DPP

DAILY PRACTICE PROBLEMS

Class : XIth
Date :

Solutions

Subject : CHEMISTRY
DPP No. : 4

Topic :- Equilibrium

1 **(c)**

For a saturated solution product of ionic concentrations $\geq K_{sp}$.

2 **(b)**

$H_2O + H_2O = H_3O^+ + OH^-$

$$K_{S.I} = \frac{K_w}{[H_2O]^2} = \frac{10^{-14}}{(55.6)^2} = 3.23 \times 10^{-18}$$

3 **(c)**

Follow the method to write K_c or K_p values. It is the ratio of concentrations of products with suitable powers to concentration of reactants e.g.,

$3A(g) + 2B(g) \rightleftharpoons 4C\,(g) + 5D(g)$

$$K_c = \frac{[C]^4[D]^5}{[A]^3[B]^2}$$

$$K_p = \frac{[P_C]^4.[P_D]^5}{[P_A]^3.[P_B]^2}$$

4 **(b)**

(i)Millimolar$=10^{-3}$M

(ii)$\text{pH} = -\log[H^+]$

$\text{pH} = -\log(10^{-3}) = 3.$

5 **(b)**

$A + 2B \rightleftharpoons C + 3D$

$$K_c = \frac{p_C {p_D}^3}{p_A {p_B}^2} = \frac{0.30 \times (0.50)^3}{0.20 \times (0.10)^2}$$

$= 18.75$

6 **(d)**

It involves gain and loss of electron pair (Lewis concept).

7 **(d)**

$$SnCl_2 + 2HgCl_2 \longrightarrow SnCl_4 + \underset{\text{(white ppt.)}}{Hg_2Cl_2}$$

$$SnCl_2 + Hg_2Cl_2 \longrightarrow SnCl_4 + \underset{\text{(Grey ppt.)}}{Hg_2}$$

8 **(c)**

BF_3 can accept a pair of electrons, but it cannot give H^+ ions in the aqueous solution, hence BF_3 acts as Lewis acid but not as a Bronsted acid

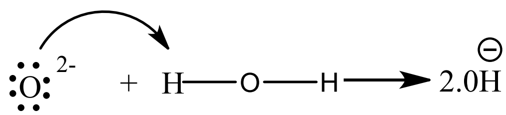
9 **(c)**

$$Na_2O + H_2O \rightarrow 2NaOH$$

	Na_2O	H_2O	$2NaOH$
Oxidation number of Na	+1		+1
Oxygen	-2	-2	-2

No change in oxidation number, so (a) and (d) are not true.

(b) is also not true.



Oxide ion donates a pair of electrons, thus changes to OH^-

10 **(d)**

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

$$= \frac{14}{2} + \frac{1}{2}\log(5 \times 10^{-3}) + \frac{1}{2} \times 4.74$$

$$= 7 + \frac{1}{2}[0.6990 - 3] + 2.3$$

$$pH = 8.2195$$

11 **(b)**

For a salt of weak base and strong acid like $MgCl_2$ the relation is as

$$K_h = \frac{K_w}{K_b}$$

12 **(d)**

Theory of active mass indicates that the rate of chemical reaction is directly proportional to the concentration of reactants

13 **(c)**

If $n_P = n_R$, then $K_p = K_c$

where, $n_p =$ number of moles of products

$n_R =$ number of moles of reactants

14 **(c)**

$$K_h = \frac{K_w}{K_a \times K_b}$$

15 **(c)**

N—H bond behaves as an acid.

16 **(c)**

	A	$+$	B	$\rightleftharpoons$	C	$+$	D
Initial	x mol		x mol				
At equilibrium	$x - \frac{x}{3} = \frac{2x}{3}$		$\frac{2x}{3}$		$\frac{x}{3}$		$\frac{x}{3}$

Hence,

$$K_c = \frac{[C][D]}{[A][B]} = \frac{\left(\frac{x}{3V}\right)\left(\frac{x}{3V}\right)}{\left(\frac{2x}{3V}\right)\left(\frac{2x}{3V}\right)} = \frac{1}{4} = 0.25$$

17 **(a)**

$$N_2 + 3H_2 \rightleftharpoons 2NH_3$$

Initially at eq. 0.2 ($0.2 - a$) 0.6 ($0.6 - 3a$) 0 ($2a$)

Total mixture is 0.8; 40% of it reacts, i.e., $\frac{0.8 \times 40}{100}$ reacts to give $\frac{0.8 \times 40}{100} \times \frac{1}{2}$ mole of NH_3

or NH_3 formed is 0.16 mole

Or $2a = 0.16$

∴ $a = 0.08$

∴ initial mole = 0.8

Final mole = (0.2 – 0.08) + (0.6 – 0.24) + 0.16

= 0.12 + 0.36 + 0.16 = 0.64

∴ Ratio of final to initial mole $= \frac{0.64}{0.8} = 0.8 = \frac{4}{5}$

18 **(b)**

$[H^+] = 4 \times 10^{-3}\,M$

∴ $pH = -\log 4 \times 10^{-3} = 2.398.$

19 **(b)**

$$pH = pK_a + \log\frac{[Salt]}{[Acid]}$$

$= 5 + \log\frac{10}{1}$ if $\frac{[Salt]}{[Acid]} = 10:1$, Then,

pH = 6.

20 **(a)**

10 M HCl will give $[H^+] = 10^1$;pH of such solution = 0.

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