

DPP

DAILY PRACTICE PROBLEMS

Class : XIth
Date :

Solutions

Subject : CHEMISTRY
DPP No. : 9

Topic :- Equilibrium

1 (a)
CH₄ has almost no acidic nature and thus, CH₃⁻ is the strongest base

3 (c)
H₂SO₄ ⇌ H⁺ + HSO₄⁻

4 (a)

$$h = \sqrt{\left[\frac{K_h}{c}\right]} = \sqrt{\left[\frac{K_w}{K_a \cdot c}\right]}$$
$$= \sqrt{\left[\frac{10^{-14}}{10^{-5} \times 0.001}\right]} = 10^{-3}$$

5 (b)

$$K_{c_1} = \frac{[\text{NO}]^2}{[\text{N}_2][\text{O}_2]} = 4 \times 10^{-4}$$
$$K_{c_2} = \frac{[\text{N}_2]^{1/2}[\text{O}_2]^{1/2}}{[\text{NO}]}$$
$$\therefore K_{c_2} = \sqrt{\frac{1}{K_{c_1}}} = \sqrt{\frac{1}{4 \times 10^{-4}}} = 50$$

6 (d)
 $K_p = (P_{\text{H}_2\text{O}})^2$ and $K_c = [\text{H}_2\text{O}]^2$; the solid species are not used in writing K_c or K_p

7 (c)
H₂SO₄ is strong acid having pH < 7. NaNO₂ on hydrolysis gives alkaline solution of pH > 7.
NaCl is neutral and H₂S is weak acid.

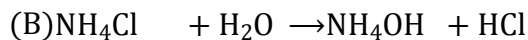
8 (a)
 $A + B \rightleftharpoons C + D$;
 $Q = \frac{[C][D]}{[A][B]} = \frac{3 \times 4}{1 \times 2} = 6$
But $K_c = 10$;

Thus, to increase the value of Q to K_c , forward reaction should occur.

9 (d)
(A) CH₃COONH₄ + H₂O → CH₃COOH + NH₄OH
Ammonium acetate

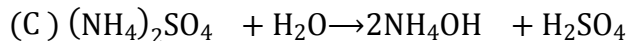
Although both (CH_3COOH and NH_4OH) of them are weak still CH_3COOH is slightly more acidic.

\therefore Solution is acidic in nature.



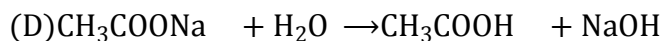
ammonium chloride weak base strong acid

\therefore Solution is acidic in nature.



ammonium sulphate weak base strong base

\therefore Solution is acidic in nature.



sodium acetate weak acid strong base

\therefore Solution is basic in nature.

10 **(d)**

Isoelectric point is the condition when Zwitter ions or sol particles do not move under the influence of electric field, *i.e.*, they lose their charge.

11 **(a)**

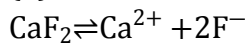
The value of equilibrium constant is independent of volume of container.

\therefore Value of equilibrium constant will remain same (300) if volume of reaction flask is tripled.

12 **(a)**

S has +4 ox.no. in H_2SO_3 and SO_2 both.

13 **(b)**



$$K_{\text{sp}} = s(2s)^2 = 4s^3$$

$$K_{\text{sp}} = 4(2.3 \times 10^{-6})^3 \\ = 48.668 \times 10^{-18} \text{ (mol dm}^{-3}\text{)}^3$$

14 **(c)**

Among the given, pH of 0.1M CH_3COOH is not equal to one as CH_3COOH is a weak acid, thus does not ionise completely.

15 **(a)**

Meq. of acetic acid = $50 \times 2 = 100$

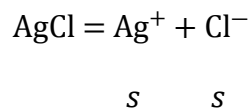
Meq. of $\text{CH}_3\text{COONa} = 10 \times 1 = 10$

$$\text{pH} = -\log K_a + \log \frac{[\text{Conjugate base}]}{[\text{Acid}]}$$

$$\text{or } \text{pH} = -\log 10^{-5} + \log \frac{10}{100} = 4$$

16 **(b)**

Let the solubility of AgCl is S



$[\text{Cl}^-]$ from NaCl = 0.2

Concentration of $\text{Cl}^- = S + 0.2$

$$K_{\text{sp}} = S(S + 0.2)$$

$$1.8 \times 10^{-10} = S^2 + 0.2S$$

(S is very small as AgCl is sparingly soluble in water, thus $S^2 \ll \ll 1$)

$$1.8 \times 10^{-10} = 0.2S$$

$$S = \frac{1.8 \times 10^{-10}}{0.2}$$

$$= 9.0 \times 10^{-10} \text{ M}$$

17 (d)

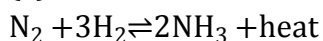
$$\alpha = 1.9 \times 10^{-9}; c = \frac{1000}{18}$$

$$K = \frac{[\text{H}^+][\text{OH}^-]}{[\text{H}_2\text{O}]} = c\alpha^2$$

$$= 1.9 \times 10^{-9} \times 1.9 \times 10^{-9} \times \frac{1000}{18}$$

$$= 2.0 \times 10^{-16}$$

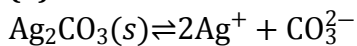
18 (a)



It is an exothermic reaction, so high temperature favours backward reaction.

Hence, equilibrium is shifted towards the left.

19 (b)



$$\underset{s}{\text{Ag}_2\text{CO}_3} \rightleftharpoons \underset{2s}{2\text{Ag}^+} + \underset{s}{\text{CO}_3^{2-}}$$

$$K_{\text{sp}} = [\text{Ag}^+]^2[\text{CO}_3^{2-}] = (2s)^2 \cdot s$$

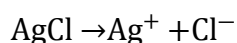
$$\therefore K_{\text{sp}} = 4s^3$$

20 (a)

Given, concentration of NaCl = 0.2 M

$$K_{\text{sp}}(\text{AgCl}) = 1.20 \times 10^{-10}$$

Let the solubility of AgCl in NaCl = x



$$\begin{aligned} & \begin{array}{ccc} x & x & x \\ \text{Solubility } \text{NaCl} & \rightarrow & \text{Na}^+ + \text{Cl}^- \\ 0.2 & 0.2 & 0.2 \end{array} \\ \therefore & \quad [\text{Ag}^+] = x \text{ and } [\text{Cl}^-] = (x + 0.2) \\ \therefore & \quad K_{\text{sp}}(\text{AgCl}) = [\text{Ag}^+][\text{Cl}^-] \\ & \quad \quad \quad = x(x + 0.2) \\ & \quad \quad \quad = x^2 + 0.2x \\ \therefore & \quad K_{\text{sp}} = 0.2x(x^2 \ll 1) \\ \text{or} & \quad 1.2 \times 10^{-10} = 0.2x \\ \therefore & \quad \quad \quad x = 6 \times 10^{-10} \end{aligned}$$

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	A	C	C	A	B	D	C	A	D	D
Q.	11	12	13	14	15	16	17	18	19	20
A.	A	A	B	C	A	B	D	A	B	A