DPP-10-[Salt Hydrolysis-1(Identification)-Solutions]

Chapter: Ionic Equilibrium

"Every question you solve is an investment in your dream."

Q1. Which of the anions is not hydrolyzed in aqueous solution?

Strong acid ke conjugate bases (Cl^-, Br^-, NO_3^-, ClO_4^-) hydrolyze nahi hote.

Koi bhi anion jo strong acid se aata hai → water ke saath react nahi karta → solution neutral.

Correct Answer: (1)

Q2. Which of the following cations is not hydrolyzed in aqueous solution?

Strong bases (NaOH, KOH) ke cations → Na^+, K^+ → hydrolyze nahi hote.

Mg^{2+}, Ca^{2+} thoda bahut hydrolysis show karte hain because charge density high hoti hai. Na^+, K^+ completely neutral.

Correct Answer: (2)

Q3. Which of the following salts does not undergo hydrolysis?

Strong acid + strong base ka salt → hydrolysis nahi.

$KCl = HCl + KOH$ → dono strong → no hydrolysis. Baaki sab weak components involve karte hain → hydrolysis hoti hai.

Correct Answer: (2)

Q4. Which salt will not undergo hydrolysis?

Neutral salt = strong acid + strong base → no hydrolysis.

KCl, NaCl, Na_2SO_4 → sab strong acid + strong base ke salts.

Correct Answer: (4)

Q5. Which of the following salts undergoes anionic hydrolysis?

Anionic hydrolysis tab hoti hai jab salt = strong base + weak acid.

Na_2CO_3 = NaOH (strong base) + H_2CO_3 (weak acid) → CO_3^{2-} undergoes hydrolysis.

Correct Answer: (3)

Q6. Which of the following salts undergoes hydrolysis in water?

Hydrolysis occurs if either cation or anion comes from weak acid/base.

Na_3PO_4 (weak acid conjugate) and CH_3COONa (weak acid conjugate) hydrolyze. $NaNO_3$ → no hydrolysis.

Correct Answer: (4)

Q7. Which of the following salts is neutral in water?

Neutral = strong acid + strong base.

KCl = KOH + HCl → neutral. NH_4NO_3 weak base + strong acid → acidic. NH_4CN → mixed → hydrolysis. NH_4OH → base, not salt.

Correct Answer: (1)

Q8. Which salt is not an example of acidic salt?

Acidic salt = partially neutralized polyprotic acid.

HCOONa → salt of weak acid + strong base → basic → acidic salt nahi. NaH_2PO_2 and NaHS → acidic salts.

Correct Answer: (4)

Q9. Example of a salt giving acidic solution:

Acidic salt = weak base + strong acid.

NH_4Cl = NH_3 (weak base) + HCl (strong acid) → acidic.

Correct Answer: (1)

Q10. Compound whose 0.1 M solution is basic:

Basic solution → strong base + weak acid salt.

CH_3COONa = NaOH + acetic acid → basic.

Correct Answer: (4)

Q11. Solution of sodium carbonate is:

CO_3^{2-} = weak acid conjugate base → strongly basic.

CO_3^{2-} hydrolysis produces OH^- → strongly basic.

Correct Answer: (3)

Q12. Aqueous solution of $Al_2(SO_4)_3$ is:

Highly charged cations (Al^{3+}) strongly hydrolyze → acidic.

$Al(H_2O)_6^{3+}$ ka strong hydrolysis → acidic medium.

Correct Answer: (4)

Q13. $FeCl_3$ solution acts acidic due to:

High charge density metal cation → water ko proton donate karwata hai.

Fe^{3+} hydrolyzes to form acidic complex.

Correct Answer: (3)

Q14. Maximum cationic hydrolysis shown by:

Higher charge + smaller size → more hydrolysis.

Order: Al^{3+} ¿ Ga^{3+} ¿ Tl^{3+} ¿ Tl^{+}. Strongest hydrolysis: Al^{3+}.

Correct Answer: (1)

Q15. Which is NOT correctly matched?

Check pH nature of each salt.

$FeCl_3$ is acidic, not basic → incorrect match. Others correct.

Correct Answer: (1)

Q16. Which is not an acidic salt?

Acidic salt = partially neutralized polyprotic acid.

HCOONa is a normal salt of weak acid + strong base → basic. Thus not acidic.

Correct Answer: (2)

Q17. Which is a basic salt?

Basic salt = salt of weak base + strong acid OR partially neutralized base.

$2PbCO_3 \cdot Pb(OH)_2$ → classic basic salt.

Correct Answer: (4)

Q18. Which of the following is an acid salt?

Acid salt contains replaceable H atom.

$NaHSO_3$ has one acidic hydrogen → acidic salt.

Correct Answer: (3)

Q19. Which ion does not show acid behaviour?

Check if species can donate H^+ or undergo cationic hydrolysis.

ClO_3^- = conjugate base of strong acid → neutral → no acidic behavior.

Correct Answer: (4)

Q20. The salt whose aqueous solution has highest pH is :

Highest pH = strongest basic solution. Weak acid + strong base salts give highest pH.

$(NH_4)_2CO_3$ and Na_2CO_3 both basic, but carbonate ion (CO_3^{2-}) is stronger base → Na_2CO_3 gives highest pH.

Correct Answer: (4)

Q21. Which of the following salts will give highest pH in water ?

Basicity depends on basic strength of anion. CO_3^{2-} ¿¿ Cl^-, SO_4^{2-}.

Na_2CO_3 has CO_3^{2-} which undergoes strong anionic hydrolysis → produces maximum OH^-.

Correct Answer: (3)

Q22. pH of salt of weak acid with strong base at 25°C is :

Weak acid + strong base → basic salt → pH ¿ 7.

Anion hydrolyzes to produce OH^-, so solution becomes basic.

Correct Answer: (2)

Q23. A solution of $MgCl_2$ in water has pH :

Mg^{2+} slightly hydrolyzes → mildly acidic solution.

Group–2 metal ions except Ba^{2+}/Sr^{2+} show slight cationic hydrolysis → pH ¡ 7.

Correct Answer: (1)

Q24. Which salt will have pH less than 7 when dissolved in water ?

Acidic solution → cation from weak base + strong acid.

$CuSO_4 = Cu^{2+}$ hydrolyzes strongly → acidic. Others (K_2CO_3, Na_3PO_4, KCN) are basic salts.

Correct Answer: (1)

Q25. The aqueous solution of which salt will have the lowest pH :

ClO_4^- ¡ ClO_3^- ¡ ClO_2^- ¡ ClO^- basicity increases. So reverse order acidity increases left→right.

Least pH = maximum acidity → strongest acid conjugate = $HClO_4$ → $NaClO_4$.

Correct Answer: (4)

Q26. **Correct increasing order of pH (A,B,C,D):**

Low pH = acidic → weak base + strong acid salts at low pH. High pH = basic salts.

NH_4Cl (D) ¡ $HCOONH_4$ (A) ¡ CH_3COONH_4 (B) ¡ CH_3COONa (C)

Correct Answer: (4)

Q27. **Which equimolar solution records the highest pH ?**

pH high when cation hydrolysis is least (weakly acidic or neutral).

Ba^{2+}, Sr^{2+}, Ca^{2+}, Mg^{2+} → hydrolysis decreases down the group. Sr^{2+} hydrolyzes least → highest pH.

Correct Answer: (4)

Q28. **Which equimolar solution records the highest pH ?**

Smaller cations (higher charge density) → more acidic → lower pH.

Be^{2+} hydrolyzes strongly → very acidic. Al^{3+} even more acidic. Ba^{2+} hydrolyzes very little → highest pH.

Correct Answer: (3)

Q29. **The pH of 0.1 M solutions increases in the order :**

Compare strongest acid → weakest acid → neutral → basic.

HCl (acid) ¡ NH_4Cl (acidic salt) ¡ NaCl (neutral) ¡ NaCN (basic).

Correct Answer: (4)

Q30. **Minimum pH is shown by aqueous solution of :**

Most acidic → highly charged small cation → strong hydrolysis.

$BeCl_2$ (Be^{2+}) hydrolyzes strongly → solution becomes highly acidic.

Correct Answer: (3)

Q31. **At 90°C, the pH of 0.1 M NaCl solution is :**

Kw increases with temperature → $[H^+]$ ¿ 10^{-7} → pH ¡ 7.

Even neutral salt shows pH drop at higher temperature because Kw ↑.

Correct Answer: (1)

Q32. A salt 'X' in neutral water becomes alkaline. The salt is made of :

Basic solution → weak acid + strong base salt.

Weak acid conjugate anion hydrolyzes producing OH^-.

Correct Answer: (4)

Q33. The highest pH value is of :

Compare: NaCl (neutral), NH_4Cl (acidic), CH_3COONa (basic), CH_3COONH_4 (near neutral).

CH_3COONa gives maximum OH^- → highest pH.

Correct Answer: (3)

Q34. pH of K_2S solution is :

S^{2-} is conjugate base of weak acid H_2S → very strong base.

S^{2-} hydrolyzes strongly producing OH^- → solution strongly basic → pH ¿ 7.

Correct Answer: (3)

Q35. pH of aqueous sodium acetate solution is :

CH_3COO^- undergoes anionic hydrolysis → produces OH^-.

Strong base + weak acid salt → basic pH ¿ 7.

Correct Answer: (3)

Q36. Ion behaviour of $C_2H_5O^-$, Cu^{2+}, etc.

Basic if conjugate base of weak acid; acidic if metal cation is small high charge.

Given classification is correct: Basic: (a)(c)(d)(f)(h)(i) Acidic: (b)(e)(j) Neutral: (g)

Given statement is correct.

Q37. **pH of $HCOONH_4$ is 6.48 because :**

Salt of weak acid + weak base → both ions hydrolyze.

NH_4^+ hydrolysis → acidic; $HCOO^-$ hydrolysis → basic. pH depends on relative Ka Kb. Since pH ¡ 7 → cationic hydrolysis slightly dominates → both ions hydrolyze.

Correct Answer: (1)

Q38. **Neutralisation invariably produces :**

Acid + base → neutralisation → water formation.

$H^+ + OH^- \rightarrow H_2O$ is always formed irrespective of salt type.

Correct Answer: (4)