DAILY PRACTICE PROBLEM OF PHYSICAL CHEMISTRY FOR NEET

BY

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DPP -1

1. At 100°C, $K_w = 10^{-12}$. pH of pure water at 100°C will be

(1) 7.0 (2) 6.0 (3) 8.0 (4) 12.0

Ans. **(2)**

2. For a acid 'A' pH = 2 and for acid 'B' pH is 4. Then

(1) A is more basic than B (2) B is more acidic than A

(3) A is more acidic than B (4) B is more basic than A

Ans. **(3)**

3. The following reactions are known to occur in the body

$CO_2 + H_2O \rightleftharpoons H_2CO_3 \rightleftharpoons H^+ + HCO_3^-$

If CO_2 escapes from the system

(1) pH will increase

(2) Hydrogen ion concentration will diminish

(3) H_2CO_3 concentration will be promoted

(4) The forward reaction will be promoted

Ans. **(2)**

4. pK_a of Quinoline base is 4.88. What will be the pK_a of 0.01M solution of it

(1) 4.88 (2) 0.01 (3) 9.12 (4) 14

Ans. **(1)**

5. 10 mL concentrated H_2SO_4 (18 molar) is diluted to 1 litre.Concentration of diluted acid is:-

(1) 0.18N (2) 0.09N (3) 0.36N (4) 18N

Ans. **(3)**

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

(1) $CH_3NH_4^+$ (2) CH_3COO^- (3) H_2O (4) HSO_4^-

Ans. **(2)**

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

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

Ans. **(2)**

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

(1) NH_3 and NH_4^+ (2) H_2O and OH^- (3) H_2O and NH_4^+ (4) NH_3 and OH^-

Ans. **(3)**

9. The conjugate base of the weak acid in the reaction $HBr + H_2O \rightleftharpoons H_3O^+ + Br^-$ is

(1) HBr (2) H_2O (3) Br^- (4) H_3O^+

Ans. **(2)**

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

(1) Na_2CO_3 (2) OH^- (3) CO_3^{-2} (4) NH_3

Ans. **(4)**

11. Calculate the concentration of the formate ion present in 0.100 M formic acid (HCOOH) solution at equilibrium ($K_a = 1.7 \times 10^{-4}$).

(1) 4.1×10^{-3} M (2) 3.1×10^{-3} M (3) 2.1×10^{-3} M (4) 5.1×10^{-3} M

Ans. **(1)**

12. The pH of 0.1 M monobasic acid is 4.50. The acidity constant (K_a) of the monobasic acid is –

(1) 1.0×10^{-7} (2) 1.0×10^{-5} (3) 1.0×10^{-4} (4) 1.0×10^{-8}

Ans. **(4)**

13. Which of the following is the strongest base ?

(1) $C_6H_5NH_2 (pK_b = 9.42)$ (2) $C_6H_5NHCH_3 (pK_b = 9.15)$

(3) $C_6H_5N(CH_3)$ $(pK_b = 8.94)$ (4) $C_6H_5NHC_2H_5 (pK_b = 8.89)$

Ans. **(4)**

14. Value of dissociation constant of acetic acid is 10^{-6}, where as dissociation constant of formic acid is 10^{-5}. Which of the following will be the value of pK_a (acetic acid) - pK_a (formic acid)

(1) 10 (2) +1 (3) 10^{+1} (4) –1

Ans. **(2)**

15. What would be $[H^+]$ of 0.006 M benzoic acid ($K = 6 \times 10^{-5}$)

(1) 0.6×10^{-4} (2) 6×10^{-4} (3) 6×10^{-3} (4) 3.6×10^{-4}

Ans. **(2)**

DPP-2

1. Calculate the percentage ionization of 0.01 M acetic acid in 0.1 M HCl K_a of acetic acid is 1.8×10^{-5}

(1) 0.18% (2) 0.018% (3) 1.8% (4) 18%

Ans. **(2)**

2. A 0.2 molar solution of formic acid is 3.2% ionised, its ionisation constant is

(1) 9.6×10^{-3} (2) 2.1×10^{-4} (3) 1.25×10^{-6} (4) 2.1×10^{-8}

Ans. **(2)**

3. A monoprotic acid in a 0.1 M solution ionises to 0.001%. Its ionisation constant is

(1) 1.0×10^{-3} (2) 1.0×10^{-6} (3) 1.0×10^{-8} (4) 1.0×10^{-11}

Ans. **(4)**

4. When 0.1 mole of ammonia is dissolved in sufficient water to make 1 litre of solution. The solution is found to have a hydroxide ion concentration of 1.34×10^{-3}. The dissociation constant of ammonia is

(1) 1.8×10^{-5} (2) 1.6×10^{-6} (3) 1.34×10^{-3} (4) 1.8×10^{-4}

Ans. **(1)**

5. A solution of NaOH contain 0.04 gm of NaOH per litre. Its pH is

(1) 10 (2) 9 (3) 11 (4) 12

Ans. **(3)**

6. 1 c.c. of 0.1 N HCl is added to 1 litre solution of sodium chloride. The pH of the resulting solution will be

(1) 7 (2) 0 (3) 10 (4) 4

Ans. **(4)**

7. pH of 1 M HCl is

(1) Zero (2) –2 (3) 7 (4) 14

Ans. **(1)**

8. A 0.1 N solution of sodium bicarbonate has a pH value of

(1) 5.6 (2) 7.0 (3) 8.4 (4) 4.0

Ans. **(3)**

9. 0.2M solution of HCOOH is 3.2% ionised then find ionisation constant of acid :-

(1) 4.2×10^{-4} (2) 4.2×10^{-5} (3) 2.1×10^{-4} (4) 2.1×10^{-5}

Ans. **(3)**

10. The pH of the solution produced when an aqueous solution of strong acid pH 5 is mixed with equal volume of an aqueous solution of strong acid of pH 3 is :-

(1) 3.3 (2) 3.5 (3) 4.5 (4) 4.0

Ans. **(1)**

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

(1) $Ka_1 V_1 = Ka_2 V_2$ (2) $Ka_1 V_2 = Ka_2 V_1$ (3) $\left[Ka_1 V_1\right]^{\frac{1}{2}} = Ka_2 V_2$ (4) $Ka_1 V_1 = \left[Ka_2 V_2\right]^{\frac{1}{2}}$

Ans. **(2)**

12. What is the molar concentration of chloride ion for the solution obtained by mixing 300 mL of 3.0M NaCl and 200 mL of 4.0 M solution of $BaCl_2$:-

(1) 5.0 M (2) 1.8 M (3) 1.6 M (4) None of these

Ans. **(1)**

13. The pH of a 0.1 M formic acid 0.1% dissociated is equal to 4. What will be the pH of another weak acid (same concentration) which is 1% dissociated

(1) 2 (2) 3 (3) 1 (4) 4

Ans. **(2)**

14. If 100 mL of pH = 3 and 400 mL of pH = 3 is mixed, what will be the pH of the mixture

(1) 3.2 (2) 3.0 (3) 3.5 (4) 2.8

Ans. **(2)**

15. What is the quantity of NaOH present in 250 cc of the solution, so that it gives a pH = 13 :-

(1) 10^{-13} g (2) 10^{-1} g (3) 1.0 g (4) 4.0 g

Ans. **(3)**

16. An aqueous solution of HCl is 10^{-9} M HCl. The pH of the solution should be:-

(1) 9 (2) Between 6 and 7 (3) 7 (4) Unpredictable

Ans. **(2)**

DPP -3

1. 100 c.c. of N/10 NaOH solution is mixed with 100 c.c of N/5 HCl solution and the whole volume is made to 1 litre. The pH of the resulting solution will be

(1) 1 (2) 2 (3) 3 (4) 4

Ans. **(2)**

2. The addition of solid sodium carbonate to pure water causes

(1) An increase in the hydronium ion concentration

(2) An increase on pH

(3) No change in pH

(4) A decrease in the hydroxide ion concentration

Ans. **(2)**

3. A salt of strong acid and weak base is dissolved in water. Its hydrolysis in solution is

(1) Unaffected on heating (2) Increased by adding strong acid

(3) Suppressed by diluting (4) Suppressed by adding strong acid

Ans. **(4)**

4. Which will undergo cationic hydrolysis ?

(1) NaCl (2) CH_3COONa (3) $(NH_4)_2SO_4$ (4) H_2CO_3

Ans. **(3)**

5. pH of a salt of a strong base with weak acid

(1) $pH = \frac{1}{2}pK_w + \frac{1}{2}pK_a + \frac{1}{2}\log C$ (2) $pH = \frac{1}{2}pK_w - \frac{1}{2}pK_a - \frac{1}{2}\log C$

(3) $pH = \frac{1}{2}pK_w + \frac{1}{2}pK_a - \frac{1}{2}\log C$ (4) None of these

Ans. **(1)**

6. Which relation is correct for NH_4Cl

(1) $K_h = K_w/K_a$ (2) $K_h = K_w/K_b$ (3) $K_h = K_w/K_a.K_b$ (4) $K_h = K_w.K_a$

Ans. **(2)**

7. An example of a salt dissolved in water to give acidic solution is

(1) Ammonium chloride (2) Sodium acetate (3) Potassium nitrate (4) Barium bromide

Ans. **(1)**

8. Given that for HA acid, $K_a = 10^{-6}$ and for MOH base $K_b = 10^{-6}$. The pH of 0.1 M MA salt solution will be :-

(1) 5 (2) 7 (3) 9 (4) 2

Ans. **(2)**

9. Ionization constant of AOH and BOH base are K_{b_1} and K_{b_2}. Their relation is $pK_{b_1} < pK_{b_2}$. Conjugate of following base, does not show maximum pH :

(1) AOH (2) BOH (3) Both of them (4) NOT

Ans. **(2)**

10. The pH of a solution obtained by mixing 100 ml of 0.2 M CH_3COOH with 100 ml of 0.2 M NaOH would be : (pK_a for $CH_3COOH = 4.74$)

(1) 4.74 **(2)** 8.87 **(3)** 9.10 **(4)** 8.57

Ans. **(2)**

11. The pH of 0.1 M solution of the following salts increases in the order :

(1) $NaCl < NH_4Cl < NaCN < HCl$ **(2)** $HCl < NH_4Cl < NaCl < NaCN$

(3) $NaCN < NH_4Cl < NaCl < HCl$ **(4)** $HCl < NaCl < NaCN < NH_4Cl$

Ans. **(2)**

12. A pair of salts are given in a solution each in 0.1M concentration. Which solution has a higher pH ?

(1) NaCN and NaOBr **(2)** NaF and NaOCl **(3)** NaF and NaOBr **(4)** NaCN and NaOCl

Ans. **(1)**

13. Which of the following salts undergoes anionic hydrolysis?

(1) $CuSO_4$ **(2)** NH_4Cl **(3)** $AlCl_3$ **(4)** K_2CO_3.

Ans. **(4)**

DPP -4

1. A buffer solution can be prepared from a mixture of

I. Sodium acetate and acetic acid in water

II. Sodium chloride and HCl in water

III. Ammonia and NH_4Cl in water

IV. Ammonia and sodium hydroxide in water

(1) 1, 3, 4 (2) 2, 3, 4 (3) 1, 2, 4 (4) 1, 3

Ans. **(4)**

2. Solubility product principle can be applied when

(1) A solid is insoluble in a liquid

(2) A liquid is insoluble in another liquid

(3) Any ionic compound is sparingly soluble in a liquid

(4) Substance is ionic

Ans. **(3)**

3. The solubility product of AgCl is K_{sp}. Then the solubility of AgCl in xM KCl is

(1) $K_{sp} \times x^2$ (2) $\frac{x}{K_{sp}}$ (3) $\frac{K_{sp}}{x^2}$ (4) $\frac{K_{sp}}{x}$

Ans. **(4)**

4. The correct representation for the K_{sp} of SnS_2 is

(1) $[Sn^{2+}][S^{2-}]^2$ (2) $[Sn^{4+}][S^{-2}]^2$ (3) $[Sn^{2+}][2S^{-2}]$ (4) $[Sn^{4+}][2S^{2-}]^2$

Ans. **(2)**

5. The K_{sp} for a sparingly soluble Ag_2CrO_4 is 4×10^{-12}. The molar solubility of the salt is

(1) 2.0×10^{-6} mol L^{-1} (2) 1.0×10^{-4} mol L^{-1} (3) 2.0×10^{-12} mol L^{-1} (4) 1.0×10^{-15} mol L^{-1}

Ans. **(2)**

6. The precipitate of CaF_2 ($K_{sp} = 1.7 \times 10^{-10}$) is obtained when equal volumes of the following are mixed

(1) 10^{-4} M Ca^{2+} + 10^{-4} M F^- (2) 10^{-2} M Ca^{2+} + 10^{-3} M F^-

(3) 10^{-4} M Ca^{2+} + 10^{-3} M F^- (4) 10^{-3} M Ca^{2+} + 10^{-5} M F^-

Ans. **(2)**

7. Hunderson equation $pH - pK_a = 1$ will be applicable to an acidic buffer when :-

(1) [Acid] = [Conjugate base] (2) [Acid] × 10 = [Conjugate base]

(3) [Acid] = [Conjugate base] × 10 (4) None of these

Ans. **(2)**

8. Which indicator works in the pH range 8 – 9.8

(1) Phenolphthalein (2) Methyl orange (3) Methyl red (4) Litmus

Ans. **(1)**

9. In a buffer solution the ratio of concentration of NH_4Cl and NH_4OH is 1 : 1 when it changes in 2 : 1 what will be the value of pH of buffer :-

(1) Increase (2) Decrease (3) No effect (4) None

Ans. **(2)**

10. The pOH of beer is 10.0. The hydrogen ion concentration will be :–

(a) 10^{-10} (b) $\frac{Kw}{10^{-10}}$ (c) $\frac{Kw}{10^{-8}}$ (d) 10^{-4}

(1) a, d (2) b, c (3) a, b, c (4) None

Ans. **(4)**

11. Solubility product of $Mg(OH)_2$ is 1×10^{-11}. At what pH, precipitation of $Mg(OH)_2$ will begin from 0.1 M Mg^{2+} solution:-

(1) 9 (2) 5 (3) 3 (4) 7

Ans. **(1)**

12. In the qualitative analysis of group III, $Fe(OH)_2$ is not precipitated because :-

(1) The K_{sp} for $Fe(OH)_2$ is higher (2) To precipitate $Fe(OH)_2$, only small $[OH^-]$ is needed

(3) $Fe(OH)_2$ is a weak electrolyte (4) The oxidation state of Fe in $Fe(OH)_2$ is +2

Ans. **(1)**

DPP -5

1. The pH of $Ca(OH)_2$ is 10.6 at 25°C. K_{sp} of $Ca(OH)_2$ is

(1) $3.2 \times 10^{-12}\ M^3$ (2) $3.2 \times 10^{-11}\ M^3$ (3) $1.6 \times 10^{-12}\ M^3$ (4) $1.6 \times 10^{-11}\ M^3$

Ans. **(1)**

2. Solubility of AgI in 0.05 M BaI_2 solution is 10^{-15} M. The solubility of AgI in water is

(1) 25×10^{-7} (2) 10^{-7} M (3) 5×10^{-8} (4) 10^{-8}

Ans. **(4)**

3. The solubility of CaF_2 in a solution of 0.1 M $Ca(NO_3)_2$ is

(1) $[Ca^{2+}]$ (2) $2[F^-]$ (3) $\frac{[F^-]}{2}$ (4) $2[NO_3^-]$

Ans. **(3)**

4. The volume of water needed to dissolve 1 mg of $PbSO_4$ ($K_{sp} = 1.44 \times 10^{-8}$, Mw of $PbSO_4$ = 303 g) at 25°C is

(1) 80 mL (2) 43 mL (3) 27.5 mL (4) 10 mL

Ans. **(3)**

5. How many grams of KBr can be added to 1 L of 0.12 M solution of $AgNO_3$ just to start the precipitation of AgBr. (Mw of KBr = 120 ; K_{sp} of AgBr = 10^{-13})

(1) 10^{-10} g (2) 10^{-9} g (3) 0.5×10^{-10} g (4) 0.5×10^{-9} g

Ans. **(1)**

6. The solubility of CH_3COOAg in a buffer solution with pH = 4, whose $K_{sp} = 10^{-12}$ and $K_a = \frac{10^{-4}}{3}$ is

(1) 10^{-6} (2) 0.5×10^{-6} (3) 5×10^{-6} (4) 2×10^{-6}

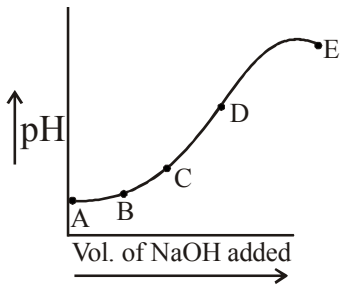
Ans. **(4)**

7. What is the maximum molarity of Co^{+2} ions in 0.1 M HCl saturated with 0.1 M H_2S. ($K_a = 4 \times 10^{-21}$). Given : K_{sp} of CoS = 2×10^{-21}.

(1) 0.10 M (2) 1.00 M (3) 4.48×10^{-11} M (4) 0.50 M

Ans. **(4)**

8. The following curve shows the change of pH during the course of weak acid HA with a strong base. At which point in the titration curve is the concentration of acid equal to that of its conjugate base.



(1) Point B (2) Point C (3) Point D (4) Point E

Ans. **(3)**

9. If the salts M_2X, QY_2 and PZ_3 have the same solubilities $\left(<\frac{4}{27}\right)$, their K_{sp} values are related

(1) $K_{sp}(M_2X) = K_{sp}(QY_2) > K_{sp}(PZ_3)$ (2) $K_{sp}(M_2X) > K_{sp}(QY_2) = K_{sp}(PZ_3)$

(3) $K_{sp}(M_2X) = K_{sp}(QY_2) = K_{sp}(PZ_3)$ (4) $K_{sp}(M_2X) > K_{sp}(QY_2) > K_{sp}(PZ_3)$

Ans. **(1)**

10. Arrange the following solutions in decreasing order of $[Ag^{\oplus}]$ ion :

I. 1M $[Ag(CN)_2]^-$

II. Saturated AgCl

III. 1 M $[Ag(NH_3)_2]^{\oplus}$ in 0.1 M NH_3

IV. Saturated AgI

(K_{sp} of AgCl = 10^{-10}, K_{sp} of AgI = 8.3×10^{-17}), K_f (Formation constant) $[Ag(CN)_2]^- = 10^{21}$

$K_f\ [Ag(NH_3)_2]^{\oplus} = 10^8$

(1) I > II > III > IV (2) II > III > I > IV (3) IV > III > II > I (4) I > IV> III > II

Ans. **(2)**