DPP
DAILY PRACTICE PROBLEMS

Class : XIth
Date :

Solutions

Subject : CHEMISTRY
DPP No. : 2

Topic :- Equilibrium

1 **(c)**

$Fe^{3+} + 3H_2O \longrightarrow Fe(OH)_3 + 3H^+$.

2 **(b)**

This is Bronsted-Lowry concept of acid base.

3 **(a)**

The conjugate acids of $\overline{O}H, \overline{N}H_2, HC \equiv C^-$ and $CH_3CH_2^-$ are $H_2O, NH_3, HC = CH$ and $CH_3 - CH_3$ respectively. Their acidic strength is as $HOH > HC \equiv CH > NH_3 > CH_3CH_3$

A strong acid has a weak conjugate base, hence the decreasing order of basic strength is

$CH_3CH_2^- > NH_2^- > HC \equiv C^- > OH^-$

5 **(b)**

On removal of CO_2 (one of the reaction), reaction will proceed in backward direction.

6 **(c)**

Common ion effect includes two necessary points; one presence of common ion and the other a weak electrolyte.

7 **(b)**

$$C(s) + CO_2 \rightleftharpoons 2CO(g)$$

Gaseous mole before dissociation - 1 0

Gaseous mole after dissociation - $\left(1 - \frac{50}{100}\right)\left(\frac{2 \times 50}{100}\right)$

1. 0.5 1

$\therefore$ Total mole $= 1.5$ and $\Delta n = 1$

Total pressure given at equilibrium $= 12$ atm

$$K_p = \frac{(n_{CO})^2}{(n_{CO_2})} \times \left[\frac{P}{\sum n}\right]^{\Delta n} = \frac{(1)^2}{0.5} \times \left(\frac{12}{1.5}\right)^1$$

$K_p = \frac{12}{1.5 \times 0.5} = 16$ atm

8 **(b)**

If $K_w = 10^{-12}$, then $[H^+]$ for neutral scale $= 10^{-6}$ or pH = 6; thus, pH 6.9 refers for alkaline nature.

9 **(c)**

$$K_c = \frac{[Cl_2][PCl_3]}{[PCl_5]} = \frac{\frac{0.2}{10} \times \frac{0.2}{10}}{\frac{0.1}{10}} = 0.04$$

10 **(d)**

$$CH_3COOH + C_2H_5OH \rightleftharpoons CH_3COOC_2H_5 + H_2O$$

$$\underset{(1-2/3)}{1} \quad \underset{(1-2/3)}{1} \quad \underset{2/3}{0} \quad \underset{2/3}{0}$$

$$\therefore K_c = \frac{\frac{2}{3} \times \frac{2}{3}}{\frac{1}{3} \times \frac{1}{3}} = 4$$

11 **(b)**

$$K_c = \frac{[NO_2]^2}{[N_2O_4]} = \frac{4 \times (0.05)^2}{0.05} = 4 \times 0.05 = \mathbf{0.2}$$

12 **(d)**

Millieq. of 0.01 M HCl $= \frac{0.01 \times 100}{1000} = 1 \times 10^{-3}$

$\therefore$ pH = 3

Millieq. of 0.02 M $H_2SO_4 = \frac{0.04 \times 50}{1000} = 2 \times 10^{-3}$

Millieq. of 0.02 M NaOH $= \frac{0.02 \times 50}{1000} = 1 \times 10^{-3}$

Left $[H^+] = 2 \times 10^{-3} - 1 \times 10^{-3}$; $\therefore$ pH = 3

13 **(a)**

$$K_p = \frac{p_{CO}^2 p_{O_2}}{p_{CO_2}^2} = \frac{[0.4]^2 \times [0.2]}{(0.6)^2} = 0.0888$$

14 **(d)**

$$\text{pH} = 4.5 + \log \frac{[\text{Conjugate base}]}{[\text{Acid}]}$$

$\because$ [Salt] = [Acid], since $[A^-] = [H_A]$

$\therefore$ pH = 4.5 $\therefore$ pOH = 9.5

15 **(b)**

We know that,

$$\text{pH} = \text{p}K_a + \log \frac{[\text{salt}]}{[\text{acid}]}$$

or $\text{pH} = -\log 10^{-8} + \log \frac{1}{1}$

($\because$ [salt] = [acid])

or pH = 8

16 **(c)**

$3A + 2B \rightarrow 2C$

$$K_c = \frac{\text{concentration of products}}{\text{concnetration of reactants}}$$

$$= \frac{[C]^2}{[A]^3 \times [B]^2}$$

18 **(a)**

Only in reaction (ii) $H_2PO_4^-$, gives $H^+$to H_2O, thus behaves as an acid.

19 **(a)**

$CH_3COO^- + H_2O \rightleftharpoons CH_3COOH + OH^-$

$$\therefore \quad [OH^-] = c \cdot h = c\sqrt{\frac{K_H}{c}} = \sqrt{K_H \cdot c} = \sqrt{\frac{K_w}{K_a} \cdot c}$$

$$\text{or} \quad -\log OH = -\frac{1}{2}[\log K_w + \log c - \log K_a]$$

$$\text{or} \quad pOH = \frac{1}{2}[pK_w - \log c - pK_a]$$

Now, $pH + pOH = pK_w$

$$\therefore \quad pH = \tfrac{1}{2}[pK_w + \log c + pK_a].$$

20 **(a)**

$\underbrace{A + B}_{2} + Q \rightleftharpoons \underbrace{C + D}_{2}$

The reaction is endothermic so, on increase temperature concentration of product will increase

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