# CHEMISTRY
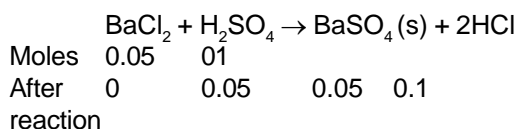
**1.**  $n_{BaCl_2} = \dfrac{20.8}{100} \times \dfrac{50}{208} = \dfrac{1}{20} = 0.05$ ; $n_{H_2SO_4} = \dfrac{9.8}{100} \times \dfrac{100}{98} = 0.1$

$BaCl_2 + H_2SO_4 \rightarrow BaSO_4\,(s) + 2HCl$

Moles    0.05     01

After     0       0.05     0.05   0.1

reaction

$\Rightarrow$    $n_{SO_4^{2-}}$ remaining = 0.05        $\Rightarrow$    $[SO_4^{2-}] = \dfrac{0.05}{150} \times 1000 = \dfrac{1}{3} = 0.33$

**2.**    $MnO_2 + 4HCl \longrightarrow MnCl_2 + 2H_2O + Cl_2$

$n_{Cl_2} = \dfrac{1.12}{22.4} = \dfrac{1}{20}$        $\Rightarrow$    $n_{HCl} = 4 \times \dfrac{1}{20} = \dfrac{1}{5}$

$\Rightarrow$    $m_{HCl} = \dfrac{1}{5} \times 36.5 = V \times 1.2 \times \dfrac{3.65}{100}$    $\Rightarrow$    V = 166.7 ml

**3.**    In case of HCl, greater volume of $KMnO_4$ is used while in case of $HNO_3$, lesser volume of $KMnO_4$ is used, than appropriate.

**4.**    From law of equivalence,

Eq of $KMnO_4$ (v.f. = 5) = Eq. of $SO_2$ (v.f. = 2)

$\dfrac{1.58}{158} \times 5 \times 2 = n_{SO_2} \times 2$

$\therefore$    $n_{SO_2} = 0.05$ moles    ;    Whole of S from $FeS_2$ is converted into $SO_2$

$\therefore$    Applying POAC on S:

$2 \times n_{FeS_2} = 1 \times n_{SO_2}$

$\therefore$    $2 \times \dfrac{m_{FeS_2}}{120} = 1 \times 0.05$    $\therefore$    $m_{FeS_2} = 3\,g = x$    $\therefore$    x = 3
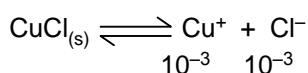
**5.**    meq. of $NH_2OH$ = meq. of $K_2Cr_2O_7$

$\therefore$    $V \times M \times 2 = V \times 6 \times 0.5$    $\therefore$    M = 1.5

**6.**    If the unknown sample contains equimolar mixture of NaOH and $Na_2CO_3$, then $V_P = 2V_M$.

**7.**    It is logical to see that out of 0.1 mol AgCl, only $1.6 \times 10^{-7}$ moles passed into the solution.
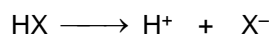
Hence,  $AgCl(s) \rightleftharpoons Ag^+ + Cl^-$

                   $1.6 \times 10^{-7}$   $1.6 \times 10^{-7} + x$

$(1.6 \times 10^{-7})(1.6 \times 10^{-7} + x) = 1.6 \times 10^{-10}$

        $1.6 \times 10^{-7} + x = 10^{-3}$

          $x \approx 10^{-3}$
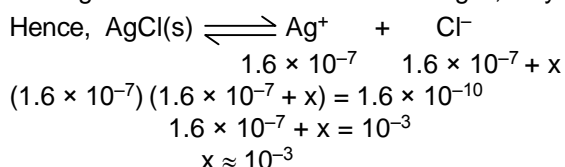
x is the concentration of $Cl^-$ due to CuCl.

$CuCl_{(s)} \rightleftharpoons Cu^+ + Cl^-$

             $10^{-3}$   $10^{-3}$

$K_{sp} = 10^{-6}$

**8.** pH = 2 $\Rightarrow$ [H$^+$] = 0.01 M

$$HX \longrightarrow H^+ + X^-$$

0.01

finally $\approx 0$      0.01    0.01

Hence, HX is strong acid.

[A$^+$] = 0.01

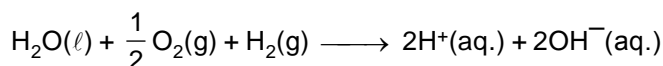$$A^+ + H_2O \rightleftharpoons AOH + H^+$$
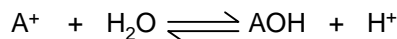
t = 0         0.0.
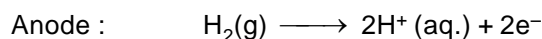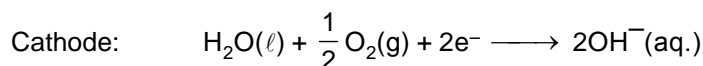
final         $\approx 0$      0.01    0.01

A$^+$ is almost completely hydrolysed, acting as very strong acid, with $K_h > 1$
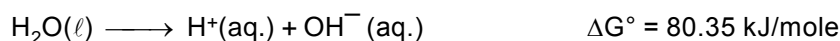
$$\Rightarrow \quad \frac{10^{-14}}{K_b} > 1 \qquad\qquad \Rightarrow \quad K_b < 10^{-14}$$

**10.** $10.8 \times 10^{-9} = (0.5S \times 2)^2 (0.5S) \qquad \Rightarrow \qquad S^3 = \dfrac{10.8 \times 10^{-9}}{0.25 \times 0.5}$

**11.** Cell reaction

Cathode: $\qquad H_2O(\ell) + \dfrac{1}{2} O_2(g) + 2e^- \longrightarrow 2OH^-(aq.)$

Anode : $\qquad\quad H_2(g) \longrightarrow 2H^+ (aq.) + 2e^-$

———————————————————————————————————

$H_2O(\ell) + \dfrac{1}{2} O_2(g) + H_2(g) \longrightarrow 2H^+(aq.) + 2OH^-(aq.)$

Also we have

$H_2(g) + \dfrac{1}{2} O_2(g) \longrightarrow H_2O(\ell) \qquad\qquad \Delta G^\circ_f = -257.2$ kJ/mole

$H_2O(\ell) \longrightarrow H^+(aq.) + OH^- (aq.) \qquad\qquad \Delta G^\circ = 80.35$ kJ/mole

Hence for cell reaction

$\Delta G^\circ = -96.50$ kJ/mole $\qquad\qquad$ So , $E^\circ = -\dfrac{\Delta G^\circ}{nF} = \dfrac{96500}{2 \times 96500} = 0.50$ V
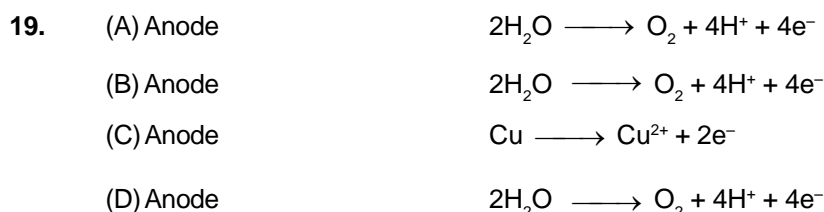
**12.** The cell is concentration cell So, $\qquad E_{cell} = \dfrac{-0.059}{1} \log \dfrac{[Cl^-]_{cathode}}{[Cl^-]_{anode}}$

more is the difference in concentration of Cl$^-$ in the electrodes, larger is the value of $E_{cell}$ . $Hg_2Cl_2$ provides least concentration of Cl$^-$.
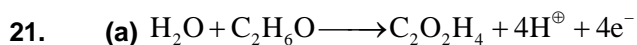
**15.** Accroding to this graph, $\wedge_m$ first decreases, and after point , $\wedge_m$ is nearly constant.

This happens when HCOOH is added to NaOH, OH$^-$ are removed from solution and HCOO$^-$ replace them. But conductivity of OH$^-$ is very high. Hence conductance keeps on decreasing till the end point.
After the endpoint, solution already contain HCOO$^-$. Hence HCOOH, being weak acid sees common ion effect and do not dissociate much to increase $\wedge_m$ .
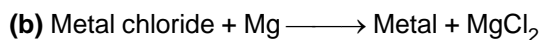
**17.** BOH $\rightleftharpoons$ B$^+$ + OH$^-$
as V $\uparrow \propto \uparrow$ so [OH$^-$] will decrease pOH $\uparrow \Rightarrow$ pH $\downarrow$.

**19.** (A) Anode $\qquad\qquad\qquad$ $2H_2O \longrightarrow O_2 + 4H^+ + 4e^-$

(B) Anode $\qquad\qquad\qquad$ $2H_2O \longrightarrow O_2 + 4H^+ + 4e^-$

(C) Anode $\qquad\qquad\qquad$ $Cu \longrightarrow Cu^{2+} + 2e^-$

(D) Anode $\qquad\qquad\qquad$ $2H_2O \longrightarrow O_2 + 4H^+ + 4e^-$

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**20.** Resistance of cell is not due to vibrations of ion but actually it is due to collisons of ions.

**21.** **(a)** $H_2O + C_2H_6O \longrightarrow C_2O_2H_4 + 4H^{\oplus} + 4e^-$

'a' = 6

**(b)** Metal chloride + Mg $\longrightarrow$ Metal + $MgCl_2$

From reaction, 24g of Mg metal produces 95g of $MgCl_2$

$\therefore$ 9.6g of Mg metal produces $\dfrac{9.6 \times 95}{24}$ = 38g of $MgCl_2$

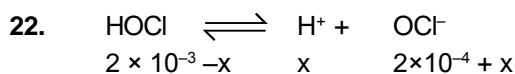Mass of Cl in $MgCl_2$ = Mass of Cl in metal chloride = 38–9.6 = 28.4g

Mass of metal in metal chloride = 52.4 – 28.4 = 24g

Now, 28.4g of chlorine combines with 24g of metal

& 35.5g of chlorine combines with Eq Wt of metal (by definition)

$\therefore$ Eq wt. of metal = $\dfrac{35.5 \times 24}{28.4}$ = 30 = 'b'.

**22.** HOCl $\rightleftharpoons$ H⁺ + OCl⁻

$2 \times 10^{-3}$ –x $\quad$ x $\quad$ $2 \times 10^{-4}$ + x

$1.5 \times 10^{-4} = \dfrac{x(2 \times 10^{-4} + x)}{(2 \times 10^{-3} - x)}$ $\quad$ ; $\quad$ $3 \times 10^{-7} - 1.5 \times 10^{-4}x = 2 \times 10^{-4}x + x^2$

$x^2 + 3.5 \times 10^{-4}x - 3 \times 10^{-7} = 0$ $\quad$ ; $\quad$ $x = \dfrac{-3.5 \times 10^{-4} + \sqrt{\left(3.5 \times 10^{-4}\right)^2 + 12 \times 10^{-7}}}{2} = 4 \times 10^{-4}$

**23.** Let $m_c = 3x$ and $m_o = 2x$ $\quad \Rightarrow \quad$ $n_c = \dfrac{3x}{12}$ and $n_o = \dfrac{2x}{16}$

$= \dfrac{x}{4}$ $\qquad$ $= \dfrac{x}{8}$

$\Rightarrow$ $n_c ; n_o$ $= \dfrac{x}{4} : \dfrac{x}{8}$ = 2 : 1

Let the empirical formula be $C_2H_xO$

$x = \dfrac{66.67}{100}(2 + 1 + x)$ $\quad$ ; $\quad$ $x = \dfrac{2}{3}(3 + x)$ $\quad$ ; $\quad$ 3x = 6 + 2x

x = 6

Hence EF = $C_2H_6O$

Molar mass = 2 × 23

$\qquad\quad$ = 46

E. F. mass = 24 + 6 +16 = 46 $\quad \Rightarrow \quad$ Molecular formula = $C_2H_6O$

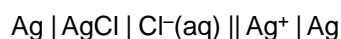Hence, total number of atoms = 2 + 6 +1 = 9

**24.** **(i)** On discharging, it generates electricity and hence works as galvanic cell.

**(ii)** Anode is positively charged during charging

**(iii)** It depends on the species getting oxidised and reduced.
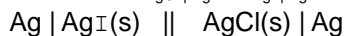
**(iv)** $E_{cell}$ depends on temperature

**(v)** This is true. Example $\qquad$ $Ag^+ + Cl^- \longrightarrow AgCl$, $\quad$ is the overall reaction occuring in the cell

$\qquad$ Ag | AgCl | Cl⁻(aq) || Ag⁺ | Ag

**(v)** It is $E_{cell}$ which determines spontanity

**25.** Ag | AgCl(s) || Calomel      $E_1$

Saturated solution

Ag | AgI(s)    || Calomel      $E_2$

Saturated solution

$E_2 - E_1 = E_{AgCl|Ag} - E_{AgI|Ag} = 0.177$       ;      This can be understood as

Ag | AgI(s)    ||    AgCl(s) | Ag

Or

Ag | $Ag^+$(aq.)    ||    $Ag^+$(aq.) | Ag

    $\left(\sqrt{K_{sp}(AgI)}\right)$     $\left(\sqrt{K_{sp}(AgCl)}\right)$

$\Rightarrow$    $0.177 = \dfrac{-0.059}{1} \ \log \dfrac{[Ag^+]_a}{[Ag^+]_c}$    $\Rightarrow$    $0.177 = 0.059 \log \dfrac{\sqrt{K_{sp}(AgCl)}}{\sqrt{K_{sp}(AgI)}}$   ;   $\dfrac{K_{sp}(AgCl)}{K_{sp}(AgI)} = 10^6$

**26.** $n_{CH_3COOH} = 0.2 \times 0.1 = 0.02$      ;      $n_{HCl} = 0.2 \times 0.1 = 0.2$    ;    $n_{NaOH} = \dfrac{1}{40} = 0.025$

$\Rightarrow$    $HCl + NaOH \longrightarrow NaCl + H_2O$      ;      0.02 mole HCl consumes 0.02 mole NaOH.

$\Rightarrow$    0.005 mole NaOH is left to react with $CH_3COOH$.

     $CH_3COOH + NaOH \longrightarrow CH_3COONa + H_2O$
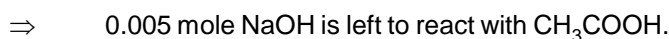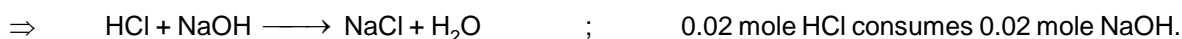
        0.02         0.005

left     0.015         0               0.005

The final solution is a buffer.

$\Rightarrow$    $K_a = \dfrac{[H^+] \times [CH_3COO^-]}{[CH_3COOH]}$      $\Rightarrow$      $[H^+] = \dfrac{K_a \times [CH_3COOH]}{[CH_3COO^-]} = \dfrac{2 \times 10^{-5} \times 0.015}{0.005} = 6 \times 10^{-5}$

     $x = 6$

     $y = 5$                  $\Rightarrow$      $x + y = 11$

**27.**      $CHCl_2COOH \longrightarrow CO_2 + H_2O + Cl_2$

      v.f. = 6

$\Rightarrow$   moles of $CHCl_2COOH \times 6 = 300$    $\Rightarrow$   moles of $CHCl_2COOH = 50$

$\Rightarrow$   $2CHCl_2COOH + Ba(OH)_2 \rightarrow Ba(CHCl_2COO)_2 + 2H_2O$      $\Rightarrow$    $n_{Ba(OH)_2} = \dfrac{50}{2} = 25$

**28.** Molar mass of methanol ($CH_3OH$) = 32 g mol$^{-1}$ = 0.032 kg mol$^{-1}$

Molarity of the given solution = $\dfrac{0.793 \text{kg L}^{-1}}{0.032 \text{ kg mol}^{-1}} = 24.78 \text{ mol L}^{-1}$

Applying

$M_1 \times V_1$           =          $M_2 V_2$

(Given solution)    (solution to be prepared)     ;      $24.78 \times V_1 = 0.22 \times 2.7$ L

or      $V_1 = 0.024$ L = 24 mL

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**29.** At cathode :                At anode :

$$2H^+ + 2e^- \rightarrow H_2 \qquad\qquad 2H_2O \rightarrow O_2 + 4H^+ + 4e^-$$

$$2SO_4^{2-} \rightarrow S_2O_8^{2-} + 2e^-$$

Equivalents at cathode = Equivalents at anode

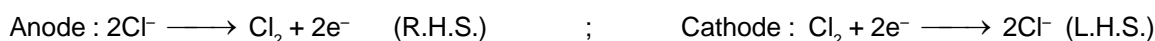$$\Rightarrow \qquad \frac{10.304}{22.4} \times 2 = \frac{2.24}{22.4} \times 4 + n_{S_2O_8^{2-}} \times 2$$

$$\Rightarrow \qquad \frac{10.304}{22.4} = \frac{2.24}{22.4} + n_{S_2O_8^{2-}} \qquad \Rightarrow \qquad n_{S_2O_8^{2-}} = 0.46 - 0.2 = 0.26$$

$$\Rightarrow \qquad m_{S_2O_8^{2-}} = 0.26 \times 194 = 50.44$$

$$\approx 50$$

**30.** Since v.f. of $I_2$ in both reactions is different, so modification should be applied while applying law of equivalence.

**32.** $Pt, Cl_2 \mid Cl^- (aq) \parallel Cl^- (aq) \mid Cl_2 (g), Pt.$

Anode : $2Cl^- \longrightarrow Cl_2 + 2e^-$    (R.H.S.)     ;     Cathode : $Cl_2 + 2e^- \longrightarrow 2Cl^-$ (L.H.S.)

$$E_{cell} = 0 - \frac{RT}{nF} \, \ln \frac{[Cl^-]_{L.H.S}}{[Cl^-]_{R.H.S}} \qquad\qquad ; \qquad\qquad E_{cell} = \frac{RT}{nF} \, \ln \frac{[Cl^-]_{R.H.S}}{[Cl^-]_{L.H.S}}$$

**35.** $N_1V_1 + N_2V_2 = N_3V_3$

$$\frac{2.8}{5.6} \times 2 + \frac{16.8}{5.6} \times 2 = \frac{2.55}{34} \times 2 \times V_3 \times 10 \qquad \therefore \quad V_3 = \frac{14}{3} \qquad \therefore \qquad V_w = \frac{14}{3} - 4 = \frac{2}{3} = 0.67L.$$

**36.** If max. volume of hypo solution is to be consumed, max. amount of $I_2$ should be liberated for which the amount of 12.6 V $H_2O_2$ solution prepared should be maximum.
Now, max. volume of 12.6 V $H_2O_2$ solution can be prepared by using 16.8 V $H_2O_2$ solution completely (2 L) and 2.8 V $H_2O_2$ solution partially (< 2 L).

$$\therefore \qquad M_1V_1 + M_2V_2 = M_fV_f \qquad\qquad \therefore \qquad \left(\frac{16.8}{11.2} \times 2\right) + \left(\frac{2.8}{11.2} \times V\right) = \frac{12.6}{11.2} \times (2 + V)$$
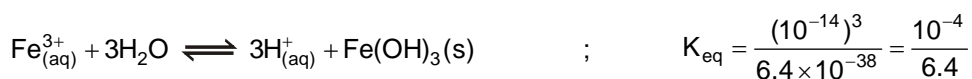
Upon solving,    $V = \dfrac{6}{7}$ L.

$\therefore \qquad$ Max. volume of 12.6 V $H_2O_2$ sol $= 2 + V = \dfrac{20}{7}$ L.

Now,    $eq_{H_2O_2} = eq_{Hypo}$

$$\left(\frac{12.6}{5.6} \times \frac{20}{7}\right) = \frac{9}{7} \times V_{Hypo} \qquad\qquad \therefore \qquad V_{Hypo} = 5 \text{ L.}$$

**37.** $Fe(OH)_3(s) \rightleftharpoons Fe^{3+}(aq) + 3OH^-(aq)$       $6.4 \times 10^{-38}$      ....(1)

$H_2O \rightleftharpoons H^+ + OH^-$                 $10^{-14}$         ....(2)

Doing   $3 \times -1$

$Fe^{3+}_{(aq)} + 3H_2O \rightleftharpoons 3H^+_{(aq)} + Fe(OH)_3(s)$      ;      $K_{eq} = \dfrac{(10^{-14})^3}{6.4 \times 10^{-38}} = \dfrac{10^{-4}}{6.4}$

**38.** $Fe^{3+} + Al(OH)_3(s) \rightleftharpoons Fe(OH)_3(s) + Al^{3+}$

$K_{eq} = \dfrac{2 \times 10^{-33}}{6.4 \times 10^{-38}} = \dfrac{1 \times 10^5}{3.2}$     ; The large $K_{eq}$ suggest, red particles of $Fe(OH)_3$ will precipitate

**39.** Water already contains $[OH^-] = 10^{-7}$ which exert common ion effect on solubility of $Fe(OH)_3$.

To avoid precipitation ;

$Q_{SP} = K_{sp}$

Let      $[Fe_2(SO_4)_3] = x$

$\Rightarrow$      $[Fe^{3+}] = 2\,x$          $\Rightarrow$      $2x \times (10^{-7})^3 = 6.4 \times 10^{-38}$    $\Rightarrow$    $2x \times 10^{-21} = 6.4 \times 10^{-38}$

$\Rightarrow$      $x = 3.2 \times 10^{-17}$       $\Rightarrow$      $n_{Fe_2(SO_4)_3}$ in 2 L water $= 6.4 \times 10^{-17}$

**40.** Cathode :      $NO_3^- + 3H_3O^+ + 2e^- \longrightarrow HNO_2 + 4H_2O$      ;      $E^o = 0.94$ V

Anode :        $2Hg^{2+} + 2e^- \longrightarrow Hg_2^{2+}$                  ;      $E^o = 0.92$ V

Overall balanced cell reaction :

$NO_3^- + 3H_3O^+ + Hg_2^{2+} \longrightarrow 2Hg^{2+} + HNO_2 + 4H_2O$      ;      $E^o = 0.02$ V

$E = E^o_{cell} - \dfrac{0.06}{2} \log \dfrac{[Hg^{2+}]^2[HNO_2]}{[NO_3^-][H_3O^+]^3[Hg_2^{2+}]}$

$E = E^o_{cell} - \dfrac{0.06}{2} \log \dfrac{1}{[H_3O^+]^3}$

$0 = 0.02 - 0.03\log \dfrac{1}{[H_3O^+]^3}$

$0 = 0.02 - 0.03 \times 3 \,(pH)$

$pH = \dfrac{0.02}{0.03 \times 3} = \left(\dfrac{2}{9}\right)$.

**41.**          $NO_3^-$  +  $3H_3O^+$  +  $Hg_2^{2+}$  $\longrightarrow$  $2Hg^{2+}$  +  $HNO_2$  +  $4H_2O$

t = 0      0.4      –        0.5        –          –        –

t = t      0.1mole   –      0.2mole    0.6mole   0.3mole   –

Cathode : $NO_3^-$  +  $3H_3O^+$  +  $2e^-$  $\longrightarrow$  $HNO_2$  +  $4H_2O$

                           0.6mole        0.3mole

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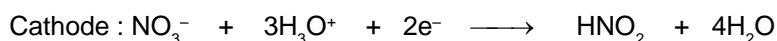
**42.** (A) $[Cl^-] = \dfrac{50 \times 3 + 150 \times 1 \times 3}{200} = \dfrac{600}{200} = 3$ M

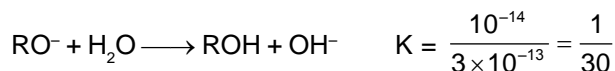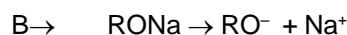(B) molality $= \dfrac{0.1}{0.9 \times 18} \times 1000 = 6.17$ m

(C) Molality $= \dfrac{10 \times 1000}{60 \times 90} = 1.85$ m.

(D) Molarity of HCl $= \dfrac{\dfrac{10.95}{36.5}}{100} \times 1000 = 3$ M

**43.** A$\rightarrow$ given in qn 9

B$\rightarrow$ pH $= \dfrac{pK_1 + pK_2}{2} = \dfrac{7 - \log 4 + 11 - \log 4}{2} = 9 - 2 \log 2$

$= 9 - 0.6$

$= 8.4$

C $\rightarrow$ $[H^+] = \sqrt{K_1 \times C + K_w}$

$= \sqrt{3 \times 10^{-13} \times 0.1 + 10^{-14}} = 2 \times 10^{-7}$

pH $= 7 - \log 2 = 6.7$

B$\rightarrow$ RONa $\rightarrow$ RO$^-$ + Na$^+$

RO$^-$ + H$_2$O $\longrightarrow$ ROH + OH$^-$ $\qquad$ K $= \dfrac{10^{-14}}{3 \times 10^{-13}} = \dfrac{1}{30}$

$10^{-3}$ M

At eq. $\quad 10^{-3} - x \qquad\quad x \qquad\quad x$

$\dfrac{x^2}{10^{-3} - x} = \dfrac{1}{30} \quad\Rightarrow\quad x = 10^{-3} \qquad\Rightarrow\qquad H^+ = 10^{-11}$, pH = 11

vf = 3 $\quad$ vf = 6

**44.** (A) For AgBr, $\qquad$ K$_{sp}$ = [Ag$^+$] [Br$^-$]

so on increase in [Br$^-$], solubility of AgBr decreases.

(B) For AgCN, $\qquad$ K$_{sp}$ = [Ag$^+$] [CN$^-$]

CN$^-$ undergoes hydrolysis so solubility in water is more than expectation.

In acidic solution, CN$^-$ gets protonated so solubility of AgCN increases.

AgCN forms complex Ag(CN)$_2^-$ with excess of CN$^-$.

(C) For Fe(OH)$_3$, $\qquad$ K$_{sp}$ = [Fe$^{3+}$] [OH$^-$]$^3$.

In acidic solution OH$^-$ decreases so solubility increases.

Solubility decreases in presence of OH$^-$.

(D) For Zn(OH)$_2$, $\qquad$ K$_{sp}$ = [Zn$^{2+}$] [OH$^-$]$^2$

Zn(OH)$_2$ is amphoteric in nature so its solubility increases in both acidic as well as strongly basic solution.

**45.** (A) Both cathode and anode are Hydrogen electrodes. So, given cell is a concentration cell.

Now, $[OH^-]_a = 0.01$ M

$\therefore \quad [H^+]_a = 10^{-12}$ M and $[H^+]_c = 10^{-2}$ M

So, $E_{cell} = -\dfrac{0.059}{1} \log_{10} \dfrac{[H^+]_a}{[H^+]_c} = -0.059 \times (-10) = 0.59$ V (> 0)

(B) $E_{cell} = [E^o_{Ag^+/Ag} - E^o_{Zn^{2+}/Zn}] - \dfrac{0.059}{2} \log_{10} \dfrac{[Zn^{2+}]}{[Ag^+]^2}$

$= 1.57 - \dfrac{0.059}{2} \log_{10} 10$ (> 0)

(C) $E_{cell} = [E^o_{H^+/H_2} - E^o_{D^+/D_2}] - \dfrac{0.059}{2} \log_{10} \left( \dfrac{[D^+]^2 \times p_{H_2}}{[H^+]^2 \times p_{D_2}} \right)$

$= 0 - (-0.01) - \dfrac{0.059}{2} \log_{10} \left( \dfrac{(0.1)^2 \times 0.001}{(0.01)^2 \times 0.1} \right)$

$= 0.01$ V (> 0)

Since the expression of log upon solving has value 1, so, $E_{cell} = E^o_{cell}$ and it can be said that Cell will have the same emf as the one made up of standard electrodes.

Also the expression of log will have the same value even after diluting each electrode solution to double volume. So, it would not affect emf of cell.

(D) $E_{cell} = E^o_{cell} - \dfrac{0.059}{1} \log_{10} \dfrac{[Cl^-]}{[Br^-]}$

$= \dfrac{0.059}{1} \log_{10} \dfrac{K_{sp}[AgCl]}{K_{sp}[AgBr]} - \dfrac{0.059}{1} \log_{10} \dfrac{[Cl^-]}{[Br^-]}$

$= \dfrac{0.059}{1} \log_{10} \dfrac{(10^{-10})}{(5 \times 10^{-13})} - \dfrac{0.059}{1} \log_{10} \dfrac{(0.1)}{(5 \times 10^{-4})}$

$= 0$

So, cell reaction is at equilibrium.

Also, upon diluting the electrode solutions to double volume, both $E^o_{cell}$ and expression of log will remain unchanged. So, $E_{cell}$ will remain zero and thus, no change in emf of cell would occur.