YAKEEN NEET 2.0

2026

Electrochemistry

Physical Chemistry

MPQ Solution - 01

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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. $\frac{\kappa \times 1000}{x-y}$

B. $\frac{\kappa}{x+y} \times 188$

C. $\frac{\kappa \times 1000 \times 188}{x+y}$

D. $\frac{x+y}{\kappa} \times \frac{1000}{188}$

$\kappa_{Sol^n(AgBr)} = \kappa$

$\lambda^{\infty}_{Ag^+} = x \text{ S cm}^2 \text{ mol}^{-1}$

$\lambda^{\infty}_{Br^-} = y$

$\lambda^{\infty}_{M\,AgBr} = (x+y)$

$M = S =$ Solubility in mol/L

$\lambda^{\infty}_{M} = \frac{\kappa \times 1000}{M}$

$(x+y) = \frac{\kappa \times 1000}{M}$

$S = M = \frac{\kappa \times 1000}{(x+y)}$ mol/L

$$S = M = \frac{K \times 1000}{(x+y)} \times 188 \text{ g/L}$$

$Ag_x Br_y$ $\quad A_x B_y$

$x=1 \quad y=1$

$K_{sp} = (xs)^x (ys)^y$

$= (1s)^1 (1s)^1$

$K_{sp} = s^2$

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

$HCOOH$

$N = 0.1N$

$R = 200\ \Omega$

$\frac{l}{a} = 2\ cm^{-1}$

$K = \frac{1}{R} \times \frac{l}{a} = \frac{2}{200} = \frac{1}{100}$

$\Lambda_N = \frac{K \times 1000}{N} = \frac{1 \times 1000 \times 10}{100 \times 1} = 100$

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 $0.2381\ cm^{-1}$

$M = 0.02\ M\ (KCl)$

$\kappa = 2.768 \times 10^{-3}\ \Omega^{-1} cm^{-1}$

$R = 82.4$ ohms

$\frac{l}{a}$

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

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

$= 2.768 \times 10^{-3} \times 82.4$

$= 0.2281\ cm^{-1}$

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

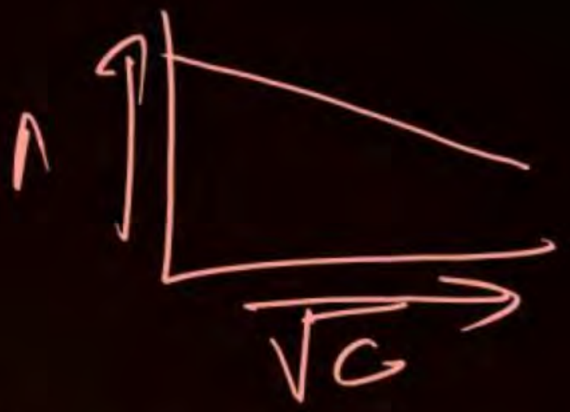
$\lambda^{\infty}_{Ba^{2+}(N)} = 127\ Scm^2eq^{-1}$

$\lambda^{\infty}_{Cl^-(N)} = 76$

$\Lambda^{\infty}_{NBaCl_2} = 127 + 76 = 203\ Scm^2eq^{-1}$

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)

$$\Lambda^{\infty}_{AgCl} = \Lambda^{\infty}_{AgNO_3} + \Lambda^{\infty}_{HCl} - \Lambda^{\infty}_{HNO_3}$$

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

$a = 100 cm^2$

$l = 10 cm$

$G = 10^{-4} S$

Salt mole $= 0.1$

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

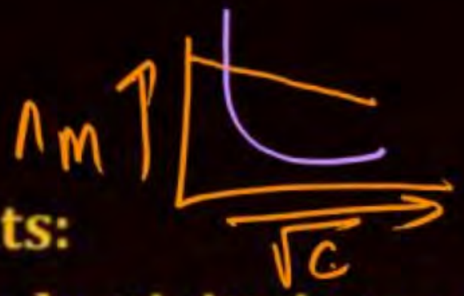
$K = G \times \frac{l}{a}$

$= \frac{10^{-4} \times 10}{100}$

$= 10^{-5}$

$= \frac{10^{-5} \times 1000}{10^{-1}} = \frac{10}{100} = \frac{1}{10}$

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.

H_2CO_3

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

$K^+ Cl^-$ CH_3COO^- H^+

(JEE MAINS 26 Aug. 1st shift 2021)

Given below are two statements:

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:

$M = 15 \times 10^{-4}$ M. pH = 4.

$l = 120$ cm

$a = 1 cm^2$.

$G = 5 \times 10^{-7}$ S

$\Lambda^\circ_M = 2 \times 10^2$ S cm^2 mol^{-1}

$K = G \times \frac{l}{a} = \frac{5 \times 10^{-7} \times 120}{} = 600 \times 10^{-7} = 6 \times 10^{-5}$

$\Lambda^c_m = \frac{K \times 1000}{M}$

$= \frac{6 \times 10^{-5} \times 1000}{15 \times 10^{-4}}$

$= \frac{600}{15} = 40$

$$\alpha = \frac{\Lambda_M^c}{\Lambda_M^\circ}$$

$$\frac{1}{15} = \frac{40}{2 \times 10^2}$$

$$2 \times 10^2 = 600$$

$$2 = \frac{600}{100} = 6$$

$$pH = 4 \Rightarrow [H^+] = 10^{-pH} = 10^{-4}$$

$$[H^+] = c\alpha = 10^{-4}$$

$$15 \times \alpha = 10^{-4}$$

$$\alpha = \frac{1}{15}$$

QUESTION – (JEE Advance 2022)

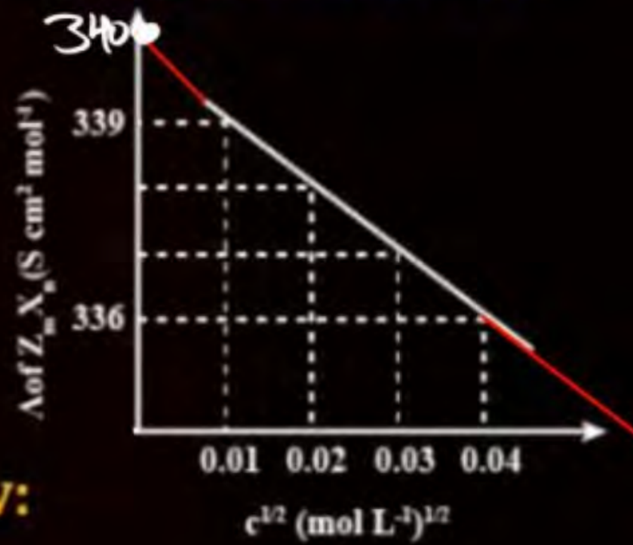
Consider the strong electrolytes Z_mX_n, U_mY_p and V_mX_n. Limiting molar conductivity (Λ°) of U_mY_p and V_mX_n are 250 and 440 S cm^2 mol^{-1}, respectively. The value of $(m + n + p)$ is _____.

Given:

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

λ° is limiting molar conductivity of ions.

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



$$\Lambda^\circ_M Z_mX_n = 340 = m\lambda^\circ_{Z^{n+}} + n\lambda^\circ_{X^{m-}} = 50m + 80n \quad (1)$$

$$\Lambda^\circ_M U_mY_p = 250 = m\lambda^\circ_{U^{p+}} + p\lambda^\circ_{Y^{m-}} = 25m + 100p \quad (2)$$

$$\Lambda^\circ_M V_mX_n = 440 = m\lambda^\circ_{V^{n+}} + n\lambda^\circ_{X^{m-}} = 100m + 80n \quad (3)$$

Subtract eq. ① from eq ③

$$50m + 80n = 340$$
$$\pm 100m \pm 80n = \pm 440$$

$$\pm 50m = \pm 100$$
$$m = 2$$

$$50 \times 2 + 80n = 340$$
$$80n = 240$$
$$n = 3$$

$$25 \times 2 + 100p = 250$$
$$100p = 200$$
$$p = 2$$

$$m + n + p = 2 + 3 + 2 = 7$$

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.

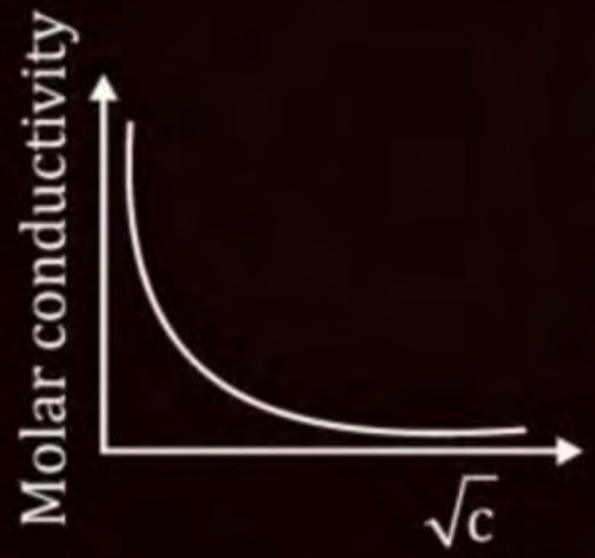
B $C_{BaSO_4}(T_2) > C_{BaSO_4}(T_1)$ for $T_2 > T_1$

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

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 → weak acid

THANK YOU