Acid Bases and Salts

SECTION - I

Straight Objective Type

This section contains multiple choice questions. Each question has 4 choices (A), (B), (C), (D), out of which ONLY ONE is correct. Choose the correct option.

1. *The conjugate acid of a strong base is*

(A) strong acid *(B) weak add*

(C) strong base *(D) weak base*

2. *A very weak add will have pOH*

(A) close to 14 *(B) close to 0*

(C) close to its pH *(D) 7*

3. *If the Heat of Neutralization of a reaction is equal to 13.7kcal /mole then*

(A) acid is weak, base is strong *(B) both are weak*

(C) both are strong *(D) acid is strong, base is weak*

4. *The compound whose aqueous solution will have the lowest pH is*

(A) $NaHCO_3$ *(B)* NH_4Cl

(C) Na_2CO_3 *(D)* $NaCl$

5. *The value of Ionic Product of water near its boiling point would be_____* 1×10^{-14}

(A) greater than *(B) less than*

(C) equal to *(D) cant say*

6. *Which aqueous solution will have the largest* pOH *?*

(A) $MgCl_2$ *(B)* $Mg(CHO_3)_2$

(C) CH_3COONa *(D)* $NaNO_3$

7. *The highest pH value would be exhibited by a 0.1M solution of*

(A) H_2SO_4 *(B)* CH_3COOH

(C) HCl *(D)* HNO_3

8. *Which one of the following will take place if a 0.1 M solution of a weak acid is diluted to 0.01M at constant temperature*

(A) $P[H^+]$ *will decrease to 0.01 M*

(B) pH will increase

(C) K will increase

(D) percentage ionization will increase

9. *The Heat of Neutralization of a reaction proceeding at 25°C will _____ if temperature is increased.*

(A) decrease (B) remain same (C) increase (D) can not say

10. *The salt formed by weak acid that is ionized to the extent of 1% and a weak base that is ionized to the extent of 5% will result in a solution that is*

(A) acidic (B) neutral (C) basic (D) can not say

11. *A solution is said to be basic when its pH is*

(A) less than 7 (B) greater than 7

(C) equal to 7 (D) equal to 0

12. *In the reaction* $H_2O + NH_3 \, rt \, NH_4^+ + OH^-$ *ammonia acts (as)*

(A) an acid (B) a base (C) is neutral (D) both as an acid and base

13. *pH of a solution is given by the expression*

(A) $\log[H^+]$ *(B)* $\frac{1}{\log[H^+]}$ *(C)* $\frac{1}{[H^+]}$ *(D)* $\log\frac{1}{[H^+]}$

14. *The pH of 0.1 M acetic acid is*

(A) less than 1 (B) greater than 1

(C) equal to one (D) seven

15. *ZnO is*

(A) acidic (B) basic (C) neutral (D) amphoteric

16. *The Heat of neutralization of a strong acid and weak base is (in kcal / mole)*

(A) 13.7 (B) greater than 13.7

(C) less than 13.7 (D) can be greater or less than 13.7

17. The aqueous compound with lowest pH is

(A) $NaHCO_3$ (B) NH_4Cl

(C) Na_2CO_3 (D) $NaCl$

18. The conjugate base of OH^- is

(A) O^{2-} (B) H_2O (C) H^+ (D) O^-

19. The conjugate base of $H_2PO_4^-$ is

(A) H_3PO_4 (B) HPO_4^{2-} (C) PO_4^{3-} (D) H_2PO_4

20. The value of Ionic Product of water at 50°C will be

(A) more than 10^{-14} (B)) less than 10^{-14}

(C) equal to 10^{-14} (D) can be more or less than 10^{-14}

21. The $[H^+]$ in 1M - ammonium sulphate solution is

(A) greater than 10^{-7} (B) less than 10^{-7}

(C) equal to 10^{-7} (D) one

22. The compound that is not a salt is

(A) $NaCl$ (B) slaked lime

(C) $Zn(NO_3)_2$ (D) $PbSO_4$

23. Of the given ions the strongest Bronsted base is

(A) ClO^- (B) ClO_2^-

(C) ClO_3^- (D) ClO_4^-

24. According to Lewis acid-base theory the bond formed in a neutralization reaction is

(A) Ionic Bond (B) Covalent Bond

(C) Co-ordinate Covalent Bond (D) Metallic Bond

25. The weakest acid is

(A) HF (B) HCl (C) HBr (D) HI

26. *According to Arrhenius Theory of acid-base, a base*
(A) donates protons *(B) accepts protons*
(C) accepts electrons *(D) gives* OH^-

27. *The salt that is acidic is*
(A) Na_2SO_4 *(B)* $NaHSO_4$
(C) Na_2SO_3 *(D)* K_2SO_4

28. *The sum of pH and pOH is always 14 at*
(A) all temperatures *(B) at 0°C*
(C) at 25°C *(D) at 100°C*

29. *If pH = 0, then the solution is extremely*
(A) acidic *(B) basic*
(C) neutral *(D) can be either acidic or basic*

30. *An aqueous solution of sodium acetate will be*
(A) weakly acidic *(B) neutral*
(C) weakly basic *(D) strongly basic*

31. *The strongest acid will*
(A) dissociate the greatest
(B) dissociate the least
(C) dissociate same as a less strong acid
(D) dissociation depends on the acid

32. *A buffer solution*
(A) has high Boiling Point *(B) has low Boiling Point*
(C) has lot of strong acid *(D) resists pH change*

33. *pH of human blood is*
(A) 5.2 *(B) 6.3* *(C) 7.4* *(D) 8.3*

34. *Which reaction is favoured in the equilibrium,* $H_2CO_3 \longleftrightarrow H^+ + HCO_3^-$ *if acidity in blood increases*
(A) backward reaction *(B) forward reaction*

(C) no change in equilibrium *(D) can not say*

35. *What can you say about the nature of an add whose* $[H^+]=10^{-8}$ *moles /l*

(A) it is a very weak base *(B) it is a very weak acid*

(C) it is strong acid *(D) it is neutral*

SECTION - II

Assertion - Reason Questions

This section contains certain number of questions. Each question contains STATEMENT-1 (Assertion) and STATEMENT - 2 (Reason). Each question has 4 choices (a), (b), (c) and (d) out of which ONLY ONE is correct. Choose the correct option.

36. *STATEMENT -1 : Ionic Product of water increases with temperature.*
because

STATEMENT -2 : The extent of dissociation of water increases with temperature

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1

(B) Statement -1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(C) Statement-1 is True, Statement-2 is False

(D) Statement-1 is False, Statement-2 is True

37. *STATEMENT-1 : Sulphuric arid can not be concentrated beyond 98% by simple boiling*
because

STATEMENT —2 : Sulphuric acid decomposes above this concentration.

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1

(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(C) Statement-1 is True, Statement-2 is False

(D) Statement-1 is False, Statement-2 is True

38. *STATEMENT -1: The Heat of Neutralisation when a weak acid is neutralised with a strong base will be above 13.7 kcal/mole.*
because

STATEMENT -2 : The strong base furnishes more OH^- *ions.*

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1

(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(C) Statement-1 is True, Statement-2 is False

(D) Statement-1 is False, Statement-2 is True

39. *STATEMENT -1: A volatile acid can be prepared by displacing it from its salt by a less volatile acid*
because

STATEMENT -2 : A less volatile acid is dissociated less.

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1

(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(C) Statement-1 is True, Statement-2 is False

(D) Statement-1 is False, Statement-2 is True

40. *STATEMENT -1 : The* K_w *of water increases with increase in temperature.*
because

STATEMENT -2 : On heating more water molecules ionize.

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1

(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(C) Statement-1 is True, Statement-2 is False

(D) Statement-1 is False, Statement-2 is True

41. *STATEMENT-1 : pH of a strong acid with [H[1']] = 10[8] moles/; is very marginally less than 7.*

because

STATEMENT -2 : If $[H^+]=10^{-8}$ *, then pH = 8*

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1

(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(C) Statement-1 is True, Statement-2 is False

(D) Statement-1 is False, Statement-2 is True

42. *STATEMENT -1 : Above room temperatures, pH + pOH of an aqueous solution is above 14.*

because

STATEMENT -2 : $[H^+]$ *and* $[OH^-]$ *increases with increase in temperature.*

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1

(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(C) Statement-1 is True, Statement-2 is False

(D) Statement-1 is False, Statement-2 is True

43. *STATEMENT -1 : Hydrolysis of salt formed from a weak acid and weak base results in a neutral solution.*
because
STATEMENT -2: Heat of Neutralisation is less than 13.7 kcal / mole when salt forms from weak acid and weak base.

(A) Statement-1 is True, Statement-2 is True; Stateinent-2 is a correct explanation for Statement-1
(B) Statement -1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) StatementT-1 is False, Statement-2 is True

44. *STATEMENT-1 : pOH of a strong acid will be dose to 14.*
because
STATEMENT -2 : pH of a strong base is close to 14.

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

45. *STATEMENT -1: H^O is a Lewis base as it donates a pair of electrons to form* H_3O^+
because
STATEMENT -2 : H^+ *is a Lewis acid as it accepts a pair of electrons to form* H_3O^+

(A) Statement-1 is True, Stateinent-2 is True; Statement-2 is a correct explanation for Statement-1
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a

correct explanation for Statement-1

(C) Statement-1 is True, Statement-2 is False

(D) Statement-1 is False, Statement-2 is True

SECTION – III
Linked Comprehension Type

This section contains paragraphs. Based upon each paragraph multiple choice questions have to be answered. Each question has 4 choices (a), (b), (c) and (d), out of which ONLY ONE is correct. Choose the correct option.

Paragraph for questions 46 to 50

When a solution of a weak acid or base is added to a saturated solution of a strong electrolyte containing a common ion, the dissociation of the weak acid or base is suppressed. When this happens the equilibrium in the saturated solution shifts backward. This results in the salt getting precipitated.

46. *When HCl is passed into a saturated solution of $NaCl$, the substance that is precipitated is*

(A) HCl (B) $NaCl$ (C) both (D) neither

47. *If HCl is passed into an unsaturated solution of $NaCl$ nothing is precipitated. This is*
because

(A) the equilibrium is not disturbed

(B) there is no equilibrium

(C) HCl is soluble in water

(D) $NaCl$ is soluble

48. *When HCl is passed into a saturated solution of $NaCl$, equilibrium shifts in such a way that $[Cl^-]$ is*

(A) remains constant *(B) increased*

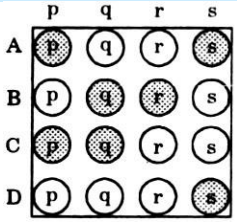
(C) becomes zero *(D) decreased*

49. *The equilibrium shifts in such a way that concentration of common ion in Common Ion Effect is*
(A) constant (B) decreases (C) increases (D) can not say

50. *The Ionic Product of water in Common Ion Effect is*
(A) constant (B) increases (C) decreases (D) can not say

SECTION – IV
Matrix - Match Type

This section contains Matrix-Match type questions. Each question contains statements given in two columns which have to be matched. Statements (a, b, c, d) in Column I have to be matched with statements (p, q, r, s) in Column II. The answers to these questions have to be appropriately bubbled as illustrated in the following example.
If the correct matches are a-p, a-s, b-q, b-r, c-p, c-q and d-s, then the correctly bubbled 4 x 4 matrix should be as follows:



51. *Match the acid in Column I with its basicity in Column II.*

Column I	**Column II**
(A) oxalic acid $(C_2O_4H_2)$	*(p) one*
(B) formic acid (HCOOH)	*(q) three*
(C) acetic acid $(C_2H_4O_2)$	*(r) two*
(D) Phosphoric acid	*(s) four*

52. ***Match the base in Column I with its acidity in Column II***

Column I	**Column II**

(A) Basic copper chloride [Cu(OH)Cl)	*p) one*
(B) NaOH	*q) two*
(C) NH_4OH	*(r) three*
(D) $Al(OH)_3$	*(s) zero*

53. Match the substances given in Column I with the extent of dissociation in Column II.

Column I	***Column II***
(A) strong acid	*(p) low dissociation*
(B) weak acid	*(q) high dissociation*
(C) organic acids	*(r) very, very low dissociation*
(D) pure water	*(s) very low dissociation*

54. Match the salts in Column I with the nature of solution on hydrolysis in Column II

Column I	***Column II***
(A) CH_3COONH_4	*(p) basic*
(B) $HCOONa$	*(q) acidic*
(C) $(NH_4)_2CO_3^-$	*(r) Not hydrolyzed (precipitate*
(D) $CaSO_4$	*(s) neutral*

55. Match the concentrations in Column I with its pH / pOH in Column II

Column I	***Column II***
(A) $[OH^-]=10^{-12}$	*(p) pH = 0*
(B) $[H^+]=10^{-7}$	*(q) pOH = 0*
(C) $[OH^-]=10^{0}$	*(r) pOH = 7*
(D) $[H^+]=10^{0}$	*(s) pOH =12*