LAKSHYA
JEE 2025

PHYSICAL CHEMISTRY | **Lecture - 2**

Electrochemistry

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Topics to be covered

1. Variation of Λ_m or Λ_N with conc.
   α, Kohlrausch law

Questions, Questions & Questions.

Rules to attend class

1. Always sit in a peaceful environment with headphone and be ready with your copy and pen.
2. Never ever attend a class from in between or don't join a live class in the middle of the chapter.
3. Make sure to revise the last class before attending the next class & always complete your home work along with DPP.
4. Never ever engage in chat whether live or recorded on the topic which is not being discussed in current class as by doing so u can be blocked by the admin team or your subscription can be cancelled.

Rules to attend class

5. Try to make maximum notes during the class if something is left then u can use the notes pdf after the class to complete the remaining class.
6. Always ask your doubts in doubt section to get answer from faculty. Before asking any doubt please check whether same doubt has been asked by someone or not.
7. Don't watch the videos in high speed if you want to understand better.

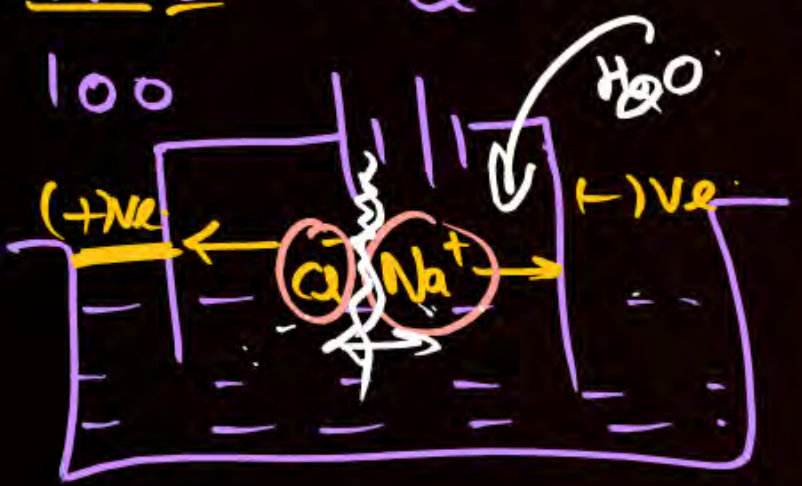

There is one big flaw in your Preparation that's name is Backlog ? What do we say to Backlog ?
NOT TODAY !!!

Variation of Λ_M or Λ_N with Concentration (C)

➢ **Strong Electrolyte:-**

$NaCl_{(s)} + H_2O \longrightarrow Na^+ + Cl^-$

100   100   100



$\downarrow C = \frac{n}{V\uparrow}$

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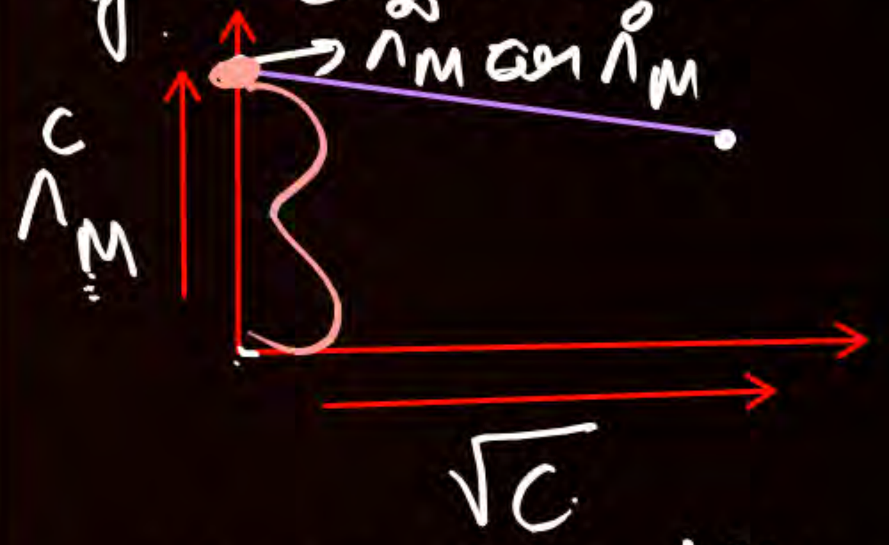
Debye-Huckel equation.

$\Lambda^c_M = \Lambda^\infty_M - b\sqrt{C}$ b = Constt.

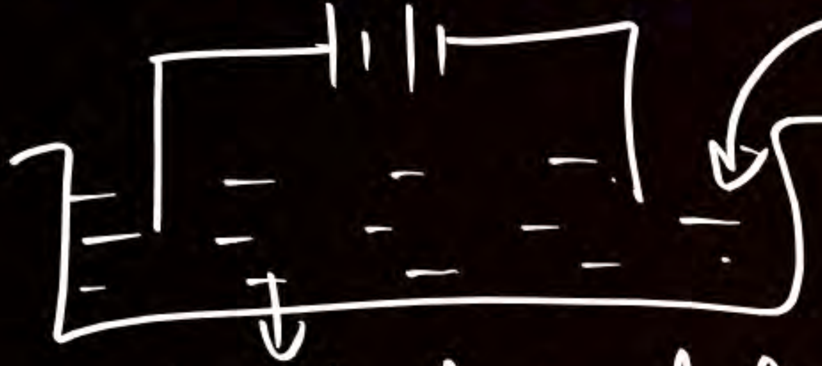
$y = c + mx$



as vol. inc., conc. dec.
distance b/w oppositely charged ions, force of attraction dec.
∴ free to move ∴ Λ_M in

Variation of Λ_M or Λ_N with Concentration (C)

➤ **Weak Electrolyte:-**



$\downarrow C = \frac{n}{V\uparrow}$

$V\uparrow$ $\alpha\uparrow$ ions$\uparrow$

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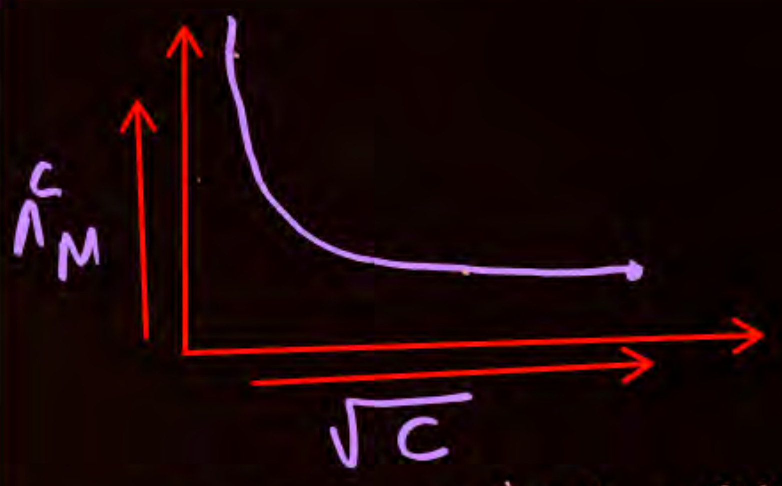
$CH_3COOH + H_2O$	$\rightleftharpoons CH_3COO^-$	$+ H^+$
100	0	0
90	10	10
60	40	40
30	70	70



as V inc., α inc., no. of ions inc.

$\therefore \Lambda_M^c$ inc.

we can't find Λ_M^∞ for weak electrolyte from this graph.

Variation of Conductivity (k) with Dilution

Strong elec :-

KCl $C = \frac{n}{V}$

Total ions = 600

Total Volume = 200 ml

1 ml → 3 ions

V ↑, C ↓

Total ions = 600

Total Volume = 600 ml

1 ml → 1 ions

weak electrolyte :-

$C = \frac{n \uparrow}{V \uparrow}$

V ↑ ∝ ↑

before dilution

V = 20 ml → 1 ml → 2 ions

ions = 40

after dilution

ions = 200, V = 200 ml → 1 ml → 1 ion

IMT

for strong electrolytes

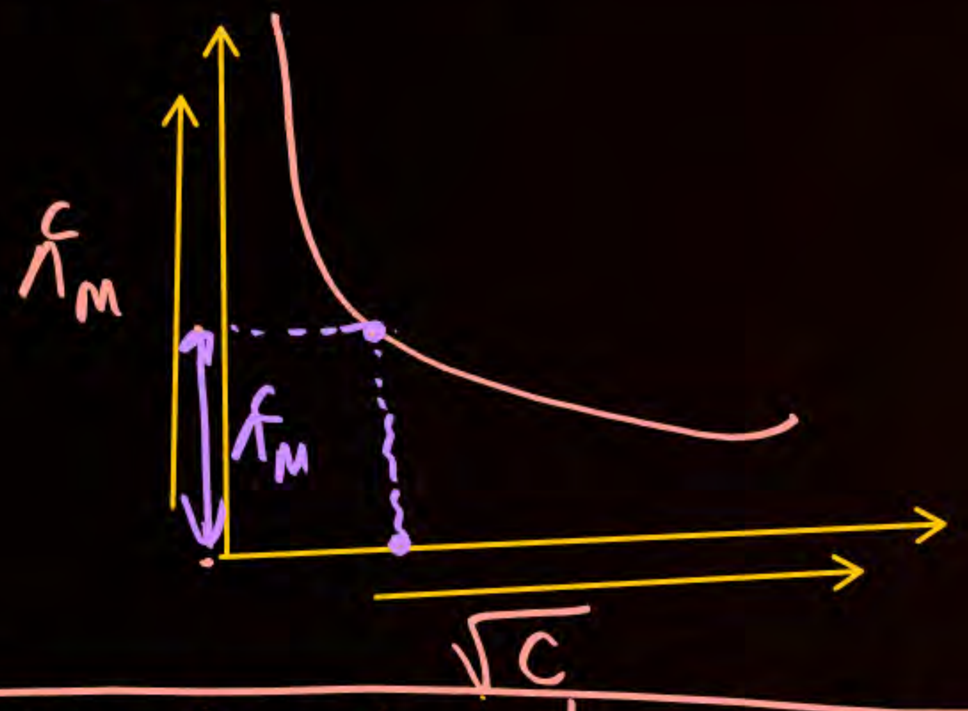
K dec. with dilutions as no. of ions in 1 ml dec.

for weak electrolyts

K dec. with dilution as no. of ions in 1 ml dec. although total ions inc.

Degree of Dissociation (α)

$$\frac{2 \rightarrow \Lambda_M^c}{5 \rightarrow \Lambda_M^\infty}$$



Weak acid

$$K_a = \frac{C\alpha^2}{1-\alpha}$$

if $\alpha \leq 0.05$

or

$$\frac{K_a}{C} \leq 25 \times 10^{-4}$$

$$K_a = C\alpha^2$$

Weak base

$$K_b = \frac{C\alpha^2}{1-\alpha}$$

if $\alpha \leq 0.05$

or

$$\frac{K_b}{C} \leq 25 \times 10^{-4}$$

$$K_b = C\alpha^2$$

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① $$\alpha = \frac{\Lambda_M^c}{\Lambda_M^\infty} = \frac{\text{no. of moles dsctd } (x)}{\text{Total moles taken } (C)}$$

② K_a or K_b $= \dfrac{C\alpha^2}{1-\alpha}$

K_a → dissociation Constt of acid

K_b → dissociation Constt of base

$$K_a \text{ or } K_b = \frac{C(\Lambda_M^c)^2}{\Lambda_M^\infty(\Lambda_M^\infty - \Lambda_M^c)}$$

$$\underline{K_a} \text{ or } \underline{K_b} = \frac{C\left(\frac{\Lambda_M^{c}}{\Lambda_M^{\infty}}\right)^2}{\left(1 - \frac{\Lambda_M^{c}}{\Lambda_M^{\infty}}\right)}$$

$$= \frac{C {\Lambda_M^{c}}^2}{{\Lambda_M^{\infty}}^2 \left(\frac{\Lambda_M^{\infty} - \Lambda_M^{c}}{\Lambda_M^{\infty}}\right)}$$

$$= \frac{C {\Lambda_M^{c}}^2 \times \Lambda_M^{\infty}}{{\Lambda_M^{\infty}}^2 \left(\Lambda_M^{\infty} - \Lambda_M^{c}\right)}$$

Kohlrausch Law

$\Lambda^{\infty}_{M}\ NaCl = 1\lambda^{\infty}_{Na^+} + 1\lambda^{\infty}_{Cl^-}$

$\Lambda^{\infty}_{CaCl_2} = 1\lambda^{\infty}_{Ca^{2+}} + 2\lambda^{\infty}_{Cl^-}$

$\Lambda^{\infty}_{Zr_3(PO_4)_4} = 3\lambda^{\infty}_{Zr^{4+}} + 4\lambda^{\infty}_{PO_4^{3-}}$

at infinite dilution Λ_M^{∞} is equal to sum of limiting ionic conductivity (λ_M^{∞}) of cation & anion, each multiplied by no. of ions present in one unit.

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① $A_xB_y + H_2O \longrightarrow xA^{y+} + yB^{x-}$

$$\Lambda_M^{\infty} A_xB_y = x\lambda^{\infty}_{A^{y+}} + y\lambda^{\infty}_{B^{x-}}$$

② $\Lambda^{\infty}_{AB} = x\ S\,cm^2\,mol^{-1}$ — ①

$\Lambda^{\infty}_{BC} = y$ ——— — ②

$\Lambda^{\infty}_{CD} = z$ ——— — ③

$\Lambda^{\infty}_{AD} = (x + z - y)\ S\,cm^2\,mol^{-1}$

eq. ① + eq. ③ − eq. ②

$1\,CaCl_2 + H_2O \longrightarrow 1\,Ca^{2+} + 2Cl^-$

1 mole ⟶ 1 mole 2 mole

1 g-eq ⟶ 1 geq 1 geq

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$$A_xB_y + H_2O \longrightarrow xA^{y+} + yB^{x-}$$

$$\Lambda^{\infty}_{M}\,A_xB_y = x\,\lambda^{\infty}_{M}\,A^{y+} + y\,\lambda^{\infty}_{B^{x-}}$$

$$\Lambda^{\infty}_{N}\,A_xB_y = 1\,\lambda^{\infty}_{N}\,A^{y+} + 1\,\lambda^{\infty}_{N}\,B^{x-}$$

or Λ^{∞}_{eq}

$BaCl_2$

$$\Lambda_M^\infty BaCl_2 = 1\lambda_M^\infty Ba^{2+} + 2\lambda_M^\infty Cl^-$$

$$\Lambda_N^\infty BaCl_2 = 1\lambda_N^\infty Ba^{2+} + 1\lambda_N^\infty Cl^-$$

QUESTION –

Molten sodium chloride conducts electricity due to the presence of:

A. Free electron

B. Free ions

C. Free molecules

D. Atoms of sodium and chlorine

QUESTION –

At 25°C molar conductance of 0.1 molar aqueous solution of ammonium hydroxide is 9.54 ohm^{-1} cm^2 mol^{-1} and at infinite dilution its molar conductance is 238 ohm cm^2 mol^{-1}. The degree of ionization of ammonium hydroxide at the same concentration and temperature is:

(A) 40.800%

(B) 2.080%

(C) 20.800%

(D) 4.008%

$T = 25^\circ C$

$C = 0.1\,M$

NH_4OH

$\Lambda^c_M(NH_4OH) = 9.54\ S\,cm^2\,mol^{-1}$

$\Lambda^\infty_M(NH_4OH) = 238$

$\alpha = \dfrac{\Lambda^c_M}{\Lambda^\infty_M} = \dfrac{9.54}{238}$

% age dissociation $= \alpha \times 100$

$= \dfrac{9.54}{238} \times 100$

$= 4.008\%$

QUESTION –

Pure water does not conduct electricity because it:

$H_2O \rightarrow H^+ + OH^-$

(A) is neutral ✗

(B) is readily decomposed ✗

(C) is almost totally unionized ✓

(D) has a low boiling point

QUESTION –

The relation among conductance (G), specific conductance (κ) and cell constant (l/A) is:

(A) $G = \kappa \frac{l}{A}$

(B) $G = \kappa \frac{A}{l}$ ✓

(C) $G\kappa = \frac{l}{A}$

(D) $G = \kappa A l$

$$K = \frac{1}{R} \times \frac{l}{a}$$

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

$$K = G \times \frac{l}{a}$$

$$G = \frac{K \times a}{l}$$

QUESTION –

If x is specific resistance (in S^{-1} cm) of the electrolyte solution and y is the molarity of the solution, then Λ_m (in S cm^2 mol^{-1}) is given by:

(A) $\frac{1000x}{y}$

(B) $1000\frac{y}{x}$

(C) $\frac{1000}{xy}$

(D) $\frac{xy}{1000}$

$\rho = x\ S^{-1} cm$

$C(M) = y\ M.$

$K = \frac{1}{\rho} = \frac{1}{x}$

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

$= \frac{K \times 1000}{y} = \frac{1000}{xy}\ S\,cm^2\,mol^{-1}$

QUESTION –

Equivalent conductivity can be expressed in terms of specific conductance (κ) and concentration (N) in gram equivalent dm^{-3} as:

(A) $\kappa \times N$

(B) $\dfrac{\kappa \times 1000}{N}$ ✓

(C) $\dfrac{\kappa \times N}{1000}$

(D) $\kappa \times N \times 1000$

$\Lambda_N = ?$

$\Lambda_N = \dfrac{\kappa \times 1000}{N}$

QUESTION –

Resistance of a decimolar solution between two electrodes 0.02 meter apart and 0.0004 m^2 in area was found to be 50 ohm. Specific conductance (κ) is:

(A) $0.1\ S\ m^{-1}$

(B) $1\ S\ m^{-1}$

(C) $10\ S\ m^{-1}$

(D) $4 \times 10^{-4}\ S\ m^{-1}$

$M = 0.1 M$

l = distance b/w two electrodes = 0.02 m

a = area of cross section = 0.0004 m^2

R = 50 ohm

$$K = \frac{1}{R} \times \frac{l}{a} = \frac{1 \times 2 \times 10^{-2}}{50 \times 4 \times 10^{-4}} = \frac{100}{100} = 1\ S\ m^{-1}$$

QUESTION –

Resistance of 0.1 M KCl solution in a conductance cell is 300 ohm and conductivity is 0.013 S cm^{-1}. The value of cell constant is:

(A) 3.9 cm^{-1}

(B) 39 m^{-1}

(C) 3.9 m^{-1}

(D) None of these

$C = 0.1M$

$R = 300\,\Omega$

$\kappa = 0.013\ S\,cm^{-1}$

$\frac{l}{a} = ?$

$\kappa = \frac{1}{R} \times \frac{l}{a}$

$\frac{l}{a} = \kappa \times R$

$= 0.013 \times 300$

$= 3.9\ cm^{-1}$

QUESTION –

$\Lambda^c_M = \Lambda_M$

Dissociation constant of a weak acid (HA) in terms of Λ^∞_m and Λ_m is:

K_a

(A) $K_a = \frac{C\Lambda^\infty_m}{(\Lambda_m - \Lambda^\infty)}$

(B) $K_a = \frac{C\Lambda^2_m}{\Lambda^\infty_m(\Lambda^\infty_m - \Lambda_m)}$

(C) $K_a = \frac{C(\Lambda^\infty_m)^2}{\Lambda^\infty_m(\Lambda^\infty_m - \Lambda_m)}$

(D) None of these

QUESTION –

When a concentrated solution of an electrolyte is diluted

(A) Its specific conductance increases

(B) Its equivalent conductivity decreases

(C) Its specific conductivity decreases and equivalent conductivity increases

(D) Both specific and equivalent conductivity increase

QUESTION –

Molar conductivity of a solution of an electrolyte AB_3 is 150 S cm^2 mol^{-1}. If it ionises as $AB_3 \longrightarrow A^{3+} + 3B^-$, its equivalent conductivity will be:

A) 150 (in S cm^2 eq^{-1})

B) 75 (in S cm^2 eq^{-1})

C) 50 (in S cm^2 eq^{-1})

D) 80 (in S cm^2 eq^{-1})

$\Lambda_M(AB_3) = 150$ S cm^2 mol^{-1}

$\Lambda_M = \Lambda_N \times n$ factor

$150 = \Lambda_N \times 3$

$\Lambda_N = \frac{150}{3} = 50$ S cm^2 eq^{-1}

QUESTION –

Equivalent conductivity of $Fe_2(SO_4)_3$ is related to molar conductivity by the expression:

$\Lambda_M = \Lambda_N \times n_{factor}$

$Fe_2(SO_4)_3 \rightarrow 2Fe^{3+} + 3SO_4^{2-}$

Fe^{2+}

$\Lambda_M = \Lambda_{eq} \times 6$

(A) $\Lambda_{eq} = \Lambda_m$

(B) $\Lambda_{eq} = \Lambda_m/3$

(C) $\Lambda_{eq} = 3\Lambda_m$

(D) $\Lambda_{eq} = \Lambda_m/6$

QUESTION –

or infinite dilution.

The limiting equivalent conductivity of NaCl, KCl and KBr and 126.5, 150.0 and 151.5 $S\ cm^2\ eq^{-1}$, respectively. The limiting equivalent ionic conductivity for Br^- is 78 $S\ cm^2\ eq^{-1}$. the limiting equivalent ionic conductivity for Na^+ ions would be:

(A) 128

(B) 125

(C) 49

(D) 50

NaCl Λ_N^∞ 126.5 $S\ cm^2\ eq^{-1}$ — (1)

KCl 150 — (2)

KBr 151.5 — (3)

$\Lambda_{N(Br^-)}^\infty = 78\ S\ cm^2\ eq^{-1}$

$\Lambda_{N(Na^+)}^\infty = ?$

$\lambda^0_{Na^+} + \lambda^0_{Cl^-} + \lambda^0_{K^+} + \lambda^0_{Br^-} - \lambda^\infty_{K^+} - \lambda^\infty_{Cl^-}$

$= 151.5 + 126.5 - 150$

$\lambda^\infty_{Na^+} + 78 = 128$

$\lambda^\infty_{Na^+} = 50\ S\ cm^2\ eq^{-1}$

QUESTION

The equation that is incorrect is (JEE MAINS 7th Jan. 2nd shift - 2020)

(A) $(\Lambda_m^o)_{H_2O} = (\Lambda_m^o)_{HCl} + (\Lambda_m^o)_{NaOH} - (\Lambda_m^o)_{NaCl}$

(B) $(\Lambda_m^o)_{NaBr} - (\Lambda_m^o)_{NaI} = (\Lambda_m^o)_{KBr} - (\Lambda_m^o)_{NaBr}$

(C) $(\Lambda_m^o)_{NaBr} - (\Lambda_m^o)_{NaCl} = (\Lambda_m^o)_{KBr} - (\Lambda_m^o)_{KCl}$

(D) $(\Lambda_m^o)_{KCl} - (\Lambda_m^o)_{NaCl} = (\Lambda_m^o)_{KBr} - (\Lambda_m^o)_{NaBr}$

QUESTION –

The specific conductance of a saturated solution of silver bromide is κ S cm^{-1}. The limiting ionic conductivity of Ag^+ and Br^- ions are x and y, respectively. The solubility of silver bromide in gL^{-1} is: (Molar mass of AgBr = 188)

(A) $\frac{K \times 1000}{x-y}$

(B) $\frac{K}{x+y} \times 188$

(C) $\frac{K \times 1000 \times 188}{x+y}$

(D) $\frac{x+y}{K} \times \frac{1000}{188}$

QUESTION –

The resistance of 0.1 N solution of formic acid is 200 ohm and cell constant is 2.0 cm^{-1}. the equivalent conductivity (in $S\ cm^2\ eq^{-1}$) of 0.1 N formic acid is:

(A) 100

(B) 10

(C) 1

(D) None of these

QUESTION –

A conductance cell was filled with a 0.02 M KCl solution which has a specific conductance of 2.768×10^{-3} ohm^{-1} cm^{-1}. If its resistance is 82.4 ohm at 25°C, the cell constant is:

(A) 0.2182 cm^{-1}

(B) 0.2281 cm^{-1}

(C) 0.2821 cm^{-1}

(D) 0.2381 cm^{-1}

QUESTION –

The ionic conductivity of Ba^{2+} and Cl^{-} at infinite dilution are 127 and 76 ohm^{-1} cm^{2} eq^{-1} respectively. The equivalent conductivity of $BaCl_2$ at infinity dilution (in ohm^{-1} cm^{2} eq^{-1}) would be:

(A) 203

(B) 279

(C) 101.5

(D) 139.5

QUESTION –

Λ^{∞}_{AgCl} can be obtained:

(A) by extraplotation of the graph Λ and $\sqrt{C}$ to zero concentration

(B) by known values of Λ^{∞} of $AgNO_3$, HCl and HNO_3

(C) Both (A) and (B)

(D) None of these

QUESTION –

The conductance of a salt solution (AB) measured by two parallel electrodes of area 100 cm^2 separated by 10 cm was found to be 0.0001 Ω^{-1}. If volume enclosed between two electrode contain 0.1 mole of salt, what is the molar conductivity (S cm^2 mol^{-1}) of salt at same concentration.

A) 10

B) 0.1

C) 1

D) None of these

QUESTION

Match List-I with List-II (JEE MAINS 31 Aug. 2nd shift 2021)

Choose the most appropriate answer from the option given below:

List-I (Parameter)		List-II (Unit)	
A.	Cell constant	i.	$S\ cm^2\ mol^{-1}$
B.	Molar conductivity	ii.	Dimensionless
C.	Conductivity	iii.	m^{-1}
D.	Degree of dissociation	iv.	$\Omega^{-1}\ m^{-1}$ of electrolyte

(A) A-i, B-iv, C-iii, D-ii

(B) A-iii, B-i, C-ii, D-iv

(C) A-iii, B-i, C-iv, D-ii

(D) A-ii, B-i, C-iii, D-iv

QUESTION

$\Lambda_{m_2} = \frac{K \times 1000}{M}$

The molar conductivity of a conductivity cell filled with 10 moles of 20 mL NaCl solution is Λm_1 and that of 20 moles another identical cell having 80 mL NaCl solution is Λm_2. The conductivities exhibited by these two cells are same. The relationship between Λm_2 and Λm_1 is (JEE MAINS 25th July 2nd shift-2022)

(A) $\Lambda m_2 = 2\Lambda m_1$

(B) $\Lambda m_2 = 2\Lambda m_1 / 2$

(C) $\Lambda m_2 = \Lambda m_1$

(D) $\Lambda m_2 = 4\Lambda m_1$

$n = 10$, $M_1 = \frac{10}{20}$

$V(ml) = 20\,ml$

$\Lambda_{m_1} = \frac{K \times 1000}{M_1}$

$n' = 20$, $M_2 = \frac{20}{80} = \frac{1}{4}$

$V'(ml) = 80\,ml$

$\Lambda_{m_2} = \frac{K \times 1000}{M_2}$

$$\frac{\Lambda_{M_2}}{\Lambda_{M_1}} = \frac{M_1}{M_2}$$

$$\Lambda_{M_2} = \frac{\Lambda_{M_1} \times 1 \times \cancel{4}^{2}}{\cancel{2} \times}$$

$$\Lambda_{M_2} = 2\Lambda_{M_1}$$

Home work from modules

Prarambh → Q 37 to Q 44

Prabal → Q 41, 44, 47, 58, 62

QUESTION

Given below are two statements:

Statement-I : For KI, molar conductivity increases steeply with dilution.

Statement-II : For carbonic acid, molar conductivity increases slowly with dilution.

In the light of the above statement, choose the correct answer from the options given below: (JEE MAINS 27 July 2nd shift-2022)

A. Both statement I and statement II are true

B. Both statement I and statement II are false

C. Statement 1 is true but statement II is false

D. Statement 1 is false but statement II is true

QUESTION

Given below are two statements: (JEE MAINS 26 Aug. 1st shift 2021)

Statement-I : The limiting molar conductivity of KCl (strong electrolyte) is higher compared to that of CH_3COOH (weak electrolyte).

Statement-II : Molar conductivity decreases with decrease in concentration of electrolyte.

In the light of the above statements, choose the most appropriate answer from the options given below:

(A) Statement I is false but statement II is true

(B) Both statement I and statement II is true

(C) Statement I is true but statement II is false

(D) Both statement I and statement II is false

QUESTION – (JEE Advance 2017)

The conductance of a 0.0015 M aqueous solution of a weak monobasic acid was determined by using conductivity cell consisting of platinized Pt electrodes. The distance between the electrodes is 120 cm with an area of cross section of 1 cm^2. the conductance of this solution was found to be 5×10^{-7} S. The pH of the solution is 4. The value of limiting molar conductivity (Λ°_m) of this weak monobasic acid in aqueous solution is $Z \times 10^2$ S cm^2 mol^{-1}. The value of Z is:

QUESTION – (JEE Advance 2022)

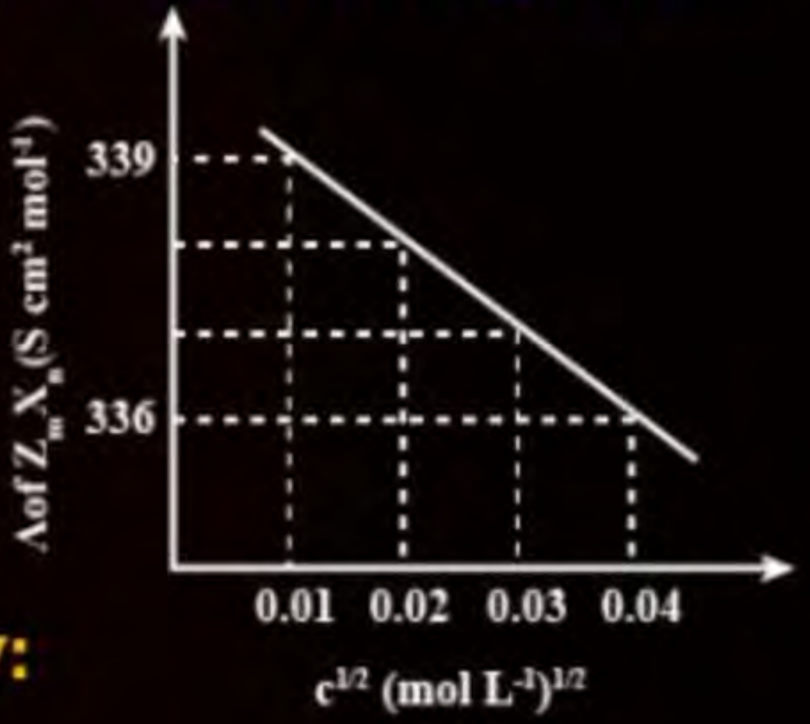
Consider the strong electrolytes Z_mX_n, U_mY_p and V_mX_n. Limiting molar conductivity ($\Lambda°$) of U_mY_p and V_mX_n are 250 and 440 $S\ cm^2\ mol^{-1}$, respectively. The value of $(m + n + p)$ is ______.

Given:

Ion	Z^{n+}	U^{p+}	V^{n+}	X^{m-}	Y^{m-}
$\lambda°(S\ cm^2\ mol^{-1})$	50.0	25.0	100.0	80.0	100.0

$\lambda°$ is limiting molar conductivity of ions.

The plot of molar conductivity (Λ) of Z_mX_n vs $c^{1/2}$ is given below:



QUESTION

Let C_{NaCl} and C_{BaSO_4} be the conductances (in S) measured for saturated aqueous solutions of NaCl and $BaSO_4$, respectively, at a temperature T.

Which of the following is false?

(JEE MAINS 3 Sep. 1st shift 2020)

A. Ionic mobilities of ions from both salts increase with T.

B. $C_{BaSO_4}(T_2) > C_{BaSO_4}(T_1)$ for $T_2 > T_1$

C. $C_{NaCl}(T_2) > C_{NaCl}(T_1)$ for $T_2 > T_1$

D. $C_{NaCl}(T_2) >> C_{BaSO_4}$ at a given T

QUESTION

250 mL of a waste solution obtained from the workshop of a goldsmith contains 0.1 M $AgNO_3$ and 0.1 M AuCl. The solution was electrolyzed at 2V by passing a current of 1 A for 15 minutes. the metal/metals electrodeposited will be

$(E^o_{Ag^+/Ag} = 0.80V, E^o_{Au^+/Au} = 1.69V)$ (JEE MAINS 4 sep. 2^{nd} shift 2020)

(A) silver and gold in proportion to their atomic weight

(B) silver and gold in equal mass proportion

(C) only gold

(D) only silver.

QUESTION

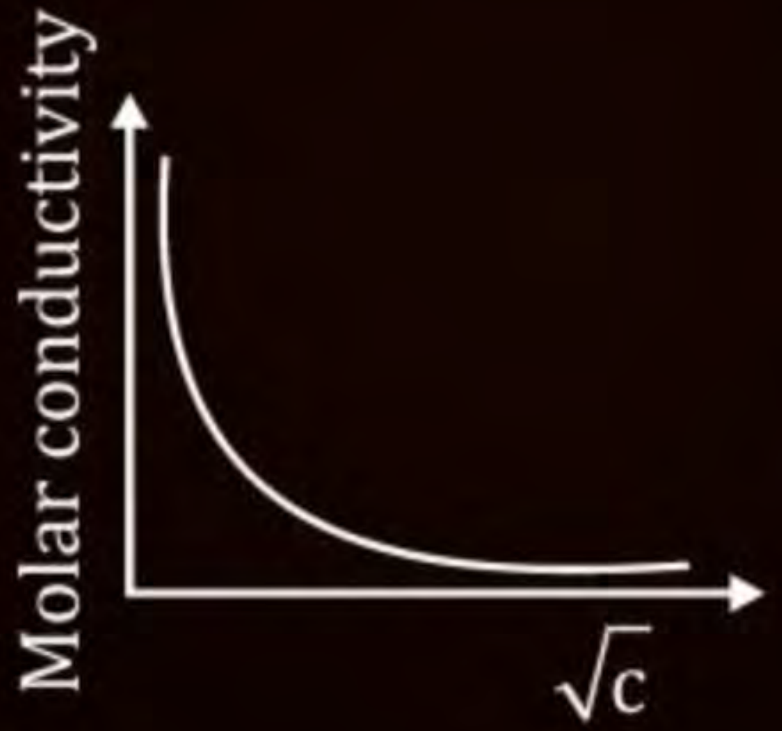
The variation of molar conductivity with concentration of an electrolyte (X) in aqueous solution is shown in the given figure. (JEE MAINS 5th sep 2nd shift 2020)

(A) HCl

(B) NaCl

(C) KNO_3

(D) CH_3COOH



QUESTION

Consider the statement S1 and S2: (JEE MAINS 10th April 1st shift 2019)

S1 : Conductivity always increases with decrease in the concentration of electrolyte.

S2 : Molar conductivity always increases with decrease in the concentration of electrolyte.

The correct option among the following is

(A) Both S1 and S2 are wrong

(B) Both S1 and S2 are correct

(C) S1 is wrong and S2 is correct

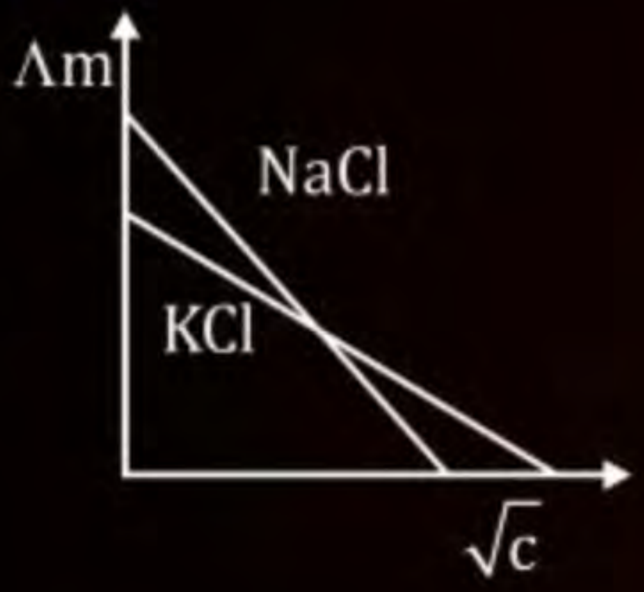
(D) S1 is correct and S2 is wrong

QUESTION

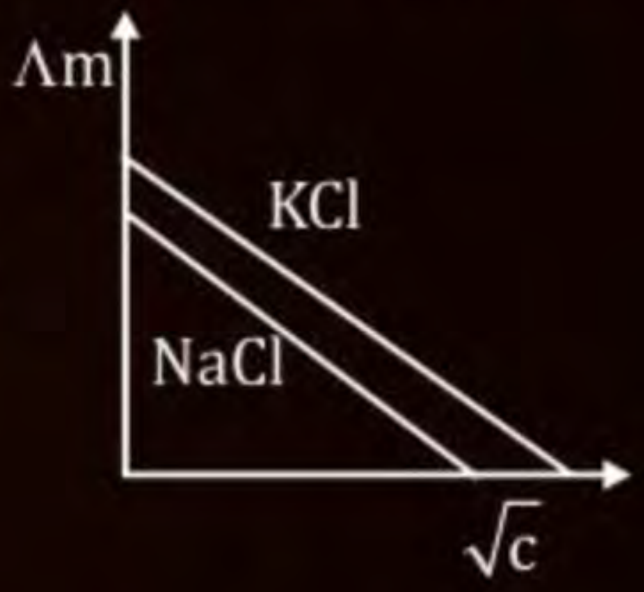
Which one of the following graphs between mole conductivity (Λ_m) varius $\sqrt{C}$ is correct?

(JEE MAINS 10 April 2nd shift 2019)

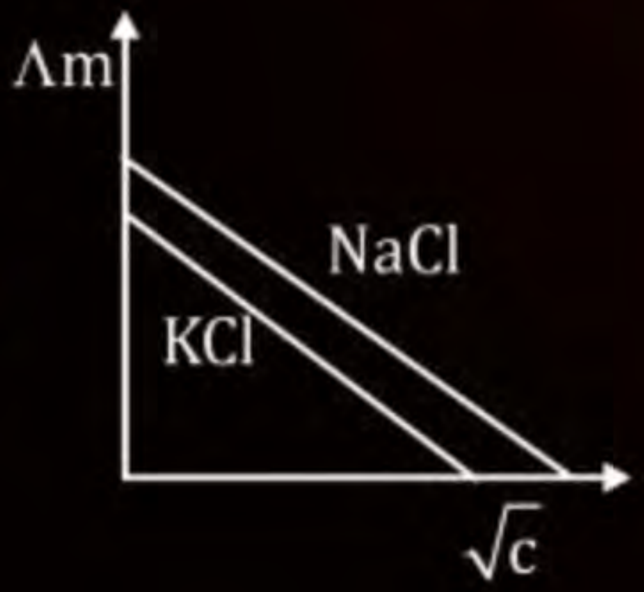
(A)



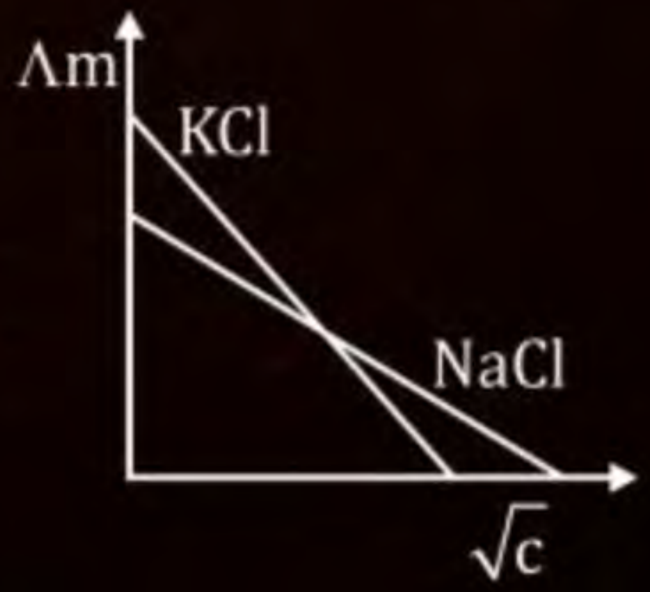
(B)



(C)



(D)



QUESTION

The decreasing order of electrical conductivity of the following aqueous solution is (JEE MAINS 12^{th} April 2^{nd} shift 2019)

0.1 M formic acid (A), 0.1 M acetic acid (B),

0.1 M benzoic acid (C)

A) C > A > B

B) A > C > B

C) A > B > C

D) C > B > A

QUESTION

Λ_m° for NaCl, HCl and NaA are 126.4, 425.9 and 100.5 S cm^2 mol^{-1}, respectively. If the conductivity of 0.001 M HA is 5×10^{-5} S cm^{-1}, degree of dissociation of HA is

(JEE MAINS 12 Jan 2nd shift 2019)

A) 0.75

B) 0.25

C) 0.125

D) 0.50

QUESTION

The specific conductance of 0.0025 M acetic acid is 5×10^{-5} S cm^{-1} at a certain temperature. The dissociation constant of acetic acid is ______ $\times 10^{-7}$.

(Nearest integer)

Consider limiting molar conductivity of CH_3COOH as 400 S cm^2 mol^{-1}.

(JEE MAINS 10th April 2nd Shift 2023)

QUESTION

A metal surface of 100 cm^2 area has to be coated with nickel layer of thickness 0.001 mm. A current of 2 A was passed through a solution of $Ni(NO_3)_2$ for 'x' seconds to coat the desired layer. The value of x is ______ . (Nearest integer) (ρ_{Ni} (density of nickel) is 10 g mL^{-1}, Molar mass of nickel is 60 g mol^{-1}, F = 96500 C mol^{-1})

(JEE MAINS 13th April 1st Shift 2023)

QUESTION

The highest electrical conductivity of the following aqueous solution is of

(JEE MAINS 2005)

A) 0.1 M acetic acid

B) 0.1 M chloroacetic acid

C) 0.1 M fluoroacetic acid

D) 0.1 M difluoroacetic acid

QUESTION

The limiting molar conductivities Λ° for NaCl, KBr and KCl are 126, 152 and 150 S cm^2 mol^{-1} respectively. the Λ° for NaBr is (JEE MAINS 2004)

(A) 128 S cm^2 mol^{-1}

(B) 176 S cm^2 mol^{-1}

(C) 278 S cm^2 mol^{-1}

(D) 302 S cm^2 mol^{-1}

QUESTION

1×10^{-5} M $AgNO_3$ is added to 1 L of saturated solution of AgBr. The conductivity of this solution at 298 K is ____ $\times 10^{-8}$ S m^{-1}.

[Given : K_{sp} (AgBr) = 4.9×10^{-13} at 298 K

(JEE MAINS 1st Feb 2nd shift 2023)

$\lambda^{o}_{Ag^+} = 6 \times 10^{-3} S\, m^2\, mol^{-1}$

$\lambda^{o}_{Br^-} = 8 \times 10^{-3} S\, m^2 mol^{-1}$

$\lambda^{o}_{NO_3^-} = 7 \times 10^{-3} S\, m^2\, mol^{-1}$]

QUESTION

The resistivity of a 0.8 M solution of an electrolyte is $5 \times 10^{-3}\ \Omega$ cm. Its molar conductivity is ______ $\times 10^{-4}\ \Omega^{-1}\ cm^2\ mol^{-1}$. (Nearest integer)

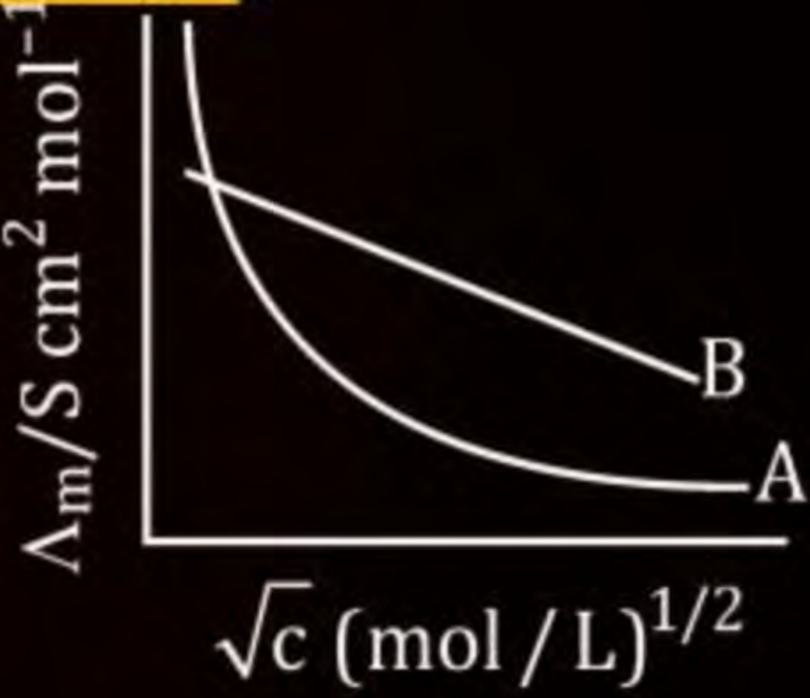
(JEE MAINS 31 Jan 2nd shift 2023)

QUESTION

Following figure shows dependence of molar conductance of two electrolytes on concentration. $\Lambda_m°$ is the limiting molar conductivity.

(JEE MAINS 29 Jan 1^{st} shift-2023)

The number of incorrect statement(s) from the following is _____.



(A) $\Lambda_m°$ for electrolyte A is obtained by extrapolation.

(B) For electrolyte B, Λ_m vs $\sqrt{C}$ graph is a straight line with intercept equal to $\Lambda_m°$.

(C) At infinite dilution, the value of degree of dissociation approaches zero for electrolyte B.

(D) $\Lambda_m°$ for any electrolyte A or B can be calculated using $\lambda°$ for individual ions.

QUESTION

Resistance of a conductivity cell (cell constant 129 m^{-1}) filled with 74.5 ppm solution of KCl is 100 Ω (labelled as solution 1). When the same cell is filled with KCl solution of 149 ppm, the resistance is 50 Ω (labelled as solution 2). The ratio of molar conductivity of solution 1 and solution 2 is i.e., $\frac{\Lambda_1}{\Lambda_2} = x \times 10^{-3}$.

The value of x is ________. (Nearest integer)

(Given, molar mass of KCl is 74.5 g mol^{-1}). (JEE MAINS 29 July 1st shift 2022)

QUESTION

The resistance of a conductivity cell containing 0.01 M KCl solution at 298 K is 1750 Ω. If the conductivity of 0.01 M KCl solution at 298 K is 0.152×10^{-3} S cm^{-1}, then the cell constant of the conductivity cell is ______ $\times 10^{-3}$ cm^{-1}.

(JEE MAINS 24 June 2nd shift-2022)

QUESTION

The limiting molar conductivities of NaI, $NaNO_3$ and $AgNO_3$ are 12.7, 12.0 and 13.3 mS m^2 mol^{-1}, respectively (all at 25°C). The limiting molar cinductivity of AgI at this temperature is ________ mS m^2 mol^{-1}. (JEE MAINS 27 June 1^{st} shift 2022)

QUESTION

If the conductivity of mercury at 0°C is 1.07×10^6 Sm^{-1} and the resistance of a cell containing mercury is 0.243 Ω, then the cell constant of the cell is $x \times 10^4$ m^{-1}. The value of x is ______ . (Nearest ingeter) (JEE MAINS 1st sep. 2nd shift 2021)

QUESTION

The resistance of conductivity cell with cell constant 1.14 cm^{-1}, containing 0.001 M KCl at 298 K is 1500 Ω. The molar conductivity of 0.001 M KCl solution at 298 K in S cm^2 mol^{-1} is ______. (Integer answer) (JEE MAINS 27 Aug. 2^{nd} shift 2021)

How To Improve Concentration ?

Absolute focus discussed in Solution Lecture 2

Mental Repetition discussed in Solution Lecture 2

How To Improve Focus ?

Use ear plugs while studying discussed Solution Lecture 4

How To maintain your mental health ?

Take time out for yourself discussed in Solution Lecture 7

How To Handle Overthinking ?

Appointment Method discussed in Solution Lecture 11

How to handle journey of next 6 Months

It's not about End Result,
It is all about JOURNEY

THANK YOU

#futureIITians