, H_3PO_4, HS^-, NH_3

Q13. Which of the following is a Bronsted base? (i) NH_3 (ii) CH_3NH_2 (iii) HCO_3^- (iv) SO_4^{2-}

(1) (i),(ii),(iii),(iv)

(2) (i),(ii)

(3) (i),(iii)

(4) (i),(ii),(iv)

Q14. Which is a base according to Lowry–Bronsted concept?

(1) I^-

(2) H_3O^+

(3) HCl

(4) NH_4^+

Q15. Which one of the following species acts only as a base?

(1) H_2S

(2) HS^-

(3) S^{2-}

(4) H_2O

Q16. Which of the following can act both as Bronsted acid and Bronsted base :-

(1) Na_2CO_3

(2) O^{2-}

(3) CO_3^{2-}

(4) NH_3

Q17. Water is a :-

(1) Protogenic solvent
(2) Protophilic solvent
(3) Amphiprotic solvent
(4) Aprotic solvent

Q18. Species which do not act both as Bronsted acid and base is :-

(1) $(HSO_4)^-$
(2) Na_2CO_3
(3) NH_3
(4) OH^-

GROUP–3 : Conjugate Acid–Base Pairs

Q19. The conjugated base for bicarbonate ion is :-

(1) CO_3^{2-}
(2) HCO_3^-
(3) CO_2
(4) H_2CO_3

Q20. For the reaction $NH_4^+ + S^{2-} \rightleftharpoons NH_3 + HS^-$, NH_3 and S^{2-} are :-

(1) Acids
(2) Bases
(3) Acid-base pair
(4) None of these

Q21. In $HC_2O_4^- + PO_4^{3-} \rightleftharpoons HPO_4^{2-} + C_2O_4^{2-}$ the pair acting as Bronsted bases only is :-

(1) $HC_2O_4^-$ and PO_4^{3-}
(2) HPO_4^{2-} and $C_2O_4^{2-}$
(3) $HC_2O_4^-$ and HPO_4^{2-}
(4) PO_4^{3-} and $C_2O_4^{2-}$

Q22. Conjugated base of OH^- is :-

(1) H_2O
(2) H_3O^+
(3) H^+
(4) O^{2-}

GROUP–4 : Lewis Acid–Base Concept

Q23. An example of Lewis acid is :-

(1) CaO
(2) CH_3NH_2
(3) SO_3
(4) None of these

Q24. Which of the following behave as Lewis acid :- BF_3, $SnCl_2$, $SnCl_4$

(1) Stanous chloride, stanic chloride

(2) BF_3, Stanous chloride
(3) Only BF_3
(4) BF_3, stanous chloride, stanic chloride

Q25. In $AlCl_3 + Cl^- \rightarrow [AlCl_4]^-$, $AlCl_3$ is :-
(1) Salt
(2) Lewis base
(3) Bronsted acid
(4) Lewis acid

Q26. Aluminium chloride is :-
(1) Bronsted Lowry acid
(2) Arrhenius acid
(3) Lewis acid
(4) Lewis base

Q27. Which of the following species can act as Lewis base :-
(1) Cu^{2+}
(2) $AlCl_3$
(3) NH_3
(4) BF_3

Q28. BF_3 is acid according to :-
(1) Lewis
(2) Arrhenius
(3) Bronsted and Lowery
(4) Madam Curie

Q29. The compound that is not a Lewis acid :-
(1) $AlCl_3$
(2) BF_3
(3) NF_3
(4) $SnCl_4$

Q30. BF_3 is :-
(1) Lewis acid
(2) Lewis base
(3) Bronsted acid
(4) Arrhenius acid

Q31. Which of the following is not a Lewis acid?
(1) SiF_4
(2) C_2H_4
(3) BF_3
(4) $FeCl_3$

Q32. Which of the following molecules acts as a Lewis acid?
(1) $(CH_3)_3N$
(2) $(CH_3)_3B$
(3) $(CH_3)_2O$
(4) $(CH_3)_3P$

Q33. Which of the following acid-base reactions cannot be explained by the Bronsted

theory?

(1) $CO_2 + CaO \rightarrow CaCO_3$

(2) $BF_3 + NH_3 \rightarrow BF_3NH_3$

(3) $Ni + 4CO \rightarrow Ni(CO)_4$

(4) All of these

Q34. Which of the following pair is Lewis acid & Lewis base & Product is also Lewis base :-

(1) BF_3, NH_3

(2) $SiCl_4$, $2Cl^-$

(3) CH_3^+, OOC_2H_5

(4) All of these

GROUP–5 : Reaction-Based Acid–Base Questions

Q35. In $NH_3 + H_2O \rightleftharpoons NH_4^+ + OH^-$, water acts as :-

(1) Acid

(2) Base

(3) Neutral

(4) Both acid & base

Q36. NH_3 gas dissolves in water to give NH_4OH. Water acts as :-

(1) An acid

(2) A base

(3) A salt

(4) A conjugate base

Q37. In $HCl + HF \rightarrow H_2Cl^+ + F^-$, HCl behaves as :-

(1) Strong acid

(2) Strong base

(3) Weak acid

(4) Weak base

Q38. HCl does not behave as acid in :-

(1) NH_3

(2) C_2H_5OH

(3) H_2O

(4) C_6H_6

Q39. In which of the following reactions NH_3 acts as acid :-

(1) $NH_3 + HCl \rightarrow NH_4Cl$

(2) $NH_3 + H^+ \rightarrow NH_4^+$

(3) $NH_3 + Na \rightarrow NaNH_2 + \frac{1}{2}H_2$

(4) NH_3 cannot act as acid

Q40. Ammonium ion is :-

(A) Lewis acid

(B) Lewis base

(C) Bronsted acid

(D) Bronsted base

Q41. **In which reaction does NH_3 act as an acid?**

(A) $NH_3 + H^+ \rightarrow NH_4^+$

(B) $NH_3 + HCl \rightarrow NH_4Cl$

(C) $NH_3 + Na \rightarrow NaNH_2 + \frac{1}{2}H_2$

(D) None, as NH_3 is a base

GROUP–6 : Special & Mixed Questions

Q42. **Sulphanilic acid is a/an :-**

(1) Arrhenius acid

(2) Lewis base

(3) Neither (A) or (B)

(4) Both (A) & (B)

Q43. **H_3BO_3 is not an Arrhenius acid.**

(1) True

(2) False

Q44. **Match the Column. (Single matching)**

Column-I	Column-II
(A) HCl	(q) Arrhenius acid
(B) KOH	(s) Arrhenius base
(C) NH_3	(r) Lewis base
(D) BF_3	(p) Lewis acid

Q45. **Which of the following is not a correct statement :-**

(1) Arrhenius theory can explain acidic nature in solvents other than water

(2) Arrhenius theory does not explain acidic nature of $AlCl_3$

(3) Aqueous Na_2CO_3 is alkaline even without OH^-

(4) Aqueous CO_2 is acidic even without H^+

Q46. **The acid $C_7H_6O_3$ forms salts $C_7H_5O_3Na$, $C_7H_4O_3Na_2$, $C_7H_3O_3Na_3$. Its basicity is :-**

(1) One

(2) Two

(3) Three

(4) Six