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Λ_m : $\rightarrow$

$$K = G \cdot \frac{l}{A} \cdot \frac{l}{l}$$

$$\Lambda_m = \frac{G \cdot l^2}{n} = \frac{K \times V}{n} = \frac{K \times V}{M \times V} = \frac{K}{M}$$

$\rightarrow$ It is independent of l & A but depends on concentration.

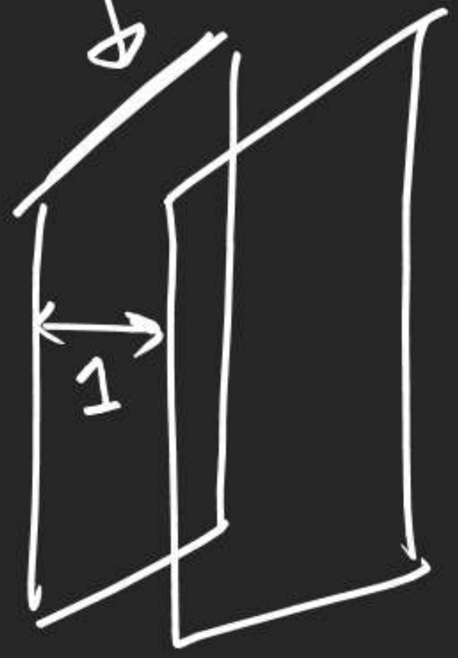
$$\boxed{\Lambda_m = \frac{G\, l^2}{n} = \frac{K}{M}}$$

0.1M KCl — Λ_m

0.1M NaCl $\rightarrow$ Λ_m

10 lit = Vol

$l = 1$



V = 10 lit

0.1M NaCl

moles = 1

$$\Lambda_m = \frac{G\, l^2}{n}$$

$$\Lambda_m = \frac{G \times 1^2}{1} = G$$

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0.1M NaCl

$l = 5\,cm$

$A = 10\,cm^2$

$G = 1/R$

$K = G\,l/A$

$\boxed{\Lambda_m = \frac{K}{M}}$

0.1M KCl

$l = 10\,cm$

$A = 20\,cm^2$

$G = 1/R$

$K = G\,l/A$

$\boxed{\Lambda_m = \frac{K}{M}}$

$$\Lambda_m = \frac{G \cdot l^2}{n}$$

Const volume

$Q_v = \Delta U$

$\Delta H = \Delta U + \Delta n_g RT$

0.1M NaCl

$l = 1$, $V = 10\,lit$

$n = 1\,mol$

$G = \Lambda_m$

0.1M KCl

$l = 1$, $V = 10$

$G = \Lambda_m$

Cell-1

0.1M NaCl

$\boxed{G = 100}$

$l = 10\,cm$

$A = 5\,cm^2$

Cell-2

0.1M KCl

$G = 50$

$l = 8\,cm$

$A = 6\,cm^2$

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$$\Lambda_m = \frac{G l^2}{n} = \frac{K}{M}$$

Conductance — conductivity

S — $S cm^{-1}$

Units $S cm^2 mol^{-1}$

$S m^2 mol^{-1}$

Λ_m (Molar conductivity)

or

Molar conductance

if $M = 1$ $\quad \Lambda_m = K$

if $n = 1$, $l = 1$ $\quad \Lambda_m = G$

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$$\Lambda_m = \frac{K}{M}$$

$K \rightarrow S\,cm^{-1}$ $\quad S\,m^{-1}$

$M \rightarrow mol/cm^3$ $\quad mol/m^3$

if K is in $S\,cm^{-1}$

$$\Lambda_m = \frac{K\,(S\,cm^{-1})}{M\,(mol/cm^3)}$$

$$= \frac{K\,(S\,cm^{-1}) \times 1000}{M\,(mol/lit)}$$

$$\boxed{\Lambda_m = \frac{K \times 1000}{M}}$$

If K is in $S\,m^{-1}$

$$\Lambda_m = \frac{K\,(S\,m^{-1})}{M\,(mol/m^3)}$$

$$= \frac{K\,(S\,m^{-1})}{1000 \times M\,(mol/lit)}$$

$$\boxed{\Lambda_m = \frac{K}{1000 \times M}}$$

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find G, K & Λ_m of $0.2M$ $NaCl(aq)$ sol^n

Given $l = 10\,cm$ $R = 100\,\Omega$

$A = 2\,cm^2$

$G = \boxed{0.01}$

$K = 0.05$

$\boxed{\Lambda_m = 250}$

$0.2 \times V = 1$

$\boxed{V = 5\,lit}$

$K\,(S\,cm^{-1})$

$G = \frac{1}{100}$

$K = \frac{1}{100} \times \frac{10}{2} = 0.05\,S\,cm^{-1}$

$\Lambda_m = S\,cm^2\,mol^{-1}$

$\Lambda_m = \frac{0.05 \times \cancel{1000}^{50}}{0.\cancel{20}} = 250\,S\,cm^2\,mol^{-1}$

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As conc $\uparrow$ κ $\uparrow$

$$\Lambda_m = \frac{\kappa \times 1000}{M}$$

conc $\uparrow$ Λ_m

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(29) $B_2H_6 + 3O_2 \longrightarrow B_2O_3 + 3H_2O$

1 mol $\quad$ $\boxed{3 \text{ mol}}$

$$3 \times 4 = \text{eq of charge} = \frac{I \times t}{96500}$$

(31)

$$\begin{array}{l} CH_2-COO^- \\ | \\ CH_2-COO^- \end{array} \longrightarrow C_2H_{4(g)} + 2CO_2(g) + 2e^-$$

$n_f = 2 \qquad n_f = 1$

0.2 eq $\quad$ 0.2 eq

0.1 mol $\quad$ 0.2 mol

H_2

0.2 eq

0.1 mol

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At $pH=3$

$$8H^+ + MnO_4^- + 5e^- \longrightarrow Mn^{2+} + 4H_2O$$

$E^0 = 1.51$

$$E = E^0 - \frac{0.059}{n} \log \frac{1}{[H^+]^8}$$

$E = 1.126$

$- 1.36$

36

$$E^0 = +\frac{0.059}{n}\log K$$

$$-nFE^0 = \Delta G^0 = -RT\ln K$$

$$Zn \longrightarrow Zn^{2+} + 2e^-$$

$$Fe^{2+} + 2e^- \longrightarrow Fe$$

$$0.2905 = E^0 - \frac{0.059}{2}\log\frac{Zn^{2+}}{Fe^{2+}}$$

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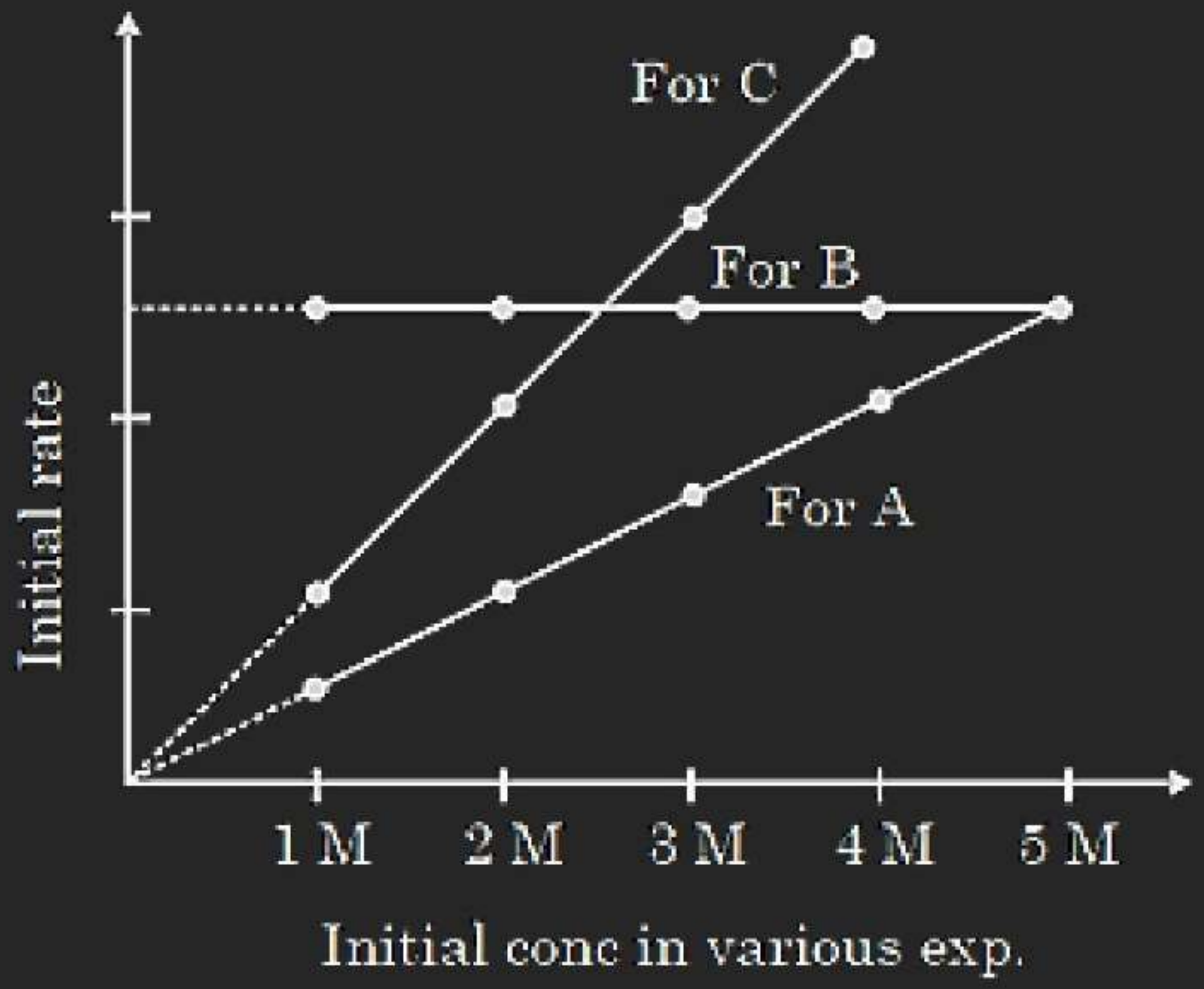
$$E_{higher} = E^0 - \frac{0.06}{2}\log\frac{[Zn^{2+}]}{0.5}$$

$$E_{lower} = E^0 - \frac{0.06}{2}\log\frac{[Zn^{2+}]}{C}$$

$$0.03 =$$

$$\boxed{\begin{array}{lll} H_2O \longrightarrow O_2 & & -1.23 \\ Mn^{3+} \text{ —— } Mn^{2+} & & 1.50 \end{array}}$$

21.



If three reactions :

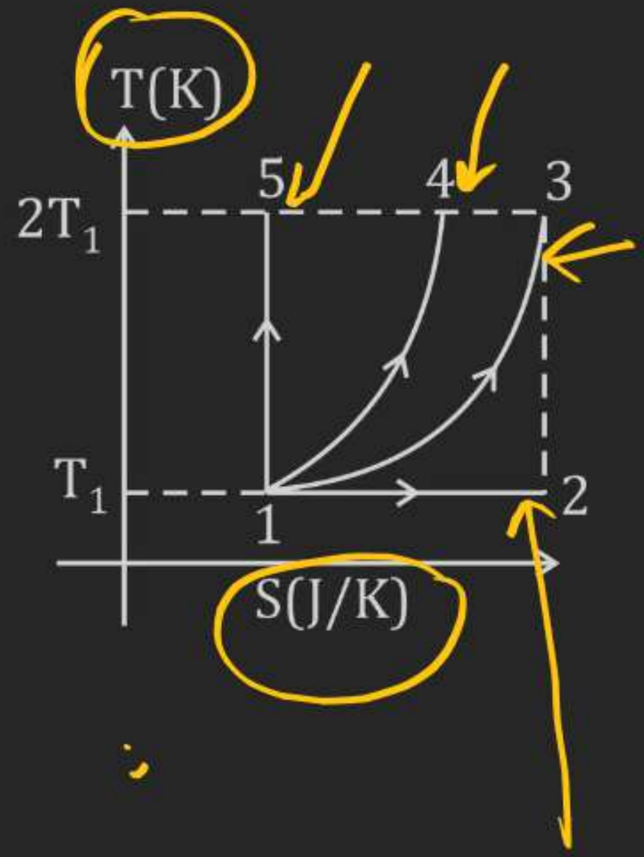
$A \longrightarrow$ Products Rate $= K_1[A]^X$

$B \longrightarrow$ Products Rate $= K_2[B]^Y$

$C \longrightarrow$ Products Rate $= K_3[C]^Z$

Value of $\left(\frac{X+Y}{4Z}\right)$ is?

2. 2 moles of a diatomic nonreacting ideal gas at temperature T_1 (state 1) is taken in a closed container. If this gas changes its state from 1 to $2, 3, 4$ & 5 by doing four different kinds of reversible processes in absence of non $P - V$ work as given below. Considering only isobaric, isochoric, isothermal & adiabatic processes, select the correct statement(s) or relationship(s).



$(R = 8.3\ J/mole/K, \log 2 = 0.3, \log 3 = 0.48)$

(A) Molar heat capacity of gas for process $1 \to 3$ is greater than molar heat capacity of gas for process $1 \to 4$.

✓ (B) $\Delta S_{1\to4} \simeq 28.\frac{67\ J}{K}$

(C) ΔH for the process $1 \to 3$ is $7RT_1$

(D) Heat exchange (Q) in process: $Q_{1\to5} < Q_{1\to2} < Q_{1\to3}$

3. Given that, $E^o_{Ni^{2+}/Ni} = 0.25V$, $E_{Cu^{2+}/Cu} = +0.34V$, $E^o_{Ag^+/Ag} = 0.80V$, $E^o_{Zn^{2+}/Zn} = -0.76V$

Which of the following redox process will not takes place in standard state ?

(A) $Ni^{2+}(aq.) + Cu(s) \rightarrow Ni(s) + Cu^{2+}(aq)$.

(B) $Cu(s)+2Ag^+(aq.) \rightarrow Cu^{2+}(aq.)+2Ag(s)$

(C) $Cu(s) + 2H^+(aq.) \rightarrow Cu^{2+}(aq.) + H_2(g)$

(D) $Zn(s)+2H^+(aq.) \rightarrow Zn^{2+}(aq.)+3H_2(g)$

AC

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4. Rate of chemical reaction becomes 4 times when temperature in increased from $27^{o}C$ to $47^{o}C$. Magnitude of slope of the graph constructed between $\log_{10}k(y-\text{axis})$ and $\frac{1}{T}(x-\text{axis})$ is : [Take $\log_{10}2 = 0.30$]

$$\ln\frac{k_2}{k_1} = \ln 4 = \frac{E_a}{R}\left[\frac{1}{300} - \frac{1}{320}\right]$$

$$\text{slope} = \frac{E_a}{2.303R}$$

5. 10 ml of 0.2 M acid is added to 250 ml if a buffer solution with $\mathrm{pH} = 6.34$ and the pH of the solution becomes 6.32. The buffer capacity of the solution is

2 mmol

$$\frac{250\text{ ml}}{0.02}$$

8 mmol

1000 ml

0.02

$$\frac{8 \times 10^{-3}}{0.02}$$

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6. An alloy weighing 2.7 mg of $Pb - Ag$ was dissolved in desired amount of NHO_3 and volume was made 250ml. A silver electrode was dipped in the solution and E_{cell} of the cell $Pt|H_2(1\text{ bar})|H^+(1M)||Ag^+|$ Ag was 0.5V at 298K. The percentage of lead in the alloy is ________.

Ag^+

moles of Ag

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0-1 76 — 80

5-1 53 — 54