DPP
DAILY PRACTICE PROBLEMS

Class : XIth
Date :

Solutions

Subject : CHEMISTRY
DPP No. : 10

Topic :- Equilibrium

1 **(a)**
Because buffer solutions are mixture of weak acid or weak base and their salt

2 **(d)**
Let solubility be S_1,S_2,S_3 for AB,AB_2 and A_3B respectively.

$$\therefore \quad S_1 = \sqrt{K_{\text{Sp}}} = \sqrt{4 \times 10^{-8}} = 2 \times 10^{-4}\, M$$

$$S_2 = \sqrt[3]{\frac{K_{\text{Sp}}}{4}} = \sqrt[3]{\frac{3.2 \times 10^{-14}}{4}} = 2 \times 10^{-5}\, M$$

$$S_3 = \sqrt[4]{\frac{K_{\text{Sp}}}{27}} = \sqrt[4]{\frac{2.7 \times 10^{-15}}{27}} = 1 \times 10^{-4}\, M$$

3 **(b)**
It is Bronsted base and can accept H^+ only.

4 **(b)**
(a)pH of 10^{-9} M HCl will be < 7

(b)pOH of 10^{-5}M NaOH

$$= -\log[OH^-]$$

$$= -\log[1 \times 10^{-5}] = 5$$

$$pH + pOH = 14$$

$$pH = 14 - 5 = 9$$

(c)pH of 10^{-9}M KOH will be slightly greater than 7.

5 **(a)**
The loss in pH of blood is called acidosis.

6 **(d)**
In 0.001 M NaOH,

$$[OH^-] = 0.001 = 10^{-3}$$

$$\therefore \quad [H^+] = \frac{10^{-14}}{[OH^-]} = \frac{10^{-14}}{10^{-3}} = 10^{-11}$$

7 **(a)**

Both NH_4Cl and NH_4OH are diluted to same extent;

$$pOH = -\log K_b + \log \frac{[\text{Conjugate base}]}{[\text{Base}]}$$

8 **(c)**

According to Arrhenius concept-Acids are the substances which furnish H^+ ions in water and a base is a substance which furnishes OH^- ions in water.

9 **(a)**

$AB_2 \rightleftharpoons A^{2+} + 2B^-$

$s \quad 2s$

$$K_{sp} = [A^{2+}][B^-]^2$$
$$= (S)(2S)^2 = 4S^3$$
$$= 4(1 \times 10^{-5})^3$$
$$= 4 \times 10^{-15}$$

10 **(b)**

$pV = nRT$

Volume become $\frac{1}{2}V$ then pressure become $2p$,

So, $2p \times \frac{1}{2}V = pV = nRT$

Hence, there is no effect on K_p

11 **(a)**

Starch is used as an indicator in the titration of iodine against sodium thiosulphate

12 **(a)**

$2HI(g) \rightleftharpoons H_2(g) + I_2(g); -Q\text{kJ}$

n_g No. of moles of gaseous products – No. of moles of gaseous reactants

$2 - 2 \quad 0$

As the number of moles of products and reactants are equal, so equilibrium constant is not affected by any change in pressure and volume. Catalyst also does not affect the equilibrium constant. It is an endothermic reaction, hence equilibrium constant depends only upon the temperature.

13 **(c)**

An increase in temperature will change K_c. Addition of inert gas has no effect in $\Delta n = 0$. Also increase in pressure has no effect if $\Delta n = 0$.

14 **(c)**

According to Le-Chatelier principle the reactions in which number of moles of reactants is equal to number of moles of products, is not effected by change in pressure.

$$2NO(g) \rightleftharpoons N_2(g) + O_2(g)$$

Moles of reactants =2

Moles of products = 2

$\because$ There is no change in number of moles of reactants and products.

$\because$ The reaction is not effected by change in pressure.

15 **(c)**

B_2H_6 is electron deficient and thus electron pair acceptor or Lewis acid.

16 **(a)**

$N_2 + 3H_2 \rightleftharpoons 2NH_3$

$\underbrace{1 \quad\quad 3}_{4} \quad\quad 2$

$\Delta n_g = 2 - 4 = -2$

$K_p = K_c(RT)^{\Delta n_g}$

$\therefore K_p = K_c(RT)^{-2}$

$$\therefore K_c = \frac{K_p}{(RT)^{-2}} = \frac{1.44 \times 10^{-5}}{(0.082 \times 773)^{-2}}$$

17 **(c)**

NH_3 is Lewis base.

18 **(b)**

$K_p \quad K_c(RT)^{n_g}$

Where, n_g No. of moles of gaseous products – No. of moles of gaseous reactants

$CO(g) \quad \frac{1}{2}O_2(g) \quad CO_2(g)$

$n_g \quad 1 - 1.5 \quad -\frac{1}{2}$

$\because \quad K_p \quad K_c(RT)^{n_g}$

$K_p \quad K_c(RT)^{-1/2}$

$\frac{K_p}{K_c} \quad (RT)^{-1/2}$

19 **(c)**

For the reaction.

$H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$

$K_p = K_c(RT)^{\Delta n}$

$\Delta n = 2 - 2 = 0$

so, $K_p = K_c$

(where, $K_p$and K_c are equilibrium constants in terms of partial pressures and concentrations.)

20 **(a)**

pH of the solution at the equivalence point is on the acidic side due to dissolution of CO_2 formed. A slight excess of strong acid lowers pH to 3.5 when methyl orange produces red colour.

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